COORDINATED HIGHWAYS ACTION RESPONSE TEAM
STATE HIGHWAY ADMINISTRATION

CHART ATMS Release 14
Detailed Design

Contract SHA-06-CHART
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Revision	Description	Pages Affected	Date
0	Initial Release	All	10/28/2014
1	Updated screens for the Call Out Lists and Notification Groups list pages. Updates to HMI section for on/off devices. Added hardware failure filter, edited rights required for poll now to match updated requirements, updated text regarding arbitration queue to make it more clear item is added to queue when response plan item is executed, and removed when response plan item is revoked, and added write ups for screens related to view, add, edit, remove on/off device types.	4-76, 4-77, 4-78 Table of Contents, Table of Figures, 4-10, 4-26, 4-27, 4-28, 4-29, 4-60, 4-61, 4-62, 4-63	11/21/2014 12/05/2014
2	Changes for user management related PRs.	Table of Contents, Table of Figures, 1-3, 1-4, 2-1, 2-59, 2-64, 4-90, 4-91 through 4-103, 6-1 through 6-5, 7-48, 7-49	1/26/2015

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1 Introduction

1.1 Purpose

This document describes the design of the software for CHART ATMS Release 14. The design for the corresponding R14 CHART Mapping update includes only an update to the Mapping ICD, which is not within the scope of this document. The CHART ATMS R14 release provides the following new features:

- **Standard Operating Procedures (SOPs):** CHART ATMS R14 provides users with a new page to view and configure links to Standard Operating Procedure documents. Users with the Manage SOPs right may add or configure a document name, an introductory header, description, and select which operations centers the SOP definition applies to. Users may also select from a specific list of the trigger actions within CHART ATMS for each SOP document definition. Upon execution of a specific trigger action and a matching operations center, the system displays a small popup with the name and header of the SOP, and a link to view the SOP document in a separate window. The popup message requires the user to acknowledge the message by clicking on a close button or pressing the Esc key, though the acknowledgement is not recorded or tracked by the system. Users with the View Major SOP right who execute associated trigger actions see SOP popups only for SOPs marked for major distribution. Users with the View All SOP Popups right see all SOP popups associated with their trigger actions, regardless of the defined distribution level of the associated SOP documents. All matching document definitions regardless of the distribution level set are displayed to users with the View All SOP Popups right when executing a trigger action.

  A new section labeled SOP Guidance has been added to CHART ARMS in R14 to list SOP definitions that are related to the current state of the event. The SOP Guidance section is added to the bottom of the Event Details page, and is viewable to users with the view/manage event right(s). The guidance section displays the SOP name, header, and document link for any mached trigger conditions and operations center. SOP definitions displayed within the section are displayed as long as the trigger conditions remain true within the event.
- **Fog Warning Devices:** CHART ATMS R14 provides support for Fog Warning Devices and other devices that can simply be turned on or off (activated or deactivated). Due to the capability of the design to support devices other than Fog Warning Devices, these devices are referred to generically as “On/Off Devices”, and that term will be used throughout the document from this point forward. The system allows any number of sub-types to be defined for On/Off Devices to allow the user to distinguish one type from another. The system is pre-configured to include “Fog Beacon” and “Fog Horn” as types of On/Off devices, and supports the addition of other types by an administrator.

  Support for On/Off Devices within CHART ATMS is very similar to the support that currently exists for DMS devices, with the exception that on/off devices do not display a message; they can simply be turned on or off. This support includes the ability to view,

sort, and filter the list of on/off devices that exist in the system (or within the user's area of responsibility and/or folders), add and configure on/off devices, use an on/off device in the response plan of a traffic event, include on/off devices in plans, display the location of on/off devices within a layer on CHART ATMS maps, and more. See the Human Machine Interface section 4.2 for a complete list of features related to on/off devices.

- **Traffic Event Queue Calculation:** CHART ATMS R14 includes updates to maintain more detailed queue length information and also to use existing INRIX link data in CHART to provide system calculated queue length values on an automatic (ongoing) or user-initiated basis. Operators will also be able to specify queue length information manually. The maximum queue length value available for traffic events will be replaced with three sets of queue information including a length, direction and optional warning indicator. The first two sets of queue information will represent the current directional queues for the event (primary/opposite for directional events, South/North, East/West, and Inner/Outer Loop for bi-directional events). The third set of queue information will store the maximum queue length over the lifetime of the event. The system will allow queue calculation for open traffic events with a primary route, a lat/lon and a direction other than NONE. See the Human Machine Interface section 4.3 for a complete list of features related to traffic event queue calculation.
- **Contact Management (SHADE):** CHART ATMS R14 includes contact management functionality to replace the SHADE system. The existing CHART ATMS notification contacts list is renamed to just be a contacts list and is used for all contacts, whether or not they are candidates to receive notifications from CHART ATMS. The contact list is now viewable by non-administrative users. A new attribute indicates whether or not a contact is eligible for receiving notifications from CHART ATMS, and current screens that allow individuals to be added to notification groups or to send notifications to individuals are changed to filter out contacts that are not eligible to receive notifications. Useful fields from SHADE are added to the existing CHART ATMS contacts. Phone numbers are specifiable as an ordered list of phone number / phone number type, in the order the person wishes for them to be called. A contact can be marked as "do not contact" during scheduled times, as an indicator to operators to avoid calling a contact during sick days or vacations. A contact can be associated with one or more operations centers and additional areas of responsibility (AOR). The contact list is filtered to show contacts applicable to the user's operations center by default, but allows the user to view the full list of contacts. New filters are added to the contact list to view contacts for a specific district or office, in addition to the existing agency filter. The contact list search feature is expanded to include additional fields. The contact list can be exported in PDF or CSV format or viewed in a more streamlined HTML format for printing, using the current sorting / filtering criteria.

  R14 adds the management of "call lists". A "call list" is a list of contacts for an operator to call (in priority order) to quickly find a responsible contact. A call list can be created for (i.e., associated with) an event resource or resource type, allowing an operator to select the person contacted for that resource / type when it is used in a traffic event. Not all event resources and types have call lists (most probably will not), so the list of all call lists is viewable independently from the list of event resources and types, and it can be viewed by non-administrative users. When a call list is displayed to allow the user to

select a contact for an event resource/type participation, it is initially filtered to show only contacts that are responsible for the traffic event's location (if it has one), based on areas of responsibility (AORs) determined from the contact's operations centers and/or additional AORs. The user can remove the initial location-based filter to view all contacts in the call list. Once a contact is selected from a call list, information for that contact is displayed in the traffic event participation record in case the contact needs to be reached again subsequently. A specific phone number can be recorded as the one last used successfully, to make it easier to reach the person in subsequent attempts. Once the contact is associated, another of the contact's phone numbers can be changed, or the contact can be removed or changed.

A contact can also be added as a standalone participant in a traffic event (i.e., without specifying an event resource or event resource type and bringing up a call list). A search feature allows contacts to be found easily for adding them to a traffic event. Standalone contact partipation records support the same status flags as resource / type participation records. The user can specify which of the contact's phone numbers was used to reach the standalone contact.

Contacts are loosely associated with CHART ATMS user accounts. Contacts are not required to have a CHART ATMS user account (the majority will probably not), and user accounts are not required to have an associated Contact (although most or all are expected to be assigned one, when the system is fully populated and reaches a steady state). To assist with this association, the Add Contact form is displayed after adding a new ATMS user account, and the Add User form is displayed after adding a new contact (if a username is specified and the user has sufficient rights). New links allow the contact information to be viewed for a user, and the ATMS username is displayed for the contact. If a contact has a username that is not known, a warning indicator is displayed in the contact list. In the user list, a new column indicates which users have associated contacts.

Existing contact data from the SHADE database will be migrated into CHART ATMS if possible, merging with the existing notification contacts as defined in the R13 ATMS database.

- **User Management Enhancements**

  Changes for several enhancements related to user management are included in CHART ATMS R14. A feature has been added to allow a person to issue a request to have an administrator create a user account to allow them to log into CHART ATMS. Another feature allows a user to issue a request to have their account re-enabled. Both of these features operate by sending an e-mail to a notification group configured in the system profile to receive these types of requests. A third feature allows a user to request to reset their password. The system allows password resets to be done automatically without intervention from an administrator if the user has remembered their user name and entered the same e-mail address that is associated with their user account. Otherwise, this feature reverts to send an e-mail to a notification group configured to receive password reset requests to allow an administrator to contact the user if necessary and reset the password for the user.

1.2 Objectives

The main objective of this detailed design document is to provide software developers with a framework in which to implement the requirements identified in the CHART ATMS R14 Requirements document. A matrix mapping requirements to the design is presented in Section 7 (Mapping to Requirements).

1.3 Scope

This design is limited to Release 14 of the CHART ATMS. It addresses both the design of the server components of CHART ATMS and the Graphical User Interface (GUI) components of CHART ATMS to support the new features being added. This design does not include designs for components implemented in earlier releases of the CHART ATMS.

1.4 Design Process

The design was created by capturing the requirements of the system in UML Use Case diagrams. Class diagrams were generated showing the high level objects that address the Use Cases. Sequence diagrams were generated to show how each piece of major functionality will be achieved. This process was iterative in nature – the creation of sequence diagrams sometimes caused re-engineering of the class diagrams, and vice versa.

1.5 Design Tools

The work products contained within this design were extracted from the Enterprise Architect design tool. Within this tool, the design is contained in the project named "chartdesign" in the folder named "CHART-ATMS-R14".

1.6 Work Products

The final CHART ATMS Release 14 design consists of the following work products:

- Human-Machine Interface section which provides descriptions of the screens that are changing or being added in order to allow the user to perform the described uses.
- Use Case diagrams that capture the requirements of the system
- UML Class diagrams, showing the software objects which allow the system to accommodate the uses of the system described in the Use Case diagrams
- UML Sequence diagrams showing how the classes interact to accomplish major functions of the system
- Requirement Verification Traceability Matrix that shows how this design meets the documented requirements for this feature

2 Architecture

The sections below discuss specific elements of the architecture and software components that are created, changed, or used in CHART ATMS Release 14.

2.1 Network/Hardware

CHART ATMS Release 14 features do not impact the network or hardware architecture of the CHART system.

2.2 Software

CHART ATMS uses the Common Object Request Broker Architecture (CORBA) as the base architecture, with custom built software objects made available on the network allowing their data to be accessed via well defined CORBA interfaces. Communications to remote devices use the Field Management Server (FMS) architecture. Newer external interfaces such as the User Management web service, Data Exporter, and GIS service employ a web services architecture combining an HTTP request/response structure to pass XML messages.

Except where noted in the subsections below, CHART ATMS Release 14 features do not impact the software architecture of the CHART ATMS.

2.2.1 COTS Products

2.2.1.1 CHART ATMS

CHART ATMS uses numerous COTS products for both run-time and development. The Apache PDFBox and Commons Lang3 libraries are added for R14. Table 2-1 contains existing and new COTS products.

Table 2-1. ATMS COTS Products

Product Name	Description
Adobe Flex SDK	CHART uses the Flex SDK 4.6 to provide the Flex compiler, the standard Flex libraries, and examples for building Flex applications used by the CHART ATMS GUI.
Apache ActiveMQ	CHART uses this to connect to RITIS JMS queues.
Apache Commons Lang3	CHART uses commons-lang3-3.3.2 for various string utility methods provided by this library. For example, the RandomStringUtils class is used to generate random passwords for password reset requests.
Apache Jakarta Ant	CHART uses Apache Jakarta Ant 1.6.5 to build CHART applications and deployment jars.
Apache PDFBox	CHART uses this library for generating PDF documents from ATMS web pages (e.g., the list of contacts)
Apache Tomcat	CHART uses Apache Tomcat 7.0.47 as the GUI web server.
Apache XML-RPC	CHART uses the apache xmlrpc java library 3.1.2 protocol that uses XML over HTTP to implement remote procedure calls. The video Flash streaming "red button" ("kill switch") API uses XML over HTTP remote procedure calls.
Bison/Flex	CHART uses Bison and Flex as part of the process of compiling binary macro files used for performing camera menu operations on Vicon Surveyor VFT cameras.
bsn.autosuggest	The event resource search feature and the EORS integration feature use version

Product Name	Description
	2.1.3 of the bsn.autosuggest JavaScript code from brandspankingnew.net. This tool is freely available and is included as source code in the CHART GUI. It provides a simple JavaScript tool that can be associated with a text entry field. It uses AJAX to provide search results / suggestions as the user types.
CoreTec Decoder Control	CHART uses a CoreTec supplied decoder control API for commanding CoreTec decoders.
Dialogic API	CHART uses the Dialogic API for sending and receiving Dual Tone Multi Frequency (DTMF) tones for HAR communications.
GIF89 Encoder	Utility classes that can create .gif files with optional animation. This utility is used for the creation of DMS True Display windows.
JAXB	CHART uses the jaxb java library to automate the tedious task of hand-coding field-by-field XML translation and validation for exported data.
JDOM	CHART uses JDOM b7 (beta-7) dated 2001-07-07. JDOM provides a way to represent an XML document for easy and efficient reading, manipulation, and writing.
JacORB	CHART uses a compiled, patched version of JacORB 2.3.1. The JacORB source code, including the patched code, is kept in the CHART source repository.
JavaMail API	The CHART Notification Service uses the JavaMail API 1.4.4, an optional Java package which provides SMTP e-mail support.
Java Run-Time (JRE)	CHART uses 1.7.0_45.
JavaService	CHART uses JavaService to install the server side Java software components as Windows services.
JAXEN	CHART uses JAXEN 1.0-beta-8 dated 2002-01-09. The Jaxen project is a Java XPath Engine. Jaxen is a universal object model walker, capable of evaluating XPath expressions across multiple models.
JoeSNMP	CHART uses JoeSNMP version 0.2.6 dated 2001-11-11. JoeSNMP is a Java based implementation of the SNMP protocol. CHART uses for commanding iMPath MPEG-2 decoders and for communications with NTCIP DMSs.
JSON-simple	CHART uses the JSON-simple java library to encode/decode strings that use JSON (JavaScript Object Notation).
JTS	CHART uses the Java Topology Suite (JTS) version 1.8.0 for geographical utility classes.
JWPlayer	CHART ATMS GUI uses JWPlayer version 6.8.4616 to display streaming video.
Log4J	CHART uses the log4J version 1.2.15 for logging purposes.
Microsoft Visual Studio	CHART uses Visual Studio 2012 to build native JNI DLLs and executables.
NSIS	CHART uses the Nullsoft Scriptable Installation System (NSIS), version 2.45, as the server side installation package.
NeoSpeech Text To Speech	For text-to-speech (TTS) conversion CHART uses NeoSpeech TTS version 3.10.7.
OpenLayers	CHART ATMS GUI uses the OpenLayers JavaScript API 2.13.1 (http://openlayers.org/) in order to render interactive maps without relying on vendor specific software. OpenLayers is an open source product released under a BSD style license which can be found at (http://svn.openlayers.org/trunk/openlayers/license.txt).
O'Reilly Servlet	Provides classes that allow the CHART GUI to handle file uploads via multi-part form submission.
Prototype Javascript Library	The CHART ATMS GUI uses the Prototype JavaScript library, version 1.7.1, a cross-browser compatible JavaScript library provides many features (including easy Ajax support).
SAXPath	CHART uses SAXPath 1.0-beta-6 dated 2001-09-27. SAXPath is an event-based API for XPath parsers, that is, for parsers which parse XPath expressions.
MSSQL Server	CHART uses MS SQLServer (2008 R2) as its database and uses the MS SQL

Product Name	Description
	Server JDBC libraries (sqljdbc4.jar) for all database transactions.
SQLServer JDBC Driver	CHART uses this driver to lookup GIS related data and also to store Location Aliases in SQL Server databases.
Velocity Template Engine	Provides classes that CHART GUI uses in order to create dynamic web pages using velocity templates, CHART uses Velocity version 1.6.1 and tools version 1.4.
Vicon V1500 API	CHART uses a Vicon supplied API for commanding the ViconV1500 CPU to switch video on the Vicon V1500 switch.

2.2.2 Deployment /Interface Compatibility

2.2.2.1 CHART ATMS

2.2.2.1.1 External Interfaces

This section describes the external interfaces being added in Release 14 of CHART ATMS. See Figure 2-1.

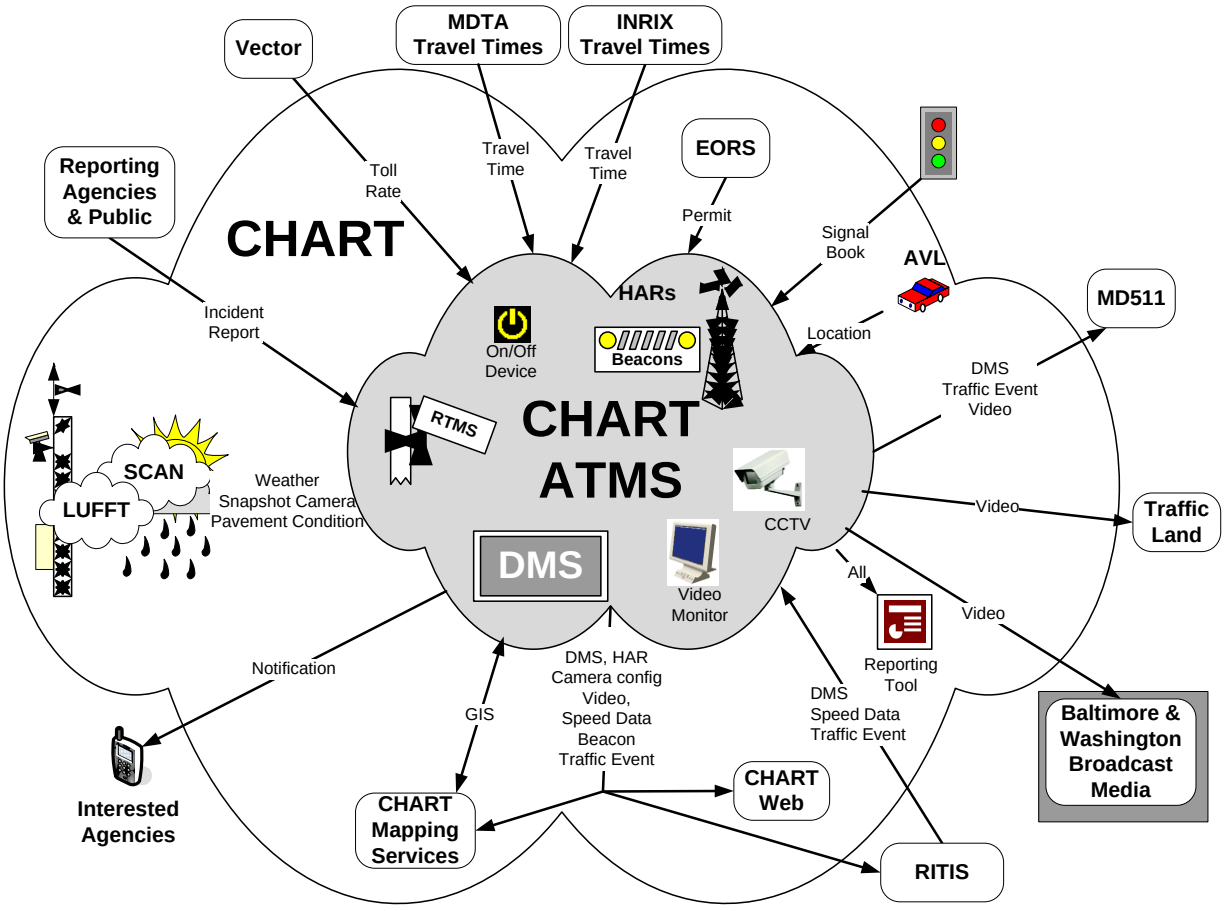


Figure 2-1. CHART and External Interfaces

The Traffic Event Export will be modified for R14 to export the expanded traffic event queue information. Details documented in Traffic Event Export ICD.

Server and GUI deployment diagrams are shown in Figure 2-2 and Figure 2-3.

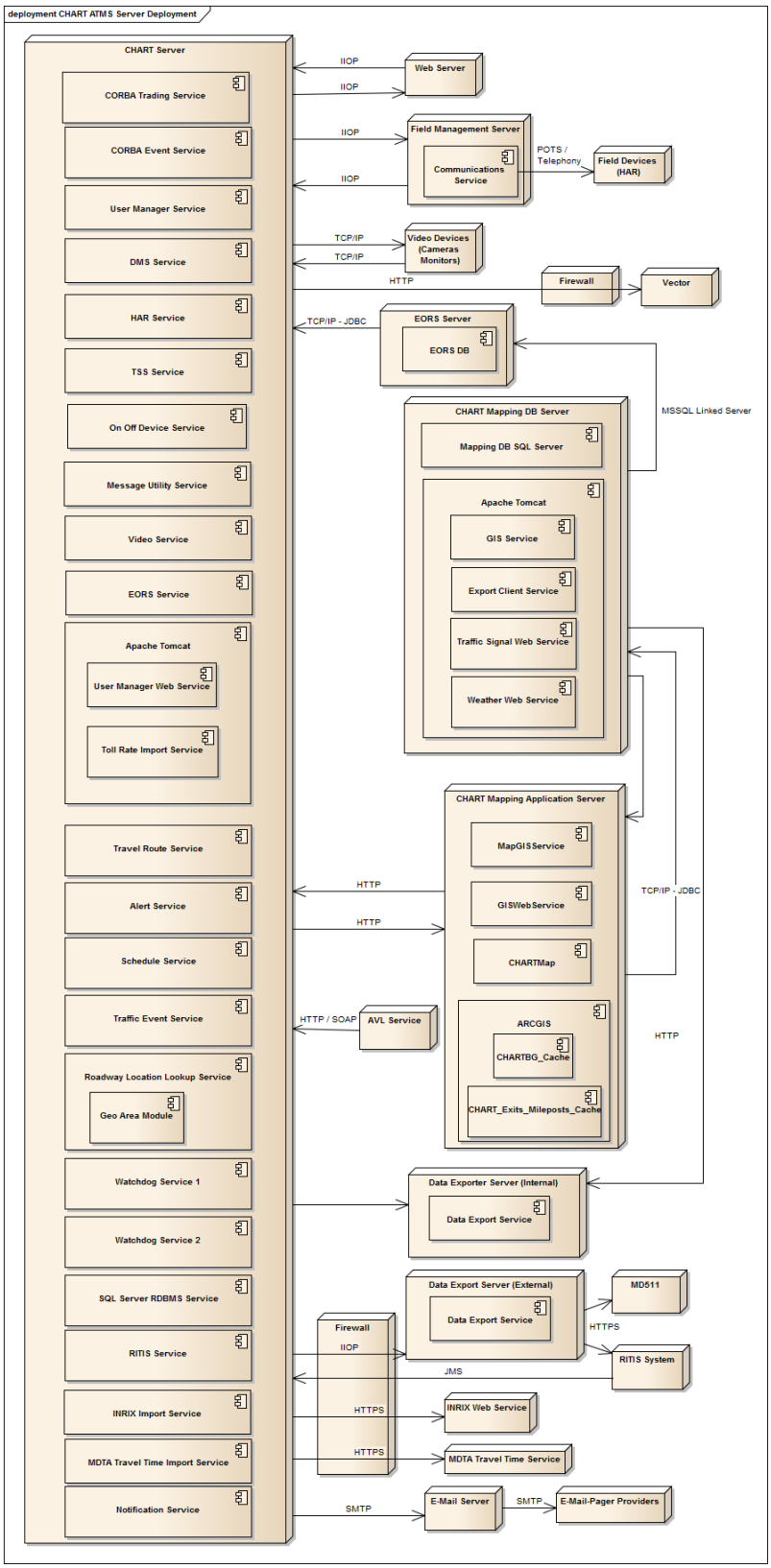


Figure 2-2. R14 Server Deployment

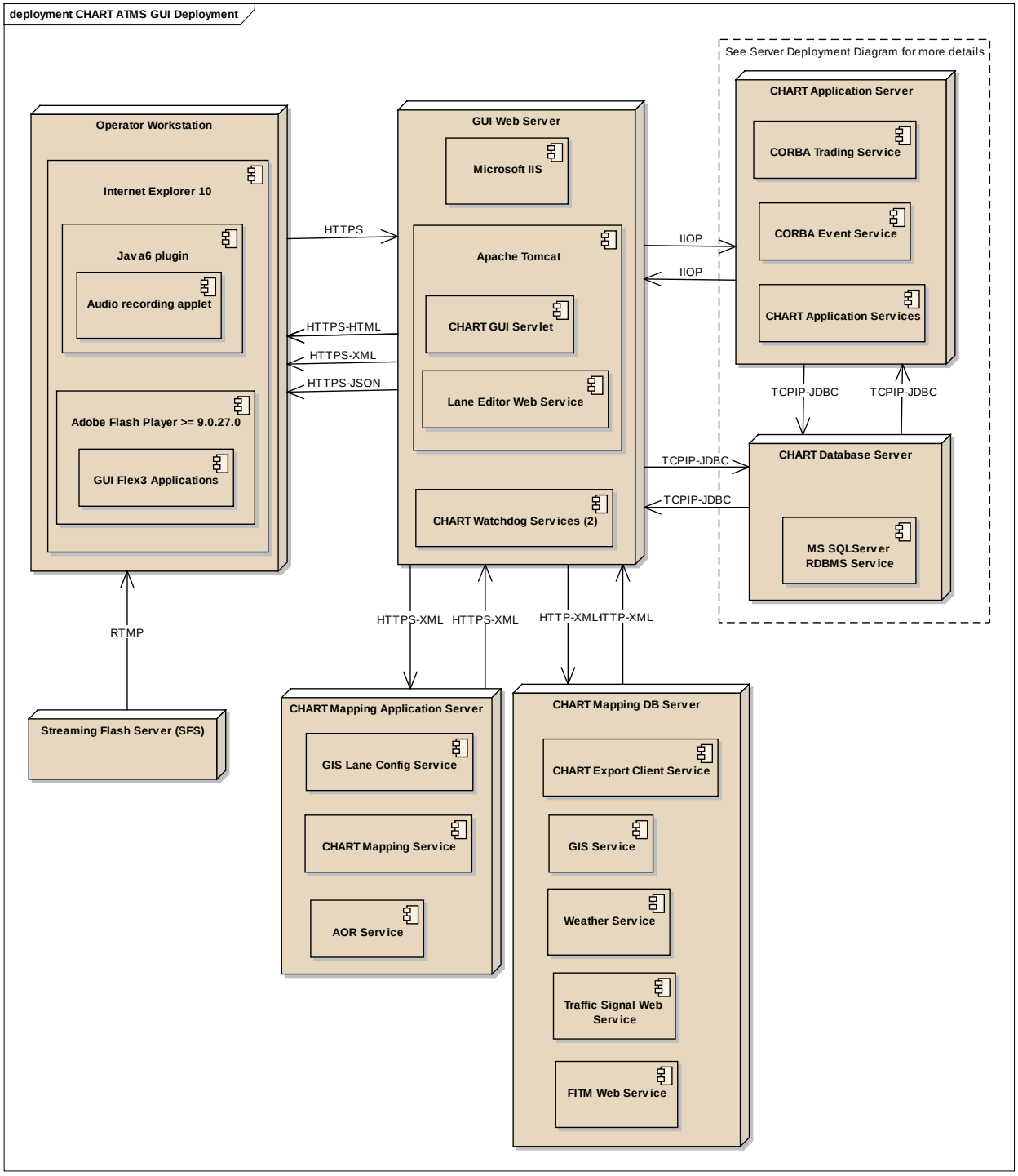


Figure 2-3. R14 GUI Deployment

2.2.2.1.2 Internal Interfaces

This section describes the internal interfaces being added or modified in Release 14 of the CHART system.

1. The R14 SOP feature requires addition of several new CORBA interfaces and structs to support the SOP document definitions and event triggers.
2. The R14 Traffic Event Queue Calculation feature requires the addition of several new CORBA interfaces and structs in the TravelRouteManagement.idl as well as serveral modifications to CORBA interfaces and structs in the TrafficEventManagement.idl.
3. The R14 Fog Warning feature requires the addition of serveral new CORBA interfaces and structs as well as a new Event Channel and Events defined in the new OnOffDeviceControl.idl.
4. The Contact Management feature adds definitions to the Common IDL module. The NotificationManagement IDL is heavily changed to split out all contact-related functionality into the new ContactManagement IDL module, which also supports call lists. The TrafficEventManagement IDL is changed to support a new hierarchy for participation data, and the TrafficEvent interface is changed to support the use of contacts in participations.

2.3 Security

This section describes the security being added or modified in Release 14 of CHART ATMS. Unless noted, features being added for CHART ATMS Release 14 do not change security aspects of the CHART ATMS.

2.4 Data

CHART ATMS Release 14 is tested and delivered with the fielded MS SQL Server version.

2.4.1 Data Storage

The CHART ATMS stores most of its data in a non-spatial MS SQL Server database. Additionally the Integrated Map feature adds the ability to store location aliases to the spatial SQL Server database. Some data is stored in flat files on the CHART servers.

This section describes all of these types of data.

2.4.1.1 Database

2.4.1.1.1 Database Architecture

Except as noted, CHART ATMS Release 14 features do not impact the overall architecture of the CHART ATMS database.

2.4.1.1.2 Logical Design

2.4.1.1.2.1 CHART Entity Relationship Diagram (ERD)

CHART ATMS Database entity relationship diagram for R14 is shown below in the fifteen figures that follow, Figure 2-4 through Figure 2-18. These figures should be mentally arranged into a grid five images wide and three images tall, if desired to follow the connector lines which go off the pages. Pages 2-1 through 5-1 are to the right of Page 1-1, and Pages 1-2 and 1-3 are below Page 1-1. For instance, the connector lines which come out the bottom of Page 2-1 (Figure

2-5) come into the top of Page 2-2 (Figure 2-10). The Table Definition Report sections that follow describe the changes that are made for R14.

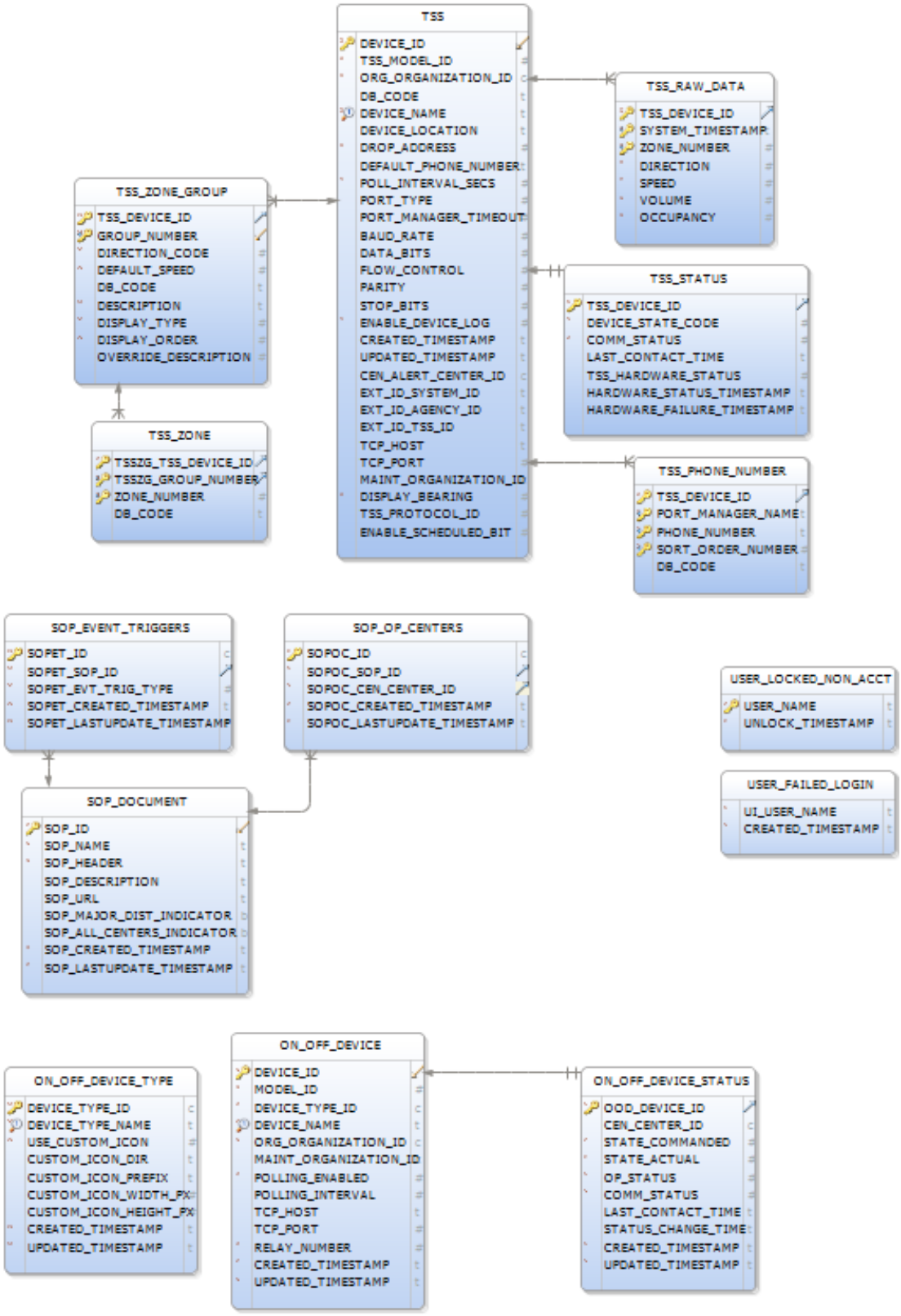


Figure 2-4. CHART_Live ERD, Page 1-1

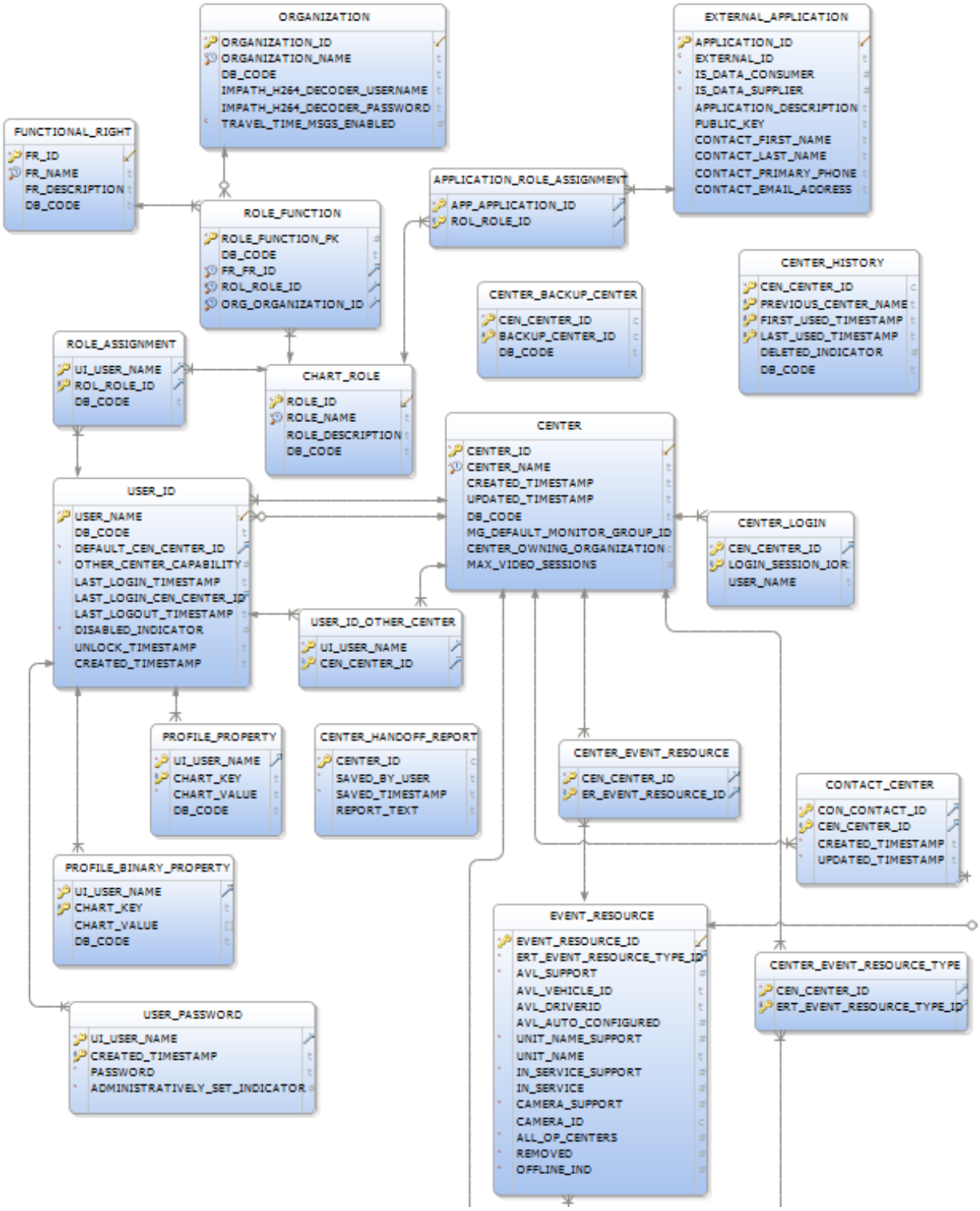


Figure 2-5. CHART_Live ERD, Page 2-1

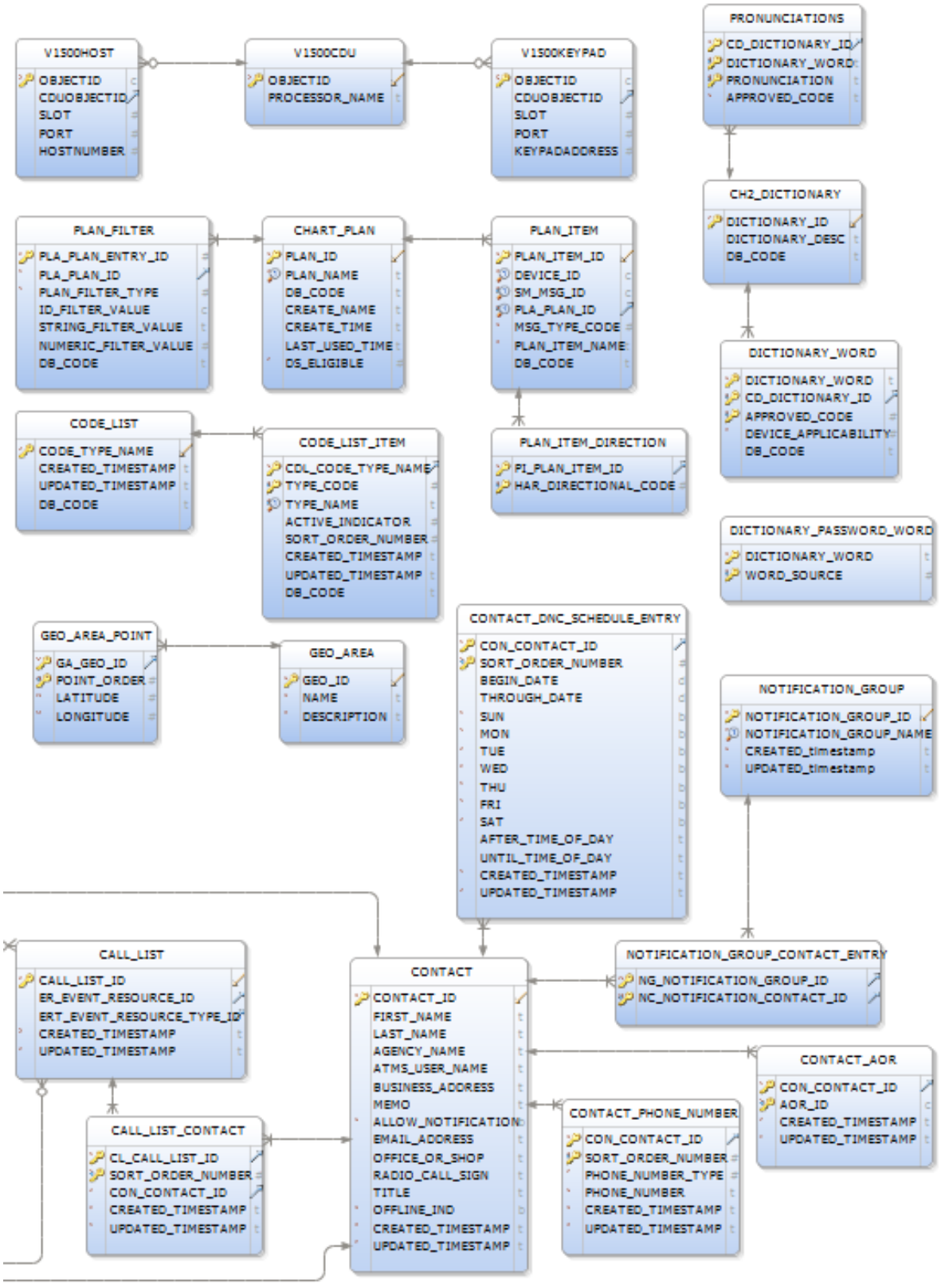


Figure 2-6. CHART_Live ERD, Page 3-1

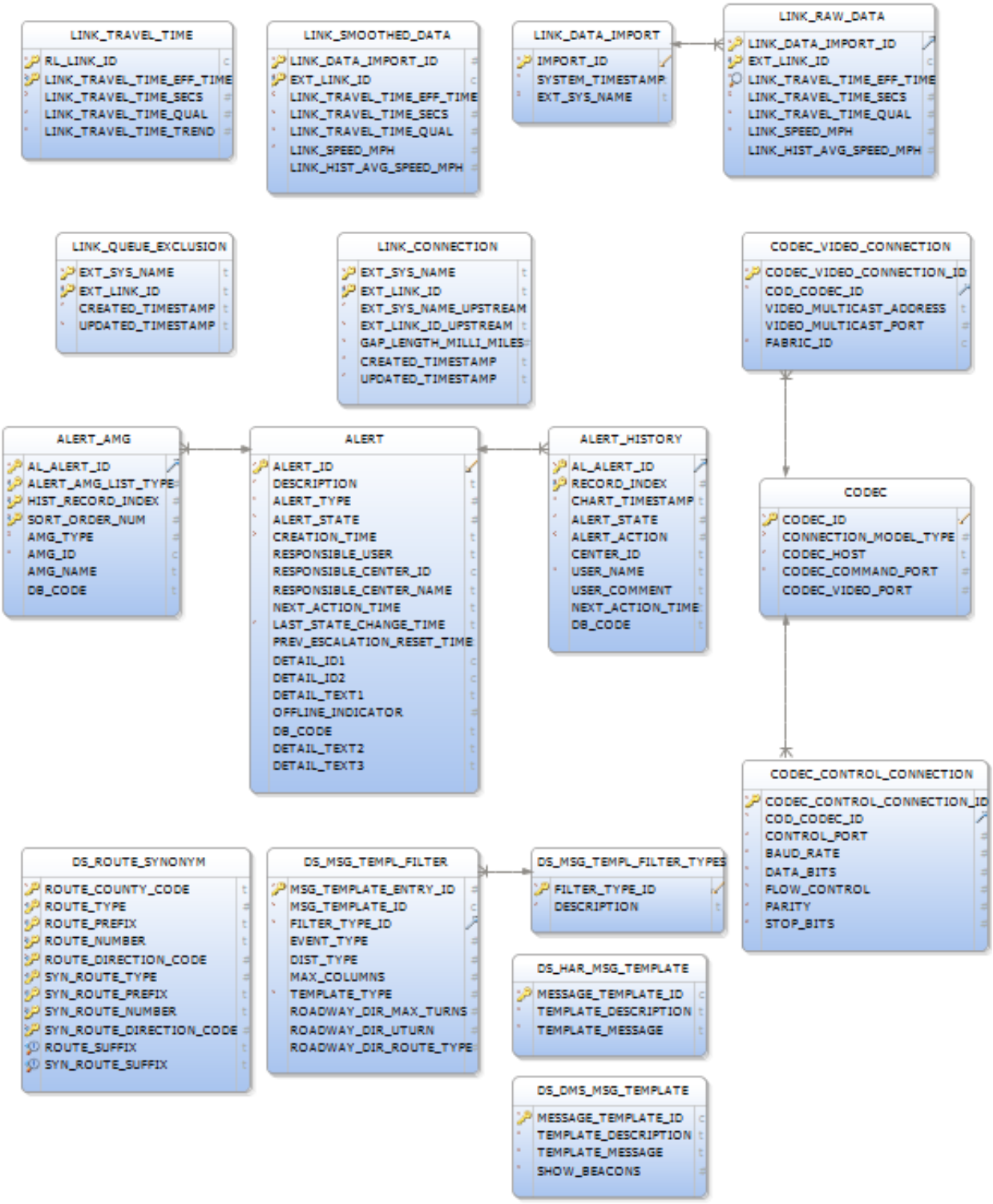


Figure 2-7. CHART_Live ERD, Page 4-1

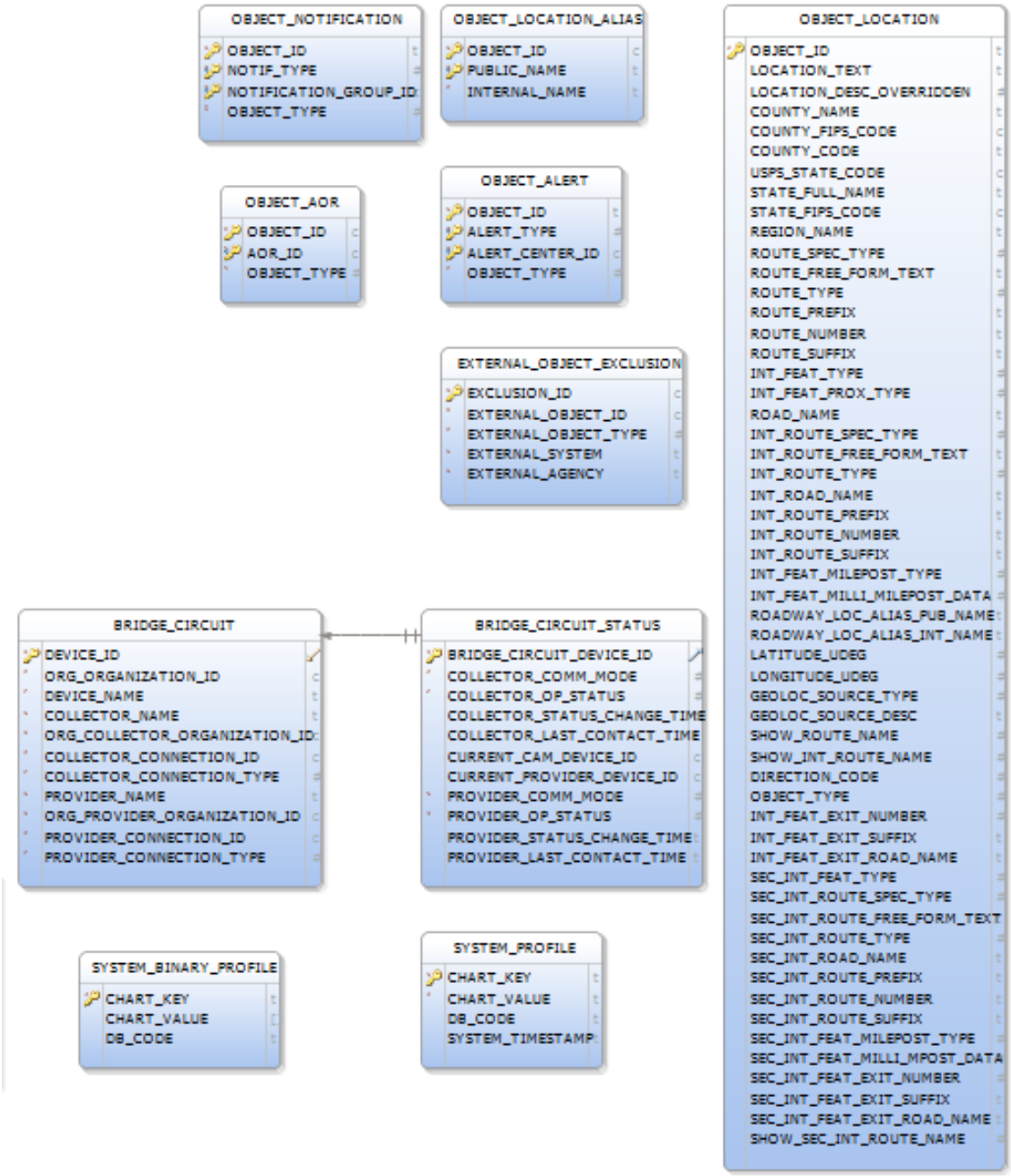


Figure 2-8. CHART_Live ERD, Page 5-1

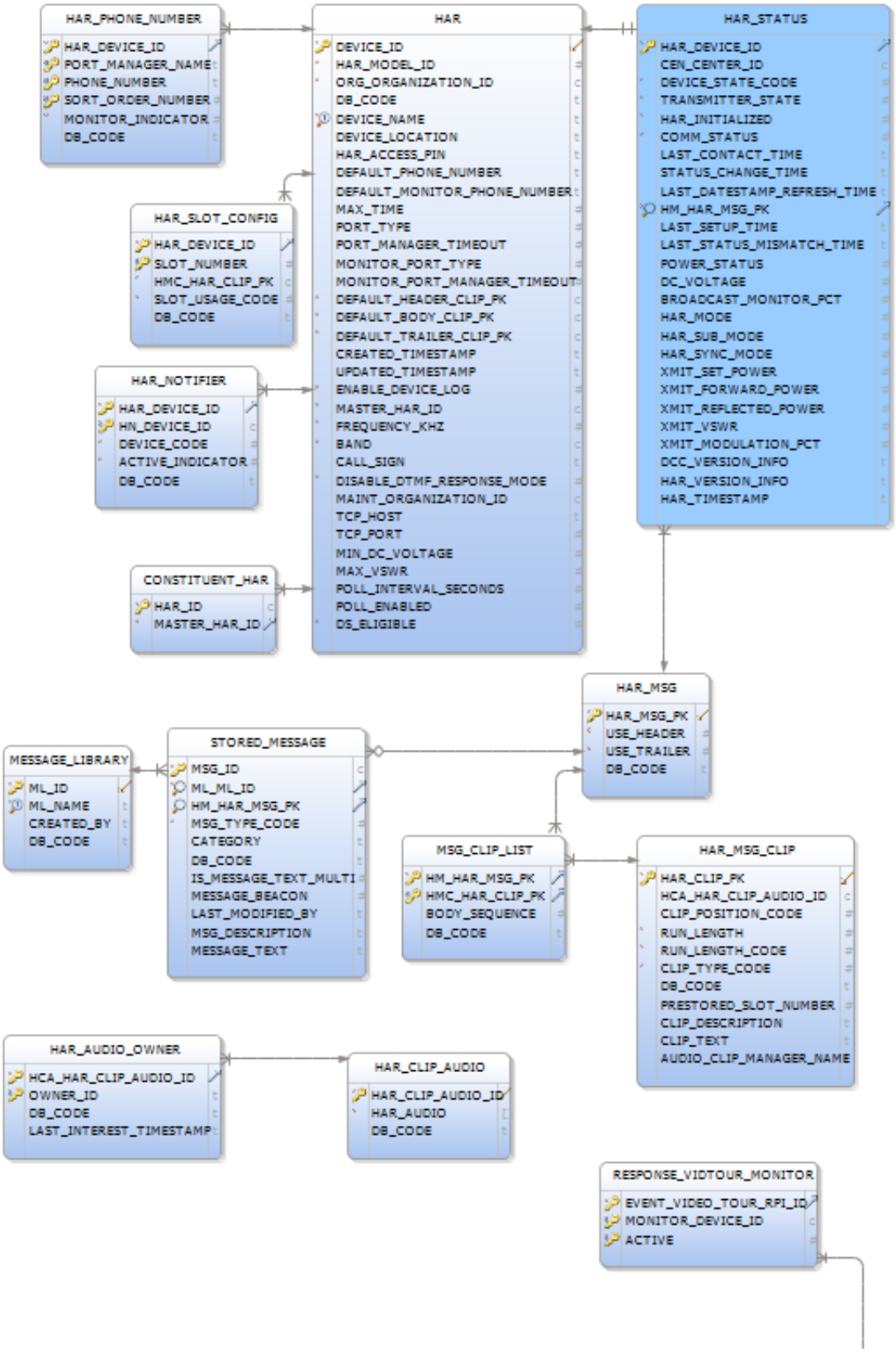


Figure 2-9. CHART_Live ERD, Page 1-2

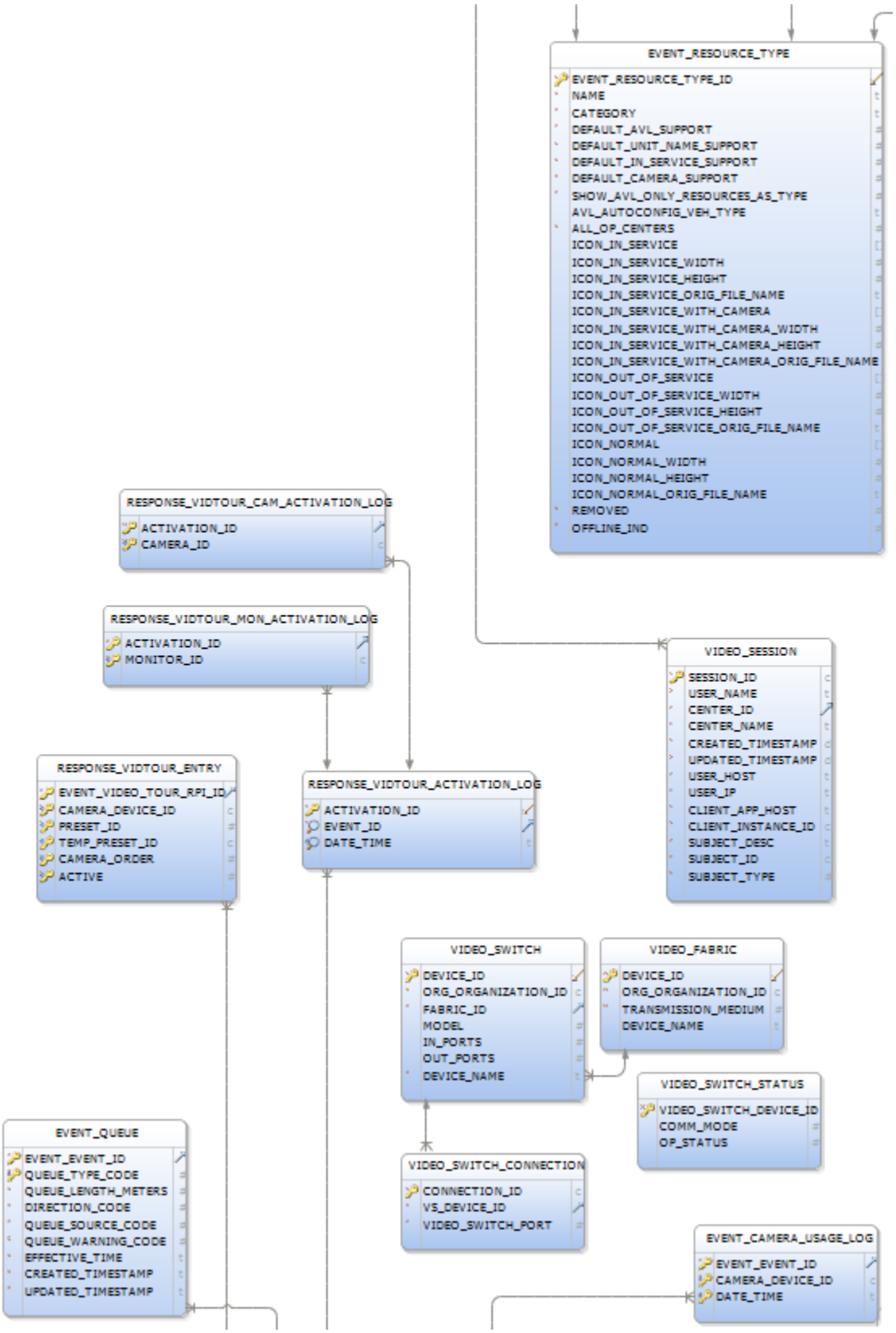


Figure 2-10. CHART_Live ERD, Page 2-2

Figure 2-11. CHART_Live ERD, Page 3-2

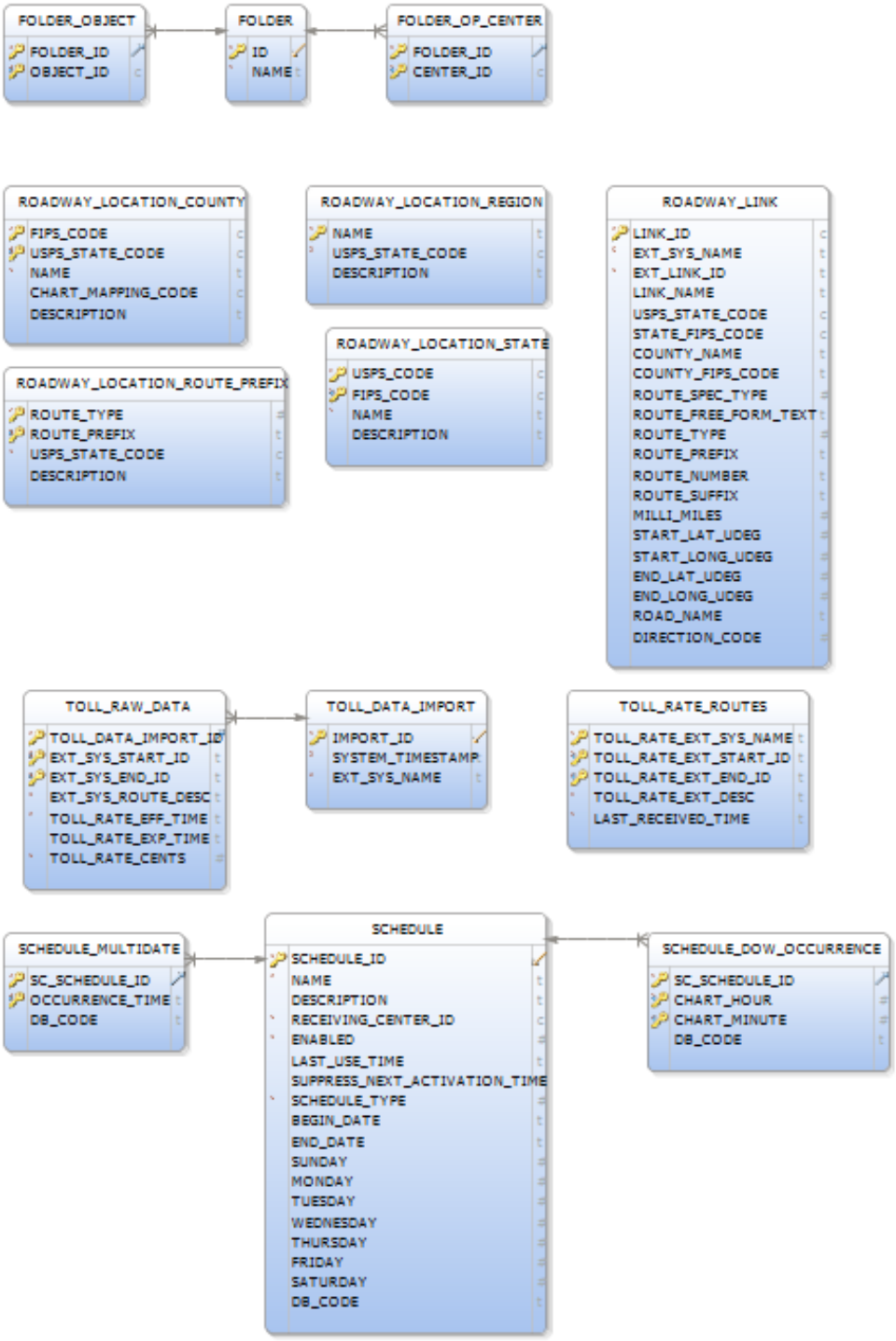


Figure 2-12. CHART_Live ERD, Page 4-2

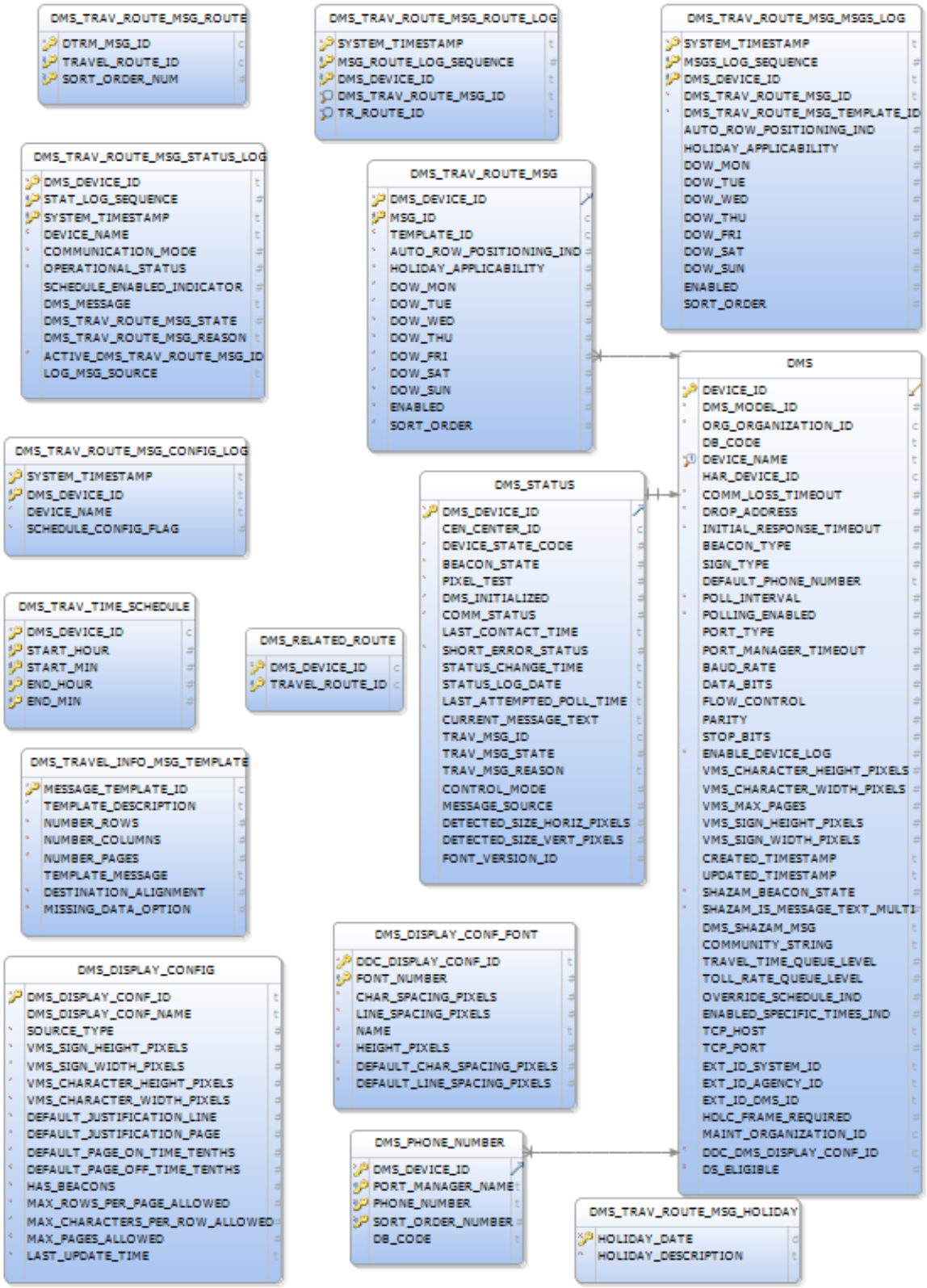


Figure 2-13. CHART_Live ERD, Page 5-2

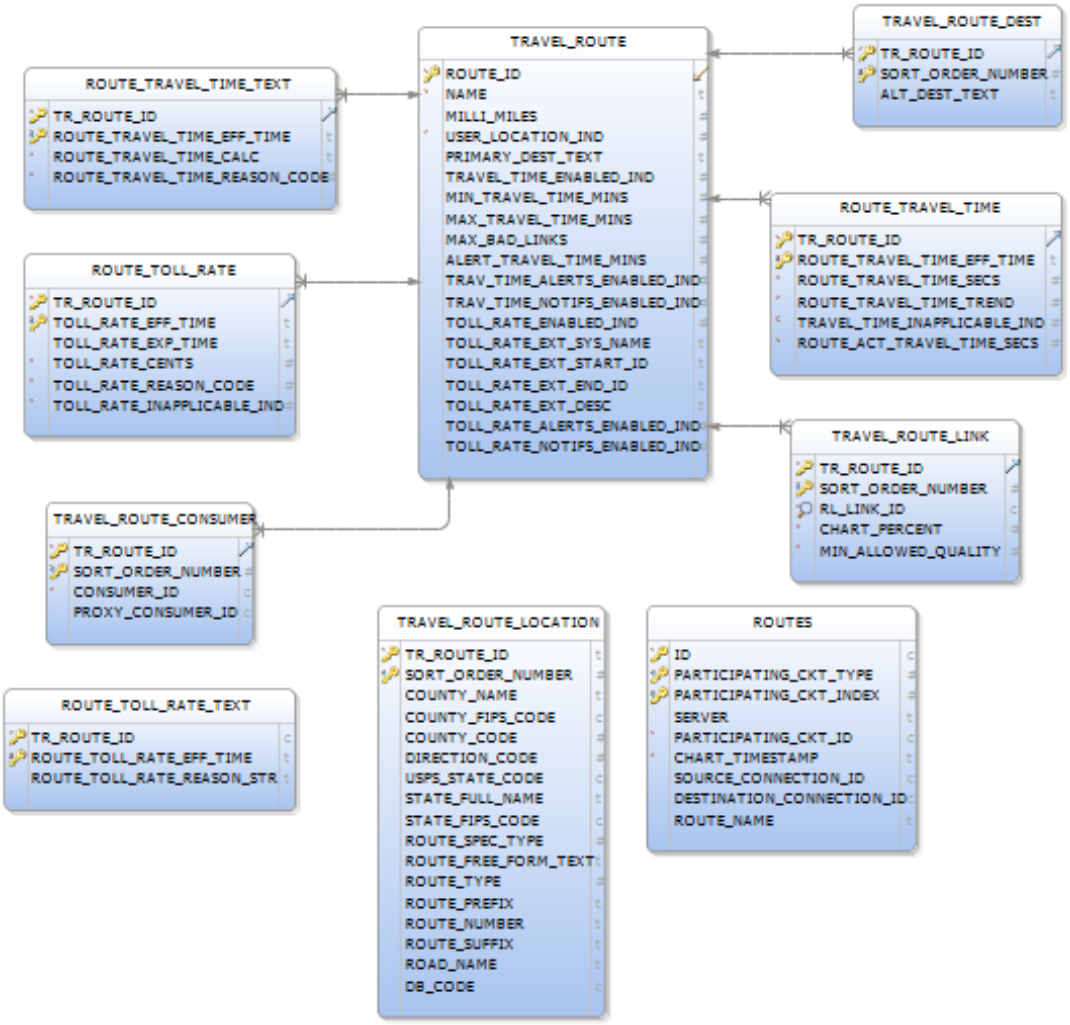


Figure 2-14. CHART_Live ERD, Page 1-3

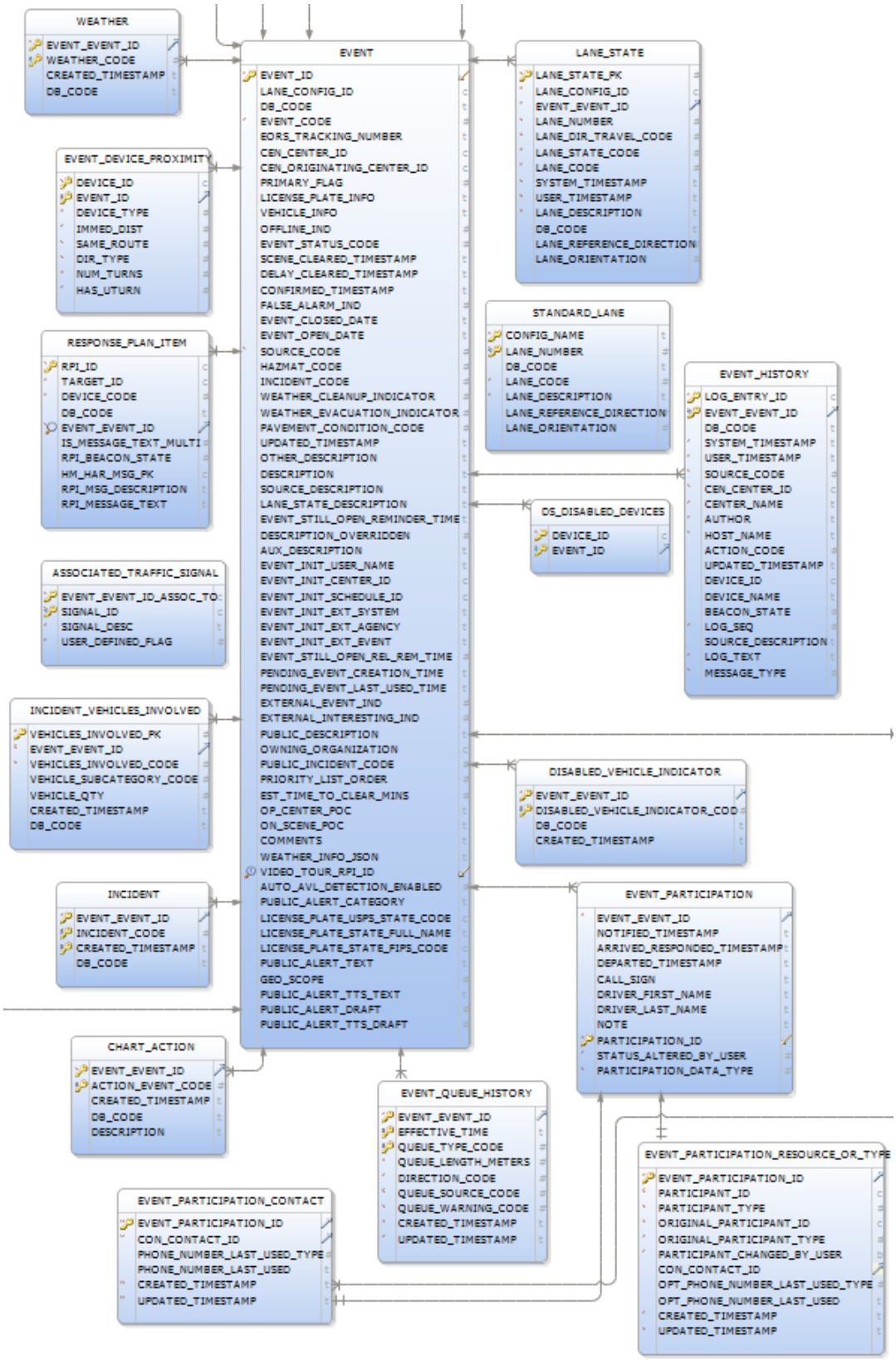


Figure 2-15. CHART_Live ERD, Page 2-3

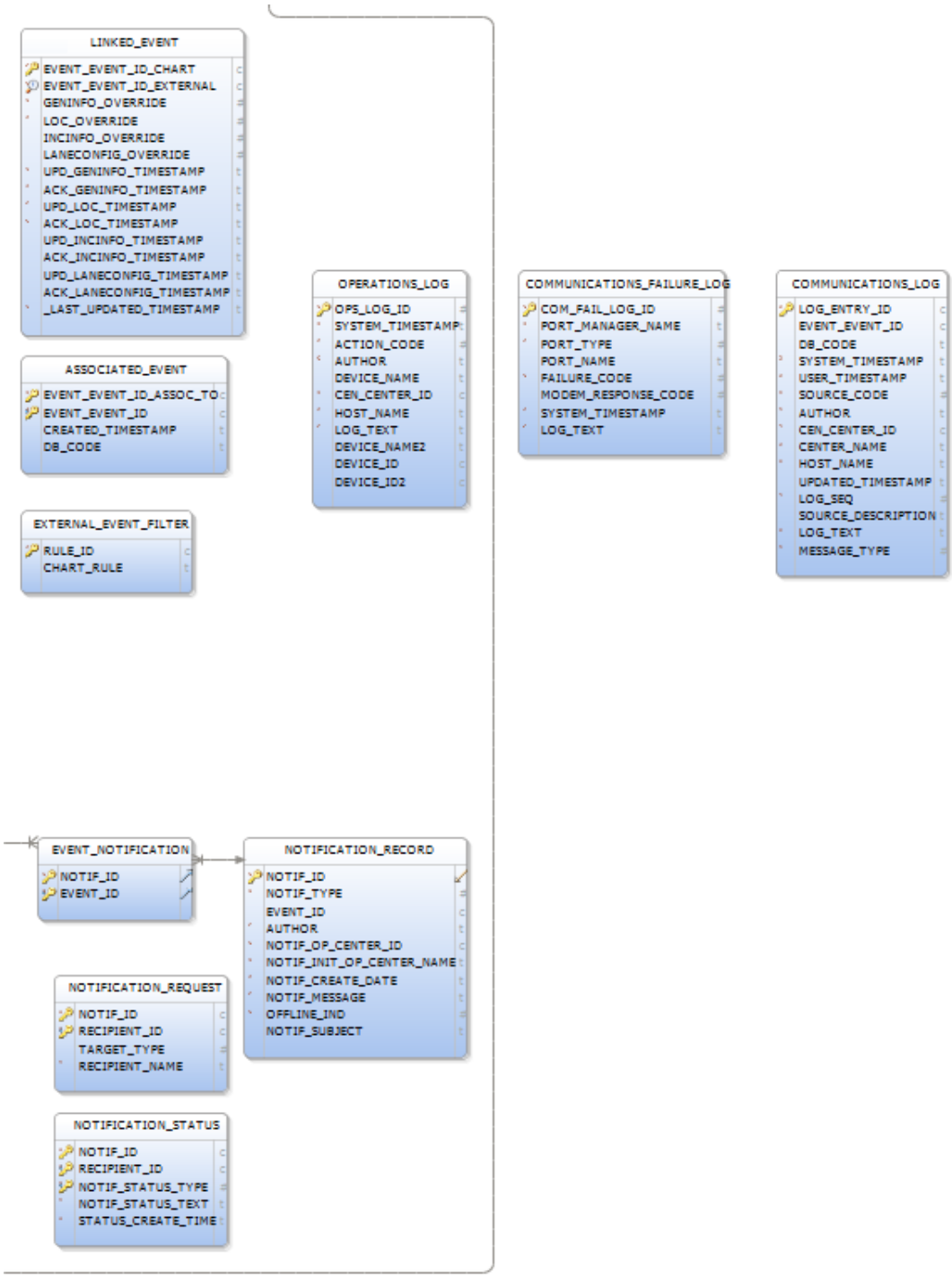


Figure 2-16. CHART_Live ERD, Page 3-3

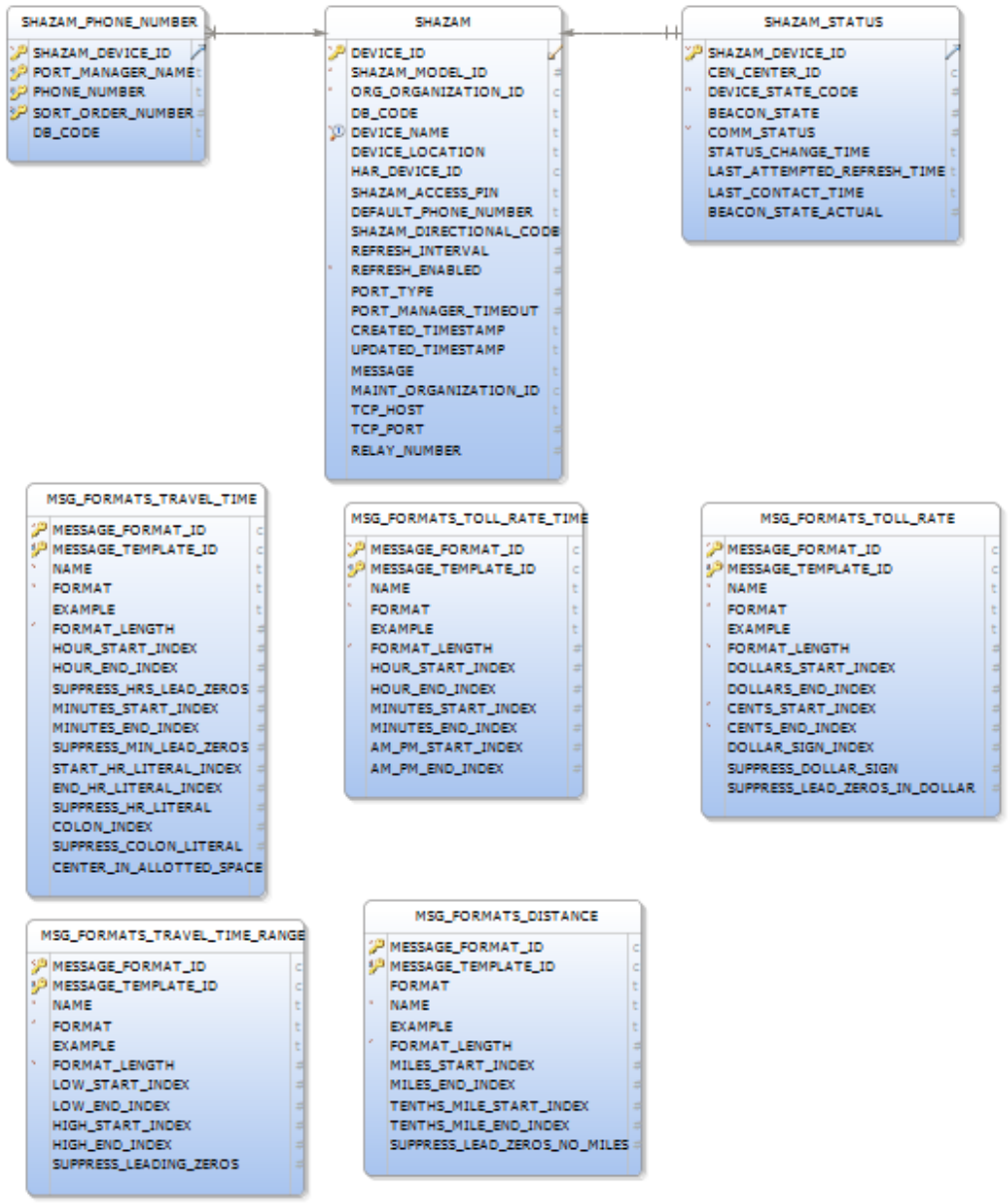


Figure 2-17. CHART_Live ERD, Page 4-3

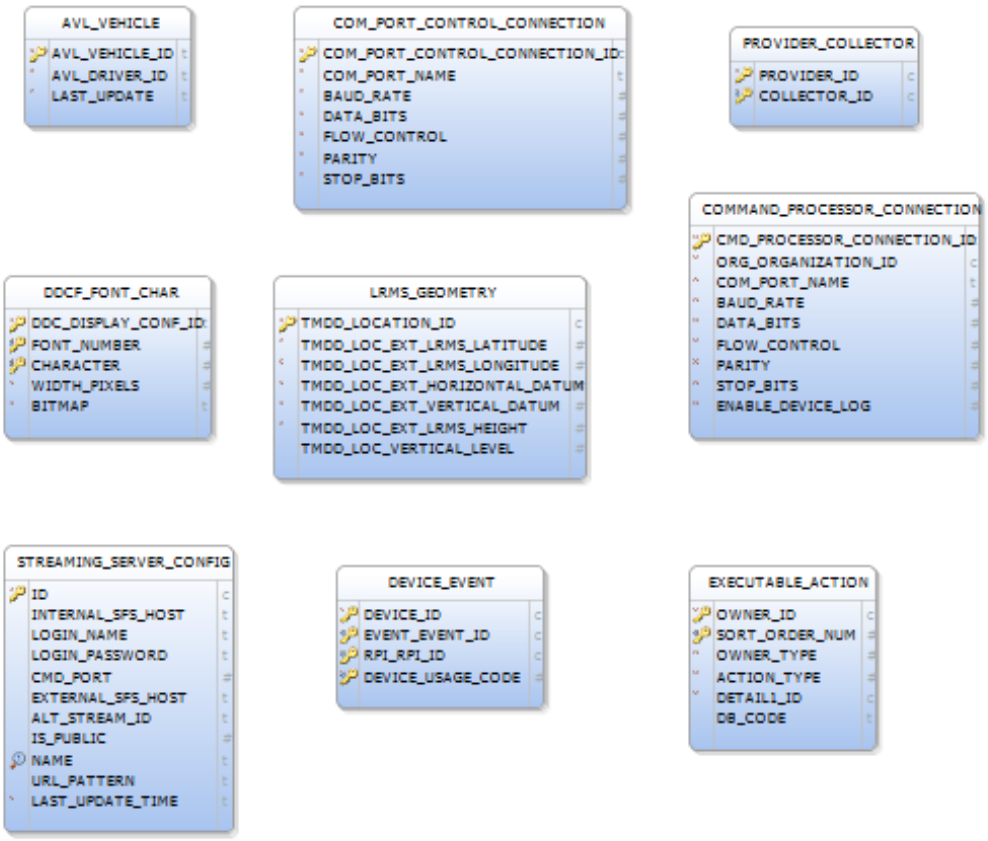


Figure 2-18. CHART_Live ERD, Page 5-3

2.4.1.1.2.2 CHART Archive Database Entity Relationship Diagram (ERD)

The CHART ATMS Archive Database Entity Relationship Diagram for R14 is shown below in the eleven figures that follow, Figure 2-19 through Figure 2-29. These figures should be mentally arranged into a grid four images wide and three images tall, if desired to follow the connector lines which go off the pages. Pages 2-1 through 4-1 are to the right of Page 1-1, and Pages 1-2 and 1-3 are below Page 1-1. Note that there is no Page 4-3 (the lower-right corner of the 4x3 grid has no image).

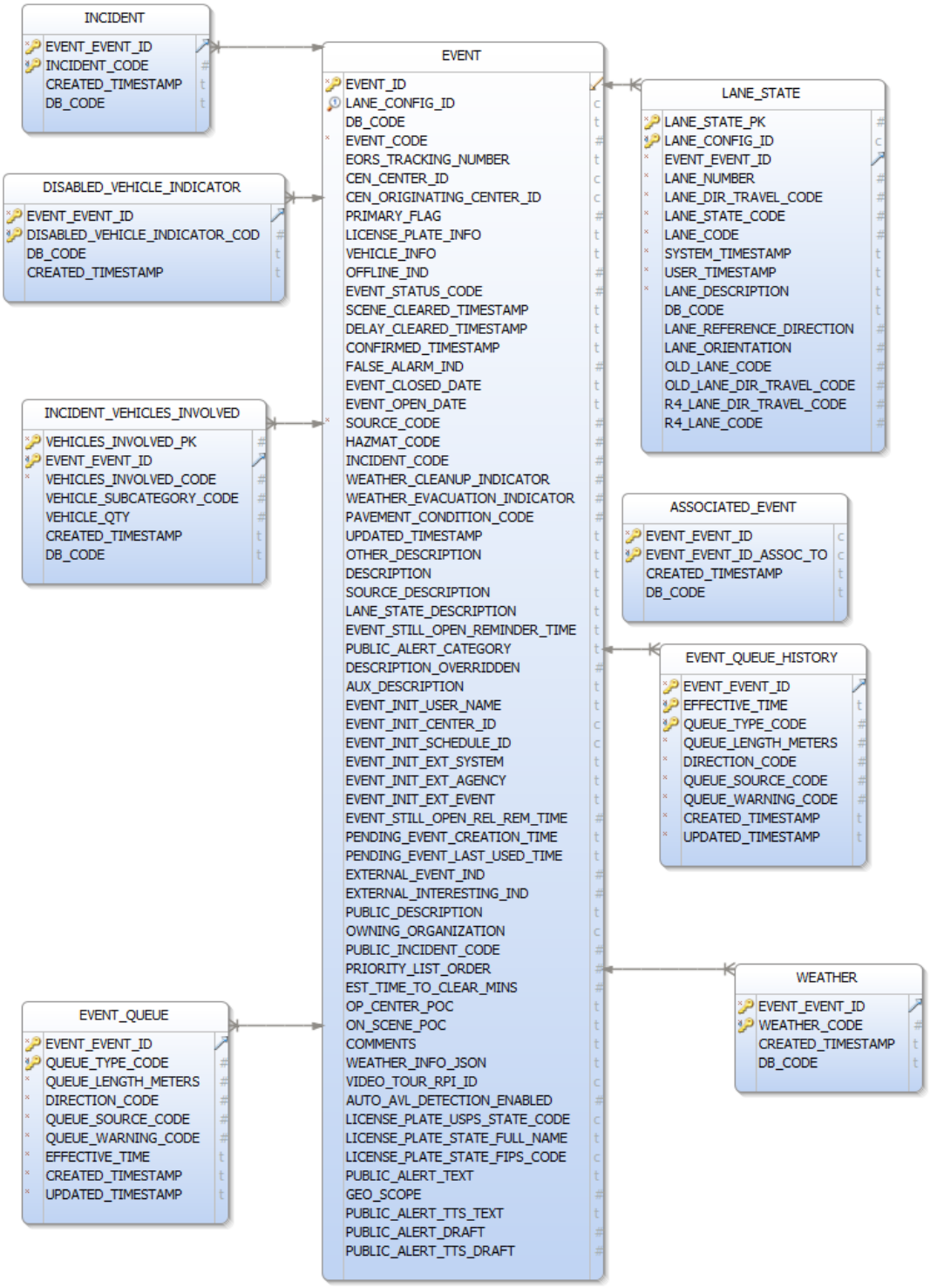


Figure 2-19. CHART_Archive ERD, Page 1-1

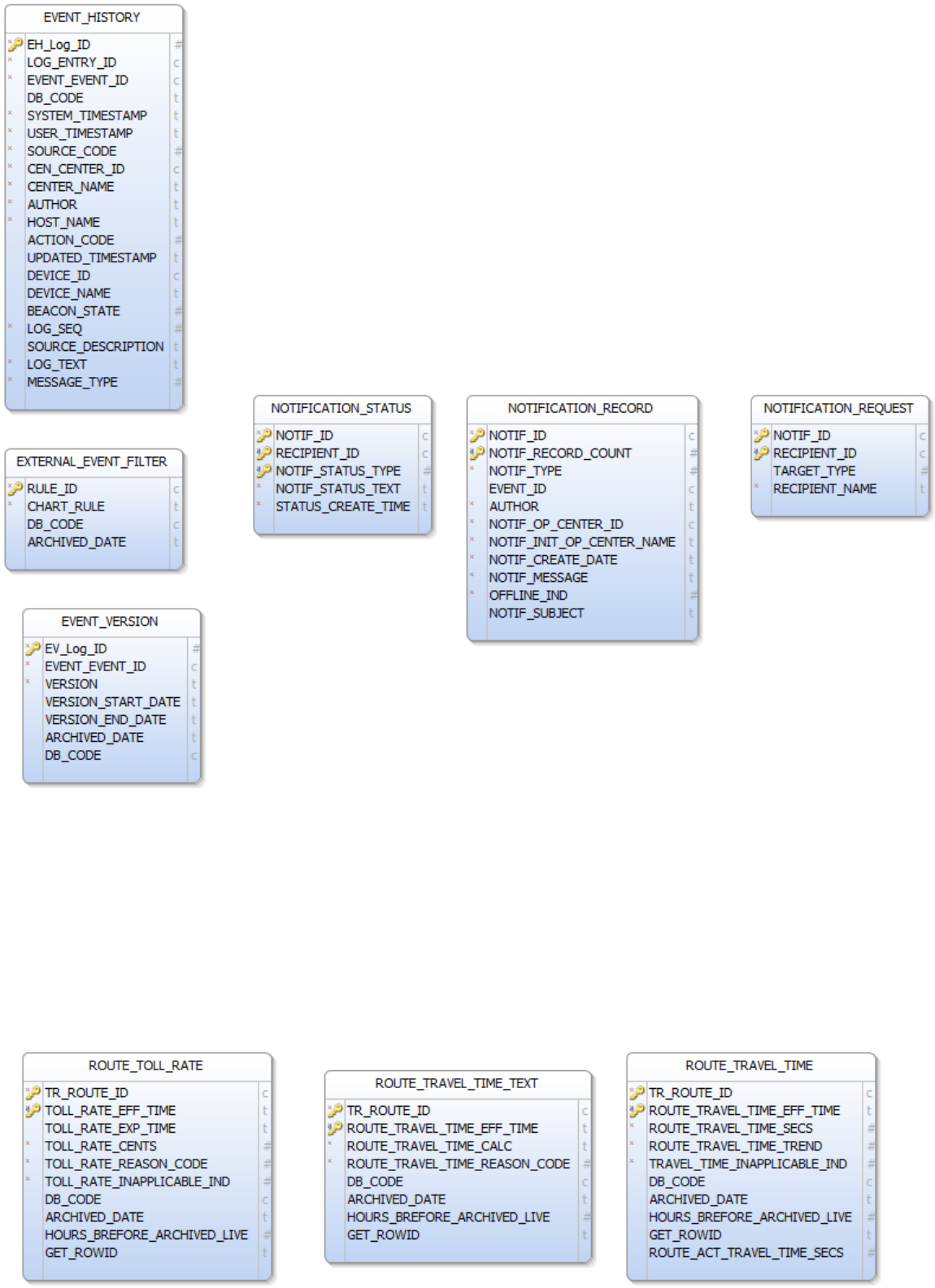


Figure 2-20. CHART_Archive ERD, Page 2-1

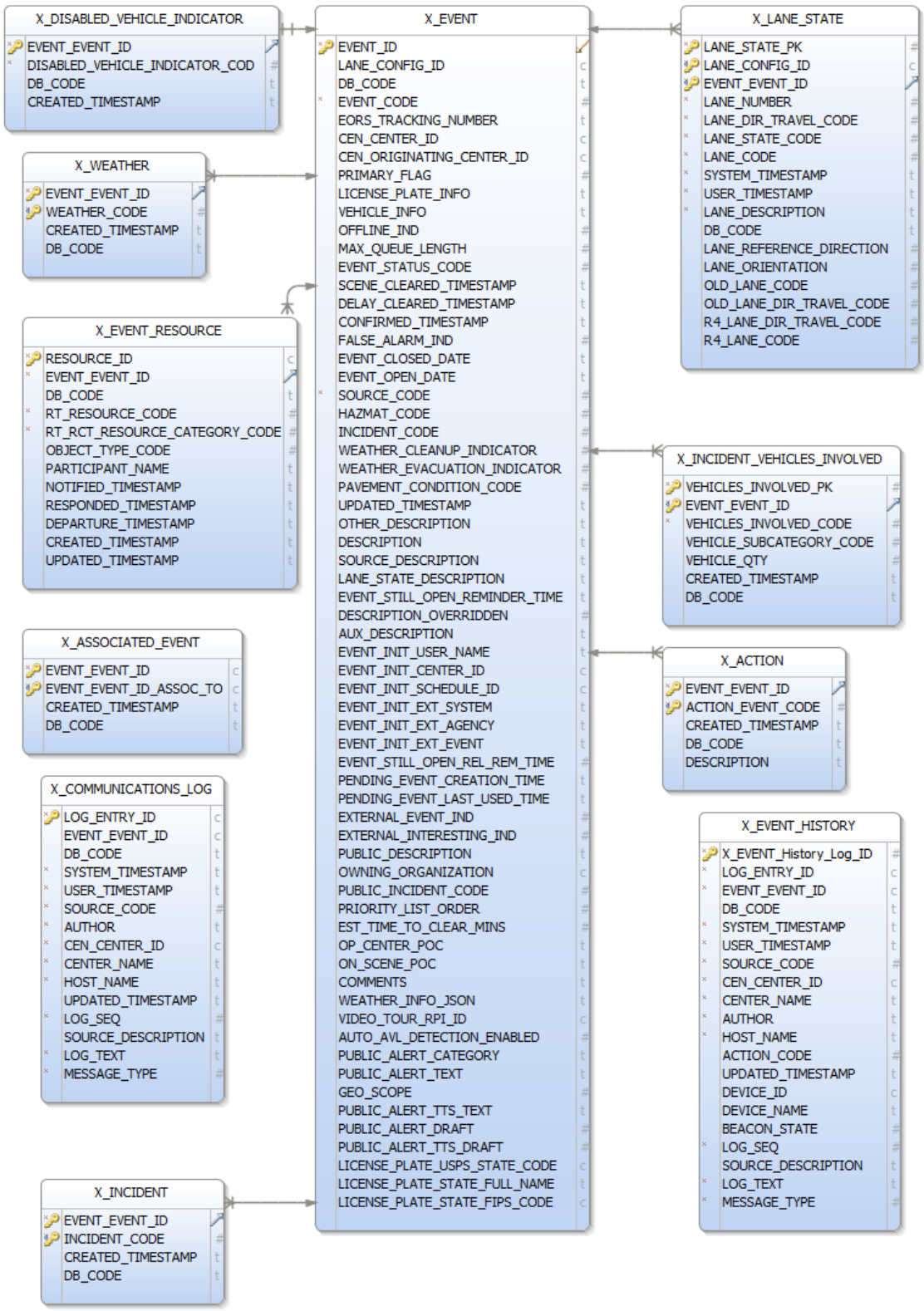


Figure 2-21. CHART_Archive ERD, Page 3-1

Figure 2-22. CHART_Archive ERD, Page 4-1

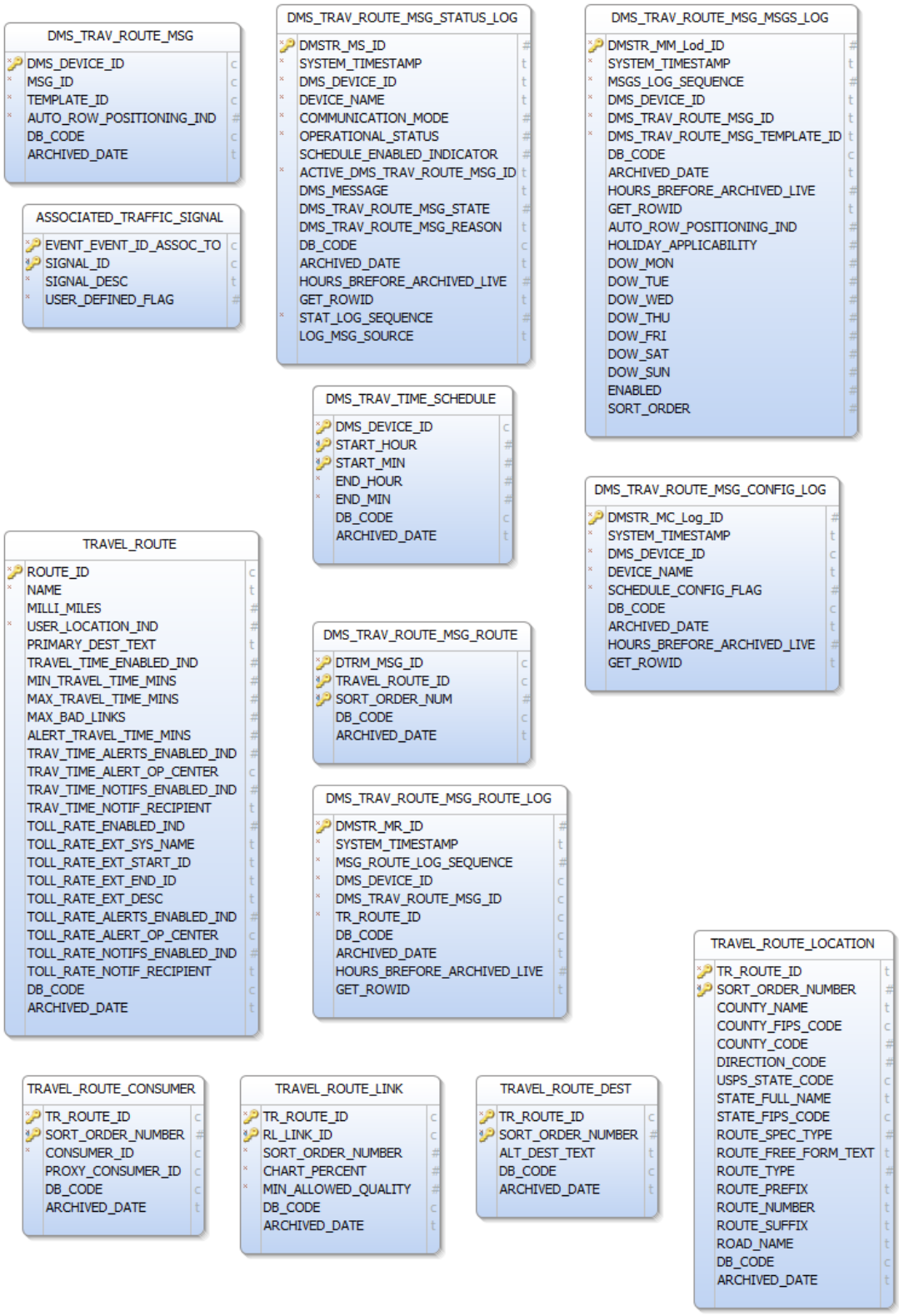


Figure 2-23. CHART_Archive ERD, Page 1-2

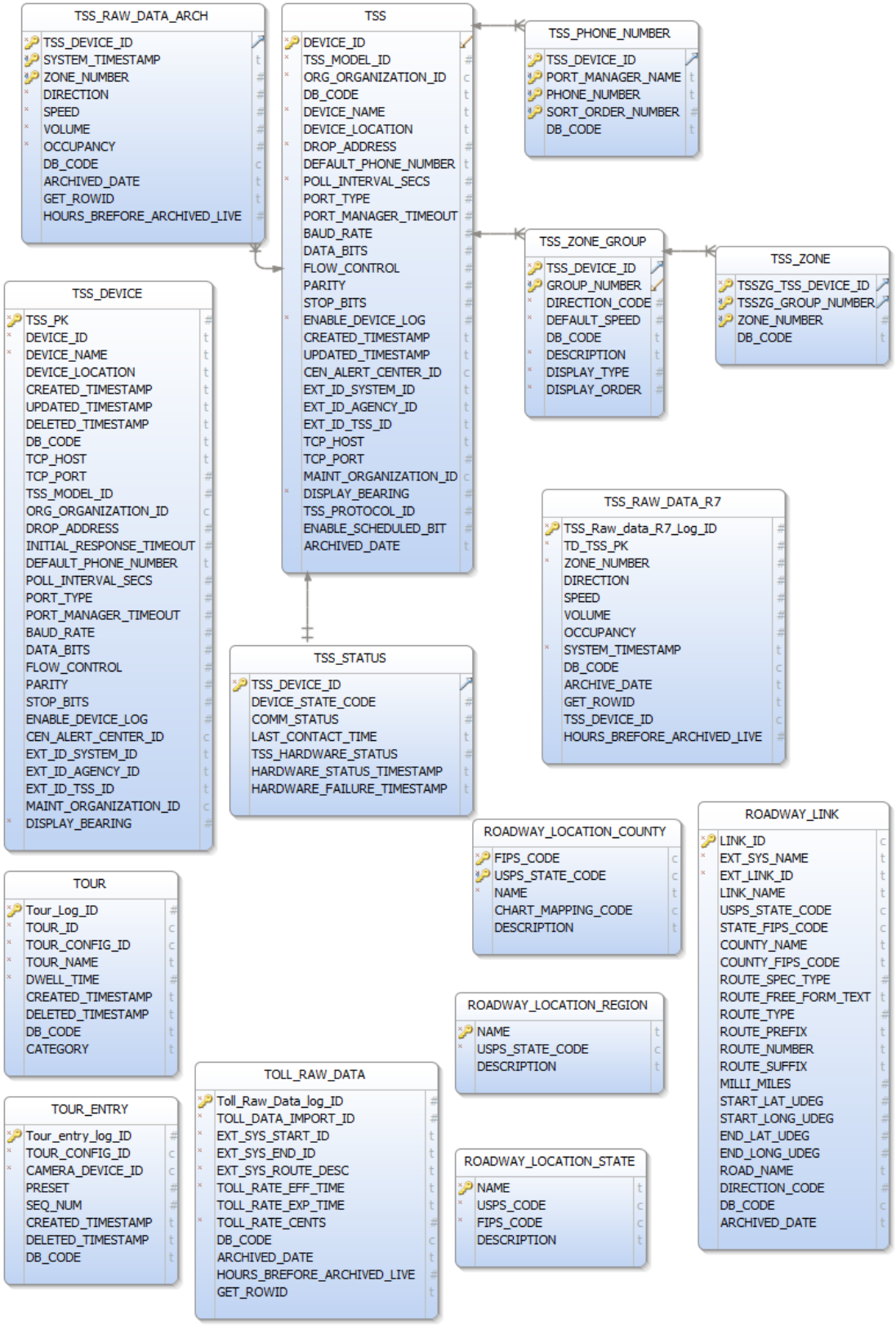


Figure 2-24. CHART_Archive ERD, Page 2-2

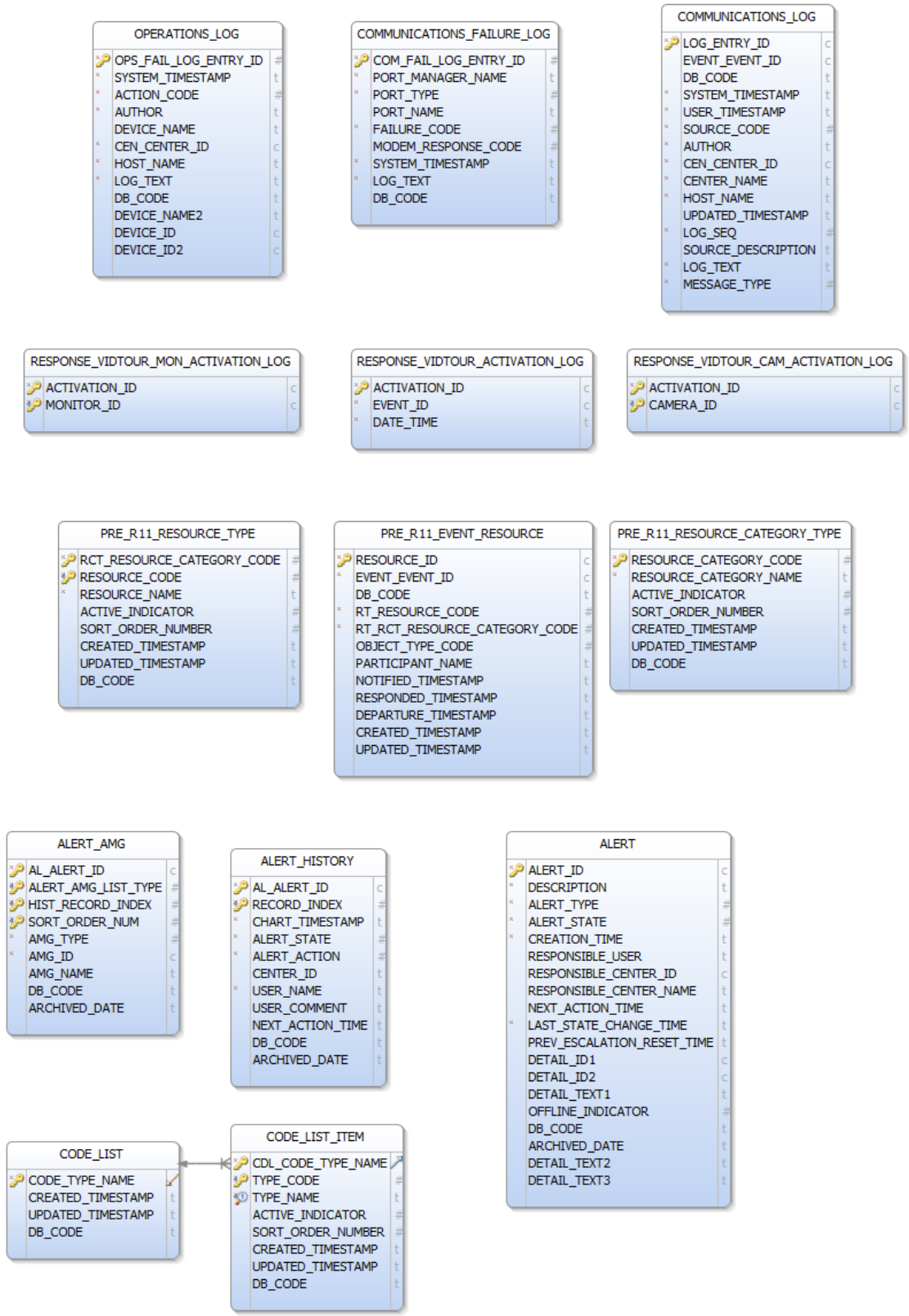


Figure 2-25. CHART_Archive ERD, Page 3-2

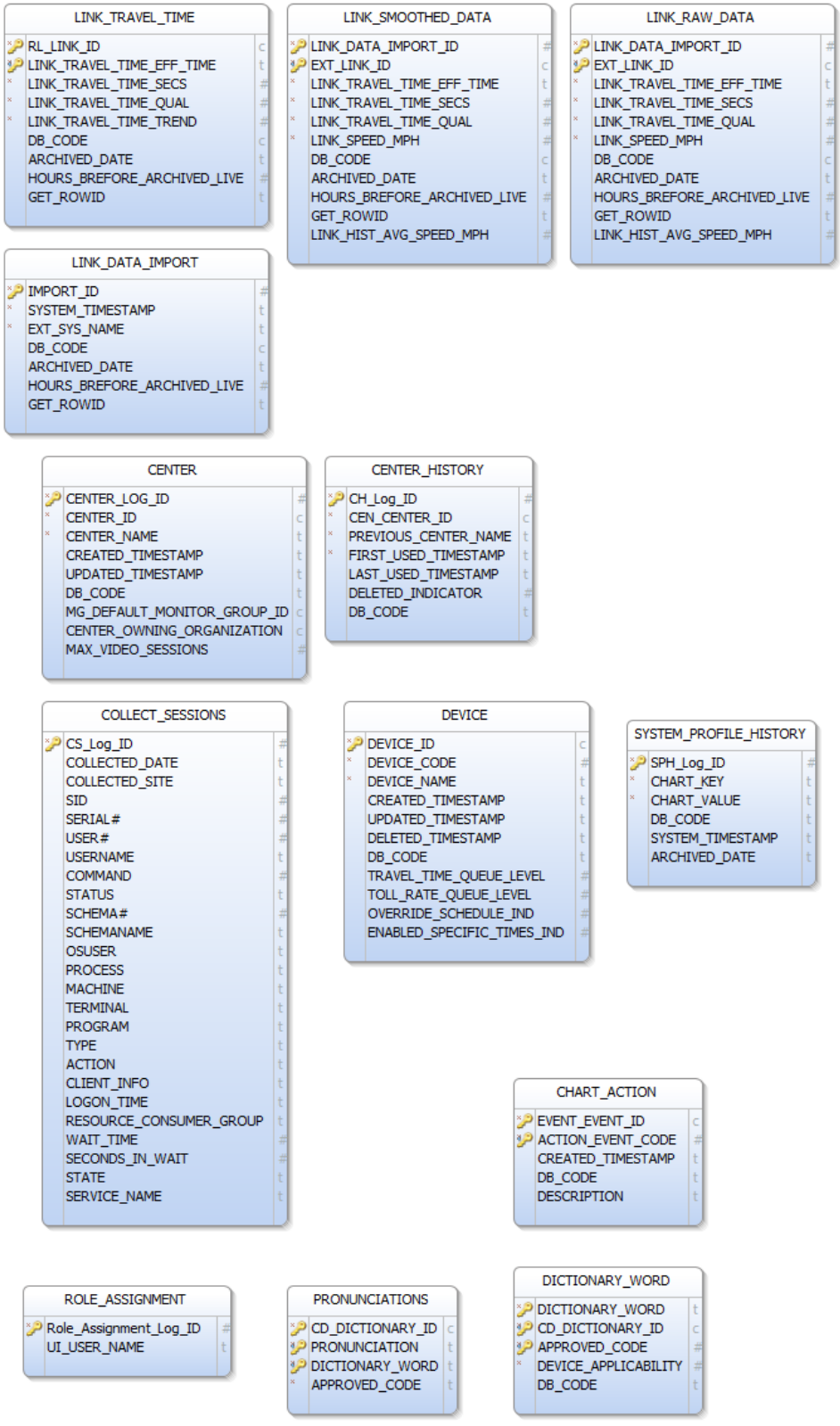


Figure 2-26. CHART_Archive ERD, Page 4-2

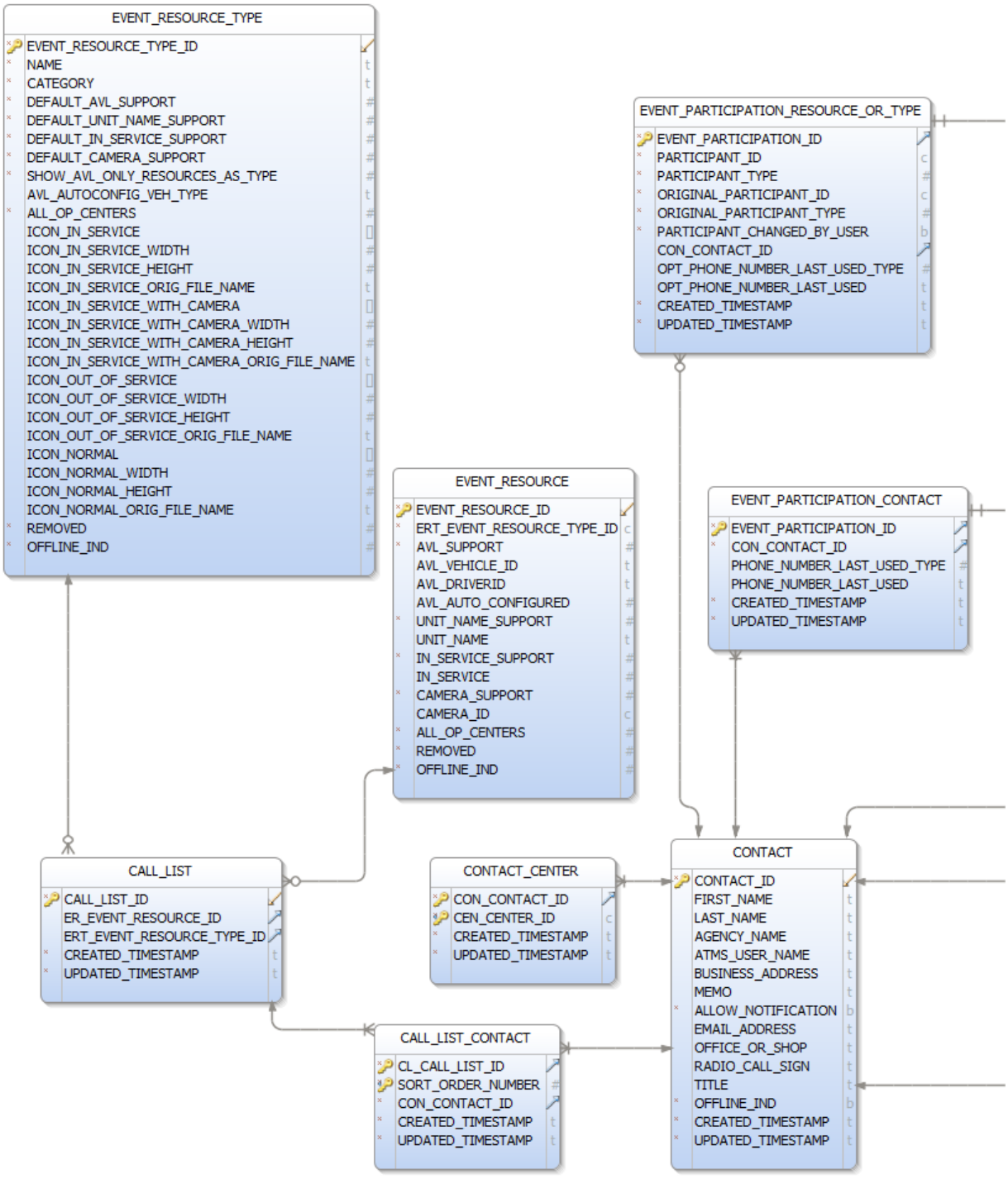


Figure 2-27. CHART_Archive ERD, Page 1-3

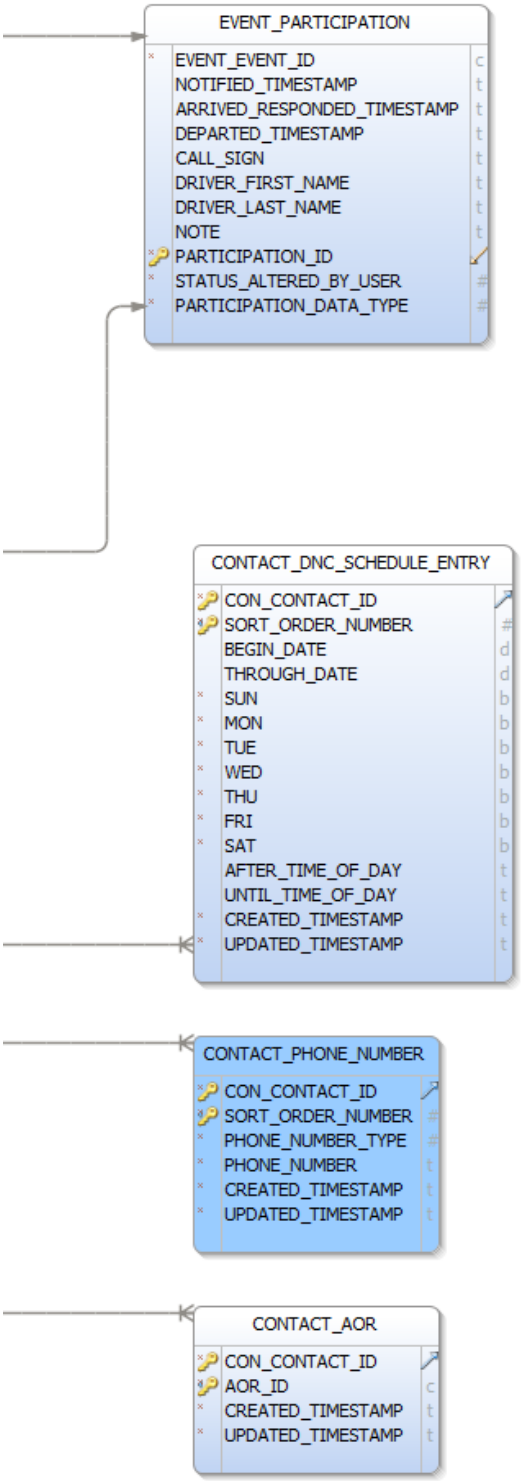


Figure 2-28. CHART_Archive ERD, Page 2-3

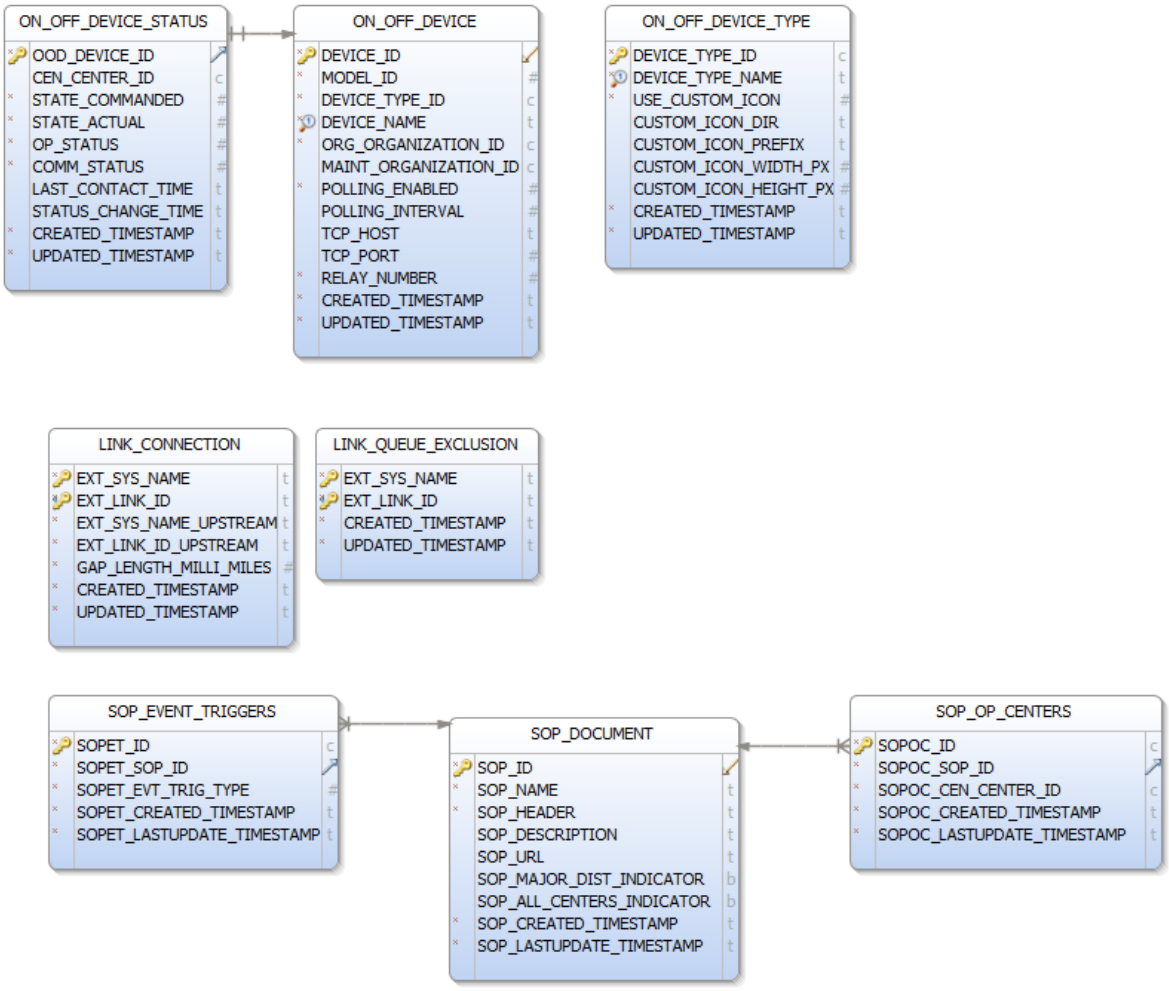


Figure 2-29. CHART_Archive ERD, Page 3-3

2.4.1.1.2.3 Function to Entity Matrix Report

The Create, Retrieve, Update, Delete (CRUD) matrix cross-references business functions to entities and shows the use of the entities by those functions. This report is generated as part of the CHART O&M Guide.

2.4.1.1.2.4 Table Definition Report –

In tables shown below:

- Deleted columns/constraints marked with a minus sign ("-")
- Modified columns/constraints marked with an asterisk ("*")
- New columns/constraints marked with a plus sign ("+")

2.4.1.1.2.4.1 Database Changes for the SOP Feature

2.4.1.1.2.4.1.1 CHART ATMS DB

The R14 SOP feature adds three new tables: a SOP_DOCUMENT table, SOP_OP_CENTERS, and a SOP_EVENT_TRIGGERS table.

SOP_DOCUMENT Table (New):
Rights: The TRAFFICEVENTSERVICE, USERMANAGEMENTSERVICE user requires full C/R/U/D rights for this table.

This new table stores the data fields for an SOP document definition. Each document definition is given a unique identifier SOP_ID which is used as the primary key and referenced in supporting tables SOP_OP_CENTERS and SOP_EVENT_TRIGGERS.

SOP_DOCUMENT Columns:

+	SOP_ID	CHAR(32)	NOT NULL
+	SOP_NAME	VARCHAR(100)	NOT NULL
+	SOP_HEADER	VARCHAR(1000)	NOT NULL
+	SOP_DESCRIPTION	VARCHAR(300)	NULL
+	SOP_URL	VARCHAR(200)	NULL
+	SOP_MAJOR_DIST_INDICATOR	BIT	NULL
+	SOP_ALL_CENTERS_INDICATOR	BIT	NULL
+	SOP_CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	SOP_LASTUPDATE_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: SOP_ID

SOP_OP_CENTERS Table (New):
Rights: The TRAFFICEVENTSERVICE, USERMANAGEMENTSERVICE user requires full C/R/U/D rights for this table.

This new table stores the mappings of SOP documents and operations centers. Each record is given a unique key and contains references to the SOP_DOCUMENT SOP_ID and the operations center CENTER_ID from the CENTER table.

SOP_OP_CENTERS Columns:

+	SOPOC_ID	CHAR(32)	NOT NULL
+	SOPOC_SOP_ID	CHAR(32)	NOT NULL
+	SOPOC_CEN_CENTER_ID	CHAR(32)	NOT NULL
+	SOPOC_CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	SOPOC_LASTUPDATE_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: SOPOC_ID
FOREIGN KEY: CEN_CENTER_ID REFERENCES CENTER.CENTER_ID
SOPOC_SOP_ID REFERENCES SOP_DOCUMENT.SOP_ID

SOP_EVENT_TRIGGERS Table (New):
Rights: The TRAFFICEVENTSERVICE, USERMANAGEMENTSERVICE user requires full C/R/U/D rights for this table.

This new table stores the mappings of SOP documents and event triggers. Each record is given a unique key and contains a reference to SOP_DOCUMENT SOP_ID and the event trigger value from the CODE_LIST_ITEM table.

SOP_EVENT_TRIGGERS Columns:

+	SOPET_ID	CHAR(32)	NOT NULL
+	SOPET_SOP_ID	CHAR(32)	NOT NULL
+	SOPET_EVT_TRIG_TYPE	TINYINT	NOT NULL
+	SOPET_CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	SOPET_LASTUPDATE_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: SOPET_ID
FOREIGN KEY: SOPET_SOP_ID REFERENCES SOP_DOCUMENT.SOP_ID

FUNCTIONAL_RIGHT Table New Values:

FR_ID	FR_NAME	FR_DESCRIPTION
153	ManageSOPs	Allows the holder to manage SOP document definitions.
154	ViewMajorSOPPopups	Allows the holder to view the SOP popup for only major distributed SOP documents. This is intended for senior operators for new SOPs that all users should see.
155	ViewAllSOPPopups	Allows the holder to view the SOP popup for all SOP documents. This is intended for junior operators who should see every possible SOP popup.
156	ViewSOPs	Allows the holder to view SOP document definitions.

CODE_LIST Table New Values:

CODE_TYPE_NAME
SOP_Triggers

CODE_LIST_ITEM Table New Values:

CDL_CODE_TYPE_NAME	TYPE_ CODE	ACTIVE_ INDICATOR	TYPE_NAME
SOP_Triggers	0	1	EventCreationAction
SOP_Triggers	1	1	ActionEventPotHole1045Citizen
SOP_Triggers	2	1	ActionEventSignal
SOP_Triggers	3	1	EventCreationCongestion

SOP_Triggers	4	1	HAZMATCheckboxChecked
SOP_Triggers	5	1	IncidentTypeCollisionFatality
SOP_Triggers	6	1	IncidentTypeEmergencyRoadwork
SOP_Triggers	7	1	IncidentTypeOffRoadActivity
SOP_Triggers	8	1	IncidentTypePoliceActivity
SOP_Triggers	9	1	IncidentTypeWeatherClosure
SOP_Triggers	10	1	NotificationOpenWindow
SOP_Triggers	11	1	HomePageLogon
SOP_Triggers	12	1	RoadwayConditionsAllBlocked
SOP_Triggers	13	1	VehicleCyclistPedestrian
SOP_Triggers	14	1	VehicleJackKnifed
SOP_Triggers	15	1	VehicleLoadedCommercialBus
SOP_Triggers	16	1	VehicleLoadedUnloadedSchoolBus
SOP_Triggers	17	1	VehicleLostLoadOverturned
SOP_Triggers	18	1	VehicleMotorcycle
SOP_Triggers	19	1	VehicleSingleUnitTruck
SOP_Triggers	20	1	VehicleTractorTrailer
SOP_Triggers	21	1	EventCreationWeatherService

SYSTEM_PROFILE Table New Values:

CHART_KEY	CHART_VALUE
chartlite.functionalRightCategory.153	SOP
chartlite.functionalRightCategory.154	SOP
chartlite.functionalRightCategory.155	SOP
chartlite.functionalRightCategory.156	SOP

2.4.1.1.2.4.2 Database Changes for the On/Off Device Feature

2.4.1.1.2.4.2.1 CHART ATMS DB

The R14 On/Off Device feature requires 3 new tables and 1 modified table specified below.

PLAN_ITEM Table (Modified):
Rights: The ONOFFDEVICESERVICE user requires full C/R/U/D rights for this table.

	PLAN_ITEM_ID	CHAR(32)	NOT NULL
	DEVICE_ID	CHAR(32)	NOT NULL
	SM_MSG_ID	CHAR(32)	NOT NULL
	PLA_PLAN_ID	CHAR(32)	NOT NULL
*	MSG_TYPE_CODE	NUMERIC(3, 0)	NOT NULL
	PLAN_ITEM_NAME	VARCHAR(60)	NOT NULL
	DB_CODE	VARCHAR(1)	NULL

The MSG_TYPE_CODE column is modified to allow values (0,1,2) instead of only allowing values (0,1) (modification to existing constraint) (0=DMS_MSG, 1= HAR_MSG, 2=OOD_NO_MSG).

ON_OFF_DEVICE Table (New):
Rights: The ONOFFDEVICESERVICE user requires full C/R/U/D rights for this table.

This new table stores configuration information about On/Off Devices in CHART.

ON_OFF_DEVICE Columns:

+	DEVICE_ID	CHAR(32)	NOT NULL
+	MODEL_ID	NUMERIC(5,0)	NOT NULL
+	DEVICE_TYPE_ID	CHAR (32)	NOT NULL
+	DEVICE_NAME	VARCHAR(15)	NOT NULL
+	ORG_ORGANIZATION_ID	CHAR (32)	NOT NULL
+	MAINT_ORGANIZATION_ID	CHAR (32)	NULL
+	POLLING_ENABLED	NUMERIC (1, 0)	NOT NULL
+	POLLING_INTERVAL	NUMERIC (5, 0)	NULL
+	TCP_HOST	VARCHAR (16)	NULL
+	TCP_PORT	NUMERIC (5, 0)	NULL
+	RELAY_NUMBER	NUMERIC (2, 0)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NNUL
+	UPDATED_TIMESTAMP	DATETIME2 (0)	NULL

PRIMARY KEY: DEVICE_ID

ON_OFF_DEVICE_STATUS Table (New):
Rights: The ONOFFDEVICESERVICE user requires full C/R/U/D rights for this table.

This new table stores status information about On/Off Devices in CHART.
ON_OFF_DEVICE _STATUS Columns:

+	OOD_DEVICE_ID	CHAR(32)	NOT NULL
+	CEN_CENTER_ID	CHAR(32)	NULL
+	COMMANDED_STATE	NUMERIC(2, 0)	NOT NULL
+	ACTUAL_STATE	NUMERIC(2, 0)	NOT NULL
+	OP_STATUS	NUMERIC(2, 0)	NOT NULL
+	COMM_STATUS	NUMERIC(2, 0)	NOT NULL
+	LAST_CONTACT_TIME	DATETIME2(0)	NULL
+	STATUS_CHANGE_TIME	DATETIME2(0)	NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NULL
+	UPDATED_TIMESTAMP	DATETIME2 (0)	NULL

PRIMARY KEY: OOD_DEVICE_ID
FOREIGN KEY: OOD_DEVICE_ID REFERENCES ON_OFF_DEVICE.DEVICE_ID

ON_OFF_DEVICE_TYPE Table (New):
Rights: The ONOFFDEVICESERVICE user requires full C/R/U/D rights for this table.

This new table stores configuration information about On/Off Device Types in CHART.

ON_OFF_DEVICE _TYPE Columns:

+	DEVICE_TYPE_ID	CHAR(32)	NOT NULL
+	DEVICE_TYPE_NAME	VARCHAR(15)	NOT NULL
+	USE_CUSTOM_ICON	NUMERIC(1, 0)	NOT NULL
+	CUSTOM_ICON_DIR	VARCHAR(100)	NULL
+	CUSTOM_ICON_PREFIX	VARCHAR(50)	NULL
+	CUSTOM_ICON_WIDTH_PX	NUMERIC(5, 0)	NULL
+	CUSTOM_ICON_HEIGHT_PX	NUMERIC(5, 0)	NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NULL
+	UPDATED_TIMESTAMP	DATETIME2 (0)	NULL

PRIMARY KEY: DEVICE_TYPE_ID

FUNCTIONAL_RIGHT Table New Values:

FR_ID	FR_NAME	FR_DESCRIPTION
158	ConfigureOnOffDevice	Allows the holder to configure on/off devices (add, edit, remove).
159	ViewOnOffDeviceConfiguration	Allows the holder to view the configuration of on/off devices.
160	MaintainOnOffDevice	Allows the holder to perform commands on an on/off device that is in maintenance mode. Holder may also transition the device in and out of maint mode.
161	ViewOnOffDeviceSensitiveConfig	Allows the holder to view sensitive on/off device configuration data.

CODE_LIST Table New Values:

CODE_TYPE_NAME
Model ID (ON/OFF DEVICE)
On/Off State

CODE_LIST_ITEM Table New Values:

CDL_CODE_TYPE_NAME	TYPE_ CODE	ACTIVE_ INDICATOR	TYPE_NAME
Model ID (ON/OFF DEVICE)	0	1	HWG-ER02a
Model ID (ON/OFF DEVICE)	1	1	HWG-ER02b
On/Off State	0	1	Off
On/Off State	1	1	On
On/Off State	2	1	Unknown

SYSTEM_PROFILE Table New Values:

CHART_KEY	CHART_VALUE
chartlite.functionalRightCategory.158	On / Off Devices
chartlite.functionalRightCategory.159	On / Off Devices
chartlite.functionalRightCategory.160	On / Off Devices
chartlite.functionalRightCategory.161	On / Off Devices

2.4.1.1.2.4.3 Database changes for Traffic Event Queue Calculation Feature

2.4.1.1.2.4.3.1 CHART ATMS DB

The R14 Queue Calculation feature requires 4 new tables and 4 modified tables, as specified below.

LINK_QUEUE_EXCLUSION Table (New):
Rights: The TRAFFICEVENTSERVICE user requires READ rights for this table.

This new table stores information about Roadway Links that are to be excluded from the set of links used for queue calculation purposes.

LINK_QUEUE_EXCLUSION Columns:

+	EXT_SYS_NAME	VARCHAR(10)	NOT NULL
+	EXT_LINK_ID	VARCHAR(9)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: EXT_SYS_NAME, EXT_LINK_ID

LINK_CONNECTION Table (New):
Rights: The TRAFFICEVENTSERVICE user requires READ rights for this table.

This new table stores information about explicit connections between a RoadwayLink and its adjacent upstream RoadwayLink.

LINK_CONNECTION Columns:

+	EXT_SYS_NAME	VARCHAR(10)	NOT NULL
+	EXT_LINK_ID	VARCHAR(9)	NOT NULL

+	EXT_SYS_NAME_UPSTREAM	VARCHAR(10)	NOT NULL
+	EXT_LINK_ID_UPSTREAM	VARCHAR(9)	NOT NULL
+	GAP_LENGTH_MM	NUMERIC(3, 0)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: EXT_SYS_NAME, EXT_LINK_ID,
EXT_SYS_NAME_UPSTREAM, EXT_LINK_ID_UPSTREAM

LINK_RAW_DATA Table (Modified):

This table is modified to store historical average speeds for each link for which link statistics are collected, from both INRIX and MDTA providers. Note: There is no driver within R14 to require changing the EXT_LINK_ID column from CHAR(9) to VARCHAR(9), but it is being changed within R14 to make it consistent with ROADWAY_LINK, which defines EXT_LINK_ID as VARCHAR(9).

LINK_RAW_DATA Columns:

	LINK_DATA_IMPORT_ID	VARCHAR(10)	NOT NULL
*	EXT_LINK_ID	VARCHAR(9)	NOT NULL
	LINK_TRAVEL_TIME_EFF_TIME	DATETIME2(0)	NOT NULL
	LINK_TRAVEL_TIME_SECS	NUMERIC(5,0)	NOT NULL
	LINK_TRAVEL_TIME_QUAL	NUMERIC(2,0)	NOT NULL
	LINK_SPEED_MPH	NUMERIC(3,0)	NOT NULL
+	LINK_HIST_AVG_SPEED_MPH	NUMERIC(3,0)	NOT NULL

PRIMARY KEY: LINK_DATA_IMPORT_ID, EXT_LINK_ID (unchanged)

LINK_SMOOTHED_DATA Table (Modified):

This table is modified to store historical average speeds for each link for which link statistics are collected, from both INRIX and MDTA providers. Note: There is no driver within R14 to require changing the EXT_LINK_ID column from CHAR(9) to VARCHAR(9), but it is being changed within R14 to make it consistent with ROADWAY_LINK, which defines EXT_LINK_ID as VARCHAR(9).

LINK_SMOOTHED_DATA Columns:

	LINK_DATA_IMPORT_ID	VARCHAR(10)	NOT NULL
*	EXT_LINK_ID	VARCHAR(9)	NOT NULL

	LINK_TRAVEL_TIME_EFF_TIME	DATETIME2(0)	NOT NULL
	LINK_TRAVEL_TIME_SECS	NUMERIC(5,0)	NOT NULL
	LINK_TRAVEL_TIME_QUAL	NUMERIC(2,0)	NOT NULL
	LINK_SPEED_MPH	NUMERIC(3,0)	NOT NULL
+	LINK_HIST_AVG_SPEED_MPH	NUMERIC(3,0)	NOT NULL

PRIMARY KEY: LINK_DATA_IMPORT_ID, EXT_LINK_ID (unchanged)

EVENT Table (Modified):

This table is modified to remove the MAX_QUEUE_LENGTH column which will be replaced by data in the new EVENT_QUEUE table in R14. Before this column is deleted, the data in this column will be migrated to the new EVENT_QUEUE table, for the few event records in both the CHART_Live and CHART_Archive databases which have MAX_QUEUE_LENGTH data.

EVENT Columns:

	EVENT_ID	CHAR(32)	NOT NULL
	LANE_CONFIG_ID	CHAR(32)	NULL
	DB_CODE	VARCHAR(1)	NULL
	EVENT_CODE	NUMERIC(3,0)	NOT NULL
	EORS_TRACKING_NUMBER	VARCHAR(255)	NULL
	CEN_CENTER_ID	CHAR(32)	NULL
	CEN_ORIGINATING_CENTER_ID	CHAR(32)	NULL
	PRIMARY_FLAG	NUMERIC(1,0)	NULL
	LICENSE_PLATE_INFO	VARCHAR(52)	NULL
	VEHICLE_INFO	VARCHAR(40)	NULL
	OFFLINE_IND	NUMERIC(1,0)	NULL
–	MAX_QUEUE_LENGTH	NUMERIC(5,0)	NULL
	EVENT_STATUS_CODE	NUMERIC(3,0)	NULL
	SCENE_CLEARED_TIMESTAMP	DATETIME2(0)	NULL
	DELAY_CLEARED_TIMESTAMP	DATETIME2(0)	NULL
	CONFIRMED_TIMESTAMP	DATETIME2(0)	NULL
	FALSE_ALARM_IND	NUMERIC(1,0)	NULL
	EVENT_CLOSED_DATE	DATETIME2(0)	NULL
	EVENT_OPEN_DATE	DATETIME2(0)	NULL
	SOURCE_CODE	NUMERIC(3,0)	NOT NULL
	HAZMAT_CODE	NUMERIC(1,0)	NULL
	INCIDENT_CODE	NUMERIC(3,0)	NULL
	WEATHER_CLEANUP_INDICATOR	NUMERIC(1,0)	NULL
	WEATHER_EVACUATION_INDICATOR	NUMERIC(1,0)	NULL
	PAVEMENT_CONDITION_CODE	NUMERIC(3,0)	NULL
	UPDATED_TIMESTAMP	DATETIME2(0)	NULL

OTHER_DESCRIPTION	VARCHAR(60)	NULL
DESCRIPTION	VARCHAR(512)	NULL
SOURCE_DESCRIPTION	VARCHAR(60)	NULL
LANE_STATE_DESCRIPTION	VARCHAR(1024)	NULL
EVENT_STILL_OPEN_REMINDER_TIME	DATETIME2(0)	NULL
PUBLIC_ALERT_CATEGORY	VARCHAR(50)	NULL
PUBLIC_ALERT_TEXT	VARCHAR(3000)	NULL
DESCRIPTION_OVERRIDDEN	NUMERIC(1,0)	NULL
AUX_DESCRIPTION	VARCHAR(512)	NULL
EVENT_INIT_USER_NAME	VARCHAR(40)	NULL
EVENT_INIT_CENTER_ID	CHAR(32)	NULL
EVENT_INIT_SCHEDULE_ID	CHAR(32)	NULL
EVENT_INIT_EXT_SYSTEM	VARCHAR(35)	NULL
EVENT_INIT_EXT_AGENCY	VARCHAR(35)	NULL
EVENT_INIT_EXT_EVENT	VARCHAR(35)	NULL
EVENT_STILL_OPEN_REL_REM_TIME	NUMERIC(8,0)	NULL
PENDING_EVENT_CREATION_TIME	DATETIME2(0)	NULL
PENDING_EVENT_LAST_USED_TIME	DATETIME2(0)	NULL
EXTERNAL_EVENT_IND	NUMERIC(1,0)	NULL
EXTERNAL_INTERESTING_IND	NUMERIC(1,0)	NULL
PUBLIC_DESCRIPTION	VARCHAR(512)	NULL
OWNING_ORGANIZATION	CHAR(32)	NULL
PUBLIC_INCIDENT_CODE	NUMERIC(3,0)	NULL
PRIORITY_LIST_ORDER	NUMERIC(2,0)	NULL
EST_TIME_TO_CLEAR_MINS	NUMERIC(4,0)	NULL
OP_CENTER_POC	VARCHAR(80)	NULL
ON_SCENE_POC	VARCHAR(80)	NULL
COMMENTS	VARCHAR(1000)	NULL
GEO_SCOPE	NUMERIC(1,0)	NULL
WEATHER_INFO_JSON	VARCHAR(2048)	NULL
VIDEO_TOUR_RPI_ID	CHAR(32)	NULL
AUTO_AVL_DETECTION_ENABLED	NUMERIC(1,0)	NULL
PUBLIC_ALERT_TTS_TEXT	VARCHAR(3000)	NULL
PUBLIC_ALERT_DRAFT	NUMERIC(1,0)	NULL
PUBLIC_ALERT_TTS_DRAFT	NUMERIC(1,0)	NULL
LICENSE_PLATE_USPS_STATE_CODE	CHAR(2)	NULL
LICENSE_PLATE_STATE_FULL_NAME	VARCHAR(32)	NULL
LICENSE_PLATE_STATE_FIPS_CODE	CHAR(2)	NULL

PRIMARY KEY: EVENT_ID (Unchanged)

EVENT_QUEUE Table (New):
Rights: The TRAFFICEVENTSERVICE user requires Create, Delete, and Read rights for this table.

This table is used to store queue information for each traffic event. Each traffic event will have up to three rows: one each for current primary queue, current opposite direction queue, and maximum queue. (The only events which will not have rows will be those which do not have enough information to have queues, such as events without a primary route and direction.) Rows for a given traffic event will be archived off with the traffic event.

EVENT_QUEUE Columns:

+	EVENT_EVENT_ID	CHAR(32)	NOT NULL
+	QUEUE_TYPE_CODE	NUMERIC(1,0)	NOT NULL
+	QUEUE_LENGTH_METERS	NUMERIC(6,0)	NOT NULL
+	DIRECTION_CODE	NUMERIC(3,0)	NOT NULL
+	QUEUE_SOURCE_CODE	NUMERIC(1,0)	NOT NULL
+	QUEUE_WARNING_CODE	NUMERIC(1,0)	NOT NULL
+	EFFECTIVE_TIME	DATETIME2(0)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: EVENT_EVENT_ID, QUEUE_TYPE_CODE

EVENT_QUEUE_HISTORY Table (New):
Rights: The TRAFFICEVENTSERVICE user requires Create rights for this table.

This table is used to record the history of all queue information changes for each traffic events. This is a write-only log table which is written by the Traffic Event Service and never read. Rows for a given traffic event will be archived off with the traffic event. A traffic event can have zero to many rows: a row will be written for every queue information change for each of the current primary queue, current opposite direction queue, and maximum queue. (Some events which do not have enough information to have queues, such as events without a primary route and direction, will have no rows written.) Note that this table is identical in structure to the EVENT_QUEUE table, except that in this table, the EFFECTIVE_TIME is part of the primary key (and therefore higher in the list of columns).

EVENT_QUEUE_HISTORY Columns:

+	EVENT_EVENT_ID	CHAR(32)	NOT NULL
+	EFFECTIVE_TIME	DATETIME2(0)	NOT NULL
+	QUEUE_TYPE_CODE	NUMERIC(1,0)	NOT NULL
+	QUEUE_LENGTH_METERS	NUMERIC(6,0)	NOT NULL
+	DIRECTION_CODE	NUMERIC(3,0)	NOT NULL
+	QUEUE_SOURCE_CODE	NUMERIC(1,0)	NOT NULL
+	QUEUE_WARNING_CODE	NUMERIC(1,0)	NOT NULL

+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: EVENT_EVENT_ID, EFFECTIVE_TIME, QUEUE_TYPE_CODE

LINK_DATA_IMPORT Table (Modified):

There is no driver within R14 to modify this table, but the size of its EXT_SYS_NAME column is inconsistent with the ROADWAY_LINK table, so this table will be modified within R14 for consistency reasons.

LINK_DATA_IMPORT Columns:

	IMPORT_ID	NUMERIC(10,0)	NOT NULL
	SYSTEM_TIMESTAMP	DATETIME2(0)	NOT NULL
*	EXT_SYSTEM_NAME	VARCHAR(10)	NOT NULL
	LINK_TRAVEL_TIME_QUAL	NUMERIC(2,0)	NOT NULL
	LINK_SPEED_MPH	NUMERIC(3,0)	NOT NULL
	LINK_HIST_AVG_SPEED_MPH	NUMERIC(3,0)	NOT NULL

PRIMARY KEY: IMPORT_ID (unchanged)

FUNCTIONAL_RIGHT Table New Values:

FR_ID	FR_NAME	FR_DESCRIPTION
157	ExportTrafficEventQueueInfo	Allows the holder to export traffic event queue info .

CODE_LIST Table New Values:

CODE_TYPE_NAME
QUEUE_DATA_CONSUMER_TYPE
QUEUE_SOURCE
QUEUE_WARNING_CODE

CODE_LIST_ITEM Table New Values:

CDL_CODE_TYPE_NAME	TYPE_ CODE	ACTIVE_ INDICATOR	TYPE_NAME
QUEUE_DATA_CONSUMER_TYPE	0	1	Traffic Event
QUEUE_SOURCE	0	1	None
QUEUE_SOURCE	1	1	System (Auto)
QUEUE_SOURCE	2	1	System (On Demand)
QUEUE_SOURCE	3	1	User
QUEUE_TYPE_CODE	0	1	First current queue length (Primary or South/East/Inner)

QUEUE_TYPE_CODE	1	1	Second current queue length (Opposite or North/West/Outer)
QUEUE_TYPE_CODE	2	1	Maximum queue length
QUEUE_WARNING_CODE	0	1	None
QUEUE_WARNING_CODE	1	1	Stale
QUEUE_WARNING_CODE	2	1	Edge
QUEUE_WARNING_CODE	3	1	Quality

SYSTEM_PROFILE Table New Values:

CHART_KEY	CHART_VALUE
chartlite.functionalRightCategory.157	Events

2.4.1.1.2.4.4 Database changes for the Contact Management Feature

2.4.1.1.2.4.4.1 CHART ATMS DB

The R14 Contact Management feature requires 7 new tables, 4 modified tables, and 1 dropped table.

CONTACT Table (New):
Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores contact information. It replaces the existing NOTIFICATION_CONTACT table, which will be dropped after the R13 contacts are migrated to this table.

Comparing the columns in the CONTACT vs. NOTIFICATION_CONTACT tables (respectively):

CONTACT_ID replaces NOTIFICATION_CONTACT_ID

FIRST_NAME replaces NOTIFICATION_CONTACT_INDIVIDUAL_FIRST_NAME

LAST_NAME replaces NOTIFICATION_INDIVIDUAL_LAST_NAME

AGENCY_NAME replaces NOTIFICATION_CONTACT_AGENCY_NAME

EMAIL_ADDRESS replaces NOTIFICATION_CONTACT_EMAIL

UPDATED_TIMESTAMP replaces NOTIFICATION_CONTACT_LAST_UPDATED.

The columns that are new, but which replace existing columns from the NOTIFICATION_CONTACT table are indicated with "+*" in the table description below. The columns indicated with a "+" are entirely new for R14.

The FIRST_NAME, LAST_NAME, and AGENCY_NAME columns in the R14 CONTACT table are nullable (unlike the corresponding columns in the R13 NOTIFICATION_CONTACT table) to allow more logical handling of unspecified values. The AGENCY_NAME column was expanded from 50 to 128 characters to match the size of the ORGANIZATION.ORGANIZATION_NAME column. Otherwise, the datatypes, sizes, and nullable attributes are the same as were used in R13.

The code will set OFFLINE_IND = 1 when a contact is removed, rather than deleting the record, to ensure that the contact will be available for event participation records to reference. The software will prevent a contact from being placed offline unless no participants are using it. An archival process will delete an offline contact.

CONTACT Columns:

+*	CONTACT_ID	CHAR(32)	NOT NULL
+*	FIRST_NAME	VARCHAR(50)	NULL
+*	LAST_NAME	VARCHAR(50)	NULL
+*	AGENCY_NAME	VARCHAR(128)	NULL
+	ATMS_USER_NAME	VARCHAR(32)	NULL

+	BUSINESS_ADDRESS	VARCHAR(256)	NULL
+	MEMO	VARCHAR(256)	NULL
+	NOTIFY_VIA_EMAIL	BIT	NOT NULL
+*	EMAIL_ADDRESS	VARCHAR(128)	NULL
+	OFFICE_OR_SHOP	VARCHAR(128)	NULL
+	RADIO_CALL_SIGN	VARCHAR(32)	NULL
+	TITLE	VARCHAR(128)	NULL
+	OFFLINE_IND	BIT	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+*	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CONTACT_ID

CONSTRAINT: ((FIRST_NAME IS NOT NULL AND LAST_NAME IS NOT NULL) OR AGENCY_NAME IS NOT NULL)

CONSTRAINT: (NOTIFY_VIA_EMAIL = 0 OR EMAIL_ADDRESS IS NOT NULL)

CONTACT_PHONE_NUMBER Table (New):

Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores the prioritized list of phone numbers for each contact.

CONTACT_PHONE_NUMBER Columns:

+	CON_CONTACT_ID	CHAR(32)	NOT NULL
+	SORT_ORDER_NUMBER	TINYINT	NOT NULL
+	PHONE_NUMBER_TYPE	TINYINT	NOT NULL
+	PHONE_NUMBER	VARCHAR (32)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CON_CONTACT_ID, SORT_ORDER_NUMBER
FOREIGN KEY: CON_CONTACT_ID REFERENCES CONTACT.CONTACT_ID

CONTACT_CENTER Table (New):

Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores the IDs of operations centers that are associated with each contact.

CONTACT_CENTER Columns:

+	CON_CONTACT_ID	CHAR(32)	NOT NULL
+	CEN_CENTER_ID	CHAR(32)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CON_CONTACT_ID, CEN_CENTER_ID
FOREIGN KEY: CON_CONTACT_ID REFERENCES CONTACT.CONTACT_ID
FOREIGN KEY: CEN_CENTER_ID REFERENCES CENTER.CENTER_ID

CONTACT_AOR Table (New):
Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores the IDs of the additional AORs associated with each contact.

CONTACT_AOR Columns:

+	CON_CONTACT_ID	CHAR(32)	NOT NULL
+	AOR_ID	CHAR(32)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CON_CONTACT_ID , AOR_ID
FOREIGN KEY: CON_CONTACT_ID REFERENCES CONTACT.CONTACT_ID

CONTACT_DNC_SCHEDULE_ENTRY Table (New):
Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores the entries for the Do Not Contact schedule for each contact.

CONTACT_DNC_SCHEDULE_ENTRY Columns:

+	CON_CONTACT_ID	CHAR(32)	NOT NULL
+	SORT_ORDER_NUMBER	TINYINT	NOT NULL
+	BEGIN_DATE	DATE	NULL
+	THROUGH_DATE	DATE	NULL
+	SUN	BIT	NOT NULL
+	MON	BIT	NOT NULL
+	TUE	BIT	NOT NULL
+	WED	BIT	NOT NULL
+	THU	BIT	NOT NULL
+	FRI	BIT	NOT NULL
+	SAT	BIT	NOT NULL
+	AFTER_TIME_OF_DAY	TIME(0)	NULL
+	UNTIL_TIME_OF_DAY	TIME(0)	NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CON_CONTACT_ID, SORT_ORDER_NUMBER
FOREIGN KEY: CON_CONTACT_ID REFERENCES CONTACT.CONTACT_ID

CALL_LIST Table (New):
Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores the information defining a call list.

CALL_LIST Columns:

+	CALL_LIST_ID	CHAR(32)	NOT NULL
+	ER_EVENT_RESOURCE_ID	CHAR(32)	NULL
+	ERT_EVENT_RESOURCE_TYPE_ID	CHAR(32)	NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CALL_LIST_ID

FOREIGN KEY: ER_EVENT_RESOURCE_ID REFERENCES EVENT_RESOURCE.EVENT_RESOURCE_ID

FOREIGN KEY: ERT_EVENT_RESOURCE_TYPE_ID REFERENCES EVENT_RESOURCE_TYPE.EVENT_RESOURCE_TYPE_ID

CONSTRAINT: ((ER_EVENT_RESOURCE_ID IS NOT NULL AND ERT_EVENT_RESOURCE_TYPE_ID IS NULL) OR (ER_EVENT_RESOURCE_ID IS NULL AND ERT_EVENT_RESOURCE_TYPE_ID IS NOT NULL))

CALL_LIST_CONTACT Table (New):
Rights: The CHART2_NOTIFICATION_ROLE user requires full C/R/U/D rights for this table.

This new table stores the information for the contacts within a call list.

CALL_LIST_CONTACT Columns:

+	CL_CALL_LIST_ID	CHAR(32)	NOT NULL
+	SORT_ORDER_NUMBER	SMALLINT	NOTNULL
+	CON_CONTACT_ID	CHAR(32)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: CL_CALL_LIST_ID, SORT_ORDER_NUMBER

FOREIGN KEY: CL_CALL_LIST_ID REFERENCES CONTACT_CALL_LIST.CALL_LIST_ID

FOREIGN KEY: CON_CONTACT_ID REFERENCES CONTACT.CONTACT_ID

NOTIFICATION_GROUP Table (Modified):

This table is being modified in R14 to add CREATED_TIMESTAMP and UPDATED_TIMESTAMP columns.

NOTIFICATION_GROUP Columns:

	NOTIFICATION_GROUP_ID	CHAR(32)	NOT NULL
	NOTIFICATION_GROUP_NAME	NVARCHAR(50)	NOT NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: NOTIFICATION_GROUP_ID (unchanged)

NOTIFICATION_REQUEST Table (Modified):

This table is being modified in R14 to add a RECIPIENT_NAME column. This serves two purposes – it stores the historical value for the notification group or contact (so that even if a group/contact is deleted, the name can still be displayed), and it stores sufficient data to depersist the new IDL NotificationRecipientInfo struct without needing to obtain the group or contact configuration.

NOTIFICATION_REQUEST Columns:

	NOTIF_ID	CHAR(32)	NOT NULL
	RECIPIENT_ID	CHAR(32)	NOT NULL
	TARGET_TYPE	NUMERIC(1,0)	NULL
+	RECIPIENT_NAME	VARCHAR(256)	NOT NULL

PRIMARY KEY: NOTIF_ID, RECIPIENT_ID (unchanged)

NOTIFICATION_RECORD Table (Modified):

This table is being modified in R14 to drop the NOTIF_RECORD_COUNT column, as it is not used and is always set to a value of 1 (as hard coded in Java). Also, the NOTIF_MANAGER_ID column is being dropped, as it is no longer needed as there is only one notification manager instance, as the architecture is now single-site. (If the notification manager ID changed (such as if the ID file was deleted during installation), notification records could get stuck online since the Traffic Event Service would not find them.)

NOTIFICATION_RECORD Columns:

	NOTIF_ID	CHAR(32)	NOT NULL
	NOTIF_TYPE	NUMERIC(1,0)	NOTNULL
-	NOTIF_RECORD_COUNT	NUMERIC(2,0)	NOTNULL
-	NOTIF_MANAGER_ID	CHAR(32)	NULL
	EVENT_ ID	CHAR(32)	NULL
	AUTHOR	VARCHAR(40)	NOT NULL
	NOTIF_OP_CENTER_ID	CHAR(32)	NOT NULL
	NOTIF_INIT_OP_CENTER_NAME	VARCHAR(16)	NOT NULL
	NOTIF_CREATE_DATE	DATETIME2(0)	NOT NULL
	NOTIF_MESSAGE	VARCHAR (3000)	NOT NULL
	OFFLINE_IND	NUMERIC(1,0)	NOT NULL

	NOTIF_SUBJECT	VARCHAR (512)	NULL

PRIMARY KEY: NOTIF_ID (unchanged)

EVENT_NOTIFICATION Table (Modified):

This table is being modified in R14 to drop the NOTIF_MANAGER_ID, as it is no longer needed as there is only one notification manager instance, as the architecture is now single-site. (If the notification manager ID changed (such as if the ID file was deleted during installation), notification records could get stuck online since the Traffic Event Service would not find them.)

EVENT_NOTIFICATION Columns:

	NOTIF_ID	CHAR(32)	NOT NULL
-	NOTIF_MANAGER_ID	CHAR(32)	NOT NULL
	EVENT_ ID	CHAR(32)	NOT NULL

PRIMARY KEY: NOTIF_ID, EVENT_ID (changed to remove NOTIF_MANAGER_ID)

EVENT_PARTICIPATION Table (Modified):

This table is being modified in R14 to drop the columns that are specific to event resource or type participation after the R13 data is copied / migrated. These columns are indicated with a minus sign below.

A new PARTICIPATION_DATA_TYPE column is added to indicate whether it is an event resource or type participation or a standalone contact participation. For initial migration, all existing participant records will be assigned to the "EventResourceOrType" CODE_LIST_ITEM value added below.

The AUTO_AVL_DETECTION_ENABLED column is renamed to STATUS_ALTERED_BY_USER and the value will be changed from 1 to 0 or vice versa for initial migration.

EVENT_PARTICIPATION Columns:

*	PARTICIPATION_ID	CHAR(32)	NOT NULL
	EVENT_EVENT_ID	CHAR(32)	NOT NULL
-	PARTICIPANT_TYPE	NUMERIC(1,0)	NOT NULL
-	PARTICIPANT_ID	CHAR(32)	NOT NULL
-	ORIGINAL_PARTICIPANT_TYPE	NUMERIC(1,0)	NOT NULL
-	ORIGINAL_PARTICIPANT_ID	CHAR(32)	NOT NULL

-	PARTICIPANT_CHANGED_BY_USER	NUMERIC(1,0)	NOT NULL
+	PARTICIPATION_DATA_TYPE	TINYINT	NOT NULL
	ARRIVED_RESPONDED_TIMESTAMP	DATETIME2(7)	NULL
	NOTIFIED_TIMESTAMP	DATETIME2(7)	NULL
	DEPARTED_TIMESTAMP	DATETIME2(7)	NULL
*	STATUS_ALTERED_BY_USER	NUMERIC(1,0)	NOT NULL
	CALL_SIGN	VARCHAR(128)	NULL
	DRIVER_FIRST_NAME	VARCHAR(128)	NULL
	DRIVER_LAST_NAME	VARCHAR(128)	NULL
	NOTE	VARCHAR(128)	NULL

PRIMARY KEY: PARTICIPATION_ID
FOREIGN KEY: EVENT_EVENT_ID REFERENCES EVENT. EVENT_ID

EVENT_PARTICIPATION_RESOURCE_OR_TYPE Table (New):
Rights: The TRAFFICEVENTSERVICE user requires full C/R/U/D rights for this table.

This new table is based off the EVENT_PARTICIPATION table and will store the current and original participant data for an Event Resource or Type participant. An un-constrained reference to the CONTACT table is also available for an optional contact association.

EVENT_PARTICIPATION_RESOURCE_OR_TYPE Columns:

+	EVENT_PARTICIPATION_ID	CHAR(32)	NOT NULL
+	PARTICIPANT_ID	CHAR(32)	NOT NULL
+	PARTICIPATION_TYPE	TINYINT	NOT NULL
+	ORIGINAL_PARTICIPANT_ID	CHAR(32)	NOT NULL
+	ORIGINAL_PARTICIPANT_TYPE	TINYINT	NOT NULL
+	PARTICIPANT_CHANGED_BY_USER	BIT	NOT NULL
+	CON_CONTACT_ID	CHAR(32)	NULL
+	OPT_PHONE_NUMBER_LAST_USED_TYPE	TINYINT	NULL
+	OPT_PHONE_NUMBER_LAST_USED	VARCHAR (32)	NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: EVENT_PARTICIPATION_ID

FOREIGN KEY: EVENT_PARTICIPATION_ID REFERENCES
EVENT_PARTICIPATION.PARTICIPATION_ID

FOREIGN KEY: CON_CONTACT_ID REFERENCES
CONTACT.CONTACT_ID

EVENT_PARTICIPATION_CONTACT Table (New):

Rights: The TRAFFICEVENTSERVICE user requires full C/R/U/D rights for this table.

This new table will store pertinent data of a contact that is assigned as a standalone participant in a traffic event. The CON_CONTACT_ID column will provide an un-constrained reference to a record within the CONTACT table.

EVENT_PARTICIPATION_CONTACT Columns:

+	EVENT_PARTICIPANT_ID	CHAR(32)	NOT NULL
+	CON_CONTACT_ID	CHAR(32)	NOT NULL
+	PHONE_NUMBER_LAST_USED_TYPE	TINYINT	NULL
+	PHONE_NUMBER_LAST_USED	VARCHAR(32)	NULL
+	CREATED_TIMESTAMP	DATETIME2(0)	NOT NULL
+	UPDATED_TIMESTAMP	DATETIME2(0)	NOT NULL

PRIMARY KEY: EVENT_PARTICIPANT_ID

FOREIGN KEY: EVENT_PARTICIPATION_ID REFERENCES EVENT_PARTICIPATION.PARTICIPATION_ID

FOREIGN KEY: CON_CONTACT_ID REFERENCES CONTACT.CONTACT_ID

FUNCTIONAL_RIGHT Table New / Modified Values:

FR_ID	FR_NAME	FR_DESCRIPTION	Comments
39	ConfigureContacts	Allows the holder to add/remove contacts and edit all fields of a contact except notification group associations.	Changed name (was: ConfigureNotificationContacts). Changed description to clarify which fields can be edited
105	ViewContactInfo	Allows the holder to view contact information (including phone numbers), notification groups, and call lists.	Changed name (was: ViewNotificationRecipients). Changed description to clarify what information can be viewed
142	ConfigureNotificationGroups	Allows the holder to add/remove notification groups and edit all fields of a notification group.	Changed description to clarify which fields this right allows to be edited
143	ConfigureNotificationGroup AndContactAssociations	Allows the holder to edit the membership of contacts within notification groups, but not necessarily edit any other fields.	Fixed incorrect name to match Java code (was: ConfigureContactAssociations) Changed description to clarify which fields can be edited
144	ConfigureContactEmail	Allows the holder to edit the email address and	Changed name (was: ConfigureNotificationContactEmai

		notifyViaEmail flag for a contact, but not necessarily edit any other fields.	l) Changed description to clarify which fields can be edited
148	ManageEventResources	Allows the holder to configure Event Resources and Types (including creating/removing call lists for the resource/type).	Changed description to state that this includes the ability to create/remove call lists
162	EditDoNotContactSchedule	Allows the holder to edit the Do Not Contact Schedule for any contact.	New for R14
163	EditCallLists	Allows the holder to edit an existing call list (add, remove, or reorder contacts within the call list).	New for R14

SYSTEM_PROFILE Table New/Modified Values:

CHART_KEY	CHART_VALUE	Comment
chartlite.functionalRightCategory.39	Contacts	Changed from "Notification"
chartlite.functionalRightCategory.105	Contacts	Changed from "Notification"
chartlite.functionalRightCategory.144	Contacts	Changed from "Notification"
chartlite.functionalRightCategory.162	Contacts	New
chartlite.functionalRightCategory.163	Contacts	New

CODE_LIST Table New Values:

CODE_TYPE_NAME
PHONE_NUMBER_TYPE
PARTICIPATION_DATA_TYPE

CODE_LIST_ITEM Table New Values:

CDL_CODE_TYPE_NAME	TYPE_ CODE	ACTIVE_ INDICATOR	TYPE_NAME
PHONE_NUMBER_TYPE	0	1	Work
PHONE_NUMBER_TYPE	1	1	Home
PHONE_NUMBER_TYPE	2	1	Pager
PHONE_NUMBER_TYPE	3	1	Mobile
PHONE_NUMBER_TYPE	4	1	Fax
PHONE_NUMBER_TYPE	5	1	Other
PARTICIPATION_DATA_TYPE	0	1	EventResourceOrType
PARTICIPATION_DATA_TYPE	1	1	Contact

2.4.1.1.2.4.5 Database Changes for PR Fixes to be Included in R14

2.4.1.1.2.4.5.1.1 LevA 7337 – Allow Password Reset Requests

This PR includes changes to allow a user to request to have their password reset. The system uses the existing Notification system to send password reset e-mails to end users when requested, and those e-mails contain a link to allow the user to initiate the reset. We don't want other users to be able to view the content of those notifications (or other notifications regarding user accounts) so we added a new functional right that is required for users to be able to view the content of password reset notifications and other user account related notifications (requests for new accounts or request to have an existing account enabled). The following database changes are required for this new functional right:

FUNCTIONAL_RIGHT Table New Values:

FR_ID	FR_NAME	FR_DESCRIPTION
164	ViewSensitiveNotifications	Allows the holder to view sensitive notification messages, such as password reset messages.

SYSTEM_PROFILE Table New Values:

CHART_KEY	CHART_VALUE
chartlite.functionalRightCategory.164	Notification

2.4.1.1.2.5 Database Conversion

A database migration script will be needed in CHART ATMS R14 to migrate queue length data stored in the MAX_QUEUE_LENGTH column in the EVENT table to the EVENT_QUEUE table for R14. There are relatively few records which have data in the MAX_QUEUE_LENGTH column: on the order of 0.5%. As of the time of this writing, approximately 6000 of 1,000,000 events in the CHART_Archive database have a non-zero queue length, and it is estimated that approximately 5 of 1000 events in the CHART_Live database will have a non-zero queue length in the CHART_Live database. For any event which has a non-zero MAX_QUEUE_LENGTH, an EVENT_QUEUE record will be created, and populated as follows:

EVENT_EVENT_ID = EVENT.EVENT_ID

QUEUE_TYPE_CODE = 2 (Maximum queue)

QUEUE_LENGTH_METERS = EVENT.MAX_QUEUE_LENGTH

DIRECTION_CODE = 0 (None)

QUEUE_SOURCE_CODE = 3 (User)

QUEUE_WARNING_CODE = 0 (None)

EFFECTIVE_TIME = EVENT.EVENT_CLOSED_TIME

A migration script will be needed to copy the R13 contacts from the NOTIFICATION_CONTACT table to the new R14 CONTACT table. A script will be needed to initialize the values for the new NOTIFICATION_REQUEST.RECIPIENT_NAME column using information from the CONTACT and NOTIFICATION_GROUP tables. (Note – these two scripts have already been written).

After the R13 contact data is migrated to the R14 CONTACT table, script(s) may be needed to merge in any contact data from the SHADE database. The script(s) will need to update existing contacts and add contacts that are present in SHADE, but not present in CHART ATMS, while not creating duplicate contacts in ATMS or overwriting existing fields. The merging of the SHADE contacts will likely need the information for each contact to be reviewed by a human, as the first / last name fields, email address, and possibly the agency field are the only possible "keys" finding existing records in ATMS, but it's also possible that those keys are not reliable (names spelled slightly differently, prefixes/suffixes, etc). Also, even if a match is found, it's possible that the other fields in SHADE could contain invalid information that might not be desirable to import.

A migration script will also be required to copy the resource/type specific fields from the R13 event participations from EVENT_PARTICIPATION into PARTICIPATION_EVENT_RESOURCE_OR_TYPE. The default value for the PARTICIPANT_TYPE for the migration script will be 0 to indicate participants of an event resource or type value. The migration script will also update the STATUS_ALTERED_BY_USER column within the EVENT_PARTICIPATION table with a value of 1 for each value of 0 and vice versa for the data migrated from the previously renamed R13 column: AUTO_AVL_DETECTION_ENABLED.

2.4.1.1.2.6 PL/SQL Module Definition and Database Trigger Reports

There are no new PL/SQL modules for CHART ATMS R14.

2.4.1.1.2.7 Database Size Estimate - provides size estimate of current design

CHART ATMS R14 causes an increase in the size of the CHART ATMS database as follows:

- CHART administrators are expected to add between 20 to 50 SOP document definitions to the database with no more than 50 definitions total anticipated. Data required to store these definitions is insignificant.
- Currently there are less than 10 On/Off devices in the state. Data required to store configuration and status info for those devices is insignificant.
- The EVENT table and EVENT_QUEUE table will add 137 bytes per event (3 x 46 bytes per EVENT_QUEUE entry minus one byte removed from the EVENT table for the old MAX_QUEUE_LENGTH). At 400 events per day (August 2014 average) that is 54,800 more bytes per day. This data is archived into the CHART_Archive database each day, so the real impact is about 55KB additional per day (20MB/year) in CHART_Archive, accumulating forever.
- Figure the average event will have 14 automatic log entries for event queue info, and 8 log entries for operator updates to event queues. The average log entry should be about 90 bytes of text, which contributes to 285 bytes per log entry. Figuring 22 entries per event, that is 6270 more bytes per event, and at 400 events per day, 2,508,000 more bytes per day. This data is archived into the CHART_Archive database each day, so the real impact is about 2.5MB additional per day (900MB/year) in CHART_Archive, accumulating forever.

- For structured EVENT_QUEUE_HISTORY, given events are open an average of 200 minutes each (August 2014 average), this results in 100 queue calculation opportunities per event, but figure only 30% of those will result in recordable changes. Also figure that half of these will be rising (increasing the maximum and adding an entry for the maximum queue) and half will be falling. So that is 30+15=45 structured EVENT_QUEUE_HISTORY entries per event, which accounts for 2070 bytes per event and 8288,000 more bytes per day given 400 events per day. This data is archived into the CHART_Archive database each day, so the real impact is about 830KB additional per day (300MB/year) in CHART_Archive, accumulating forever.
- All of the above adds to 1.2GB/year of growth in the CHART_Archive database over the current R13 growth rate.
- The major increase is in the LINK_RAW_DATA and LINK_SMOOTHED_DATA tables. Currently in R13 there are 865 rows written to LINK_RAW_DATA every two minutes. This will increase to 8759 rows, an increase of 7894 rows, and also each row increases by one byte to store the additional historical average speed. The R13 rate is 25KB/2mins, or 750KB/hour. The R14 rate is 263KB/2mins, or 8MB/hour. A maximum of 8 hours is held in CHART_Live before being archived, so that is a maximum of 63MB in R14, as compared with 6MB in R13, an increase of 57MB. The LINK_SMOOTHED_DATA table doubles this, so this is a net increase of 114MB in the R14 CHART_Live database. The CHART_Archive database holds 90 days of this data before being permanently purged. The 90 days is 90x3 or 270 times the 8 hours held in the CHART_Live database, so that is an increase of 31GB of data stored in the CHART_Archive database at any given time.
- There are expected to be on the order of 2000 contacts added from the SHADE data (vs. 600 defined in R13). The CONTACT table fields should require up to 1250 bytes per contact (worst case, with varchars at maximum capacity) for a total of 2.5 MB for 2000 contacts. The auxiliary contact and call list-related tables are likely to be sparsely populated, and probably will add less than that amount again. The contact and call list data is also static,and once defined, will not grow by itself.
- The addition of the RECIPIENT_NAME column to the NOTIFICATION_REQUEST table will likely add an average of around 30-50 bytes per specified contact/group when sending a notification, which could double the storage size for that table, but the amount of data stored in the table should be relatively small and is cleaned up by an archival process. The removal of the NOTIF_MANAGER_ID from NOTIFICATION_RECORD and EVENT_NOTIFICATION also offsets this by 64 bytes per notification.

2.4.1.1.2.8 Data Distribution

There are no changes to data distribution for R14.

2.4.1.1.2.9 Database Replication

Database replication is not used in R14.

2.4.1.1.2.10 Database Failover Strategy

The database failover strategy is defined as part of Work Order 27. There are no changes to the database failover strategy for R14.

2.4.1.1.2.11 Reports

No reports are added or updated for R14. Since R5, the CHART reporting function has been transferred to University of Maryland.

2.4.1.2 CHART Flat Files

The following describes the use of flat files in CHART ATMS.

2.4.1.2.1 Service Registration Files

In CHART ATMS R14 there are new service registration files to support the installation of the new On/Off Device Service and its associated CORBA Event Service. There are no changes to any existing service registration files.

2.4.1.2.2 Service Property Files

The Notification Service properties file will has a new setting for the amount of time (age) after which expired Do Not Contact schedule entries may be removed. There are new property files for the new On/Off Device Service and its associated CORBA Event Service.

2.4.1.2.3 GUI Property Files

There are only minor updates to the GUI properties file in its WEB-INF directory for CHART ATMS R14.

2.4.1.2.4 Device Logs

There are no changes to Device Log Files for CHART ATMS R14.

2.4.1.2.5 Service Process Logs

All CHART ATMS services write to a process log, used to provide a historical record of activity undertaken by the services. These logs are occasionally referenced by software engineering personnel to diagnose a problem or reconstruct a sequence of events leading to a particular anomalous situation. These logs are automatically deleted by the system after a set period of time defined by the service's properties file, so they do not accumulate infinitely. These files are stored in the individual service directories and are named by the service name and date, plus a "`.txt`" extension. These logs are typically read only by software engineering personnel. Except where noted, there are no changes for service process logs for R14 features.

- For R14 a new service process log will be added for the new OnOffDevice service. Files include: `OnOffDeviceService_YYMMDD.txt`, `jacorb_YYMMSS.txt`, `ServiceTrace-YYMMDD.txt`.

2.4.1.2.6 Service Error Logs

All CHART ATMS services write to an error log, used to provide detail on certain errors encountered by the services. Most messages, including most errors, are captured by the CHART

ATMS software and written to the process logs, but certain messages (typically produced by the Java Virtual Machine itself, by COTS, or DLLs) cannot be captured by CHART ATMS Software and instead are captured in these "catch-all" logs. Errors stored in these logs are typically problems resulting from a bad installation; once the system is up and running, errors rarely appear in these error logs. Debugging information from the JacORB COTS, which is not usually indicative of errors, can routinely be found in these error logs, as well. These log files can be reviewed by software engineering personnel to diagnose an installation problem or other type of problem. These logs are automatically deleted by the system after a set period of time defined by the service's properties file, so they do not accumulate infinitely. These files are stored in the individual service directories and are named by the service name and date, plus an ".err" extension. These logs are typically read only by software engineering personnel. Except where noted, there are no changes for service error logs for R14 features.

- For R14 a new service error log will be added for the new OnOffDevice service. OnOffDeviceService_YYMMDD.err.

2.4.1.2.7 GUI Process Logs

Like the CHART background services, the CHART ATMS GUI service also writes to a process log file, used to provide a historical record of activity undertaken by the process. These GUI process logs are occasionally referenced by software engineering personnel to diagnose a problem or reconstruct a sequence of events leading to a particular anomalous situation. These logs are automatically deleted by the system after a set period of time defined by the GUI service's properties file, so they do not accumulate infinitely. These files are stored in the `chartlite/LogFiles/` directory under the `WebApps/` directory in the Apache Tomcat installation area. They are named by the service name ("`chartlite`") and date, plus a "`.txt`" extension. These logs are typically read only by software engineering personnel. Additional log files written by the Apache Tomcat system itself are stored in the `log/` directory in the Apache Tomcat installation area.

- The CHART ATMS R14 GUI changes do not change the way the GUI process logs operate.

2.4.1.2.8 FMS Port Configuration Files

The CHART ATMS Communications Services read a Port Configuration file, typically named `PortConfig.xml`, upon startup, which indicates which ports are to be used by the service and how they are to be initialized. A Port Configuration Utility is provided which allows for addition, removal of ports and editing of initialization parameters. As indicated by the extension, these files are in XML format. This means these files are hand-editable, although the Port Configuration Utility allows for safer, more controlled editing. The Port Configuration files are typically modified only by software engineers or telecommunications engineers.

- There are no changes to this section for the any of the CHART ATMS R14 features.

2.4.1.2.9 Watchdog Configuration Files

The Watchdog service will be configured to monitor the new On/Off Device service.

2.4.2 Database Design

Changes made to the CHART ATMS database design for Release 14 features are described below.

2.4.2.1 CHART ATMS DB

2.4.2.1.1 SOP Feature

The R14 SOP feature requires three new tables and provides updates to four tables. See the details described in section 2.4.1.1.2.4.1 above.

2.4.2.1.2 On/Off Device Feature

The R14 On/Off Device feature requires several new tables. See the details described in section 2.4.1.1.2.4.2 above.

2.4.2.1.3 Traffic Event Queue Calculation Feature

The R14 Traffic Event Queue Calculation feature requires several new tables and updates to others. See the details described in section 2.4.1.1.2.4.3 above.

2.4.2.1.4 Contact Management Feature

The R14 Contact Management feature requires several new tables and updates to others. See the details described in section 2.4.1.1.2.4.3 above.

2.4.2.1.5 PR Fixes to be Included in R14

The PR fixes included in R14 require database changes as specified in section 2.4.1.1.2.4.5 above.

2.4.2.2 Archiving - Changes

The CHART ATMS Archive database stores data from the CHART operational system as part of a permanent archive. The CHART ATMS Archive database design is a roughly copy of the CHART ATMS operational system for those tables containing system, alert, traveler information messages and their underlying data, and event log information. In addition, the CHART ATMS Archive database stores detector data. In R14, the archive will be changed as follows:

- New tables for the SOP feature as specified in section 2.4.1.1.2.4.1 above will be incorporated into the archive database, and archiving functionality will be modified to archive this data.
- Devices included in the ON_OFF_DEVICE table as specified in section 2.4.1.1.2.4.2 above will be incorporated into the existing archive database DEVICE table.
- New and modified tables for the Queue Calculation feature as specified in section 2.4.1.1.2.4.3 above will be incorporated into the archive database, and archiving functionality will be modified to archive this data.
- New and modified tables for the Contact Management feature as specified in section 2.4.1.1.2.4.3 above will be incorporated into the archive database, and archiving functionality will be modified to archive this data.

3 Key Design Concepts

3.1 SOP

The SOP design is straightforward and involves very little complexity. The SOP document list is displayed within a new section in the System Profile. The SOP List page allows sorting on all columns except the Actions and SOP Link columns, and allows filtering specifically on the operations centers and event triggers columns. The list page also displays columns based on user's rights to View SOPs or Manage SOPs. The Add/Edit page for SOP provides validation on the length requirements for the SOP fields of document name and introductory header. The SOP popup is implemented by a reusable javascript ("JS") method that displays a list of SOP objects. For each SOP object, the SOP document name and introductory header are formatted and displayed in an HTML construct. For trigger actions within the context of a traffic event, the JS method is invoked upon execution of a user's mouse event such as clicking on a checkbox, updating a field value, or upon page load. The SOP popup appears close to the mouse event or in the upper right portion of the working window or page.

A few trigger actions also occur outside a traffic event, and are handled separately from traffic events. For the trigger conditions related to creation of a(n) Congestion, Action, or Weather Service event, the flex method calls for ExternalInterface are updated to pass parameters to the Event Details page. Upon loading of the page for a new event, these parameters will be used to determine whether a call to the JS method for display of the popup is made. For the trigger condition related to successful log on to ATMS, the loading of the Acknowledgement Page is considered execution of a successful user login. The SOP popup will then be displayed for this page for matching users with the specified rights.

The SOP Guidance section on the Event Details page uses the current event state to determine if any trigger conditions are presently satisfied. If the traffic event is an incident event, the event state is tested for vehicle counts of specific vehicle types and their involvement status. Vehicle counts greater than zero indicate that relevant SOP document definitions should be considered for display in the section. In addition, for incident events, the current incident type is tested to determine if any relevant SOP definitions for incident types should be considered. If the traffic event is an action event, the action event type is tested for specific types and any matching SOP document definitions are displayed within the section. If the traffic event supports roadway configuration, the current lane configuration status is tested to determine the percentage of lanes closed. If the travel lanes in at least one direction are 100% blocked, then any matching SOP definitions with the related trigger are displayed in the SOP Guidance section as well.

3.2 On/Off Devices

The design to allow CHART ATMS to support fog warning devices is generic and will support any simple device that can be turned on or off (activated or deactivated) via a supported model of electronic relay. Because of the generic nature of the design, these devices are referred to as "On/Off Devices" rather than "Fog Warning Devices". To achieve the ability to support multiple types of on/off devices, the design includes the concept of an "On/Off Device Type". The system allows the administrator to define any number of on/off device types to identify the different types of on/off devices that may exist in the system. The system is initially populated

with two on/off device types, Fog Beacon and Fog Horn. In addition to providing a name for a type of on/off device, the definition of an on/off device type also serves to specify the set of icons used to represent that type of on/off device within CHART ATMS. An icon set consists of 38 separate icons used to represent the various device mode and status combinations that may exist. Custom icon sets are included in the system for Fog Beacon and Fog Horn, and a generic set of icons is included for use with other on/off device types that are added to the system. The system also supports the use of a custom icon set for other on/off device types that are added, however the icon set must be created outside of the system and manually installed into the proper location of the CHART ATMS GUI before being available for use in the configuration of an on/off device type. There is no support within CHART ATMS to create / install a custom icon set for an on/off device type; only support to configure an on/off device type to utilize an icon set that has already been created and installed. When adding or editing an on/off device type, the administrator has the ability to choose to use the generic icon set, or to provide configuration values required to use an existing, pre-installed custom icon set.

CHART ATMS supports the use of electronic relays from HW-Group, models ER02a and ER02b as the underlying controller for an on/off device. The ER02b model is only supported if it has been loaded with the ER02a firmware. CHART ATMS operates either model relay exactly the same, using the ER02a protocol. When adding an on/off device to CHART ATMS or changing the model of an existing on/off device in CHART ATMS, the system allows the administrator to specify which model relay is used to control the device. This selection has no effect on how CHART ATMS communicates with the relay, but does provide the ability for a maintainer to know which model is installed (native ER02a vs. ER02b with ER02a firmware). The existing HWGER02AProtocolHandler class is packaged in CHART2.SHAZAMProtocols and is loosely tied to SHAZAMs through its use of BeaconState. The class will be moved to a new package (CHART2.DeviceUtility.RelayProtocols and will be modified (minor) to make it generic (no reference to SHAZAM or On/Off Device concepts). The OnOffDeviceModule and SHAZAMModule will use this class.

CHART ATMS allows on/off devices to be included in the response plan of a traffic event. The design leverages the existing framework that is currently used for including DMS and HAR devices in the response plan of a traffic event, including the concept of an Arbitration Queue. The main difference between on/off devices and DMS devices is on/off devices don't have a message; they can simply be on or off. When an on/off device is included in the response plan of a traffic event, the intent is for the on/off device to be on/activated while the response plan item is in an "executed" state, and for the device to be off/deactivated while the response plan item is not in an "executed" state. When multiple traffic events have the same on/off device in their response plan, the system will activate the device if at least one response plan item is executed. It doesn't matter if other events include the on/off device in their response plan in a "not executed" state; it only takes one traffic event with a response plan item for the on/off device to be in the executed state for the device to be activated. For this reason, the priority levels in the arbitration queue for an on/off device don't have any bearing on whether or not the device will be activated. Despite this fact, the system will include priority levels in an on/off device arbitration queue and even allow the user to change priority levels of an event on the queue, however doing so will have no effect on whether or not the device is active. This is done to allow existing GUI and Server design and code to be reused for on/off devices.

When the system polls an on/off device, the system will check if the current state of the on/off device matches the last commanded state as known to CHART ATMS. If the state is found not to match, CHART ATMS will command the device to the desired state. This ensures that if a device is commanded outside of CHART ATMS or otherwise becomes set to the wrong state (on when it should be off, or off when it should be on), ATMS will set the device to the proper state. This is similar to existing DMS processing, which will change the DMS message if during polling it is found not to match the message as specified by ATMS.

Other aspects of this design are not considered to be key design decisions; the design leverages existing frameworks and/or parallels the design already in place for DMS devices.

3.3 Traffic Event Queue Calculation

The design supports the link queue calculation functionality in a way that is generic and not tied to Traffic Events specifically. Because of the close relationship between roadway links and travel routes the link queue calculation functionality is designed as part of the TravelRouteModule (TravelRouteManagement.idl). The maximum queue length value available for traffic events will be replaced with 3 sets of queue information including a length, direction and optional warning indicator. 2 sets of queue information will represent the current directional queues for the event (primary/opposite for directional events, South/North, East/West, and Inner/Outer Loop for bi-directional events). The 3rd set of queue information will store the maximum queue length over the lifetime of the event.

The design takes advantage of existing roadway link data already available in CHART enhanced for R14 with historic MPH. The roadway links for Interstate, US and MD roads are loaded into a QuadTree for quick searching. Each link is keyed using the link starting lat/lon and the link ending lat/lon. Longer links may also be keyed with additional points (lat/lons) along a straight line between the starting and ending lat/lons to increase the visibility of the link when querying the QuadTree. RoadwayLinks connect to other RoadwayLinks in 2 ways.

- Implicitly – By virtue of the *close* proximity of a link's starting point and the adjacent upstream link's ending point we can search the QuadTree for the closest link that matches a link's route info and direction to find the next upstream link.
- Explicitly – Using a database table we can explicitly connect a link to its next upstream link which will take precedence over implicit connections. This table contains a gap length between the 2 links being connected. Limited use in R14 to handle specific data issues (Ex. I-95 connectivity to I-95 portion of Washington Beltway). Possible expanded use in future releases.

The design implements a non-branching algorithm for queue calculation (only queue on primary route is calculated) because of the lack of link connectivity at interchanges (see assumptions and constraints section).

The design supports the calculation of current directional queues for open traffic events that have a primary route, lat/lon and a direction other than NONE. This system will automatically calculate queues information for events. Automatic queue calculation for events can be disabled by an administrator on a system wide basis. Operators can manually specify queue information for current directional queues which will stop the automatic calculation for that queue (overriding auto calculation). Operators can also request an on-demand queue calculation for an event's current directional queue which gives them the opportunity to accept the system

calculated info or discard it. If the operator accepts the queue information (updates the event) the system will continue to automatically calculate the queue information for the event or re-initiate automatic calculation if the queue was previously overridden.

3.4 Contact Management

The design for the Contact Management feature is fairly straightforward, with the main challenge being reorganizing the existing R13 design, code, and database to support the new functionality. In R13, contacts served only one purpose (notification), and the design reflected that. In R14, contact-related functionality is moved to a new ContactManagement IDL module, which is independent of the notification functionality. (The new module also includes call list management). Beyond that, several aspects of the IDL design are cleaned up to simplify the code. For example, the group/contact associations were stored in both the contact and the group configuration data in R13, making it more difficult to maintain consistency. In R14, only the notification group keeps track of its members. Also, the concept of a "recipient" being either a contact or a group was overused in a number of places in the R13 IDL, making the resulting code more complex and less specific than it should have been, so in R14 this concept is being mostly removed by dealing with notification groups and contacts in separate lists.

In R14, the Notification Module serves both the NotificationManager and the new ContactManager interface to ensure that the contact information will be present in the local process for cache lookup. When sending a notification, it needs to look up certain information for each contact including the name, allow notification flag, and email address. In R13, the sendNotification() method required the ATMS GUI or other client (such as other ATMS services that need to send notifications) to pass in the full configuration data for the contact or notification group when sending a notification. This method is being changed in R14 to only require IDs to be specified, as this information is known by the Notification Service but not necessarily by the GUI or client service (and if known, may be incorrect or stale). Also in R13, no data was cached in the Notification Service, so when any information was needed (such as looking up the name of a group or contact for an operations log message) a database query was performed. Notification service startup required multiple DB queries for each online notification, and fairly complex database joins. In R14, the contacts, call lists, and notification groups will be cached in memory for fast access.

The Notification Manager ID field that was being stored in the database for each notification record is being removed in R14, as it caused notifications to be stuck online if the ID changed (such as after an installation) and the traffic event service could not find the notification manager with the same ID. Now that ATMS uses a single-site architecture the notification manager ID is not necessary, as all notifications are served by the same manager. This will also simplify logic in the Traffic Event Service to find notifications.

In the Traffic Event Service and ATMS GUI, the ability to add a standalone contact as an event participant requires a reorganization of the participation-related IDL structures, code, and database.

The ATMS GUI design is fairly simple, with the R14 prototype being fairly close to the actual design, but one of the remaining challenges is exporting the Contact List as different formats (PDF, CSV, and HTML for printing) using the existing column visibility, sorting, and filtering criteria. Fortunately, the dynamic list (DynList)-related classes contain this state information and

allow the visibility / sorting / filtering criteria to be used within Java in addition to their current use, which until now has been limited to Velocity templates. A new interface called DynListContentStreamer allows generic streaming of dynamic lists, providing the HTTP content type and the ability to stream the DynList to an output stream. This generic interface / feature should be useful not only in R14 for the Contact List, but also for other dynamic lists as well. The PDF streaming promises to be by far the most complex format to implement. The IText library would probably have been the easiest for PDF generation; however, since that would require a commercial license, the Apache PDFBox library will be used instead. Unfortunately PDFBox does not have built-in support for tables, although there are a couple of user-written add-on libraries that could be used to add table functionality. There is some risk that these may not be easy to use, or may be buggy.

3.5 Packaging

3.5.1 CHART ATMS

This software design is broken into packages of related classes. Table 3-1 shows each package that is new or changed to support the Release 14 features.

Table 3-1. CHART ATMS Packages

Package Name	Package Description
CHART2.AlertManagement	This IDL package has minor update for R14 related to the addition of OnOffDevices.
CHART2.Common (generated)	New definitions for the ConditionSchedule (a schedule indicating when some condition is true)
CHART2.ContactManagement (generated and hand-coded)	New IDL package for management of contacts and call lists. Hand-coded utility classes for dealing with the IDL-generated code.
CHART2.DeviceUtility.RelayProtocols	This new package contains the new HWGER02AProtocolHandler that has be refactored to be generic for use with SHAZAMs and On/Off Devices.
CHART2.INRIXImportModule	This package is modified to collect historical average speeds for links roughly once per hour.
CHART2.NotificationManagement (generated and hand-coded)	Extensive changes in the IDL to remove the contact functionality (which is moving to ContactManagement) , and corresponding changes in the hand-coded utility classes.
CHART2.NotificationModule	Extensive changes for contact management and notification. This module will also serve the ContactManager interface.
CHART2.OnOffDeviceControl (generated)	This IDL package is new to define the server interface for features related to on/off devices.
CHART2.OnOffDeviceControl	This package contains implentations for valuetypes specified in the OnOffDeviceControl IDL.
CHART2.OnOffDeviceControlModule	This new server package provides the server module that hosts on/off device (and factory) CORBA objects.
CHART2.SOPManagement	This IDL package is new to support SOP requirements and features.
CHART2.SOPModule	This package is new to support SOP document requirements and features.

Package Name	Package Description
CHART2.TrafficEventManagement	This package has IDL changes required to support link queue calculation. It also has changes related to the use of contacts participating in a traffic event.
CHART2.TravelEventModule	This package is changed to support the objects related to link queue calculation. It also has changes related to the use of contacts participating in a traffic event, and the removal of logic involving the notification manager ID.
CHART2.TravelRouteManagement	This package has IDL changes required to support link queue calculation.
CHART2.TravelRouteModule	This package is changed to support the objects related to link queue calculation.
CHART2.Utility	Classes for dealing with the ConditionSchedule IDL structure that is defined in the Common package.
CHART2.Utility.ObjectCache.sop	This package is new to support discovery and handling of SOP document events.
CHART2.webservices.dataexporter. trafficeventexportmodule	This package is changed to support the export of new traffic event queue information.
chartlite.data.onoffdevice	This new GUI package supports the caching of data related to on/off devices.
chartlite.data	Changes to support new System Profile settings.
chartlite.data.contacts	New package containing the contact and call list wrapper classes, discovery code, and cache.
chartlite.data.notification	Changes to remove the use of "notification contacts" and "recipients" corresponding to the IDL changes.
chartlite.data.sop	This package is new to support caching and handling of SOP data.
chartlite.data.trafficevents	Changes to support IDL changes for queue calculation including updates to WebTrafficEvent, WebBasicEventData, WebMergeEvent and TrafficEventPushConsumer. Changes to support the use of contacts used in traffic event participation corresponding to IDL changes.
chartlite.data.travelroutes	Changes to support IDL changes for queue calculation.
chartlite.servlet.contacts	New package to handle requests related to contacts and call lists (management and display).
chartlite.servlet.dynlist	New request handler and implementation classes to support the streaming of dynamic lists in various formats (PDF, CSV, HTML)
chartlite.servlet.notification	Changes to remove contact management functionality, and deal with any other changes corresponding to the new IDL.
chartlite.servlet.onoffdevice	This new GUI package supports user interface requests related to on/off devices.
chartlite.servlet.sop	This package is new to support SOP Document List related requests.
chartlite.servlet.trafficevents	This package is changed to support SOP event triggers and related requests. Also changes to support displaying queue calculations for and event and requesting on-demand queue calculations for an event. Changes to support the use of contacts in traffic event participation.

Package Name	Package Description
chartlite.servlet.usermgmt	This package is updated to support SOP event triggers related to system login. Also changes to support new System Profile Property settings related to queue calculation functionality.

3.6 Assumptions and Constraints

3.6.1 SOP

1. All SOP links contain URLs that are accessible from the user's browser.
2. There is no limit to the number of times a user with the specific rights views an SOP popup when applicable SOP documents exist for an executed trigger action.
3. The system does not keep track of each time an SOP link is presented to the user or each time an SOP link is clicked or ignored.
4. Any new trigger actions beyond the 22 trigger actions determined in the JAD requires code changes if requested after implementation.
5. Relevant SOP definitions are not saved as part of a traffic event nor exported by CHART ATMS. SOP definitions are managed by the SOP Module.
6. All information pointed to by the SOP document URL's are inputted and maintained by SHA.

3.6.2 On/Off Devices

1. Assumption: The ER02b model relay will always be loaded with ER02a firmware prior to attempting to use the device within CHART ATMS.
2. Assumption: The ER02b model relay, when loaded with ER02a firmware, will operate in exactly the same manner as an ER02a model relay.
3. Constraint: Aside from fog beacons and fog horns, the system will not provide customized icon sets for additional on/off device types. A generic set of icons will be provided and can be used for additional on/off device types. Custom icon sets for additional on/off device types will be supported by configuration only; the icon set must be created and installed outside of CHART ATMS. Creation of custom icon sets, other than for Fog Beacon and Fog Horn are outside the scope of ATMS R14.
4. Constraint: Support for on/off devices will utilize existing frameworks that were built to support the other device types that exist in the system, such as DMS and HAR. Because those existing devices either display or play a message, some aspects of the existing framework assume all devices display or play a message. We will fit the on/off devices into these existing frameworks, making concessions where necessary to avoid changing the frameworks so we can be assured not to affect the other devices that already exist in CHART ATMS. This includes the Arbitration Queue, which contains priority levels that will exist for on/off devices but have no effect on whether or not an on/off device is activated. Also, some existing CHART ATMS screens may include a

"Message" column, such as for plans or response plans, and for on/off devices we will use a value in that column that indicates the device will be activated.

3.6.3 Traffic Event Queue Calculation

1. Constraint: INRIX links not well connected at interchanges. Data currently only supports following the single main highway an event is on.
2. Constraint: INRIX links properly cover only Interstate, U.S. and MD routes but not other routes. Only Interstate, U.S. and MD routes will be used.
3. Constraint: INRIX links imported into CHART generally stop at state boundaries. Queues will not extend (much) beyond state lines.
4. Contraint: Queue Calculation is limited to the granularity of INRIX links (~12% > 2 miles long, including ~5% of links > 3 miles long).
5. Constraint Queue Calculation can be only as good as the INRIX data feeding it (both in terms of current speeds and historical average speeds).
6. Constraint: Calculation of any given queue will terminate after too many consecutive poor quality links are found.
7. Assumption: A task will be added to identify and exclude local lanes in local/express environments (Ex. I-270 in Montgomery Co.) as it is not possible to distinguish between local / express lanes in INRIX data. (Exclusion for queue calculation only.)
8. Assumption: A task will be added to redesignate links on the east side of the Washington Beltway as I-95 in the imported INRIX link configurations.INRIX designates the all Washington beltway links as I-495 entirely. In CHART the east half of beltway is designated as I-95.
9. Assumption: A task will be added to correct 2000+ Interstate, U.S. and MD links which have a direction of NONE as imported into the CHART ATMS database.

3.6.4 Contact Management

1. Assumption: The SHADE contact data can be merged with the existing ATMS R13 data.
2. Assumption: The Apache PDFBox (and any community-authored libraries adding table support) can be used to generate table-based PDF content for export of the Contact List with a reasonable amount of effort.

4 Human Machine Interface

4.1 SOP

This section describes the user interface changes in R14 related to the SOP feature.

4.1.1 SOP Document List

A new section has been added to the CHART ATMS System Profile to allow users with the View SOP right or Manage SOP right to view SOP document definitions.

Figure 4-1. SOP Settings Section

For users with the View SOP or Manage SOP right, but without the Configure System right, a link is added under the General section on the main page to view the SOP document definitions.

Figure 4-2. View SOP Section/Link

4.1.2 View Only SOP Documents

On the View SOP List page, a user with the View SOP right may view the document name, introductory header, and HTTP link to the SOP document for an SOP document definition. The user is not allowed to configure SOPs or view additional admin related data. The user is allowed to sort the list by document name or by the introductory header. An example is shown inFigure 4-3.

Standard Operating Procedures (21) Set Columns

Document Name △	Introductory Header	SOP Link
Action Event Any Signal Type	Procedures to consider for Action Event with any Signal Types reported.	View SOP
Action Event Pot Hole, Carcass, Citizen Call	Procedures to consider for Action Event Types: Pot Hole, Animal Carcass 10-45, Citizen Call.	View SOP
Commercial Bus Any Incident	Procedures for any Commercial Bus involved in any Incident	View SOP
Create Congestion Event	Procedures to follow when creating a congestion event.	View SOP
Create Notification Procedures	Procedures to consider when sending a notification from an event.	View SOP
Incident Type Collision, Fatality	Procedures to consider for a Collision, Fatality incident.	View SOP
Incident Type Emergency Roadwork	Procedures to consider for an Emergency Roadwork Incident.	View SOP
Incident Type Off Road Activity	Procedures to follow for an off road activity incident type.	View SOP
Incident Type Police Activity	Procedures to consider for police activity incident type.	View SOP
Incident Type Weather Closure	Procedures to consider for a weather closure incident type event.	View SOP
MDTA HAZMAT INCIDENT	Operating Procedures by the Maryland Transportation Authority to consider for response to a HAZMAT Incident within the MDOT operated area.	View SOP
MDTA Vehicle Overturned or Lost Load	MDTA Procedures to follow for any Vehicle that is Overturned or has Lost Load	View SOP
Roadway Conditions 100% Blocked	Procedures to consider for when roadway conditions are 100% blocked.	View SOP
SHA HAZMAT Incident	Operating Procedures by the State Highway Administration to consider for response to a HAZMAT Incident within the AOC operated area.	View SOP

Figure 4-3. View Only SOP List

4.1.3 Manage SOP List

On the View SOP List page, a user with the Manage SOP right may view and manage all fields of an SOP document definition. The user may sort the list by all fields except the SOP link and actions fields, and filter the list by specific operations centers or event triggers. The user may also show/hide all columns except the document name and actions columns. The ability to add an SOP document definition, edit an existing definition, and remove a definition is also available to the users. An example of the complete column display for users with the Manage SOPs right is shown in Figure 4-4.

Standard Operating Procedures (21) Set Columns (show default columns)

Add SOP Document

Document Name △	Description	Introductory Header	SOP Link	Major Distribution	Operation Centers --Any--	Event Triggers --Any--	Actions
Action Event Any Signal Type	Procedure for action event type signals.	Procedures to consider for Action Event with any Signal Types reported.	View SOP	True	AOC Central AOC North AOC South	Action Event Info Signal (all types) Selected	Edit Remove
Action Event Pot Hole, Carcass, Citizen Call	Procedures for action event types	Procedures to consider for Action Event Types: Pot Hole, Animal Carcass 10-45, Citizen Call.	View SOP	False	ALL	Action Event Info Pot Hole, 10-45, Citizen Call Selected	Edit Remove
Commercial Bus Any Incident	Procedures for any Commercial Bus involved in any Incident	Procedures for any Commercial Bus involved in any Incident	View SOP	False	MDOT	Vehicle Loaded Commercial Bus Count Set	Edit Remove
Create Congestion Event	Procedures on congestion event creation.	Procedures to follow when creating a congestion event.	View SOP	False	ALL	Congestion Event Created	Edit Remove
Create Notification Procedures	Procedures to follow for Notification	Procedures to consider when sending a notification from an event.	View SOP	False	ALL	Notification Window Opened Within Traffic Event	Edit Remove
Incident Type Collision, Fatality	Procedures for collision, fatality	Procedures to consider for a Collision, Fatality incident.	View SOP	False	ALL	Incident Type Collision, Fatality Selected	Edit Remove

Figure 4-4. SOP List for User with Manage SOPs Right

4.1.4 Modify or Create SOP Document Definition

CHART ATMS allows a user with the Manage SOPs right to add or edit an SOP document definition. In the add or edit form, the user must enter a document name of up to 100 characters, an introductory header with optional embedded HTML of up to 1000 characters, a valid URL to

an SOP document, and specify at least one operations center or all current and future operations centers that the definition applies to. The user may enter an optional description field of up to 300 characters. The user may also select zero or more event triggers that the definition should be considered for upon execution. The SOP Link field is pre-populated with the server host and possibly the high level directory where SOP documents are located for the particular GUI installation. The user may add or configure the remaining path to the SOP document relative to the host location. The server location is configured by an administrator within the GUI properties upon system installation. The user also has the option to leave the SOP Link field blank for the definition. For definitions with a blank SOP Link, only the introductory header text is used when displaying the definition in the SOP popup and within the SOP Guidance section. The user may also set the distribution level of the definition to major. When an SOP definition is set to major distribution, operators with the View Major SOP Popups right and/or the View All SOP Popups right are shown an SOP popup upon trigger execution. An example of editing an SOP definition is shown in Figure 4-5.

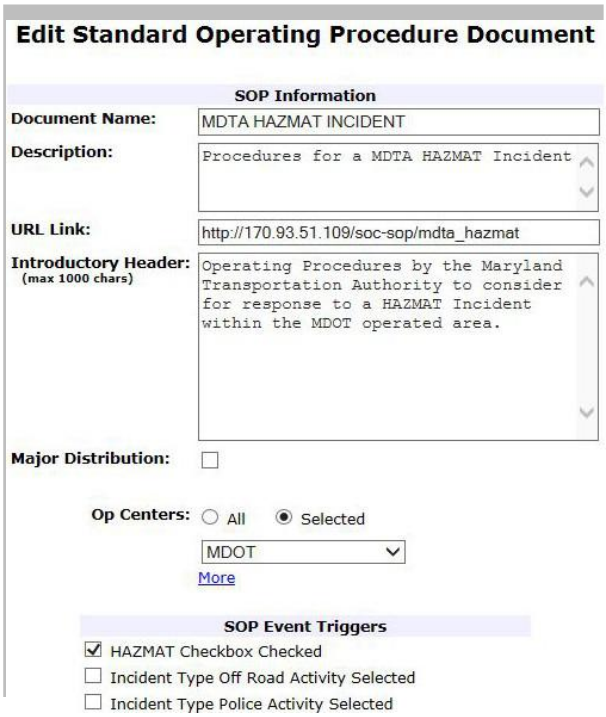


Figure 4-5. Add/Edit SOP Document Definition

CHART ATMS allows an SOP document definition to specify zero or more of the following event triggers that can be associated with a definition for display within an SOP popup.

Figure 4-6. SOP Document Definition Allowable Event Triggers

4.1.5 View SOP Popup

CHART ATMS allows the display of the SOP Popup to operators with the specified rights when an event trigger action is executed and a match on the relevant operations center occurs. For the trigger conditions executed within the context of a traffic event, the controlling operations center of the event is used first to determine if an SOP document definition with the identified event trigger action matches. If the controlling operations center is not set or is unknown at the time the trigger action is executed, then the operations center that the current user is logged into is used to determine if there is an operations center match. For a user with the View All SOP Popups right, each SOP document definition that matches the operations center and the event trigger executed is displayed within the popup regardless of the distribution level currently set. For a user with the View Major SOP Popups right, only SOP document definitions that match the operations center, the event trigger executed, and have the distribution set to major are displayed within the popup.

Within the SOP popup, a list of one or more matched SOP definitions may be displayed. For each matched definition, the introductory header is displayed. This header can contain embedded HTML, such as additional links to overarching SOP manuals. If the SOP Link to a valid URL is entered for the definition, then an HTTP link with the document name as the hyperlink text is displayed. The SOP popup appears close to the original trigger action, and remains viewable until the user acknowledges the popup or the page is refreshed. The user may acknowledge the popup by either clicking a close button in the popup or pressing the Esc key. CHART ATMS does not track the acknowledgement of the popup or the history of the number of instances the popup was displayed.

The following figures display the locations of where the popup is displayed in CHART ATMS. Figure 4-7 shows the SOP popup on the Incident Information page for when a user indicates that an incident involves hazadardous materials.

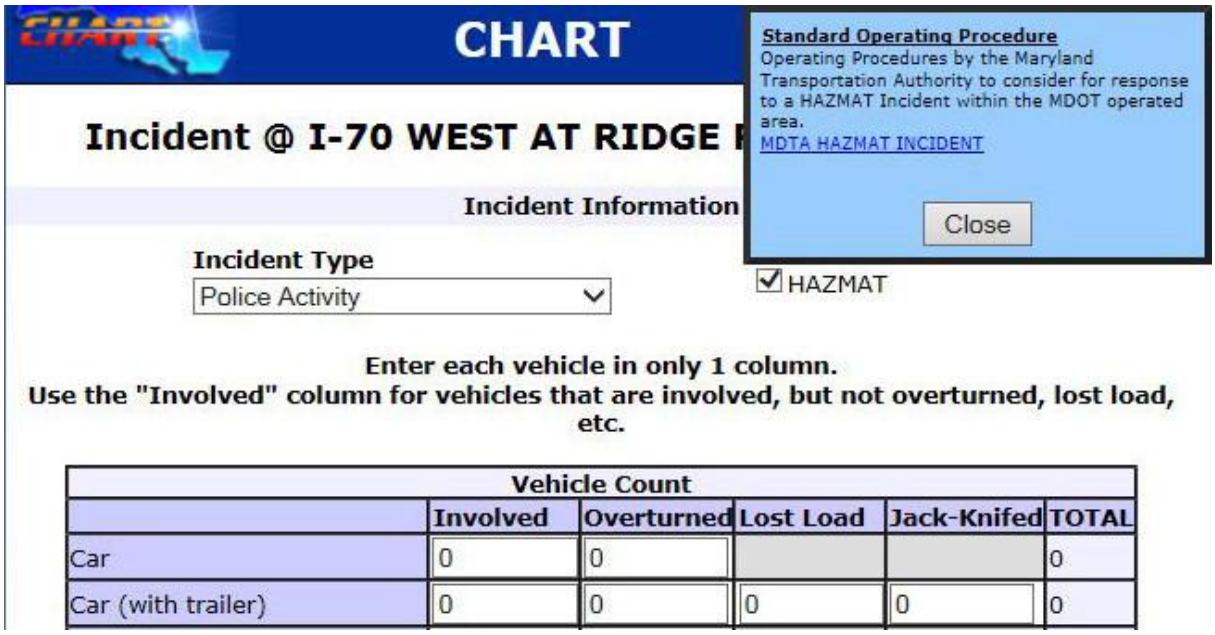


Figure 4-7. SOP Popup Hazmat Incident Example

The following shows the SOP Popup on the Incident Information page for when a user selects a specific incident type.

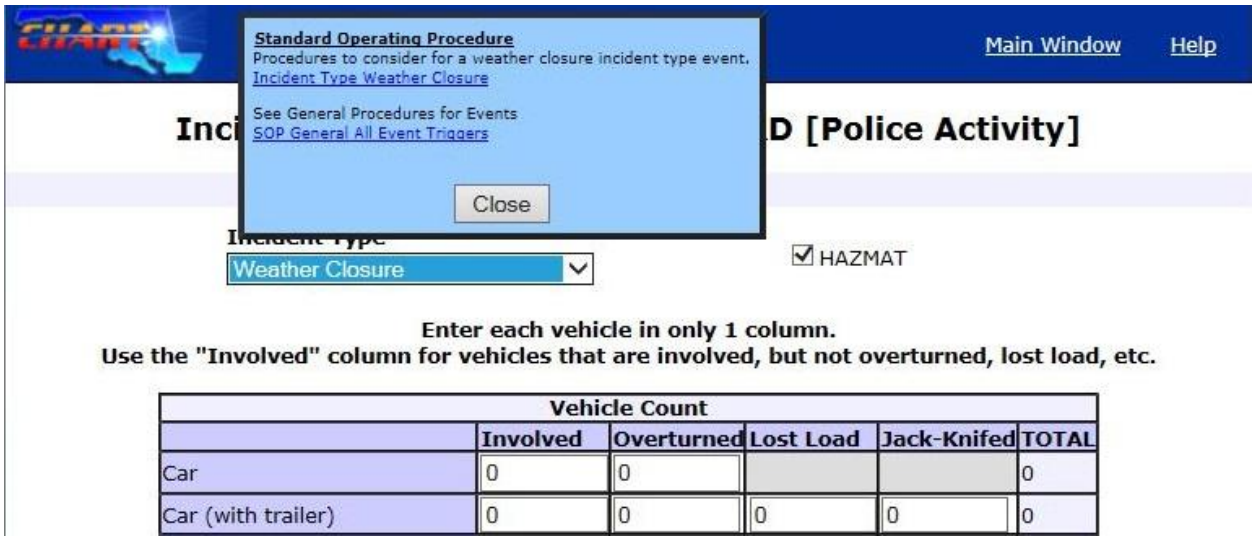


Figure 4-8. SOP Popup Incident Type Example

The following shows the SOP Popup on the Incident Information page for when a user sets the vehicle count from zero to a non-zero value for a specific vehicle type or group and involvement type.

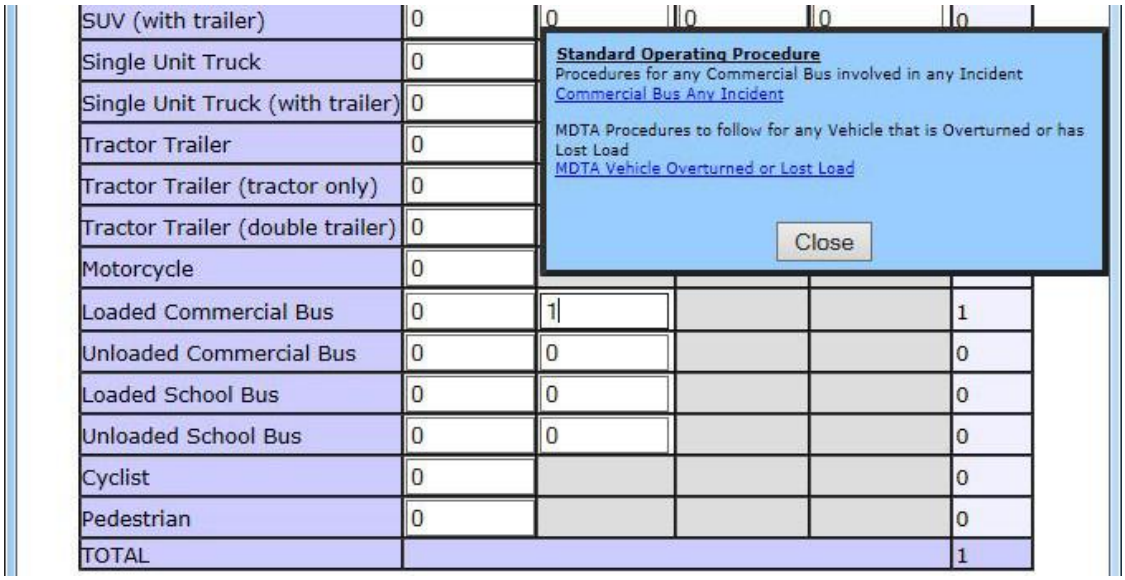


Figure 4-9. SOP Popup Vehicle Counts Example

The following shows the SOP Popup on the Action Event Information page for when a user selects a specific action event type.

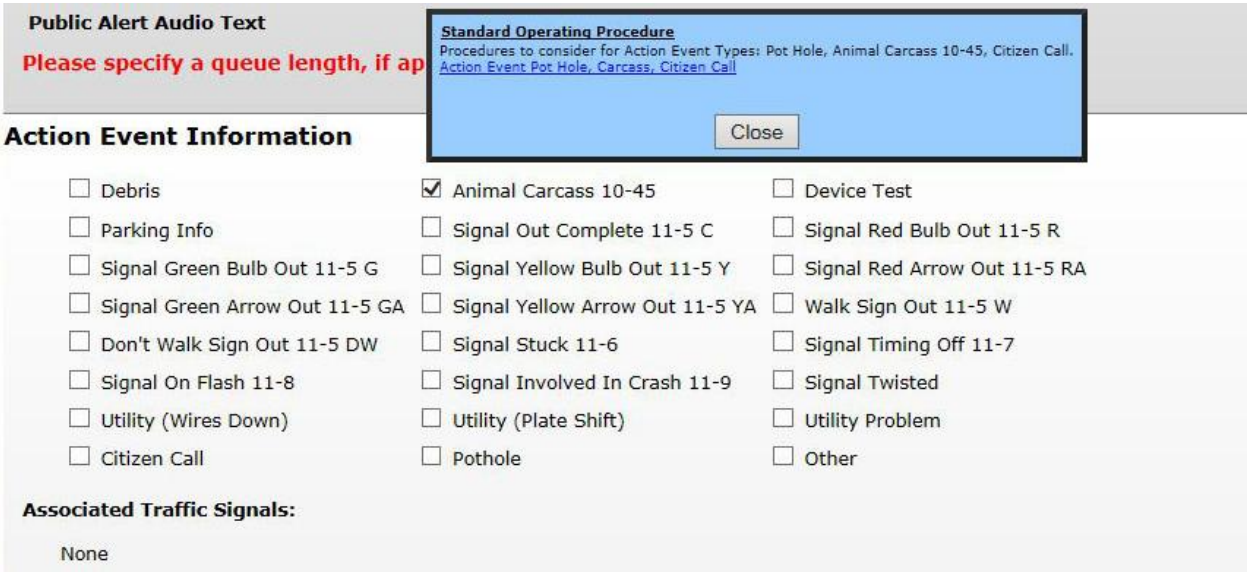


Figure 4-10. SOP Popup Action Event Signal Type Example

The following is an example of the SOP Popup on the Event Details page for when the user indicates 100% of the roadway is closed for an event. The roadway is considered 100% closed when all travel lanes in at least one direction are indicated as closed. The lane status of any shoulders and ramps does not affect whether the roadway is considered 100% closed for purposes of the SOP Popup.

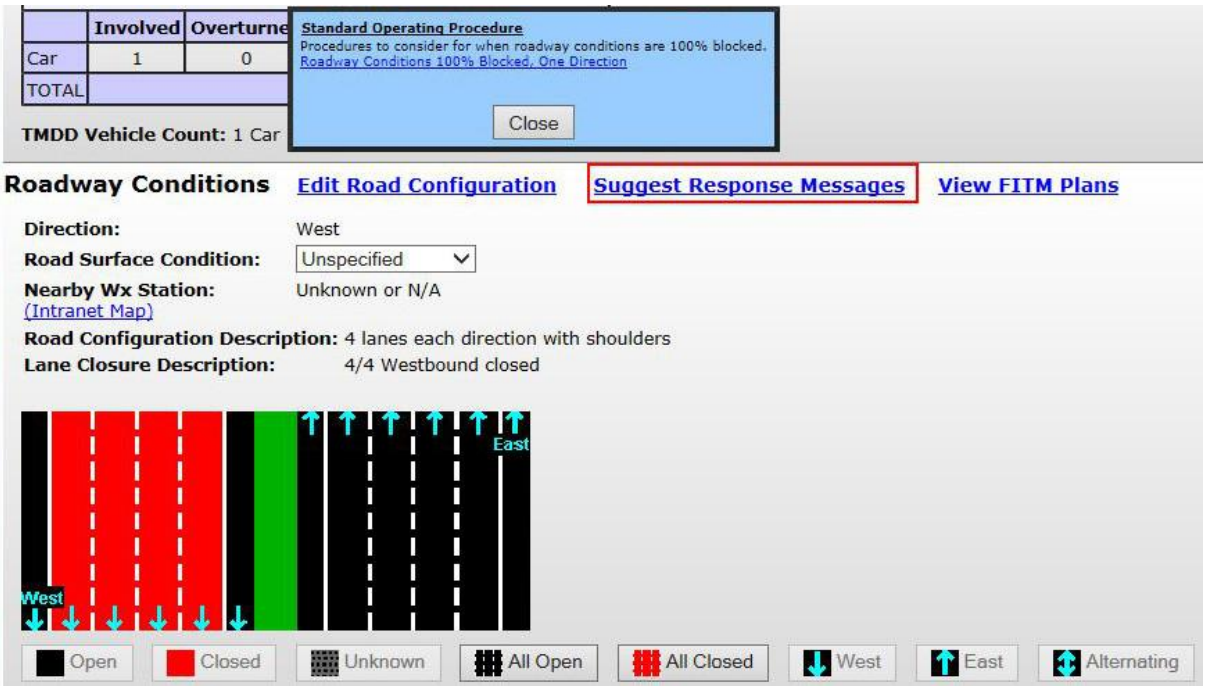


Figure 4-11. SOP Popup Roadway Conditions Example

The following shows the SOP Popup on the Send Notification form for when a user opens the window from a traffic event.The popup does not appear when the Notification dialog is opened from outside the context of a traffic event.

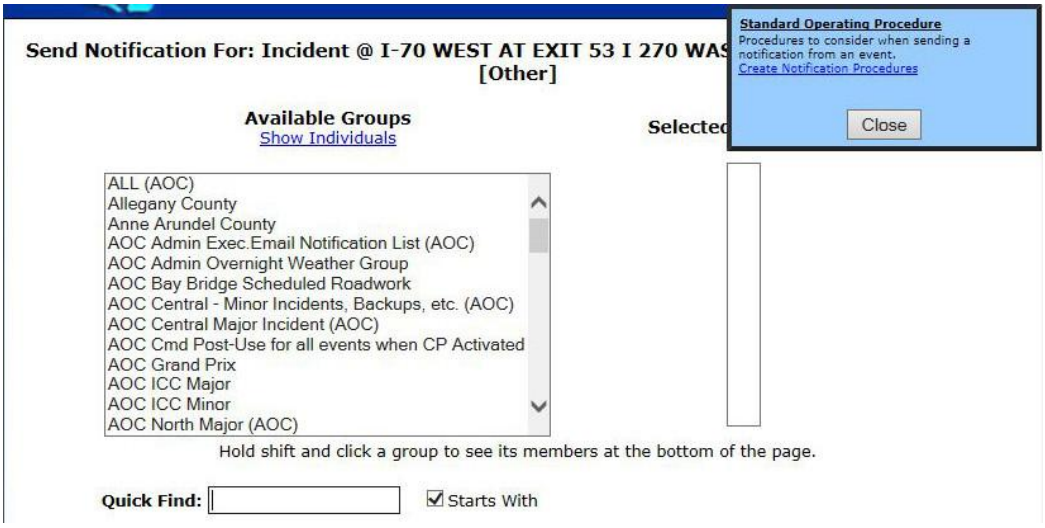


Figure 4-12. SOP Popup Open Notification Window Example

The following shows the SOP Popup on the Event Details page after a user has created a specific event type.

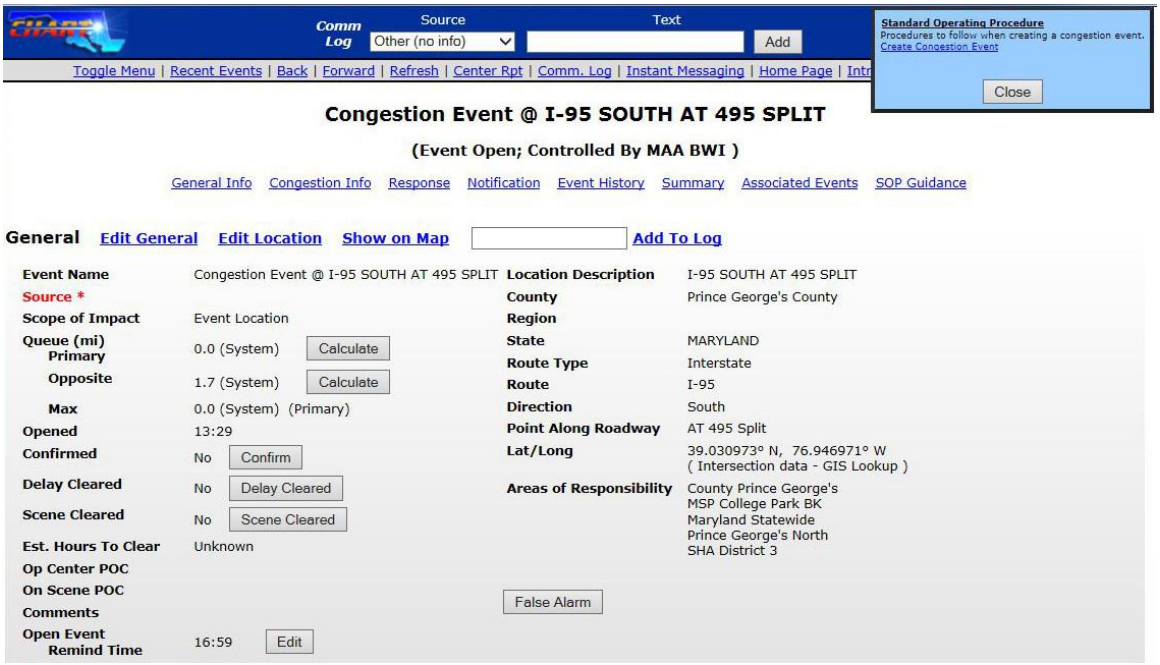


Figure 4-13. SOP Popup Create Event Example

The following shows the SOP Popup on the Acknowledgement page after a user successfully logs into CHART ATMS.

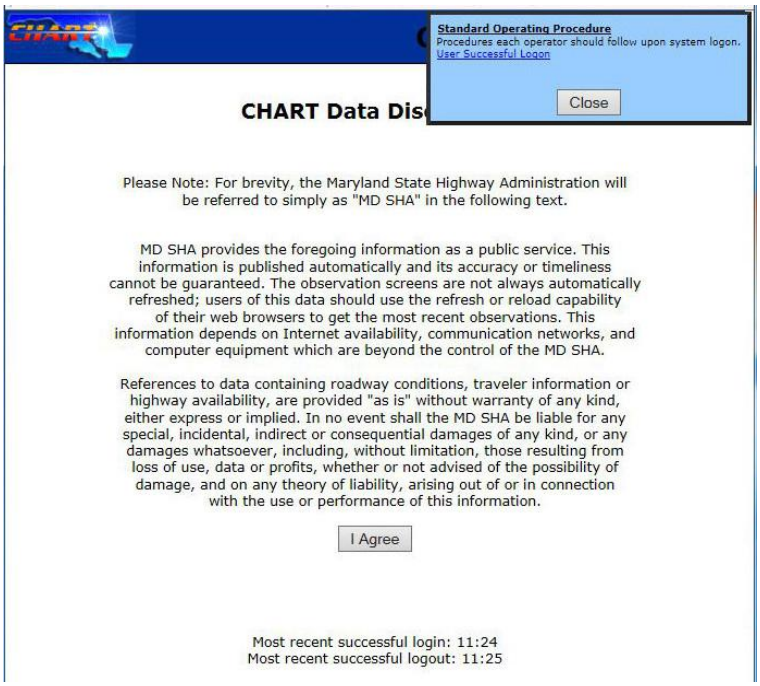


Figure 4-14. SOP Popup User Login Example

4.1.6 View SOP Guidance Section

For R14, CHART ATMS displays a section labeled SOP Guidance on the Event Details page for SOPs related to the current event. The section lists SOP document definitions to operators with the View Traffic Event right that match event trigger conditions in the current state of an event and match on the relevant operations center. The controlling operations center of the event is used first to determine if an SOP document definition with the identified event trigger action matches. If the controlling operations center is not set or is unknown for the event, the operations center that the current user is logged into is utilized instead to determine an operations center match.

In the SOP Guidance section, a list of zero or more matched SOP definitions may be displayed. For each matched definition, the introductory header is displayed. This header can contain embedded HTML, such as additional links to overaching SOP manuals. If the SOP Link to a valid URL is entered for the definition, then an HTTP link with the document name as the hyperlink text is displayed. An example of the section for an incident that involves hazardous materials and involves policy activity is displayed in Figure 4-15 and Figure 4-16.

Figure 4-15. SOP Guidance Section Link

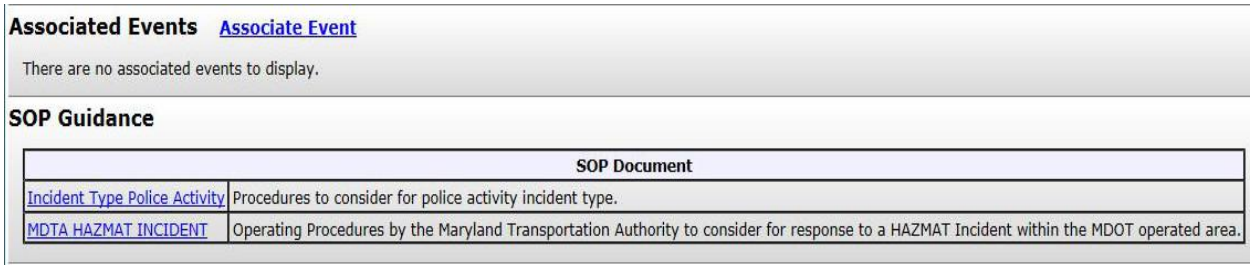


Figure 4-16. SOP Guidance Section

The following shows the SOP Guidance section when no event trigger conditions match within the current event state.

Figure 4-17. SOP Guidance Section with No Definitions

4.2 On/Off Devices

This section describes the user interface changes to support on/off devices.

4.2.1 On/Off Device List

The list of on/off devices that already exist in the system is available via a link on the home page within the Device Management section of the home page navigation area, shown below.

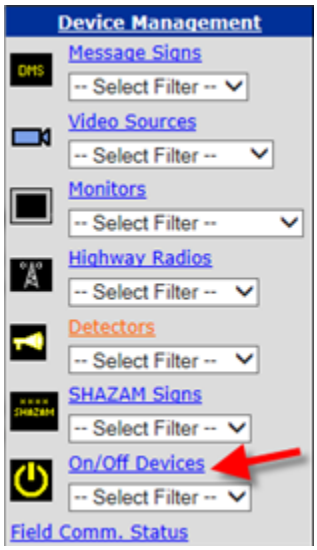


Figure 4-18. On/Off Devices List Link

When the user clicks the On/Off Devices link, the system will show the list of on/off devices using the user's default operations center filter. This filter includes all on/off devices located within the area(s) of responsibility (AORs) assigned to the user's op center plus any on/off devices that are contained within system folders assigned to the user's op center. If the user's op center doesn't have any AORs assigned and there aren't any on/off devices in folders assigned to the user's op center, all on/off devices in the system will appear. So, for example, if the user's op center has at least one AOR assigned, but there aren't any on/off devices located within that AOR, the list will be initially empty.

Beneath the On/Off Devices link is a drop down list that can be used to view the list of on/off devices using other filters, including the ability to force the list to include all on/off devices in the system, bypassing the default op center filtering (see below).

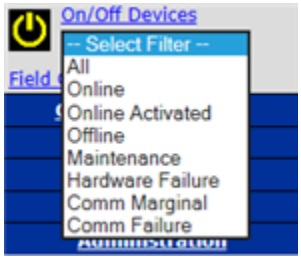
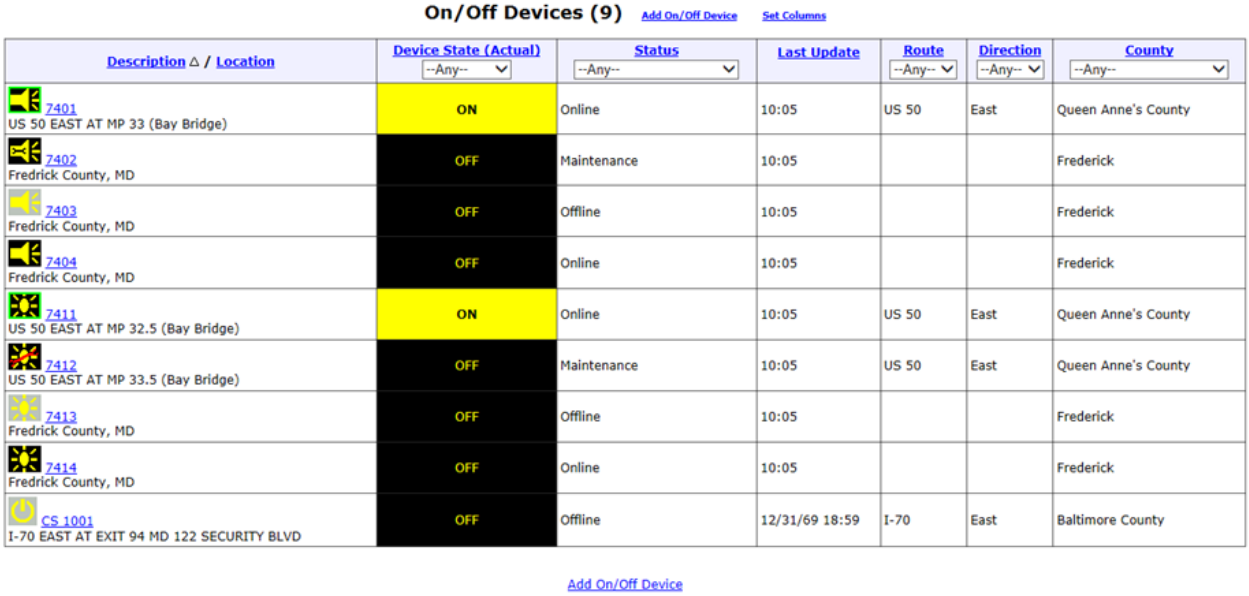


Figure 4-19. On/Off Devices List Filters

After the user either clicks the On/Off Devices link or chooses a filter, the list of on/off devices is shown. The page heading shows the number of devices that are displayed:



On/Off Devices (9) Add On/Off Device Set Columns

Description △ / Location	Device State (Actual) --Any--	Status --Any--	Last Update	Route --Any--	Direction --Any--	County --Any--
7401 US 50 EAST AT MP 33 (Bay Bridge)	ON	Online	10:05	US 50	East	Queen Anne's County
7402 Fredrick County, MD	OFF	Maintenance	10:05			Frederick
7403 Fredrick County, MD	OFF	Offline	10:05			Frederick
7404 Fredrick County, MD	OFF	Online	10:05			Frederick
7411 US 50 EAST AT MP 32.5 (Bay Bridge)	ON	Online	10:05	US 50	East	Queen Anne's County
7412 US 50 EAST AT MP 33.5 (Bay Bridge)	OFF	Maintenance	10:05	US 50	East	Queen Anne's County
7413 Fredrick County, MD	OFF	Offline	10:05			Frederick
7414 Fredrick County, MD	OFF	Online	10:05			Frederick
CS 1001 I-70 EAST AT EXIT 94 MD 122 SECURITY BLVD	OFF	Offline	12/31/69 18:59	I-70	East	Baltimore County

Add On/Off Device

Figure 4-20. On/Off Device List Default View

The columns shown in the image above are the default columns. The user can click on the Set Columns link to choose which columns they wish to view (or hide), and the system will remember their selection the next time the list is viewed (even if they log out and back in at a later time).

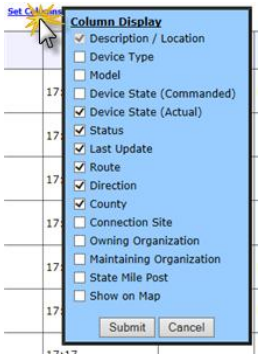


Figure 4-21. On/Off Device List Column Settings

The following columns of information are available within the on/off device list:

FIELD NAME	DESCRIPTION
Description/Location	This contains the device name and the device location
Device Type	The on/off device type, such as "Fog Beacon" or "Fog Horn"
Model	The model of the underlying electronic relay, such as "HWG-ER02b"
Device State (Commanded)	The device state currently commanded by CHART ATMS (on or off)

FIELD NAME	DESCRIPTION
Device State (Actual)	The actual device state (on or off) as queried from the device during the most recent communications with the device
Status	The status of the device, such as OK, Comm Failed, or HW Failed
Last Update	The timestamp for when the status was last updated
Route	The main route as specified in the device location, if any
Direction	The nominal roadway direction as specified in the device location, if any
County	The county as specified in the device location, if any
Connection Site	The name of the server site where the software object representing the device is hosted
Owning Organization	The name of the organization that owns the device
Maintaining Organization	The name of the organization that maintains the device
State Mile Post	The state mile post of the route where the device is located (if specified in the device location)
Show On Map	This column contains links that allow the user to click when they want to view the device location on the home page map

Each column header is a link, that when clicked causes the list to be sorted by the values in that column. Clicking the same column link again reverses the sort. All column headers except for Description/Location and State Mile Post also contain a drop down list that can be used to filter the list of on/off devices. The user can combine filters from multiple columns. When the list is filtered, the number of devices displayed may change (if the filter causes some devices to be excluded from the list) and the total number of devices is also shown. The current filter being used is displayed, and a link exists to allow the user to remove all filters to view all on/off devices in the system.

Figure 4-22. On/Off Device List Filtered

4.2.2 Add On/Off Device

If a user has the Configure On/Off Devices right for at least one organization, a link appears on the on/off device list page to allow new on/off devices to be added to the system.

Figure 4-23. Add On/Off Device Link

The Add On/Off Device form is shown when the user clicks the Add On/Off Device link. The form is fairly long, so each section of the form is addressed separately within the document sections below.

4.2.2.1 General Device Information

The top of the Add On/Off Device form contains general information about the device. All fields in this section are required.

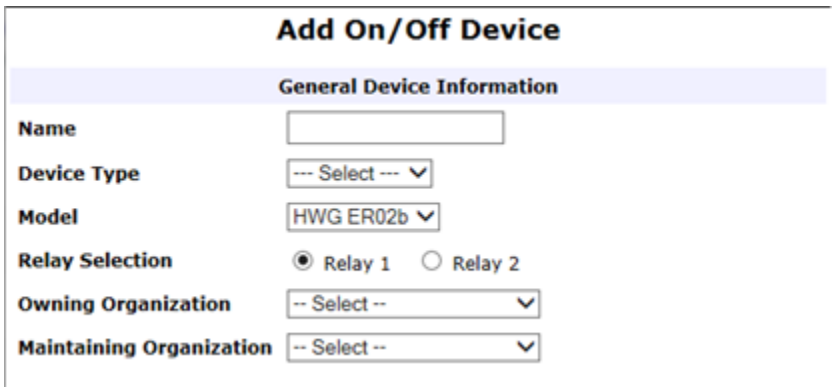


Figure 4-24. Add On/Off Device Form, General Device Info

The following fields are included:

FIELD NAME	DESCRIPTION
Name	The user must enter a name for the device, and the name must be unique among other on/off devices of the same type. If any other on/off device with the same Device Type selection has the same name as the name that is entered, the system will display an error when the form is submitted.
Device Type	The Device Type field is a selection that includes On/Off Device Types that have been previously defined within the system profile. Examples include "Fog Beacon" and "Fog Horn".
Model	The Model field includes "HWG ER02b" and "HWG ER02a" to allow the user to specify the model of the underlying electronic relay used to control the on/off device. Note that regardless of the user's selection, the system always communicates with the device using the ER02a protocol, and ER02b devices must have been loaded with the ER02a firmware for them to work properly. Regardless, this setting allows a maintainer to know which version of the device is fielded.
Relay Selection	Both the ER02a and ER02b models actually contain 2 separate electronic relays. The user must specify which of these relays is used to control the on/off device. It is possible for one on/off device to be connected to one relay, and another to be connected to the second relay of the same HWG ER02x device, but in practice this is not done; each on/off device is usually connected to it's own HWG ER02x device, using one relay or the other.
Owning Organization	This field contains all organizations that exist in the system and the user must select which organization owns the on/off device.
Maintaining Organization	This field contains all organizations that exist in the system and the user must select which organization maintains the on/off device.

4.2.2.2 Location

The location section of the Add On/Off Device form shows the location information that has been specified (if any) and provides a link to edit the information. The user must enter a location using the Edit link, and once they have entered a location the location information will appear. They can use the Edit link as many times as they like to change the location information that is shown before submitting the Add On/Off Device form. The Edit Location form, shown below, is

the exact same form used to edit the location of other device types that exist in CHART ATMS, such as DMS and HAR.

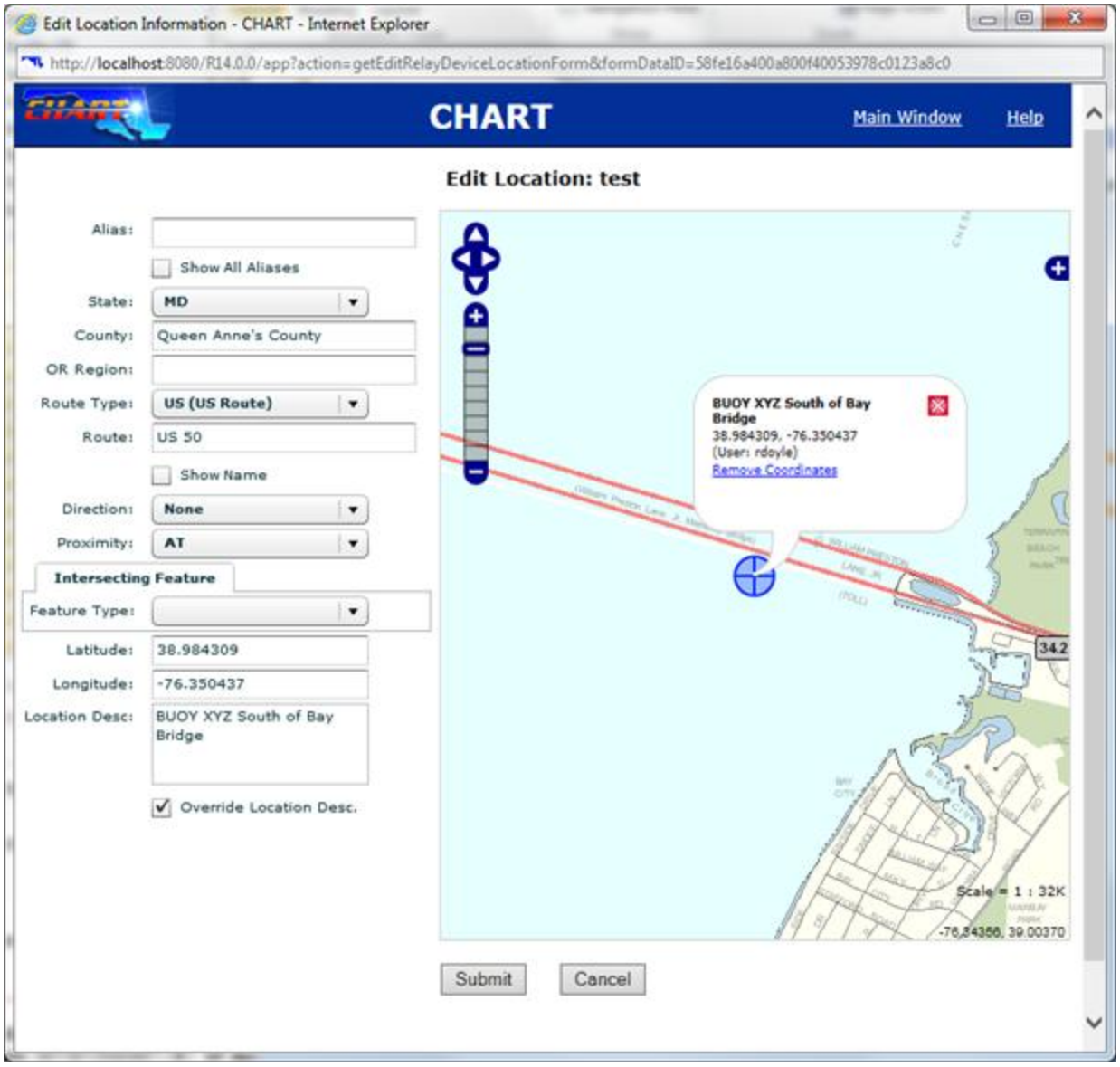


Figure 4-25. Add On/Off Device, Location Form

After a location is specified and the location form is submitted, the location details will appear within the Add On/Off Device form.

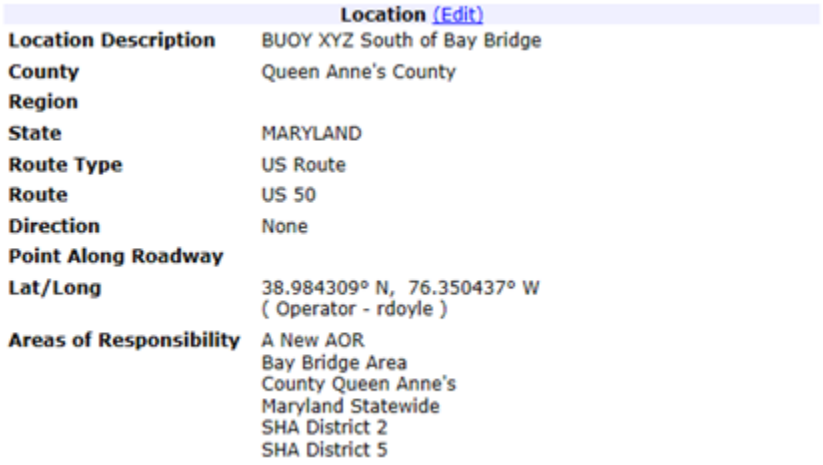


Figure 4-26. Add On/Off Device Form, Location Settings

Note that some on/off devices such as Fog Horns and Fog Beacons may actually be located on buoys in the water. For these devices, the user may manually specify a lattitude and longitude and override the location description, as there will be no roadway intersection to accurately describe the location of the device.

4.2.2.3 Device Communications

The device communications section of the Add On/Off Device form contains fields that specify the IP address of the underlying electronic relay used to control the on/off device, and polling settings.

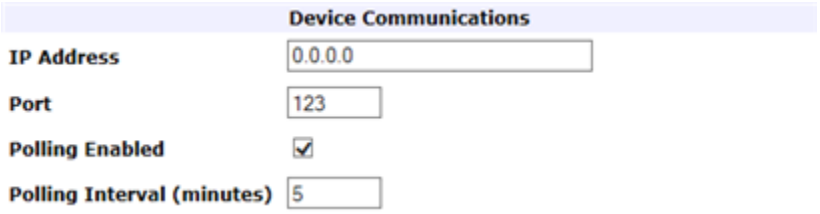


Figure 4-27. Add On/Off Device Form, Communication Settings

The following fields are included:

FIELD NAME	DESCRIPTION
IP Address	This field is required and must be the IP address of the electronic relay used to control the on/off device.
Port	This field is required and must be the TCP/IP port where the electronic relay used to control the on/off device listens for connections.
Polling Enabled	This check box can be checked to indicate the electronic relay should be automatically polled for status, or unchecked to disable automated polling.
Polling Interval (minutes)	This field is required if the Polling Enabled check box is checked. It specifies the polling interval, in minutes.

4.2.2.4 Alert and Notification Settings

The Alert and Notification Settings section of the Add On/Off Device form contains optional settings that control whether or not alerts and/or notifications will be generated when the relay used to control an on/off device is detected to be communication failed or hardware failed.

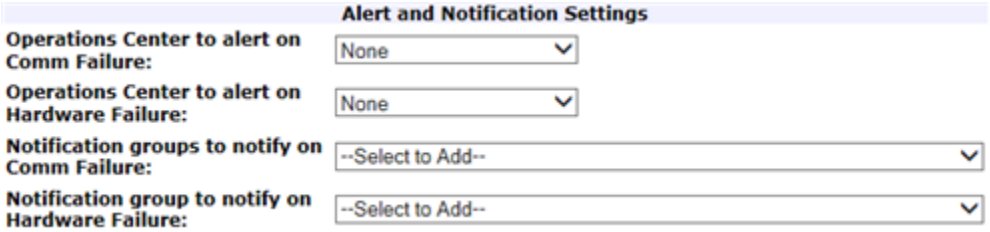


Figure 4-28. Add On/Off Device Form, Alert and Notify Settings

The following fields are included:

FIELD NAME	DESCRIPTION
Operations Center to alert on Comm Failure	This selection is optional, and when set to None, alerts for communication failures will not be enabled for the on/off device. Otherwise, the user can select an operations center that is to receive an alert when the system detects a communication failure while attempting to communicate with the relay used to control an on/off device. If a communication failure is detected, a device failure alert will be generated and assigned to the specified operations center.
Operations Center to alert on Hardware Failure	This selection is optional, and when set to None, alerts for hardware failures will not be enabled. Otherwise, the user can select an operations center that is to receive an alert when the system detects a hardware failure with the relay used to control an on/off device. If a hardware failure is detected, a device failure alert will be generated and assigned to the specified operations center.
Notification groups to notify on Comm Failure	This selection is optional and when no groups are selected, notifications for communication failures will be disabled for the on/off device. Otherwise, the user can select one or more notification groups that will receive a notification if the system detects a communication failure with the electronic relay used to control the on/off device.
Notification group to notify on Hardware Failure	This selection is optional and when no groups are selected, notifications for hardware failures will be disabled for the on/off device. Otherwise, the user can select one or more notification groups that will receive a notification if the system detects a hardware failure with the electronic relay used to control the on/off device.

4.2.2.5 Buttons

Buttons appear at the bottom of the Add On/Off Device form to allow the user to submit the form or to cancel the form. If the user chooses to submit the form (Add On/Off Device), a new on/off device will be added to CHART ATMS and it will appear within the list of on/off devices. If the user chooses to cancel the form, the form entries will be lost and the on/off device list will be shown.

If missing or invalid data is detected when the user submits the form, a popup will notify the user of the error.

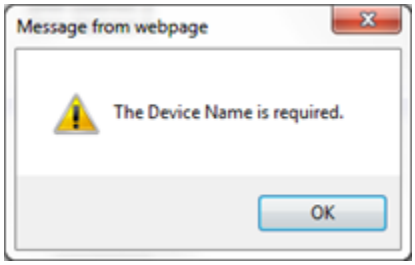


Figure 4-29. Add On/Off Device Form, Error Popup

If an error condition not related to missing or invalid form data is detected when the form is submitted, such as a duplicate name, the form will be redisplayed with an error message at the top of the form:

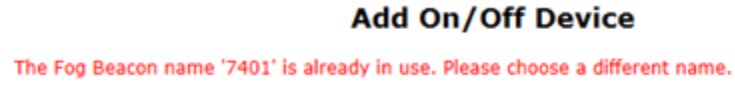


Figure 4-30. Add On/Off Device Form, Error After Submit

4.2.3 On/Off Device Details Page

Within the on/off device list, and in other locations throughout the application where on/off devices appear, the name of the on/off device is a link that when clicked, causes the on/off device details page to be shown.

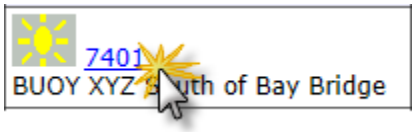


Figure 4-31. On/Off Device Name, Link to Details

The details page for an on/off device is fairly long. Each section of the form will be discussed separately in the document sections below.

4.2.3.1 Status

The status section of the on/off device details page is shown below:

Figure 4-32. On/Off Device Details, Status

The following fields are included:

FIELD NAME	DESCRIPTION
Used By	This field shows any traffic events that are using the device in their response plan. An asterisk will appear next to any event that has the device in a response plan item in the executed state when the device is currently on/activated. Events without an asterisk have the device in a response plan item that is not in the executed state. Each event listed is a link that when clicked causes the event's details page to be shown.
Controlling Center	The name of the center that is currently controlling the device. This only applies when the device is in maintenance mode. It will initially be set to the center that placed the device in maintenance mode, but can change if the control of the resource is transferred to another center.
Mode	The current mode setting for the device. This can be Online, Offline, or Maintenance Mode.
Last Reported Status	The last reported status of the device. This can be OK, Communications Failed, or Hardware Failed. An icon also appears that represents a combination of the Mode, Last Reported Status, and whether or not the device is on/activated. An on/off device is considered hardware failed if CHART ATMS commands the electronic relay to turn the device on or off and afterwards the status of the electronic relay does not match the commanded state. In other words, an on/off device will be considered hardware failed when the commanded and actual status do not match (see below).
Device State (Commanded)	The state (on or off) as last commanded by CHART ATMS.
Device State (Actual)	The state (on or off) as last reported by the electronic relay used to control the device when queried by CHART ATMS.
Last Status Time	The timestamp for when the status was last updated.
Last Contact Time	The timestamp for when the electronic relay used to control the device was last contacted.

4.2.3.2 Configuration

The Configuration section contains sub sections as described below. A user must have one of the following user rights to be able to view the configuration section:

- Configure On/Off Device (for the owning organization of the device)
- View On/Off Device Configuration (for the owning organization of the device)
- View On/Off Device Sensitive Config (for the owning organization of the device)

4.2.3.2.1 Configuration, Model

The Model section of the on/off device details page shows the specified model of the electronic relay used to control the on/off device.

Figure 4-33. On/Off Device Details, Model, Not Offline

If the device is offline and the user has the user right to configure on/off devices for the owning organization of the device, a link will appear to allow the model to be changed.

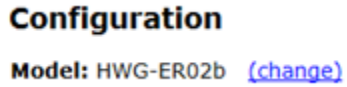


Figure 4-34. On/Off Device Details, Model, Change Link

Clicking the change link causes the Change Model form to be displayed. The user can select a different model and submit the form, or click cancel to close the form without making any changes.

Figure 4-35. On/Off Device Change Model Form

If the user submits the form, the command status page is shown.

Figure 4-36. On/Off Device Details, Change Model Command Status

4.2.3.2.2 Configuration, Basic Configuration

The Basic Configuration section of the on/off device details page shows general settings for the device. These fields are the same as those that appear on the Add On/Off Device form in the General Device Information. See 4.2.2.1 above for details about each of the fields shown. One additional field is included, Network Connection Site. This is the name of the CHART ATMS server site where the software object representing the on/off device is located.

Figure 4-37. On/Off Device Details, Basic Configuration

If the user has been granted the right to configure on/off devices for the owning organization specified for the device, an Edit link appears next to the section header. If the user clicks this link, a form is shown to allow the user to edit the basic configuration settings (except for the network connection site).

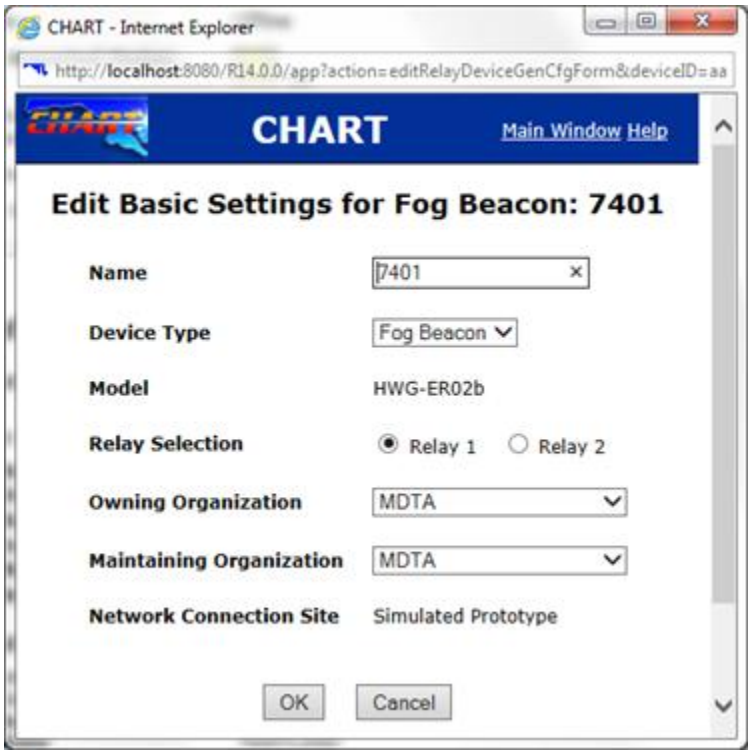


Figure 4-38. On/Off Device Details, Edit Basic Settings

The fields shown on this form are the same fields that appear in the Add On/Off Device form. Refer to 4.2.2.1 above for information on each of these fields. Like the Add On/Off Device form, if any missing or invalid data is detected when the form is submitted, and error popup will appear. If an error not related to missing or invalid data is detected following the form submit, an error message will appear as shown below.

Figure 4-39. On/Off Device Details, Edit Basic Settings Error

If no error is detected when the form is submitted, the command status page is shown to allow the user to track the progress of the operation.

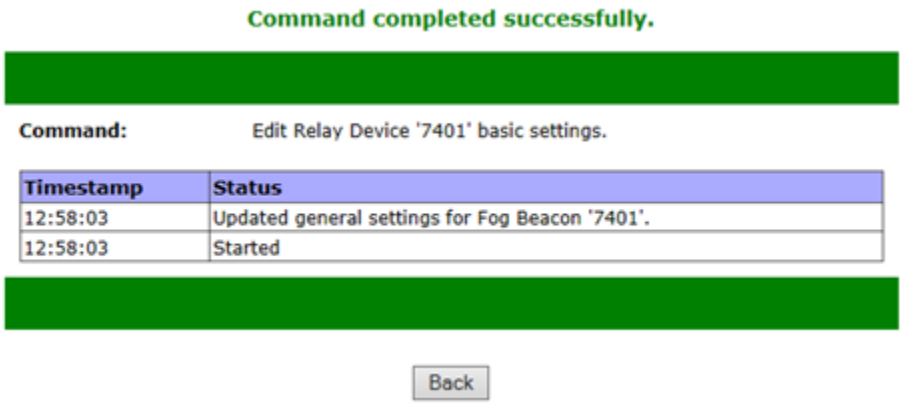


Figure 4-40. On/Off Device Details, Edit Basic Settings Command Status

4.2.3.2.3 Configuration, Location

The Location section of the on/off device details page shows settings related to the location of the on/off device. The fields shown in this section of the page are exactly the same as the Location section shown for existing CHART ATMS device types such as DMS and HAR.

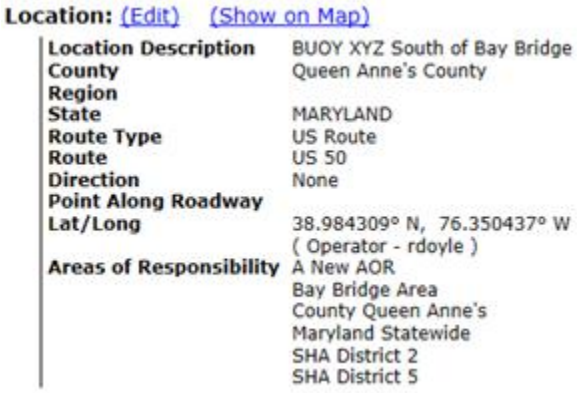


Figure 4-41. On/Off Device Details, Location Settings

If the location contains a latitude and longitude, a Show on Map link appears near the section header. When this link is clicked, the home page map will pan and zoom to the location of the device.

If the user has been granted the right to configure on/off devices for the device's owning organization, an Edit link appears. When the Edit link is clicked, the Edit Location form is shown. This is the same form that is used to set the location when adding an on/off device. Refer to 4.2.2.24.2.2.2 above for details. Note that after submitting the edit location form, a command status page is not shown; instead the on/off device details page will update and show the new location settings.

4.2.3.2.4 Configuration, Communication Settings

The communcation settings section of the on/off device details page shows the settings related to communicating with the electronic relay that is used to control the on/off device and automatic polling settings. The fields in this section are described in 4.2.2.3 above.

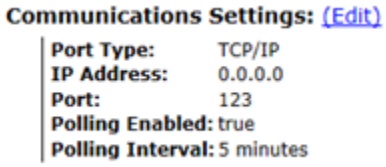


Figure 4-42. On/Off Device Details, Communication Settings

If the user has not been granted the right to view sensitive configuration information for on/off devices for the owning organization of the device, the IP Address and Port will be hidden.

If the user has been granted the right to configure on/off devices for the owning organization of the device, an Edit link appears. If the user clicks the Edit link, the Edit Comm Settings form appears.

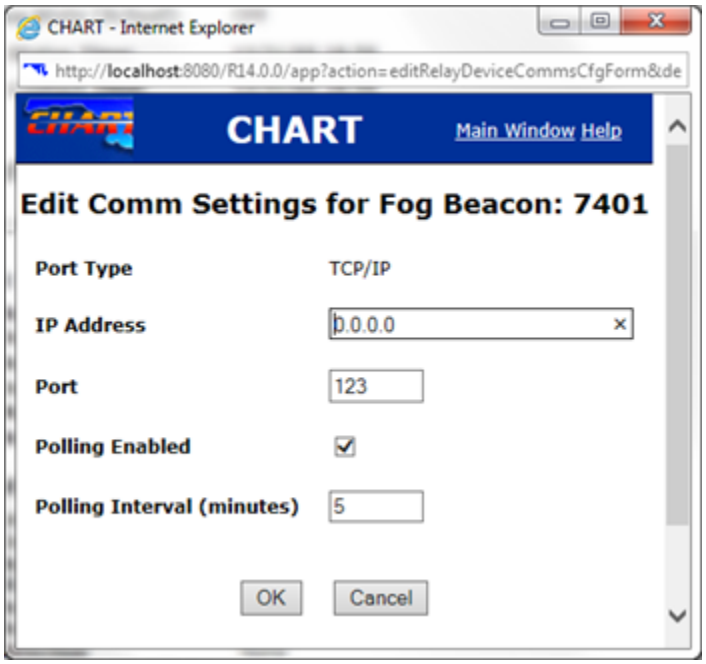


Figure 4-43. On/Off Device Details, Edit Comm Settings

The fields that appear on this form are the same as the fields that appear on the Add On/Off Device form in the communication settings section. Refer to 4.2.2.3 above for details. When the form is submitted, any errors due to missing or invalid values will be shown in a popup message. Errors not related to missing or invalid values will appear in an error message. If no errors occur, a command status page will appear to allow the user to track the status of the operation.

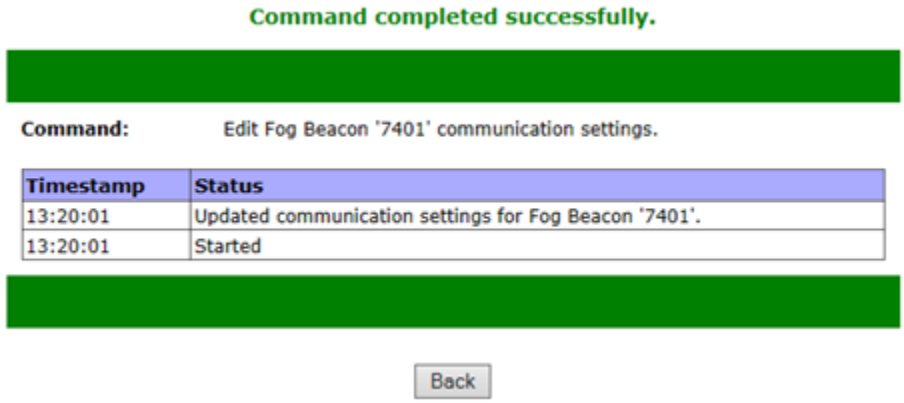


Figure 4-44. On/Off Device Details, Edit Comm Settings Command Status

4.2.3.2.5 Configuration, Alerts and Notifications

The Alerts and Notifications section of the on/off device details page shows settings related to the generation of alerts and notifications when the system detects a communication or hardware failure for the device. These fields are the same as those that appear on the Add On/Off Device form and are described in 4.2.2.4 above.

Figure 4-45. On/Off Device Details, Alerts and Notifications

If the user has been granted the right to configure on/off devices for the owning organization of the device, an Edit link appears. If the user clicks the Edit link, the Alert and Notifcation Settings form appears. The fields on this form are identical to those that appear in the Alerts and Notifications section of the Add On/Off Device form, and details can be found in 4.2.2.4 above.

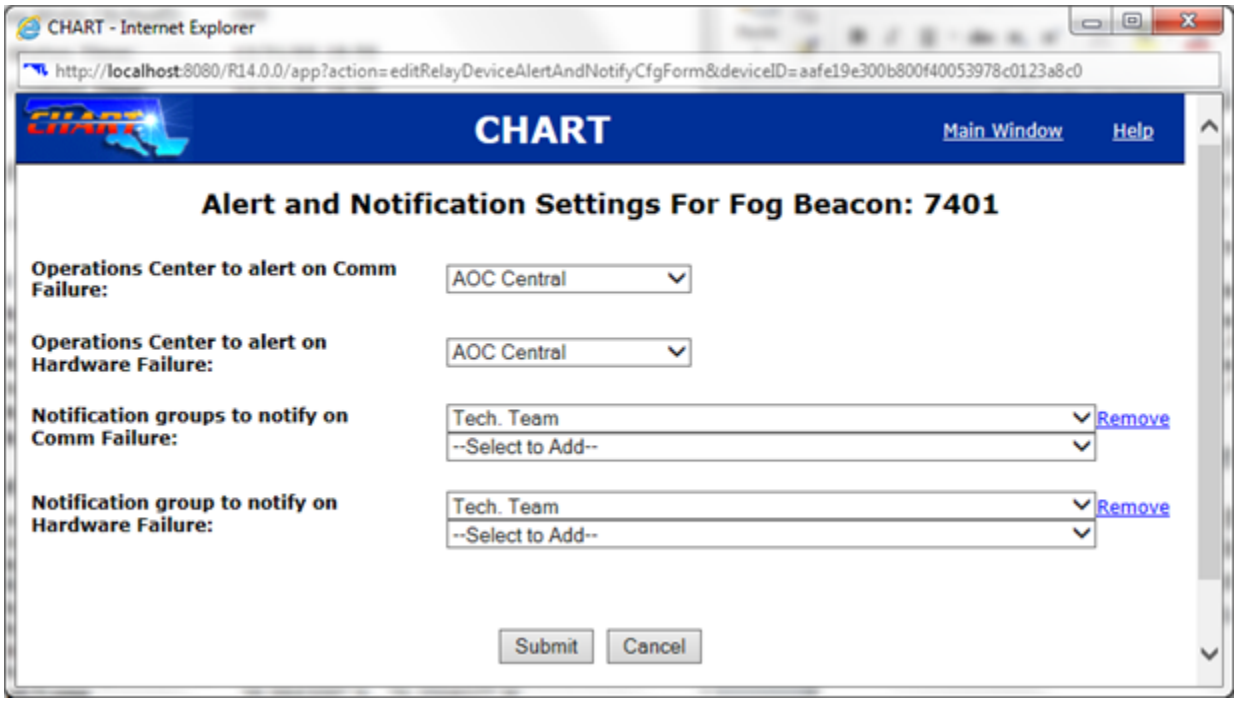


Figure 4-46. On/Off Device Details, Edit Alert and Notification Settings

This form has only select lists, and all values are optional, so it should not be possible for a user to generate an error while using this form. If an unexpected error occurs, however, an error screen will be shown. Otherwise, the user is shown the command status page so they can see the progress of the operation.

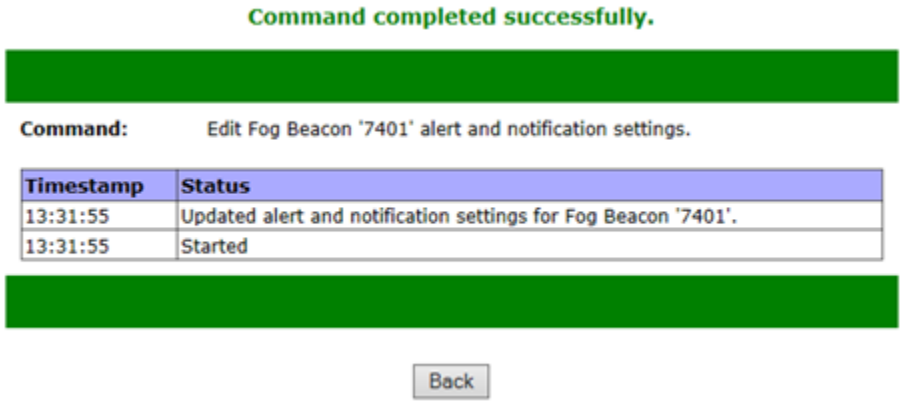


Figure 4-47. On/Off Device Details, Edit Alert and Notification Settings Command Status

4.2.3.3 Actions

The actions section of the on/off device details page provides links to allow the user to perform actions that are valid for the current device mode, and for which the user has the proper user rights. The following images show the links that appear for the device in each mode, assuming the user has all required user rights.

Figure 4-48. On/Off Device Details, Action Links

Each action that may appear is described in the table below.

Link Name	Applicable Modes	User Right Required	Description
View Arbitration Queue	Online, Offline, Maint	None	Shows the device arbitration queue. See 4.2.4 below.
Put Online*	Offline, Maint	Manage Device Comms (for the device's owning organization)	Transitions the device from offline or maint mode to online mode, causing the arbitration queue processing and automatic polling to be enabled (if so configured). In online mode, the state of the device is controlled via response plan items in traffic events.
Take Offline*	Online, Maint	Manage Device Comms (for the device's owning organization)	Transitions the device from online or maint mode to offline mode. The system will attempt to turn the device off as part of this transition. In offline mode, arbitration queue processing is stopped and automatic polling is stopped (if it was enabled).
Put in Maint Mode*	Online, Offline	Manage Device Comms (for the device's owning organization)	Transitions the device from online or offline to maint mode. The system will attempt to turn the device off as part of this transition. In maint mode, arbitration queue processing is stopped and automatic polling is stopped (if it was enabled). Maintenance mode allows manual operation of the device for testing / maintenance activities.
Poll Now*	Online, Maint	When online, Responsd To Traffic event OR Maintain On/Off Device (for the device's owning organization). When in maint mode, only Maintain On/Off Device	Causes the system to communicate with the electronic relay used to control the device to check its current status. If the system finds the current state of the device does not match the last commanded

Link Name	Applicable Modes	User Right Required	Description
		(for the device's owning organization) is acceptable.	state, it will set the device to the last commanded state.
Set <device type> ON*	Maint	Maintain On/Off Device (for the device's owning organization)	Sends command to the electronic relay used to control the device to turn the device on.
Set <device type> OFF*	Maint	Maintain On/Off Device (for the device's owning organization)	Sends command to the electronic relay used to control the device to turn the device off.
Copy <device type>	Online, Offline, Maint	Configure On/Off Device (for the device's owning organization)	Launches the Add On/Off Device form, prepopulated with data from the device being copied.
Remove <device type>	Offline	Configure On/Off Device (for the device's owning organization)	Displays a confirmation dialog and removes the on/off device from the system if the user acknowleges the confirmation.

The actions marked with an asterisk in the table above will cause the command status page to be shown to allow the user to track the progress of the action. Following is an example:

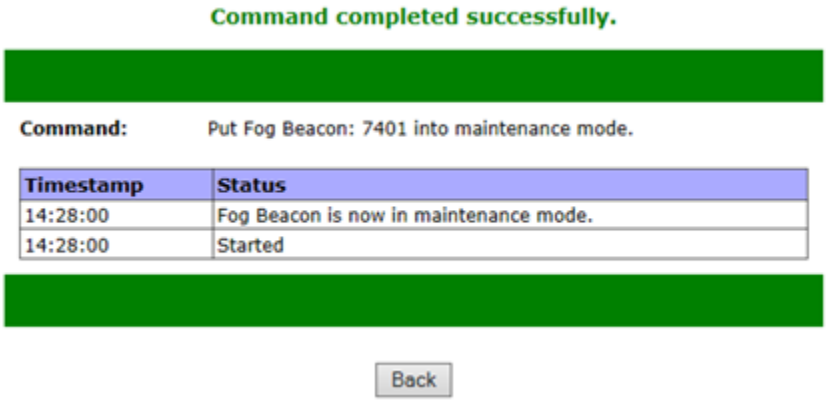


Figure 4-49. On/Off Device Action, Command Status Example

4.2.4 On/Off Device Arbitration Queue

The arbitration queue provides the means by which an on/off device can be used by multiple traffic events. In online mode, the arbitration queue is responsible for determining if the on/off device should be on or off, and commanding the device to that state. Traffic events that include the on/off device in their response plan will have an entry on the arbitration queue of the device if the response plan item has been executed. If any traffic event response plan items for the on/off device have been executed and are on the device's arbitration queue, the system will command the on/off device to be on/activated. If no traffic events exist on the queue, the system will command the on/off device to be off/deactivated.

The system allows any user to view the arbitration queue for an on/off device, using a link on the on/off device details page, or a link in the response plan section of a traffic event. Following is an example of an arbitration queue for a device in use by two separate traffic events.

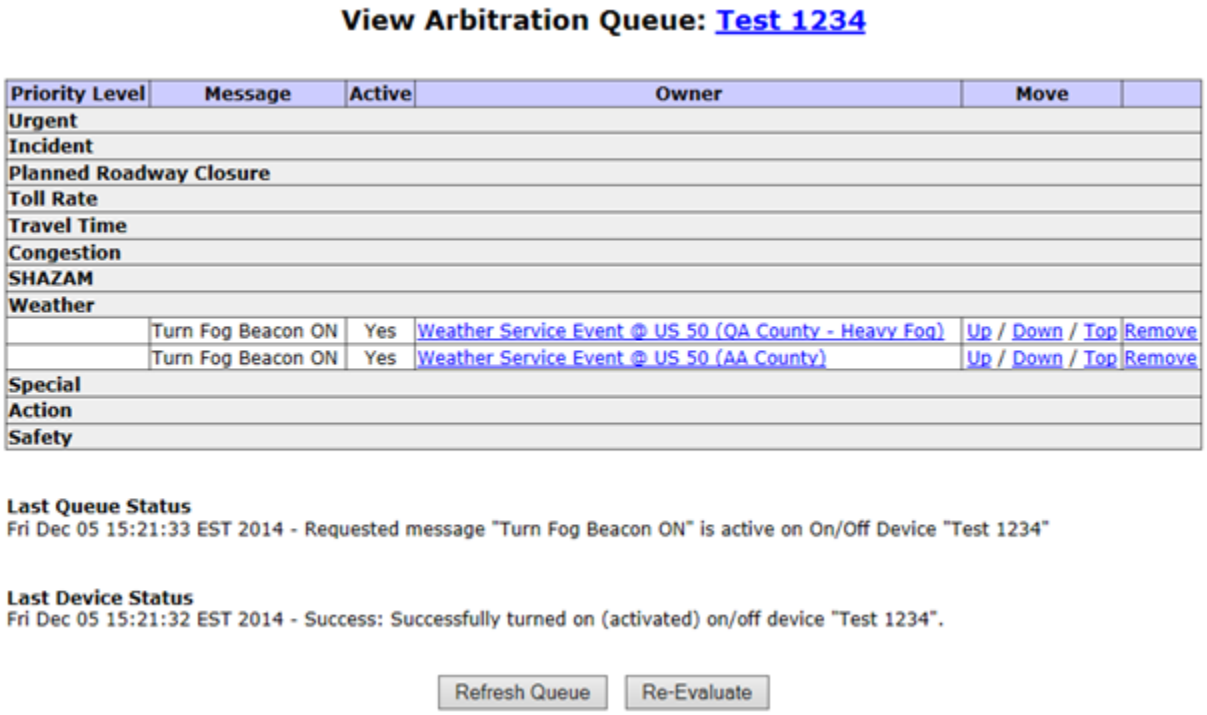


Figure 4-50. On/Off Device Arbitration Queue

The arbitration queue contains priority levels which allow the queue entry from one event to be given priority over another within the queue. This feature, which is part of the generic framework for arbitration queues in CHART ATMS, is useful for messaging devices because it controls which message is activated on the messaging device. For an on/off device, however, this feature has no relevance. If the user has the Manage Arb Queue right, they can use the Up, Down, and Top links to manually change the priority of items on the queue, but since priority is irrelevant for on/off devices, changing the order of entries on the queue will have no effect.

The Message column exists with messaging devices in mind. For on/off devices, it will show the intended action, which is to turn on/activate the device. Note that there is no ability for an arbitration queue entry to Set <device type> OFF; the only action available is to turn on/activate the device.

The Active column shows whether or not the entry is fully or partly responsible for the the device being active. It will show Yes if the device is active and online. It will show No at all other times. For example, if the device is not online, none of the entries will be active because the arbitration queue will not be running.

The Owner column shows the traffic event whose response plan includes the queue entry. The name of the event is a link that when clicked causes the traffic event details page to be shown.

If the user has the Manage Arb Queue right, a Remove link will appear for each entry on the queue. Clicking this link has the effect of changing the associated response plan item to a not executed state and removing the entry from the queue. If the response plan item is exectued again, a new entry will be placed on the queue. If all items are removed from the queue, the device will be deactivated.

The last queue status field is used to show status updates during queue evaluation. The last device status field is used to show messages regarding the status of any device commands that are issued by the queue (for example to turn on/activate the on/off device).

The Refresh Queue button is available to all users, and causes the user interface to obtain the current status of the queue from the CHART ATMS server. The Re-Evaluate button is shown if the user has the Manage Arb Queue right or Manage Response Plan right. When this button is clicked, it forces the system to re-evaluate the entries on the arbitration queue to determine if it needs to command the on/off device to change its state. This involves checking the associated response plan item for each entry to see if it is still valid, and if at least one item remains on the queue, the device will be activated.

4.2.5 Site Search

The existing CHART ATMS site search feature is updated in R14 to include on/off devices in the search. The following fields of an on/off device are considered during a site search: Device Name, Location, Controlling Operations Center. The search is available at the top of the home page or working window. The basic search involves simply typing text into the Search field and clicking the Search button. The basic search is case insensitive and includes all item types, including on/off devices.

Figure 4-51. Site Search, Basic

The advanced search dialog, available by clicking the Adv. button, allows the user to specify the item types to be included in the search. This capability is changed in CHART ATMS R14 to include on/off devices (circled in the image below).

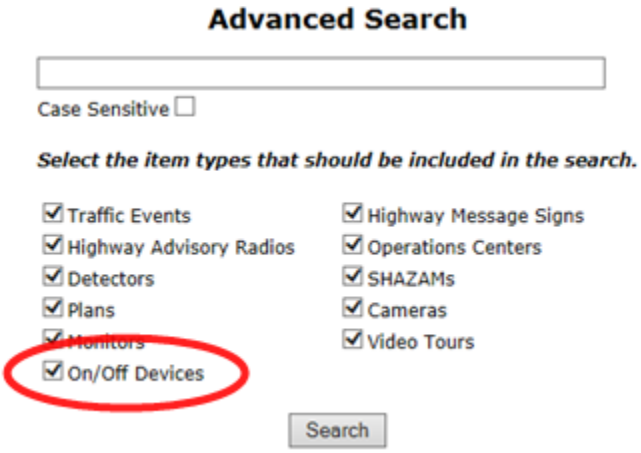


Figure 4-52. Site Search, Advanced

If any on/off devices match the search text, they are shown on the search results page in a new section for on/off devices, as shown in the example below.

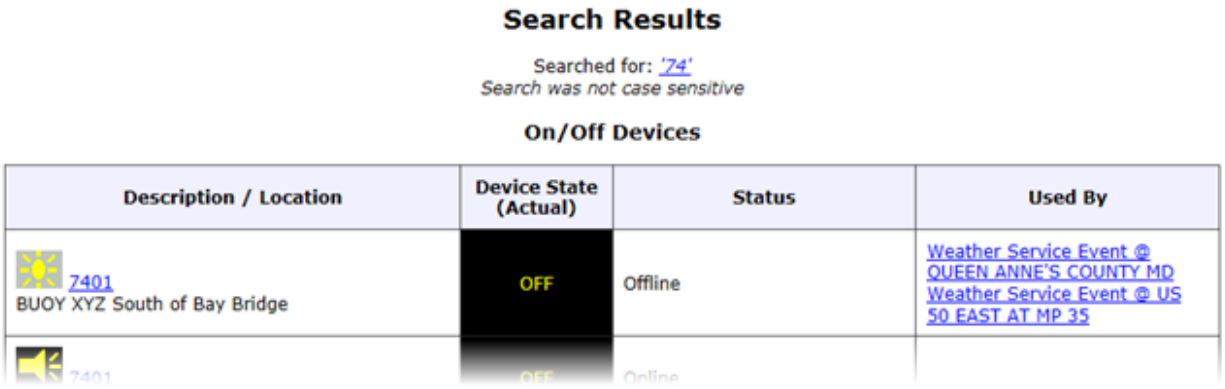


Figure 4-53. Site Search, Results with On/Off Devices

The Used By column in the search results shows any traffic events that include the on/off device in their response plan. Each event name is a link that when clicked causes the event details page for that event to be displayed.

4.2.6 Folders

The existing CHART ATMS folders feature is enhanced in R14 to allow on/off devices to be included in folders. Folders are accessed via the Folders section of the home page menu. If the user has the Manage Folders right, they can view the page used to manage all folders. Any user can use the Select Folder drop down to view the content of existing folders.

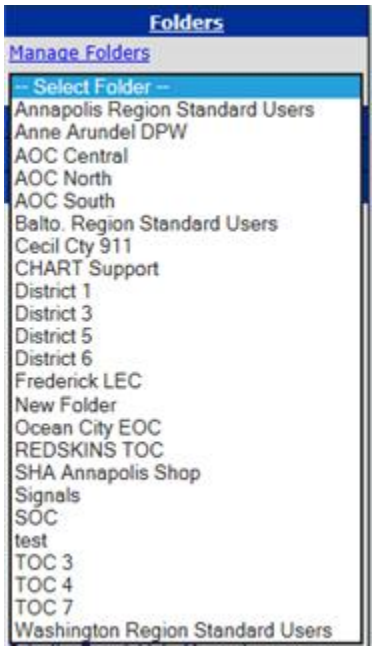


Figure 4-54. Folder Access via Home Page Menu

From the Manage Folders page, the user can click the Add Objects link for a folder to add objects to a folder.

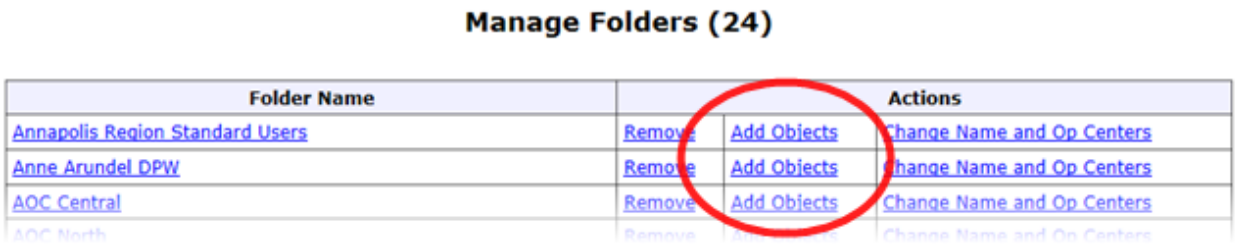


Figure 4-55. Manage Folders Page, Add Objects Links

When viewing the content of a folder, if the user has the Manage Folders right, they can also choose to add objects to the folder using the Add to Folder link at the bottom of the page.

Figure 4-56. Folder Content Page, Add to Folder Link

The Add to Folder form is changed in ATMS R14 to include a new section containing on/off devices, making them available for inclusion in the folder. A new link is added in the row of quick navigation links that appear above and below each section of items.

Clicking the On/Off Devices link causes the page to scroll to the On/Off Devices section of the form.

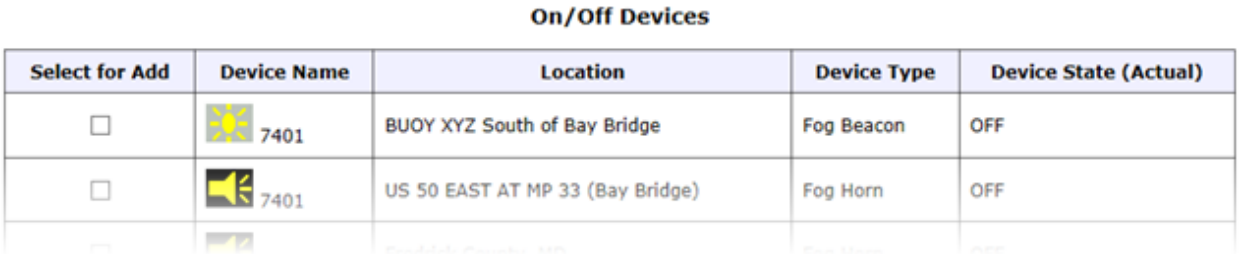


Figure 4-57. Add to Folder Form, On/Off Devices

The user can check the box in the Select to Add column for any on/off device and submit the form to include the on/off device in the folder. The folder content page for the folder is shown after the user submits the form. This page is also available when selecting a specific folder from the Select Folder drop down list in the home page menu, or by clicking the name of a folder on the manage folders page. A new section is added to show all on/off devices that have been added to the folder.

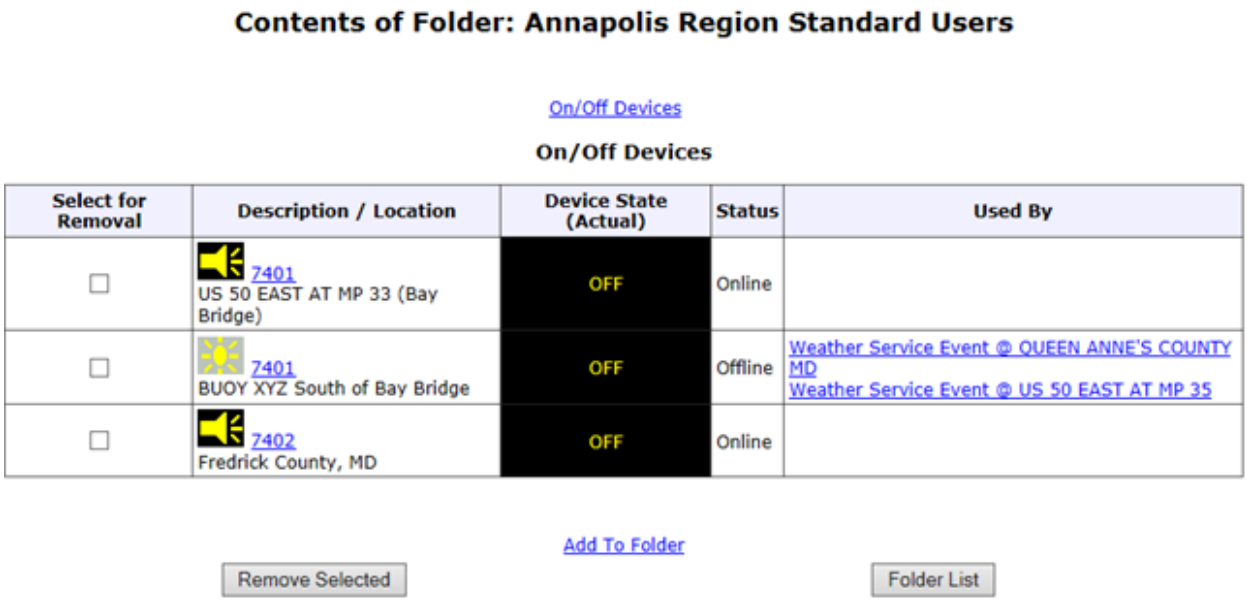


Figure 4-58. Folder Content, On/Off Device Section

A user with the Manage Folders right can click the box for one or more on/off devices in the Select for Removal column and click the Remove Selected button to remove the selected on/off devices from the folder.

4.2.7 Device Plans

The existing CHART ATMS device plans feature is enhanced in R14 to allow on/off devices to be included in device plans. Unlike DMS and HAR, which are the other devices that can be included in a device plan, on/off devices do not have a message, so the message selection process that exists for DMS and HAR devices when adding them to a plan does not exist for on/off devices.

Plans are accessed via the Plans link in the Administration section of the home page menu. This option is only available to users that have the Manage Plans user right.

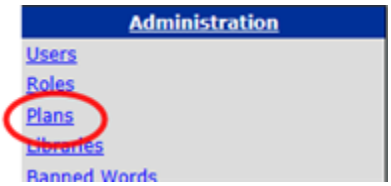


Figure 4-59. Plans Link in Home Page Menu

After clicking the Plans link, the list of plans is shown.

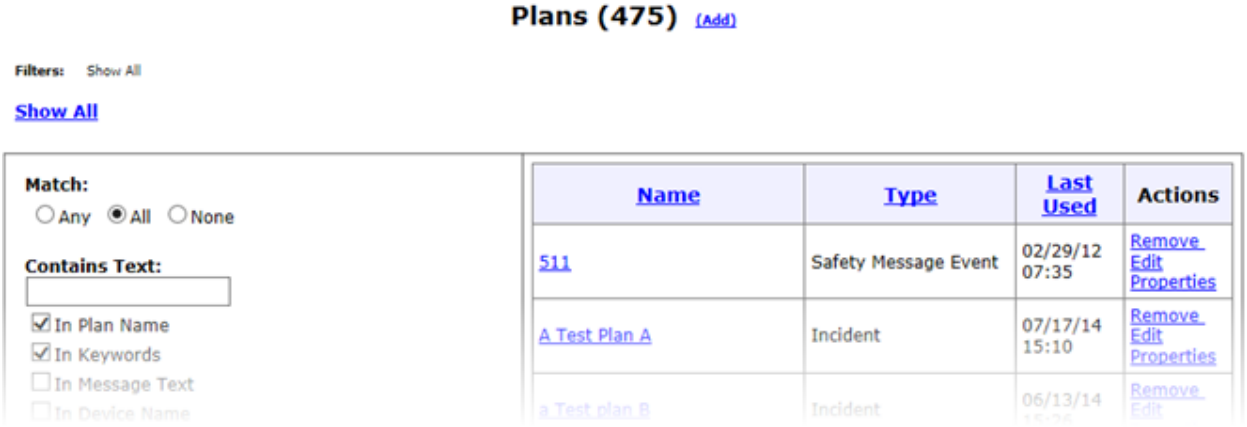


Figure 4-60. Plan List

To add an on/off device to a plan, the user must first view the plan by clicking its name.

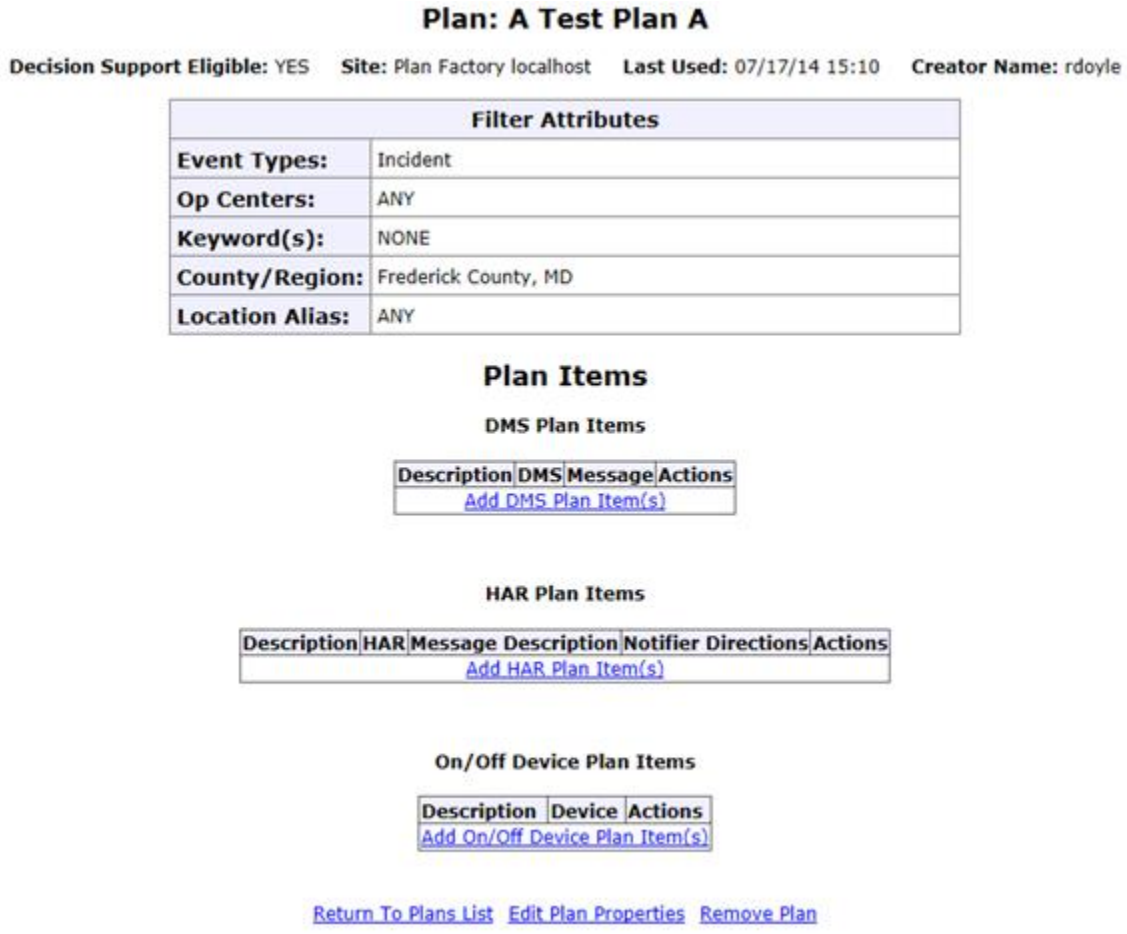


Figure 4-61. Plan Details

A new section is added to the plan details page in R14 to show on/off devices that are included in the plan. The user can click the Add On/Off Device Plan Item(s) link to launch the form used to add on/off devices to the plan.

Figure 4-62. Add On/Off Device(s) to Plan

The user can click the Select button to see all on/off devices in the system, or they can type text into the search box and click the Search button to view a list of on/off devices that match the search text. The search considers the Name and Location fields when searching for on/off devices. Whether the Select or Search method is used, the Select target device form is shown, listing either all on/off devices in the system or only those that match the search. If an on/off device is already included in the plan, it will not be shown for selection.

Figure 4-63. Select On/Off Device for Plan

The user can select one or more on/off devices and click Use Selected to select the on/off devices for the plan. The Add On/Off Devices to Plan form will be redisplayed with a complete list of on/off devices that have been selected.

Figure 4-64. Add On/Off Devices to Plan, with selected items

The user can utilize the Select or Search buttons multiple times to add to (or remove from) the list of selected items. If an on/off device was previously selected, its check box on the Select target device form will be initially checked.

After the user is satisified with their list of selected devices, they can click the Add to Plan button to add the on/off devices to the plan. If they click the Cancel button, the form will be closed and no on/off devices will be added to the plan.

After on/off devices are added to the plan, they will be shown on the plan details page.

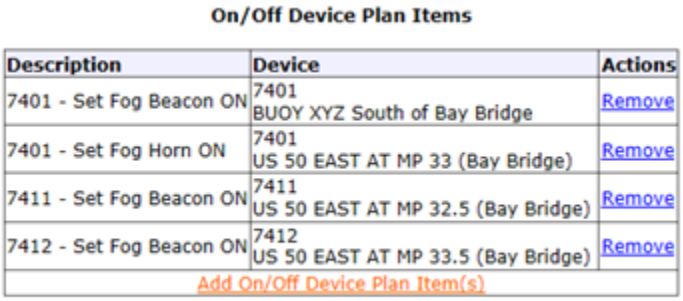


Figure 4-65. Plan Details Page, with On/Off Devices

The description of each on/off device plan item consists of its name, a dash, and the action description, which is always "Set <device type> ON". The user can choose to remove an on/off device from the plan. A confirmation form is used to prevent accidental removal.

Figure 4-66. Remove On/Off Device Plan Item Confirmation

4.2.8 Response Plans

The existing CHART ATMS response plan feature, used to specify various device actions that are to be performed in response to a traffic event, is changed in R14 to allow the activation of on/off devices as part of the response.

4.2.8.1 Adding On/Off Devices to the Response Plan

If the user has the Respond to Traffic Event user right, the Response section of the event details page includes an Add Items link, which is used to add items to the response plan of the event. When the link is clicked, a form is popped up on the page and a variety of options exist for selecting or searching for items to be added to the response plan. This existing form is changed in R14 to not only add capabilities related to on/off devices, but changes are also made to shorten some existing terminology to make room for on/off devices.

Figure 4-67. Adding Devices to a Response Plan

The buttons labeled “DMSs”, “HARs”, “Plan”, and “Cameras” are all modified to remove the word “Select”. The default search, which now reads “All Response Devices and Plans” is changed from its prior value which read “All DMSs, HARs, Cameras, and Plans”. A new button is added, On/Off Devices, used to select on/off devices to add to the response plan. This form provides a variety of ways to add an on/off device to the response plan. Each is discussed in the following sections.

4.2.8.1.1 Select On/Off Devices for Response Plan

If the user clicks the On/Off Devices button, the system shows a form listing on/off devices that can be selected and included in the response plan. On/off devices that are already in the response plan are excluded from this form.

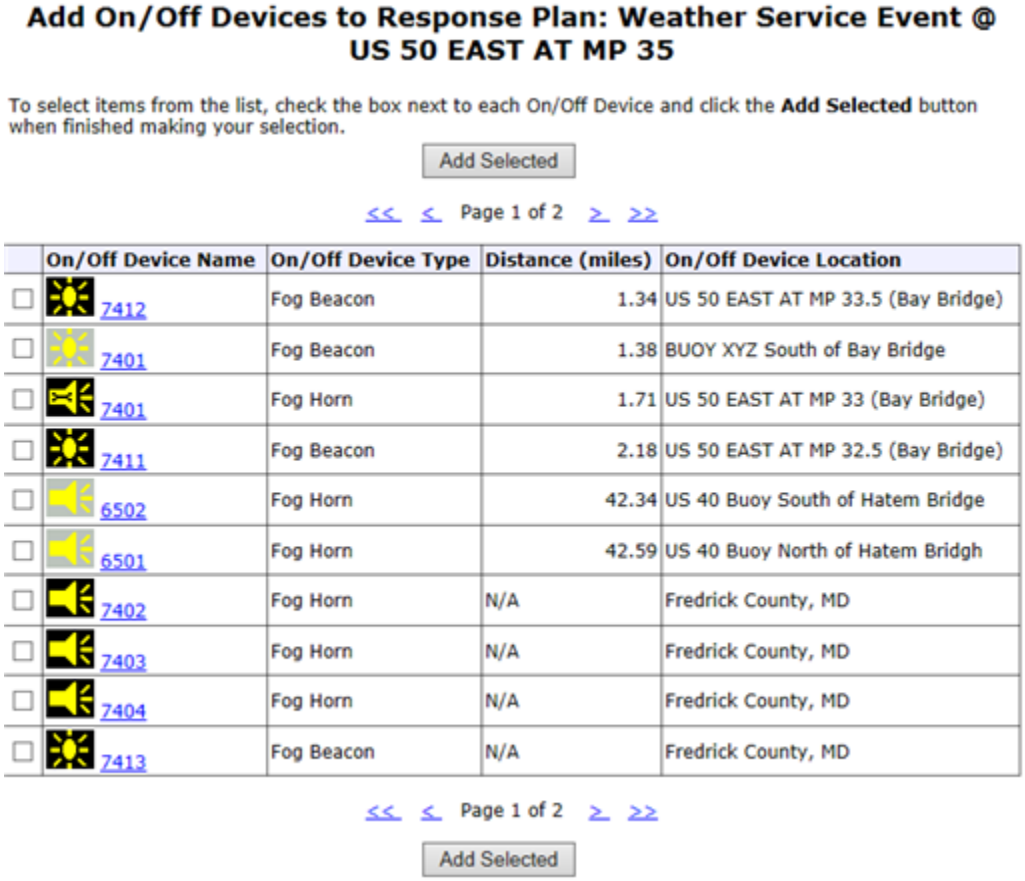


Figure 4-68. Select On/Off Devices for Response Plan

The list of on/off devices is initially filtered to include only devices in AORs assigned to the user's operations center plus any devices included in system folders assigned to the user's operations center. If the filter results in no devices being shown and the user's operations center doesn't have any AORs assigned to it, the list will be unfiltered. The list is sorted by the device's distance from the event location. Those devices without a location will appear at the end of the list. Pagination will be used if the user's preference for items per response plan page is set to show less than the number of on/off devices that appear in the list. The user can utilize the arrow links to move forward and backward page by page, or to jump to the first page or last page. The user can select any number of on/off devices they want to include in the response plan, then click the Add Selected button to add them.

4.2.8.1.2 Search for On/Off Devices for Response Plan

To search for on/off devices to add to the response plan, the user can click the Add Items link, then select "On/Off Devices" in the Search drop down, enter text in the "for" field, then click the Search button.

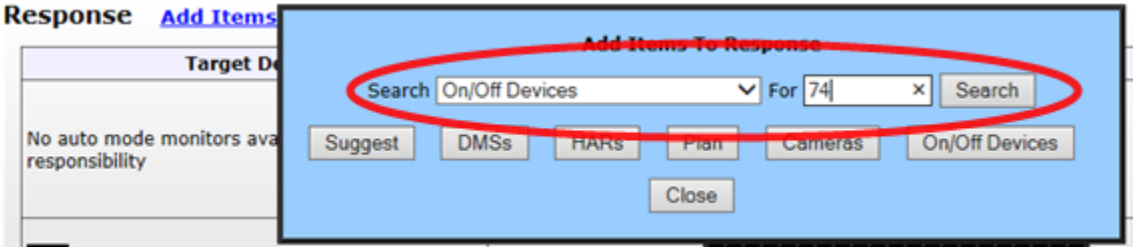


Figure 4-69. Search for On/Off Devices for Response Plan

If the search matches exactly one on/off device, it will be added to the response plan without any further action required by the user. If more than one on/off device matches, the search results will be shown. The search results page is the same page used to select on/off devices described in 4.2.8.1.1 above. Since the list is filtered however, a Show All link appears at the bottom of the list. The user can click this link to remove the search filter and view the list of all on/off devices in the system.

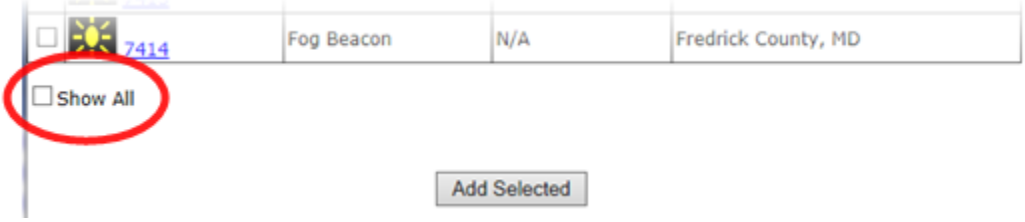


Figure 4-70. Show All Link on Select On/Off Device for Response Form

4.2.8.1.3 Search All Response Devices and Plans for Response Plan

The user may choose to search all response devices and plans for items to add to a response plan, and on/off devices will be included in that search.

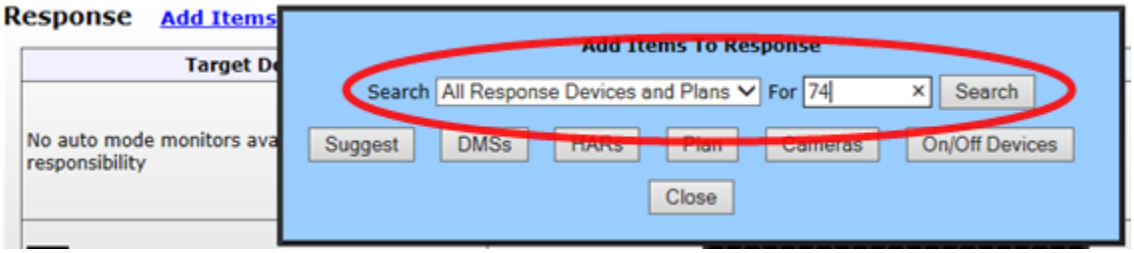


Figure 4-71. Search All Response Devices and Plans for Response Plan Items

If the search matches exactly one on/off device (or any single item for that matter), it will be added to the response plan without any further action required by the user. If more than one item matches the search, a search results page is shown that contains a section for each type of item that matched the search.

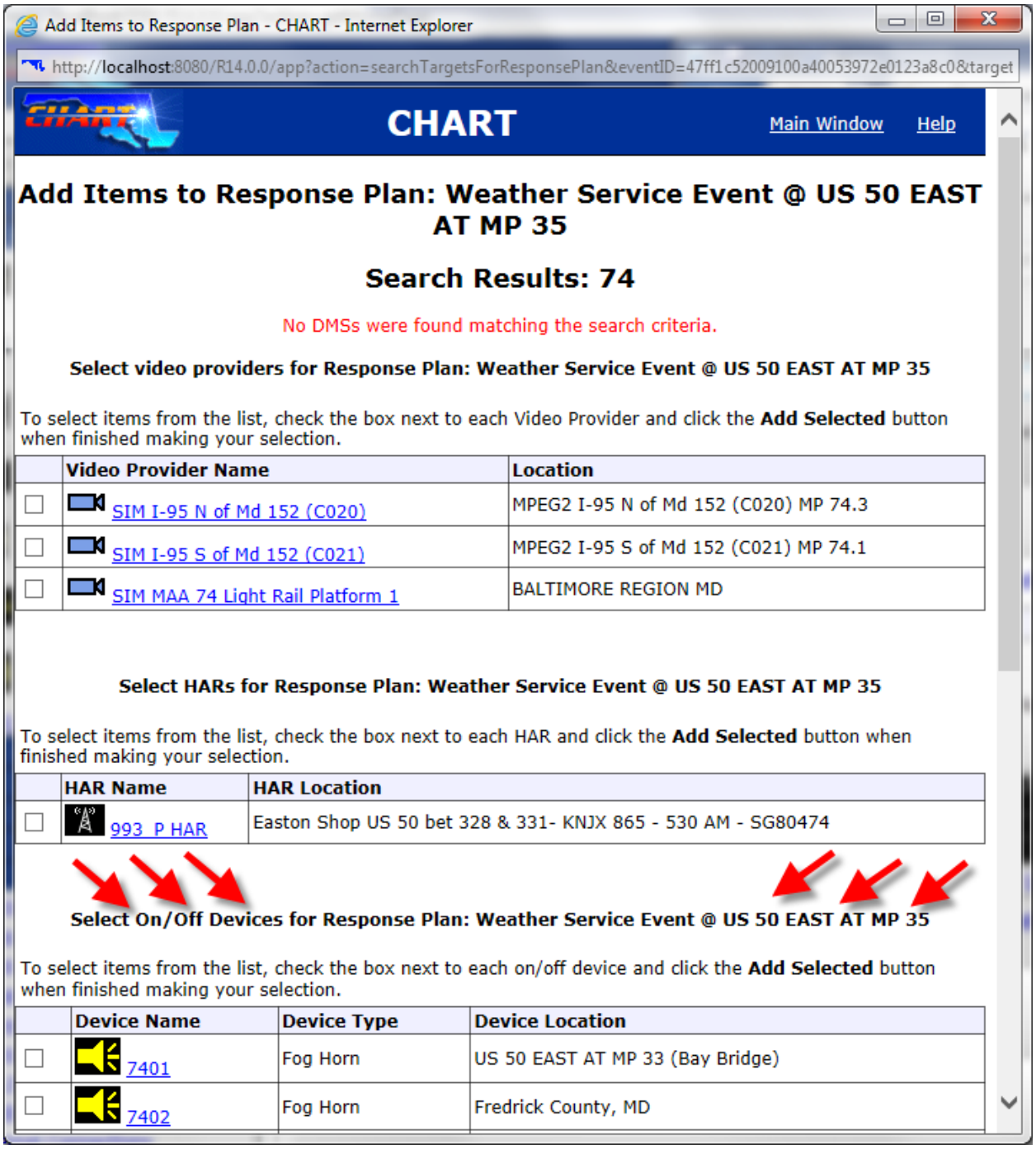


Figure 4-72. Search For Response Plan Items, Multiple Item Types

Note that at the top of the page, a message appears for any device type for which no items matched the search. There is then a section for each type of item, including a section for on/off devices, highlighted with red arrows in the image above. The user can click the check box for any item (including on/off devices) then click the Add Selected button at the bottom of the page (not shown) and the items will be added to the response plan of the event.

If any plans match the search and they contain on/off devices, those on/off devices will be added to the response plan if the user selects the plan and clicks the Add Selected button.

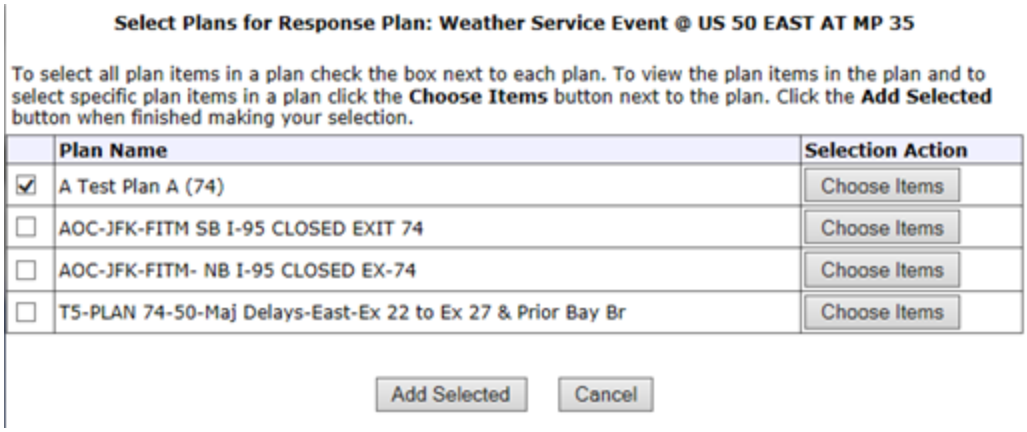


Figure 4-73. Search All Response Devices and Plans for Response Plan Items, Plan Section

The user may also click the Choose Items button to see the individual plan items, including on/off device plan items. This page will contain a section for on/off device plan items if any exist in the plan. The user can click the box for any plan items shown (including on/off device plan items) and then click the Add Selected button to add those items to the response plan.

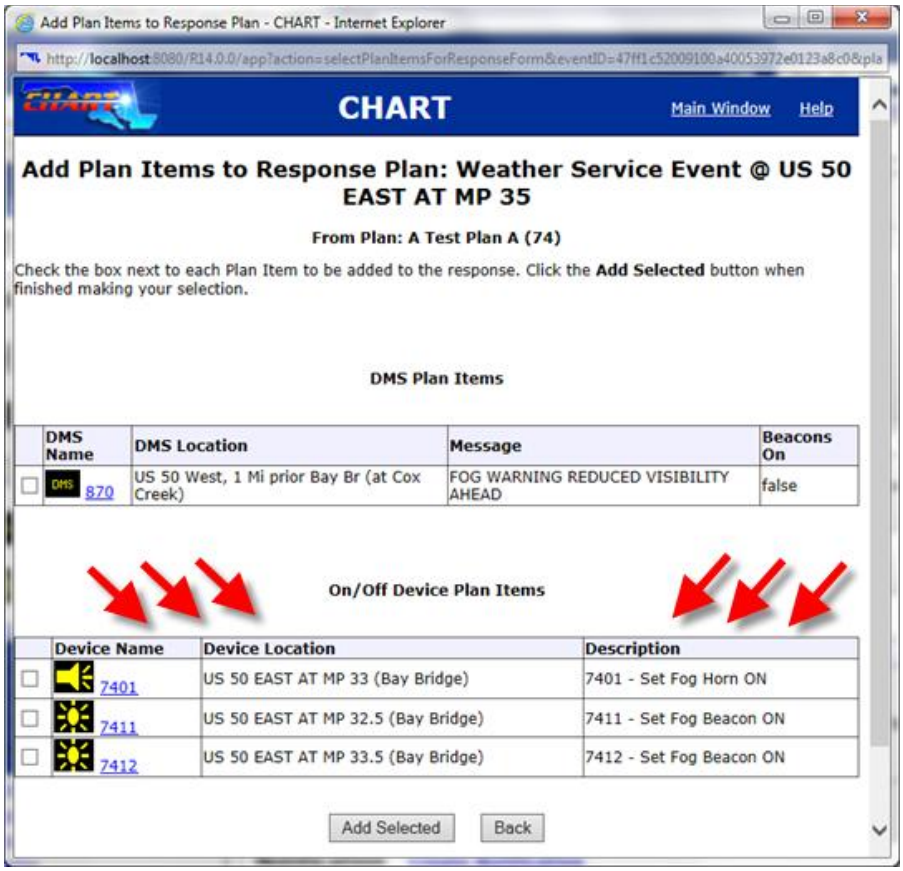


Figure 4-74. Choose Plan Items for Response Plan

4.2.8.1.4 Select Plans for Response Plan

The user can choose to select a plan from the list of plans to add to the response, and if that plan contains on/off device plan items, they will be added to the response along with the other plan items in the plan. The user can also uncheck the Select All box and select individual plan items, including on/off device plan items.

Figure 4-75. Add Items to Response, Plan button

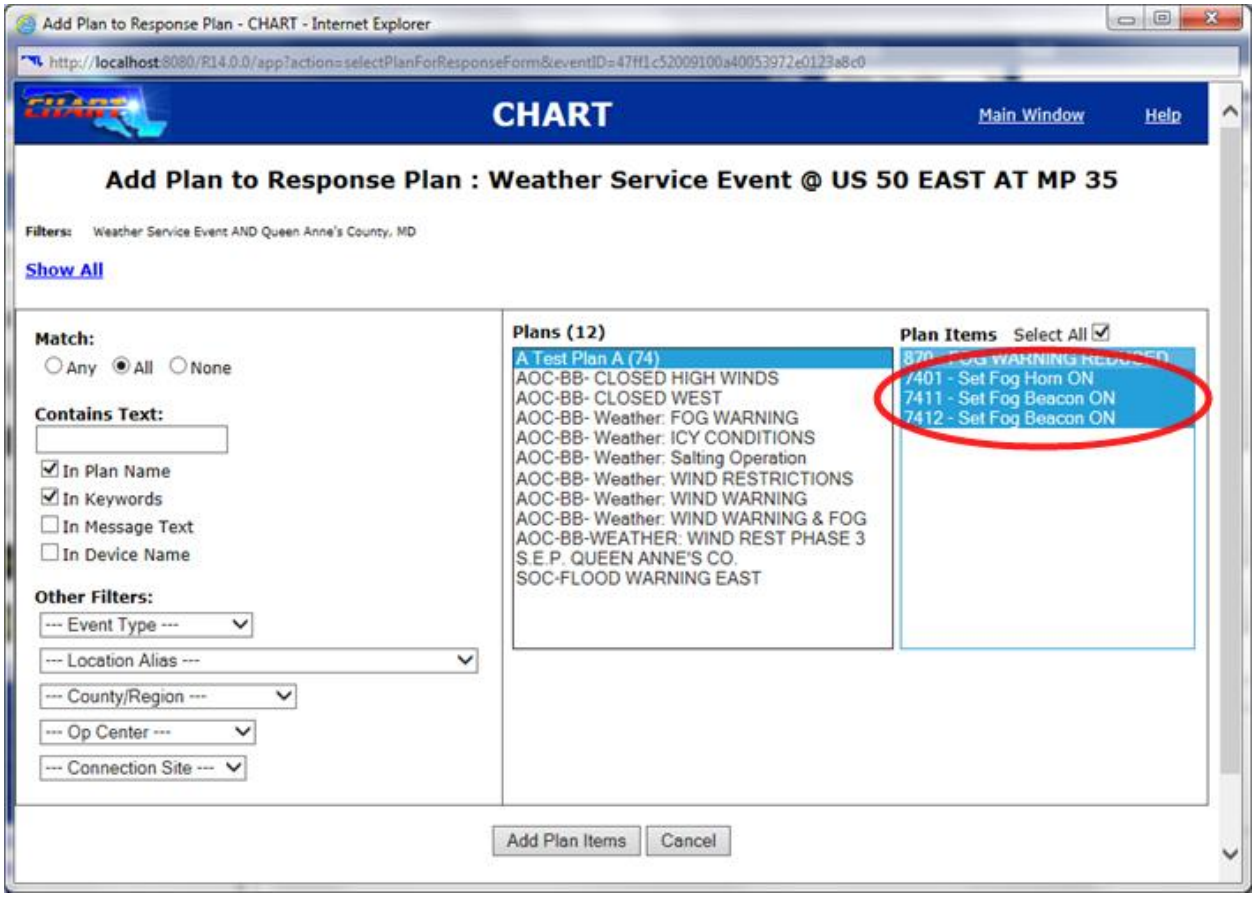
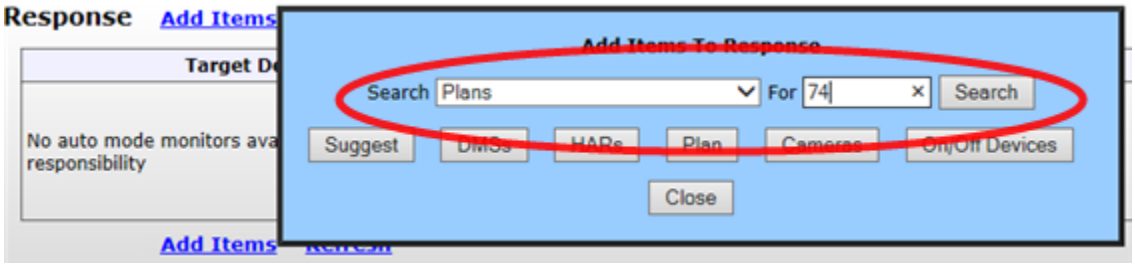


Figure 4-76. Select Plans for Response

4.2.8.1.5 Search Plans for Response Plan

The user may choose to search plans to add to the response plan of an event by clicking the Add Items link, changing the Search drop down to “Plans”, entering search text in the “For” field, and clicking the “Search” button.



When searching for plans to add to the response, the same process described for selecting plans in 4.2.8.1.4 above is used. The only difference is the list of plans will be initially filtered to only include plans that match the search text.

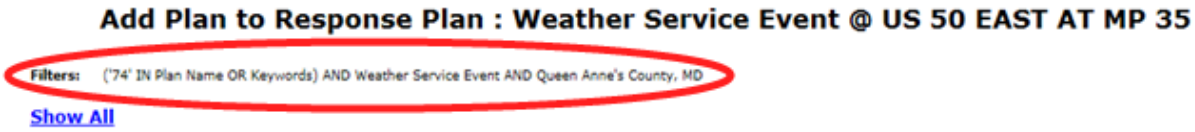


Figure 4-77. Search for Plans to Add to Response, Filtered Plan List

4.2.8.2 Viewing On/Off Devices in Response Plan

After on/off devices have been added to the response plan using one or more of the methods discussed above, they will appear within the Response section of the traffic event details page. On/off devices are shown beneath DMSs and HARs, and include all of the same options for a DMS and HAR except the ability to edit the message. A DMS is shown in the example image below to allow for comparison.

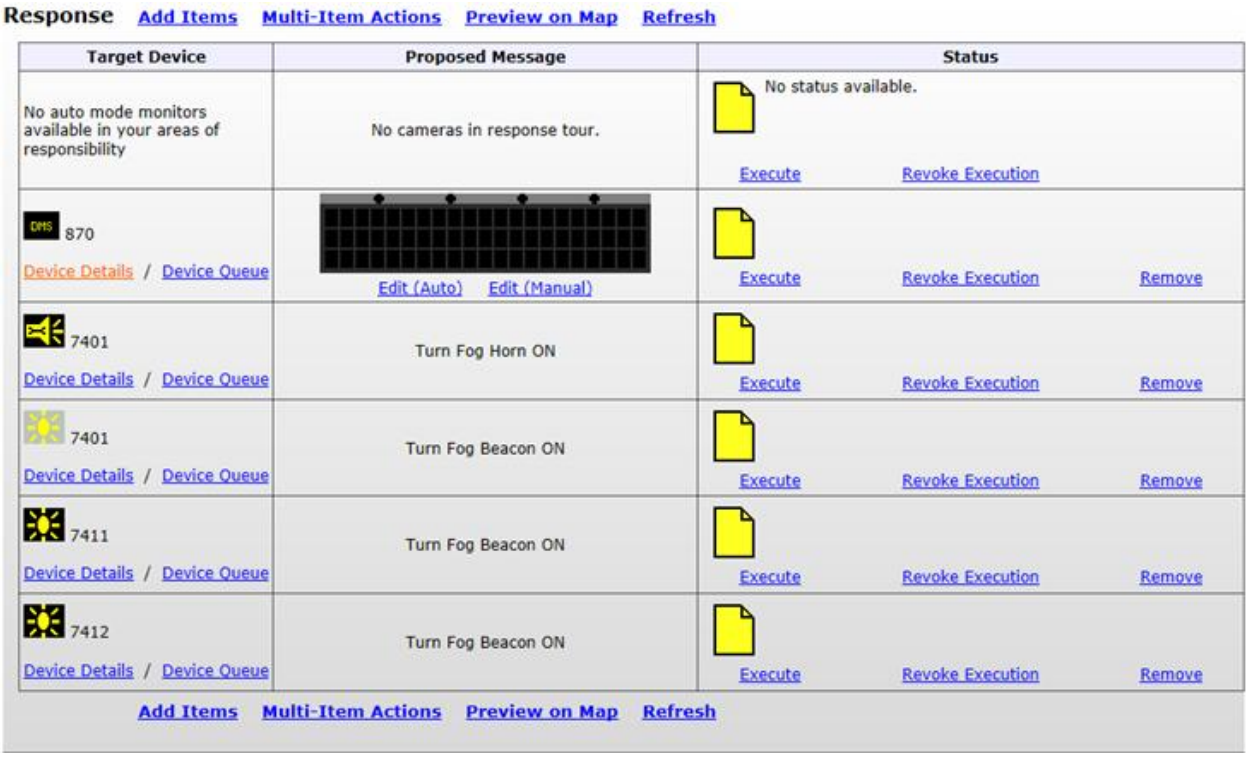


Figure 4-78. Response Plan Items, On/Off Devices

The Target Device column contains the name of the on/off device along with an icon that represents its current mode, status, and whether or not it is currently on/activated. A Device Details link provides access to the on/off device details page (see 4.2.3 above), while the Device Queue link provides access to the Arbitration Queue page (see 4.2.4 above).

The proposed message column will contain text in the format "Turn <device type> ON" for on/off devices.

The status column shows the current status of the response plan item. Note that on/off device response plan items cannot be edited (they don't have an associated message), so the response plan item status of "executed and modified" will never appear for an on/off device in a response plan. If the user has the Respond to Traffic Event user right, the Status column also contains links to allow the response plan item to be executed, revoked, or removed.

4.2.8.3 Response Plan Item Operations

If the user clicks the Execute link for an on/off device response plan item, the response plan item is placed in the "executed" state and is added to the arbitration queue of the on/off device (if not already present). If the on/off device is online, the on/off device arbitration queue will perform an evaluation, discover that there is at least one on/off device whose response plan item is executed, and activate the device if not already active.

If the user clicks the Revoke link for an on/off device response plan item, the response plan item will be set to the "not executed" state and the device's arbitration queue will perform an evaluation. If there are other on/off device response plan items with entries on the on/off device

arbitration queue that are in the executed state, the device will remain activated. Otherwise the on/off device arbitration queue will deactivate the device.

If the user clicks the Remove link for an on/off device response plan item, the item is revoked, removed from the device arbitration queue, and removed from the response plan.

If the user chooses to perform operations on all or multiple response plan items, on/off devices will be included for the Execute, Revoke Execution, and Remove options. The form used to select multiple items for any of these actions will include any on/off devices that exist in the response plan.

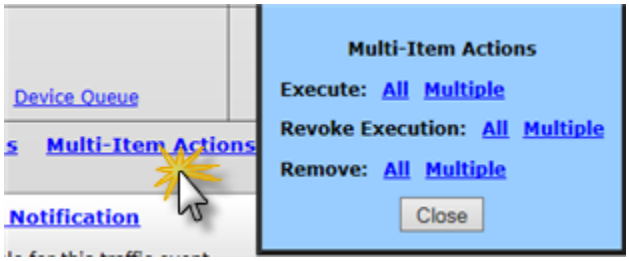


Figure 4-79. Response Plan Multi-Item Actions

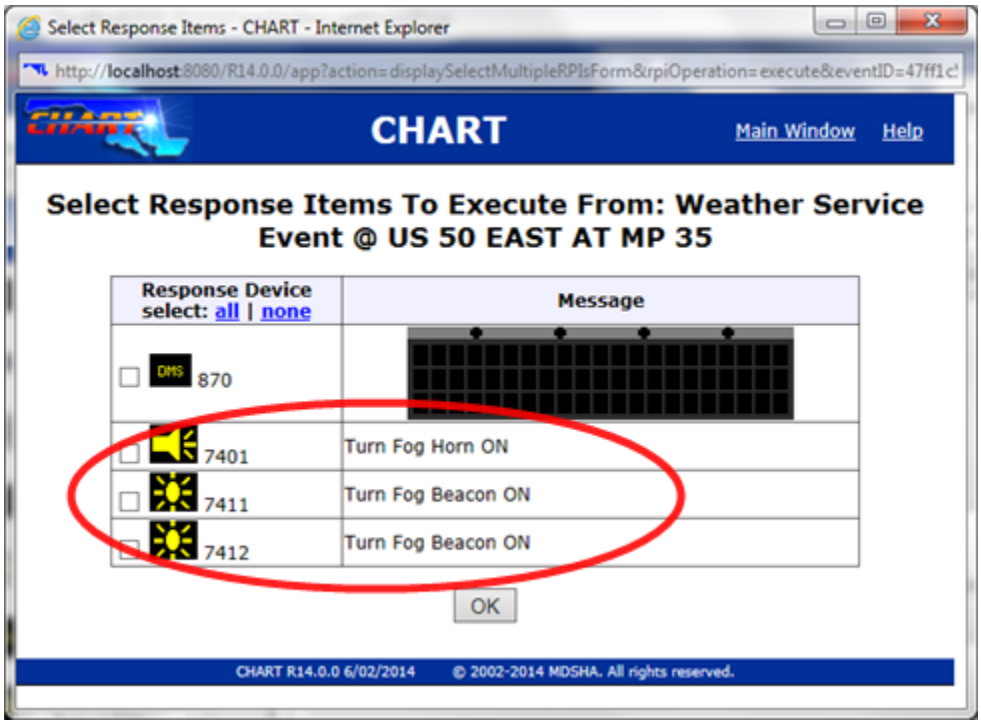


Figure 4-80. Select Multiple Items for Response Plan Action

4.2.9 Operations Center Report

The existing operations center report, shown when the user first logs in (or when the Center Rpt link is clicked at the top of the home page or working window) is updated in CHART ATMS R14 in two areas. First, in the list of traffic events, any on/off devices that are in the response plan of the traffic event will be shown.

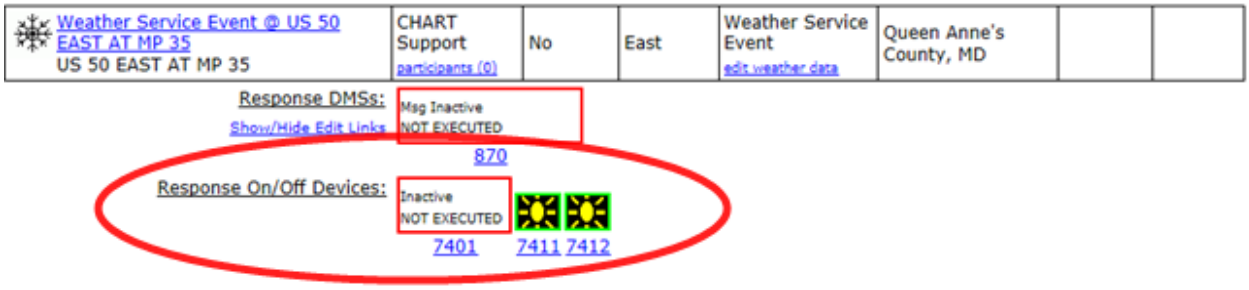


Figure 4-81. Op Center Report, Response On/Off Devices

If the on/off device is not active, a red box similar to those used for DMSs will be shown to indicate the reason. The reasons include NOT EXECUTED, OFFLINE, and MAINT. Note that the QUEUED status, which can be shown for DMS devices does not apply to on/off devices. DMS arbitration queue entries can be queued and not active if there is a higher priority message being displayed for a different traffic event. This does not apply to on/off devices since queue priority is not applicable.

The other section of the operations center report that is updated is the Device Responsibilities section of the report where maintenance mode devices are shown. Any on/off devices that are in maintenance mode and have a controlling op center set to the op center whose report is being viewed will appear in this section of the op center report.

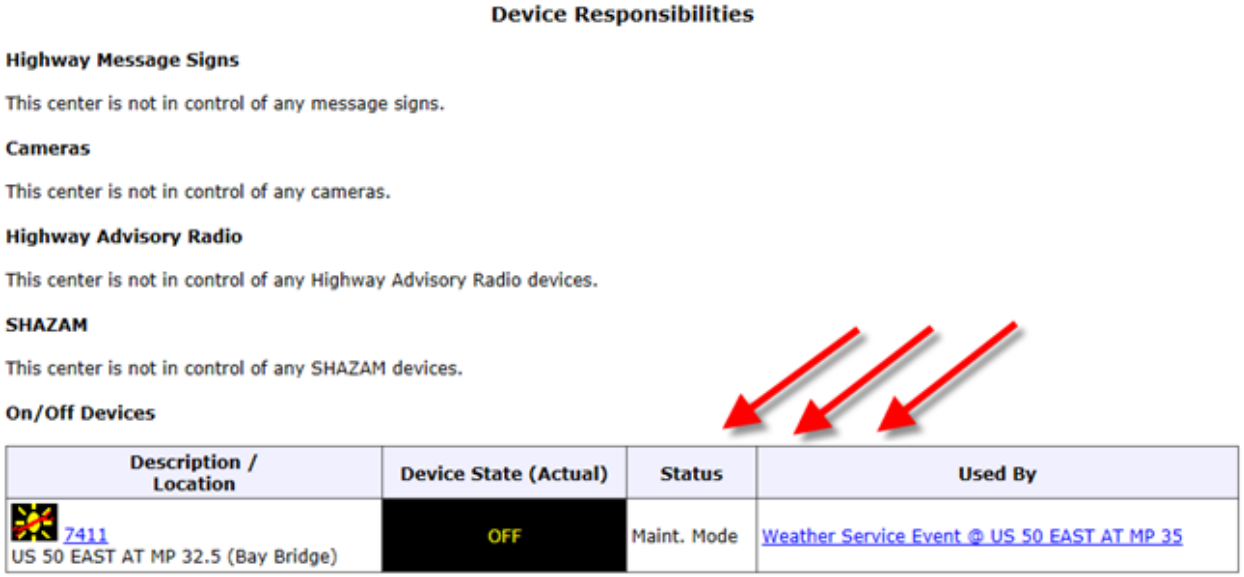


Figure 4-82. Op Center Report, Device Responsibilities

4.2.10 All Open Events and Devices with Active Messages

This existing CHART ATMS page is accessible while viewing the operations center report, using the link at the top of the page.

Figure 4-83. All Open Events and Devices With Active Messages link

This page is updated in R14 to include any on/off devices in traffic event response plans in the list of events (unless the user has checked the box to hide devices) and will include any active on/off devices in the list of devices with active messages. While these devices are not technically displaying a message, they fit into the intent of this report and are therefore included.

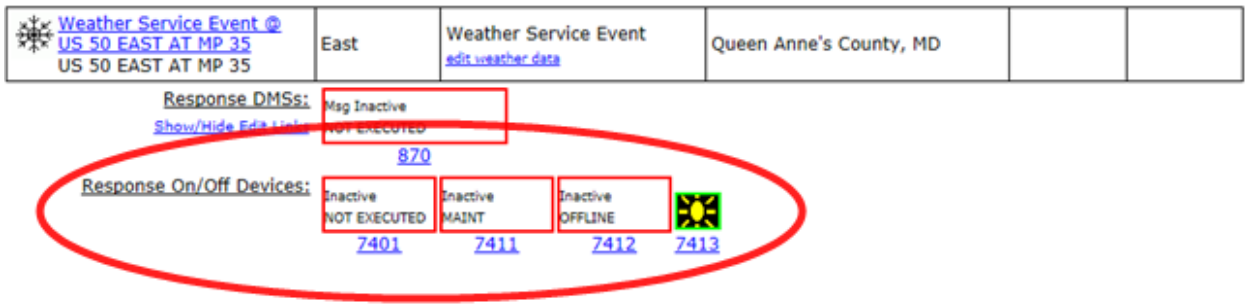


Figure 4-84. Open Events and Devices With Active Messages, Response On/Off Devices

Active On/Off Devices

Description / Location	Device State (Actual)	Status	Used By
7413 Fredrick County, MD	ON	Online	* Weather Service Event @ US 50 EAST AT MP 35

Figure 4-85. Open Events and Devices With Active Messages, Active On/Off Devices

4.2.11 Open / Closed Event List

The list that shows Open and/or Open and Closed traffic events is available via links in the home page menu.

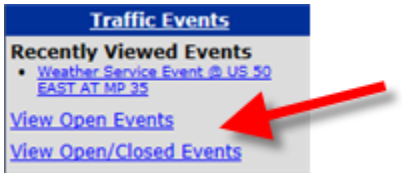


Figure 4-86. View Event List Links on Home Page

This page is updated in R14 to include any on/off devices in traffic event response plans in the list of events (unless the user has checked the box to hide devices).

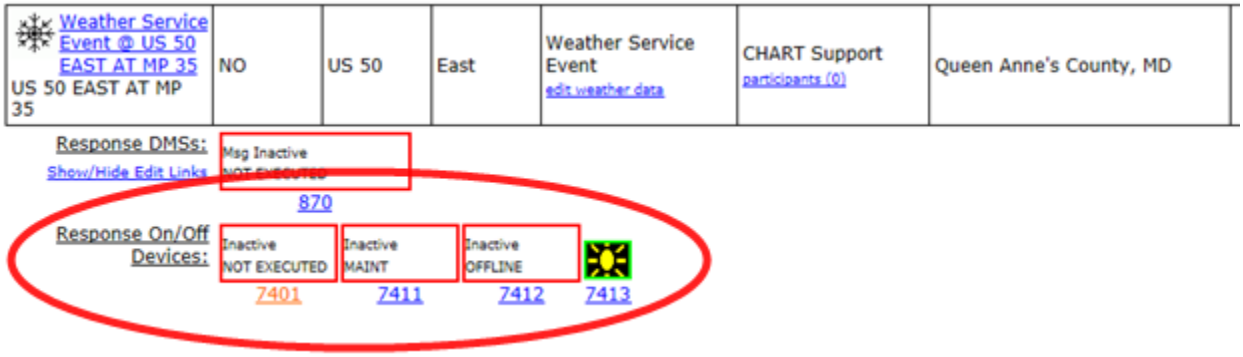


Figure 4-87. Open/Closed Event List, Response On/Off Devices

4.2.12 Home Page Map

A new layer is added to the home page map to allow on/off devices to be shown.

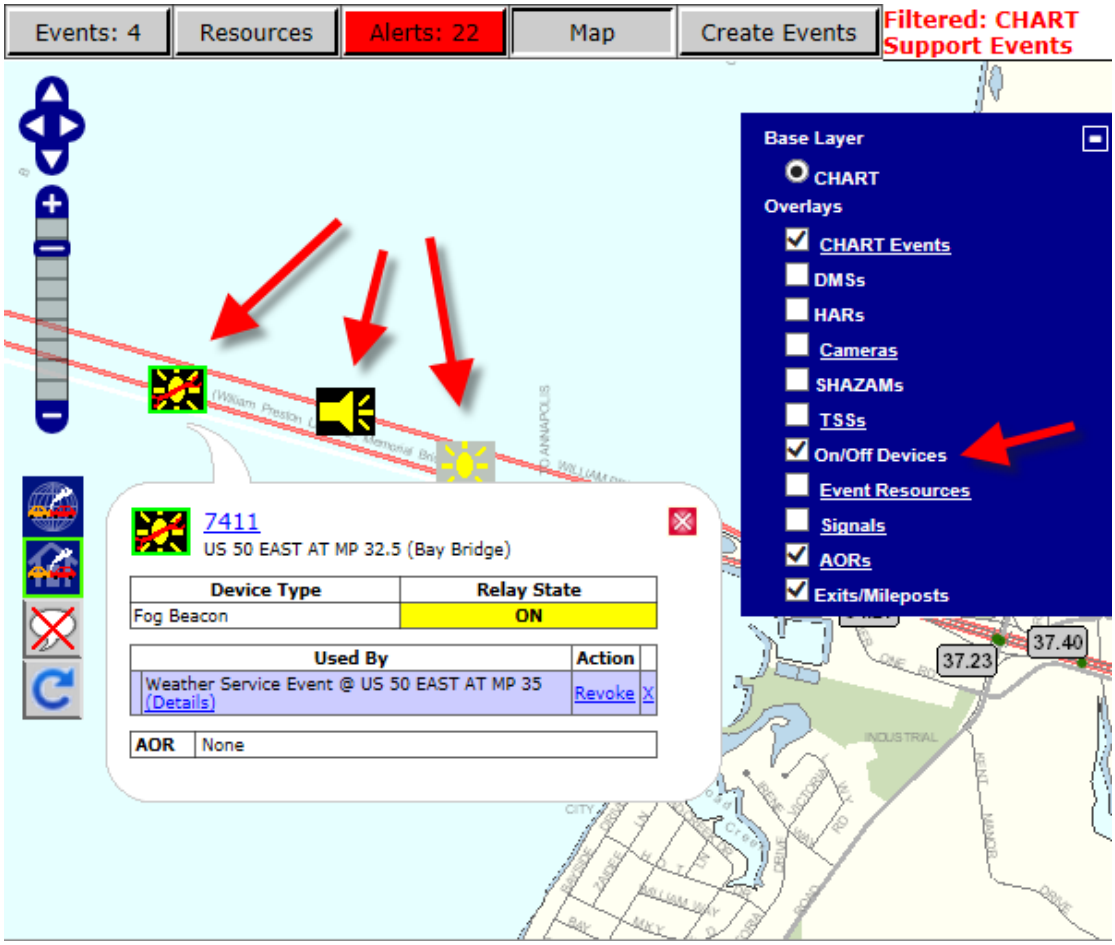


Figure 4-88. Home Page Map, On/Off Device Layer

If the user clicks on a device (see 7411 in the image above), a callout is shown that includes the device name and location, the device type, the current state of the device, and a list of any traffic events that include the device in their response. If the user has the respond to traffic event right,

links exist to allow the user to execute or revoke the response plan item and to remove the response plan item. The on/off device name is a link that when clicked causes the on/off device details page to be shown in the working window. A details link is shown for any traffic event that includes the device in its response plan. If the user clicks the Details link the details page for the traffic event is shown in the working window.

4.2.13 Edit Location Map

The map included on the Create Events tab of the home page, or on the Edit Location form for events and devices is changed in CHART ATMS R14 to include an on/off device layer to allow on/off devices to be displayed. The functionality included on this map is identical to the functionality described in 4.2.12 above.

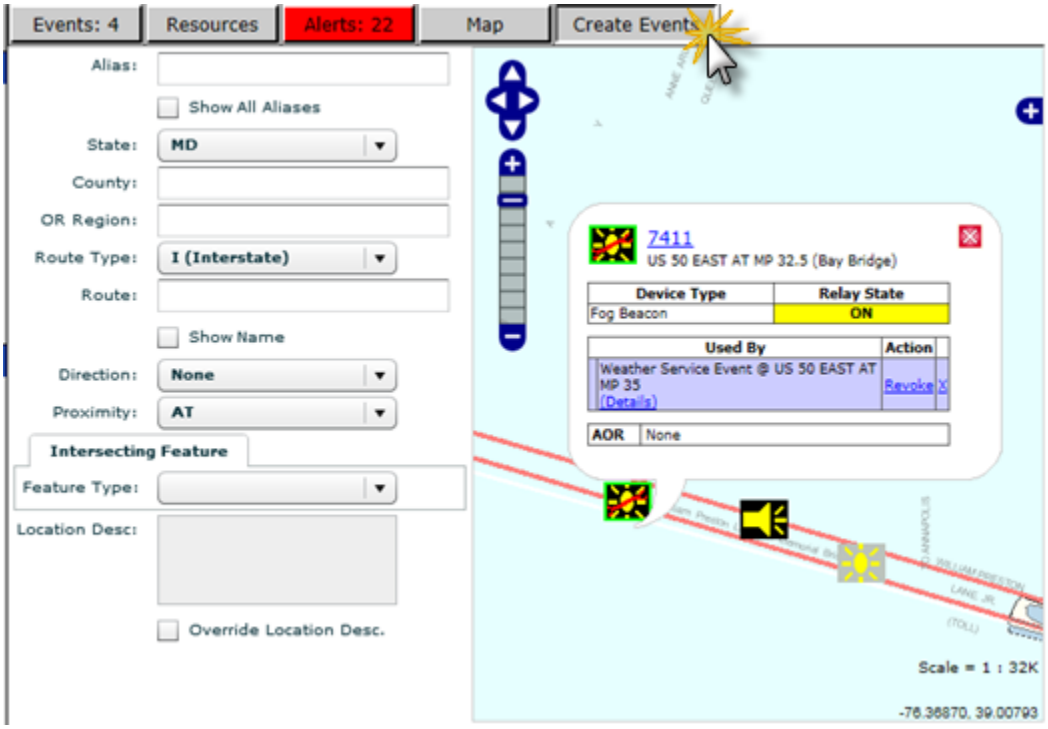


Figure 4-89. Create Events Form Map, On/Off Device Layer

4.2.14 Close Devices Map

The close devices map is available on the traffic event details page. It is updated in CHART ATMS R14 to include a layer for on/off devices, and to allow on/off devices to be added to the response plan of the event by selecting the devices on the close devices map.

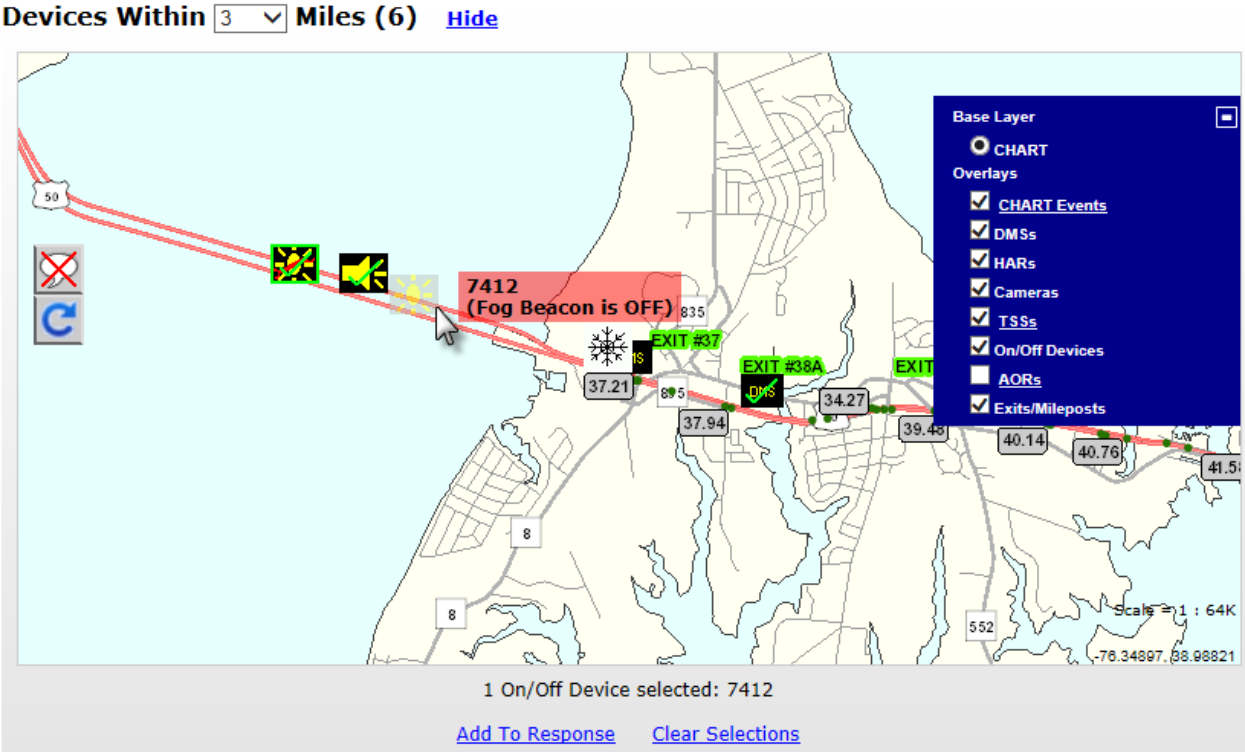


Figure 4-90. Close Devices Map

In the image above, Fog Beacon 7412 is selected. The user selects devices on this map by holding shift and clicking on the device icon. When one or more devices are selected, the user can click the Add To Response link and the devices will be added to the response plan of the traffic event. Note that icons for devices shown on this map contain a check mark if they are already included in the response plan of the event. Other functionality on this map is identical to the functionality described in 4.2.12 above.

4.2.15 Close Devices Table

The close devices table appears beneath the close devices map on the traffic event details page. This section of the details page is changed in CHART ATMS R14 to include close on/off devices. Initally, just a header that shows the number of close on/off devices is shown. If the user clicks the Show link, the list of close on/off devices is shown (see below).

Figure 4-91. Close Devices Table, On/Off Devices

If an on/off device shown in this table is not already in the response plan of the event and the user has the Respond To Traffic Event user right, an Add to Response button will appear in the Action column. If the user clicks this button, the on/off device will be added to the response plan of the event. Note that each on/off device name shown in this list is a link that when clicked causes the on/off device details page to be shown.

4.2.16 Preview Response on Map

The response plan preview map shows all response devices included in a traffic event's response plan. This map is accessed using the Preview on Map link in the Response section of the traffic event details page.

Figure 4-92. Traffic Event Response, Preview on Map Link

The map is initially panned and zoomed such that all response devices will appear on the map. All device layers are initially visible, including the on/off device layer. All functionality related to on/off devices discussed in 4.2.12 above apply to this map, including the actions available from the callout that is displayed if the user clicks on an on/off device icon.

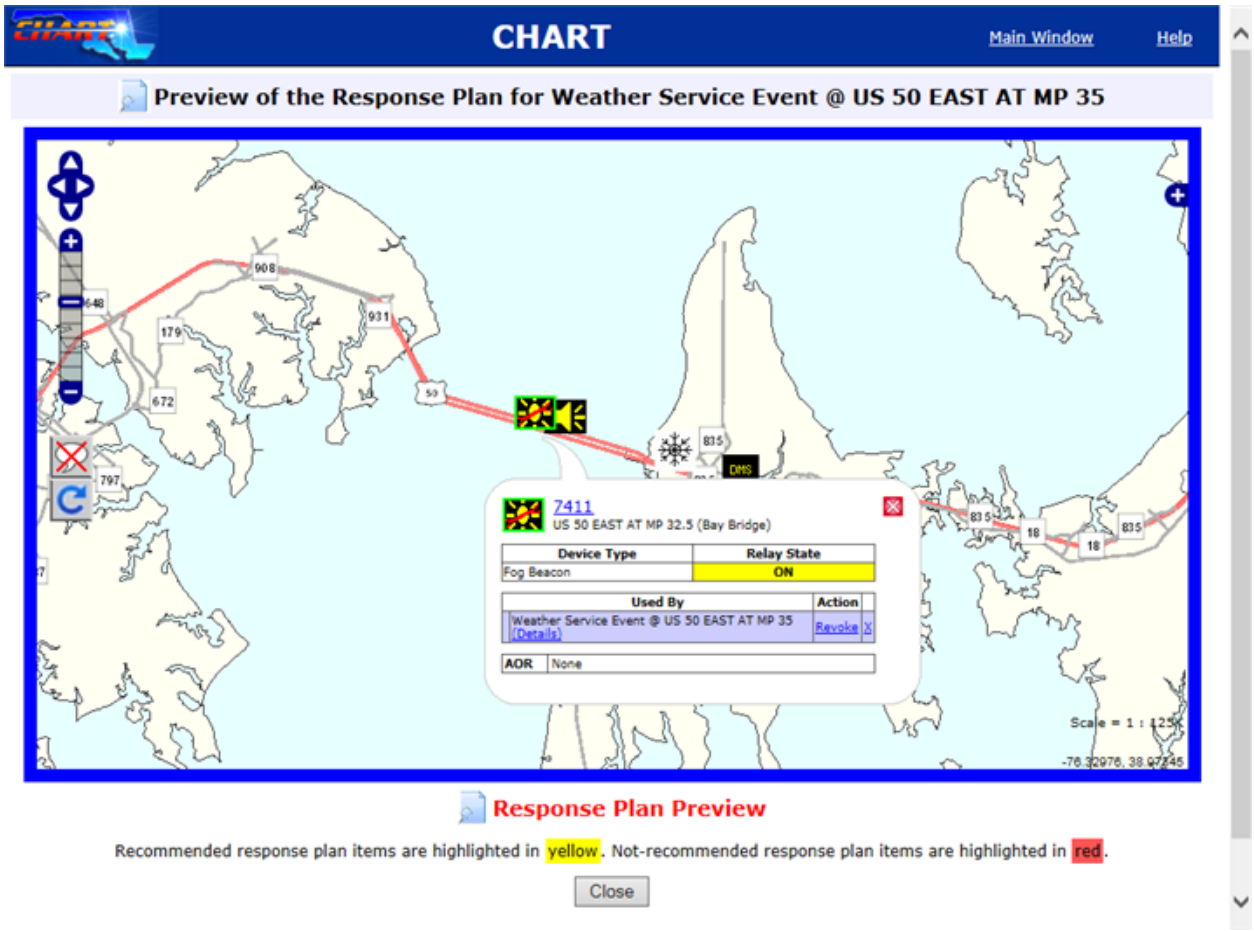


Figure 4-93. Response Plan Preview

4.2.17 Logout Not Allowed

If the last user logged into an operations center attempts to log out and there are resources controlled by that operations center, the system will prevent the user from logging out and show the Logout Not Allowed page. CHART ATMS R14 adds on/off devices as controlled resources, and if the center has any on/off devices in maintenance mode with a controlling operations center set to the user's center, logout will be blocked. The user can choose to transfer the resource to another center, or use the Change User operation to have another user log in.

Figure 4-94. Logout Not Allowed

4.2.18 Transfer Controlled Resources

Users can transfer controlled resources from their center to another center with logged in users. Users with the Transfer Any Controlled Resource can also transfer resources controlled by other centers. In CHART ATMS R14, on/off devices are added as another type of controlled resource that can be transferred.

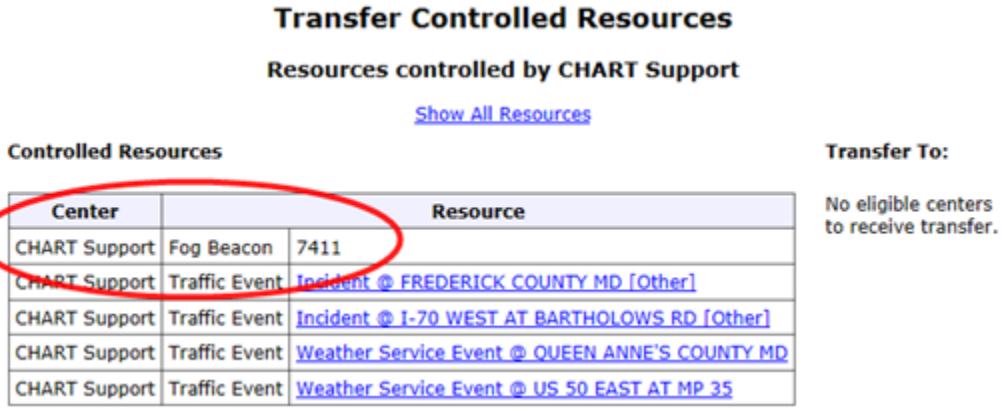


Figure 4-95. Transfer Controlled Resources

4.2.19 Device Maintenance Portal

The device maintenance portal is accessed by clicking the Device Maintenance Portal box on the CHART ATMS Login screen prior to logging in.

Figure 4-96. Login Screen, Device Maintenance Portal Access

4.2.19.1 Device Maintenance Portal Home Page

The device maintenance portal home page provides the user with several ways to navigate to find devices of interest, such as those they are repairing. A search field at the top of the page allows them to search for devices by name, location, or controlling op center name. The home page also allows the user to browse for a device by viewing device lists, with optional filters. The home page is updated in CHART ATMS R14 to include on/off devices.

Figure 4-97. Maintenance Portal Home Page

4.2.19.2 Device Maintenance Portal, Search for On/Off Device

If the user performs a search, the search results page shows a section for each type of device that matched the search text within the device name, location, or controlling operations center. A new section for on/off devices is added to the search results page for CHART ATMS R14.

Figure 4-98. Maintenance Portal, Search for On/Off Device

4.2.19.3 Device Maintenance Portal, Browse for On/Off Device

If the user wishes to instead browse for a device, they can click the On/Off Devices link to view a list of on/off devices filtered using their default operations center filter. The default filter shows only devices within areas of responsibility assigned to the center and devices contained in system folders assigned to the center. If no devices exist in system folders assigned to the center and there are no areas of responsibility assigned to the center, all on/off devices will be shown. The user can also use the drop down that appears below the On/Off Devices link to initially bypass the default filter to view all on/off devices, or to use another available mode/status filter.

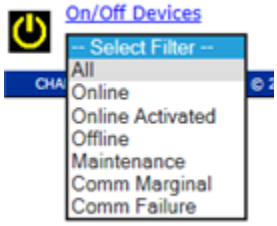


Figure 4-99. Maintenance Portal, Browse for On/Off Device

After the user has clicked the On/Off Devices link or used a filter, the list of on/off devices is shown with the selected filtering applied (if any). Any filter that is currently in use is shown near the top of the page, and the user can click the View All link to remove the current filtering.

Figure 4-100. Maintenance Portal, On/Off Device List

The device list is simple by design. Only the device icon, name, and location are shown. Each device name is a link, that when clicked, causes the on/off device details page to be shown.

4.2.19.4 Device Maintenance Portal, On/Off Device Details

The on/off device details page contains the same functionality as the full CHART ATMS GUI as described in 4.2.3 above, with a few modifications to the layout to make it more condusive to use on mobile devices. The actions section is moved from the right side of the page to the top left, and other information is left justified. Rules regarding the user rights required to see the configuration information as discussed in 4.2.3 above also apply here.

Figure 4-101. Maintenance Portal, On/Off Device Details

4.2.19.5 Device Maintenance Portal, Logout Warning

When the user logs out, if there are any on/off devices in maintenance mode that have a controlling operations center set to the user's center, the system will display a logout warning. The devices that are in maintenance mode are shown, including on/off devices. The user can choose to view the details page for the device and place it online or in maintenance mode, or to ignore the warning and log out anyway.

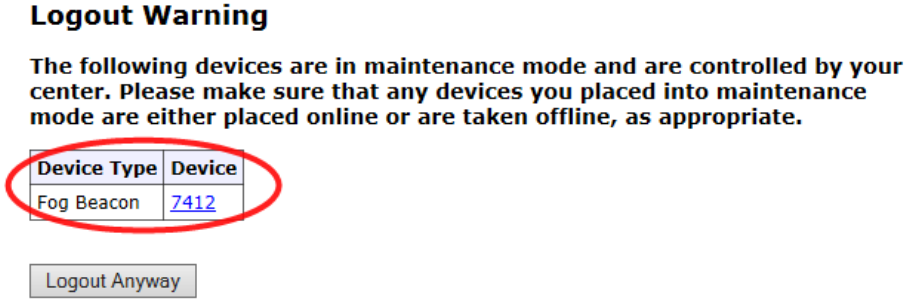


Figure 4-102. Device Maintenance Portal, Logout Warning

4.2.20 On/Off Device Type Configuration

CHART ATMS allows for any number of on/off device types to be configured. These types are used to further classify on/off devices to indicate the type of device connected to the electronic relay which is turned on or off when the on/off device is commanded via CHART ATMS. The system is initially deployed with two on/off device types; Fog Horn and Fog Beacon. Each of these types has a set of custom icons defined to further assist in identifying these devices within CHART ATMS. Another set of icons is included to generically represent an on/off device, and this icon set is suitable for new on/off device types added to the system. The system also allows additional custom icon sets to be defined and installed in the CHART ATMS GUI manually. The administrator can then configure the system use the manually installed custom icon sets to represent new on/off device types.

Figure 4-103 Fog Horn Icon

Figure 4-104 Fog Beacon Icon

Figure 4-105 Generic On/Off Device Icon

4.2.20.1 View On/Off Device Types

A user with the Configure System right can view the on/off device types that have been defined in the system. The on/off device types are viewed in the system profile and are accessed via the system profile link on the home page. The on/off device types are found in the On/Off Devices section of the system profile as shown below:

Figure 4-106 Viewing the On/Off Device Types

After clicking the view/edit link in the On/Off Device Types section of the system profile, the list of currently defined on/off device types is shown:

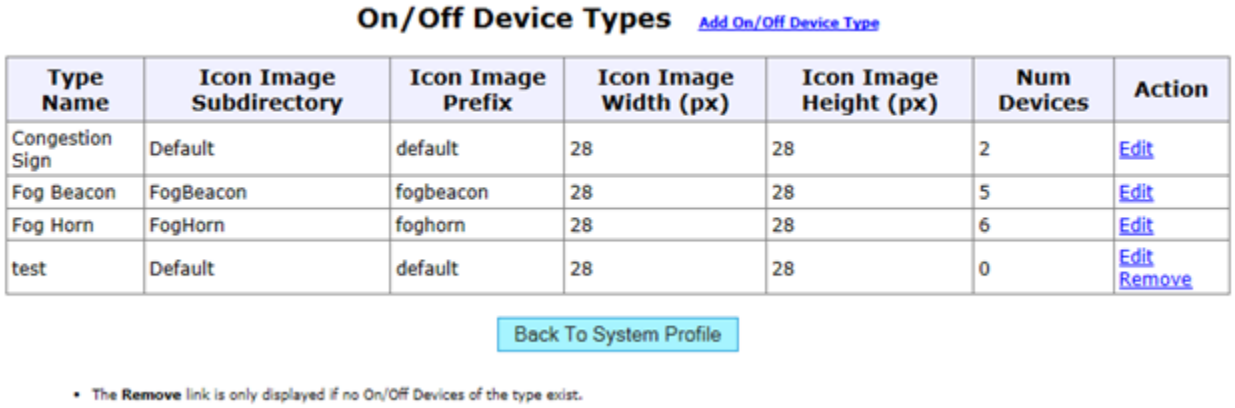


Figure 4-107 On/Off Device Type List

For each on/off device type listed, the following data is shown:

FIELD NAME	DESCRIPTION
Type Name	The name of the device type.
Icon Image Subdirectory	The directory within the CHART ATMS GUI installation's images/onoffdevice directory where the custom icons for this on/off device type are stored.
Icon Image Prefix	The prefix used for all icon file names. The system uses this prefix and then formulates a file name based on the device status, mode, and other factors. There are 38 images included in a custom icon set; all file names start with this prefix.
Icon Image Width (px)	The width of custom icon images, in pixels.
Icon Image Height (px)	The height of custom icon images, in pixels.
Num Devices	The number of on/off devices in the system that are configured as this device type.
Action	Actions that can be peformed on the device type. An Edit link appears for all on/off device types and allows for its settings to be changed. A Remove link will appear to allow the on/off device type to be removed, but only if the device type is not in use by any on/off device type. To find which on/off devices are using a device type, view the on/off device list, enable the on/off device type column and filter by the device type.

4.2.20.2 Add On/Off Device Type

To add a new on/off device type to the system, the user clicks the Add On/Off Device Type link to view the Add On/Off Device Type form, shown below.

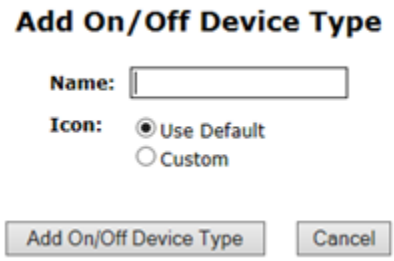


Figure 4-108 Add On/Off Device Type (1)

When using the default icon set, the form is very simple as shown above. The user must supply a name for the on/off device and then submit the form. If the user clicks the Custom radio button, however, more fields appear as shown below.

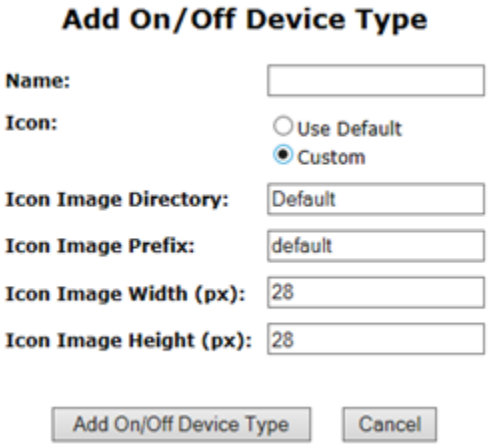


Figure 4-109 Add On/Off Device Type (2)

When the user chooses to use a custom icon set, they must specify the Icon Image Directory, Icon Image Prefix, Icon Image Width, and Icon Image Height as described in section 4.2.20.1 above. The user can click the Add On/Off Device Type button to add the device type, or Cancel to exit the form without making any changes.

4.2.20.3 Edit On/Off Device Type

If the user clicks the Edit link for any on/off device type shown in the on/off device type list (see 4.2.20.1 above), the Add On/Off Device Type form is shown with the form heading changed to indicate it is an edit and with the form prepopulated with the existing values for the on/off device type. See 4.2.20.2 above.

4.2.20.4 Remove On/Off Device Type

If no on/off devices are configured with their device type set to an on/off device type that appears in the on/off device type list, a Remove link will appear for that type. Upon clicking the Remove link the user is prompted to confirm their desire to remove the on/off device type.

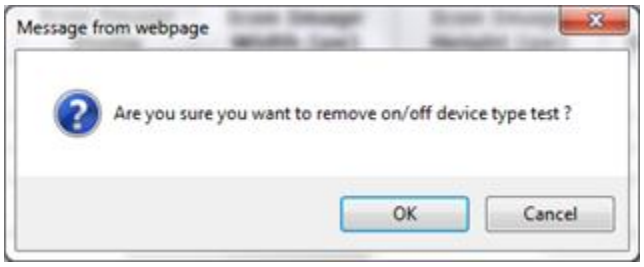


Figure 4-110 Remove On/Off Device Type Confirmation

If the user confirms their intention to remove the on/off device type by clicking the OK button, the system will remove the on/off device type and it will no longer appear in the list of on/off device types. Note that icons associated with the on/off device type are not removed. Icon sets can be used by more than one on/off device type or a user may define a new on/off device type that uses the icon set in the future. An administrator can remove the icons manually from the CHART ATMS GUI installation if the icons are no longer needed.

4.3 Traffic Event Queue Calculation

This section describes the user interface changes in R14 related to the Traffic Event Queue Calculation feature.

Changes will include system-wide configuration for enabling / disabling automatic queue calculation for open traffic events. There are also several settings that control various aspects of the queue calculation and usage by the Traffic Event Service.

There will also be changes for Event Details pages for displaying and managing queue information for events.

The following sections provide details of the changes.

4.3.1 System Configuration Changes

4.3.1.1 Configure Traffic Event Queue Calculation Settings

An administrator with the Configure System right will be able to specify the system-wide settings that enable or disable the automatic queue calculation for open traffic events. Other settings control various aspects of the queue calculation logic and usage by the Traffic Event Service. A new page is added under System Profile Properties – Traffic Event Settings.

- Enable Automatic Event Queue Calculations
- Calculation Frequency (Multiple of INRIX update frequency)
- Event to First Link Maximum Distance (miles)
- Link to Next Upstream Link Maximum Distance (miles)
- Minimum Link Data Quality
- Maximum Consecutive Bad Links To End Queue
- Maximum % Speed Differential for Congestion
- Maximum Distance Change for Queue Length Update (miles)
- Stale Calculated Queue Length Time (minutes)

- Event History Log Queue Entry interval (minutes)

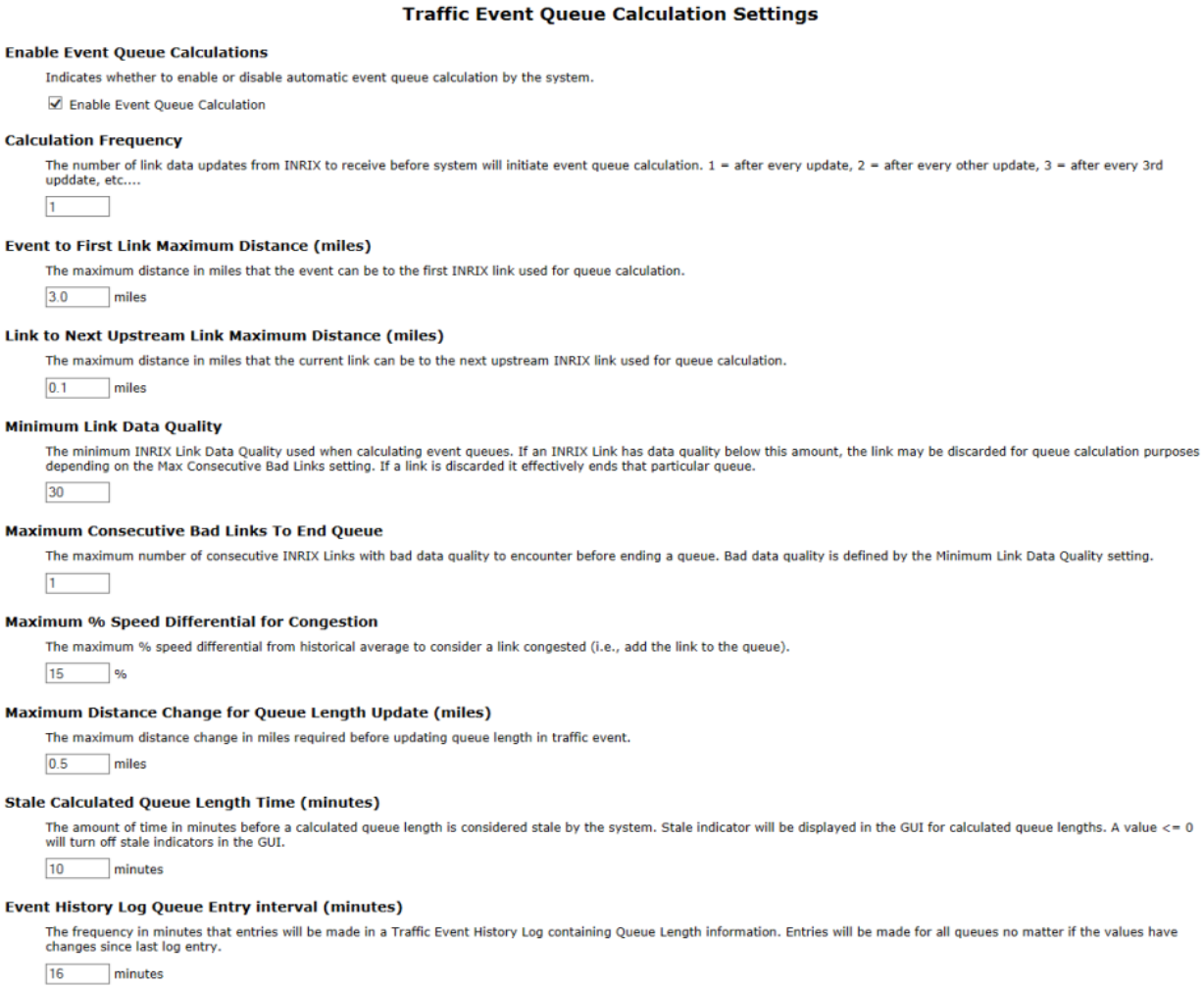


Figure 4-111. New Sys Profile Props for Traffic Event Queue Calculation

4.3.2 Traffic Event Details Page Changes Queue Calculation

In R14, the maximum queue length value associated with a Traffic Event (General Information) will be replaced with more detailed queue information that can be provided by the system automatically or specified by an operator. This new information will include a current queue length for each of the 2 directions for the event and a maximum queue length for the lifetime of the event. Each queue length will have a source (SYSTEM or OPERATOR) and may have a warning indicator if it was provided by the SYSTEM.

4.3.2.1 Traffic Event Details Queue Information

For R14 the system will automatically calculate queue information for open traffic Events that have a primary route, direction and lat/lon. Queue length info can also be provided by an operator. Three queue length values will now be maintained for an event:

- Current primary direction queue

- Current opposite direction queue
- Maximum queue (event lifetime)

For bi-directional events, queues will be directionally labeled instead of primary/opposite (South/North, East/West, Inner/Outer Loop). Maximum queue length will be the maximum value of the primary queue over the event's lifetime. For bi-directional events it will be the maximum of both queues. All 3 queue lengths will be labeled with a source (SYSTEM / OPERATOR) and direction.

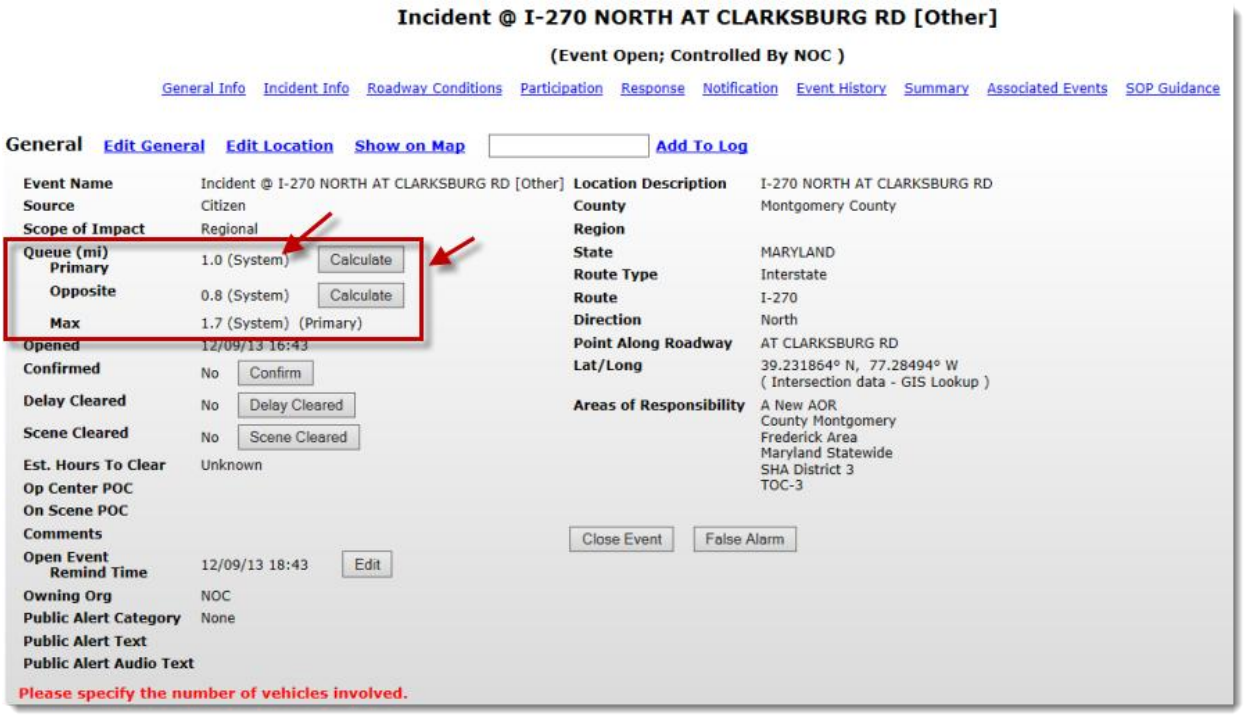


Figure 4-112. New Event Queue Info Display – Directional Event

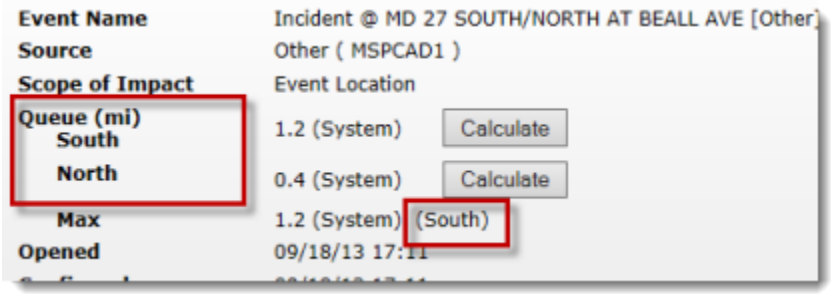


Figure 4-113. New Event Queue Info Display – Bi-directional Event

Initial state for Queue Information will be a 0.0 length queue with a Queue Source of NONE. Users will rarely see this under normal circumstances. Ex. Auto Calculation feature disabled or temporarily unavailable during traffic event creation.

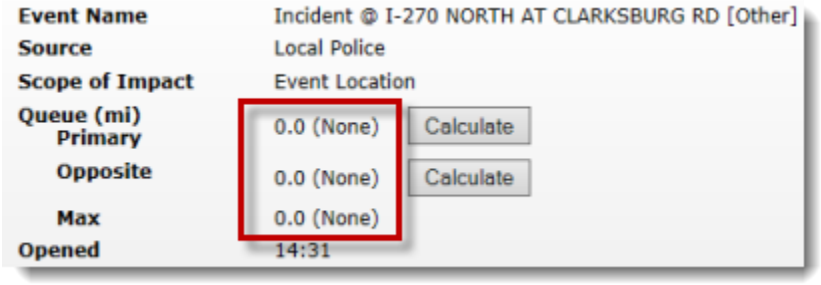


Figure 4-114. Initial State for Queue Info Prior to Calculation

Queue information will be available only for traffic events that have a primary route and a direction other than none. For traffic events that don't meet this requirement there will be no queue information available at all (no user or system provided queue info). (Note: A geolocation (latitude/longitude) is also needed in order for queues to be calculated.)

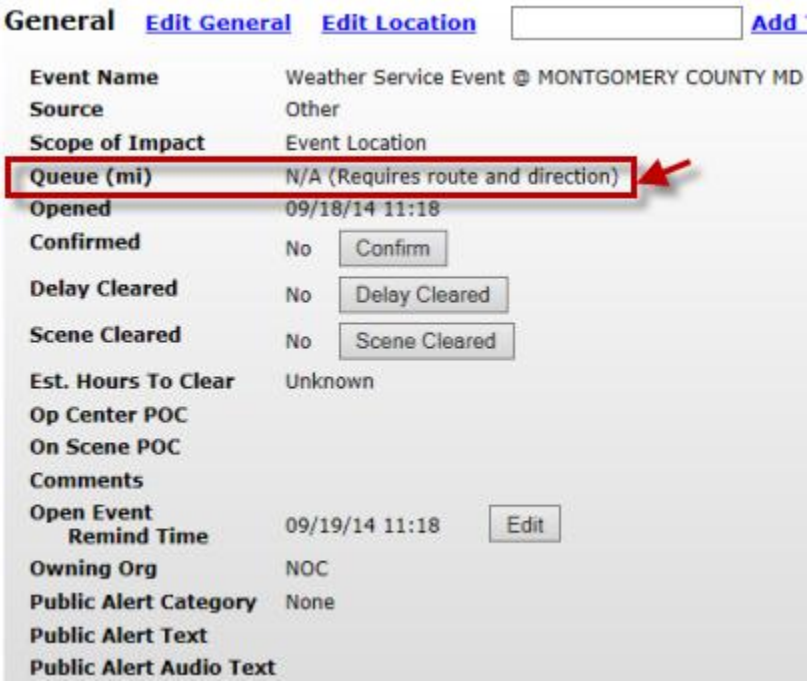


Figure 4-115. Queue Info Not Applicable – No Route/Direction

4.3.2.2 On-demand Queue Calculation

An operator with the Manage Traffic Event right may request an on-demand queue calculation for a current queue at any time by clicking the 'Calculate' button next to the queue to be calculated. This will present the user with the calculated queue information and allow the user to

either update the event with the info or discard the info. The 'Calculate' button will only be available for open events that have a primary route, lat/lon and a direction other than NONE.

Note: if the specified queue info was previously provided by an operator (source = Operator), accepting the calculated queue info will update the event and also initiate automatic queue calculation. If the specified queue was previously provided by the system, accepting the calculated queue info will update the event and will continue to automatically calculate the queue. For On-demand queue calculation, the source for the info will be SYSTEM.

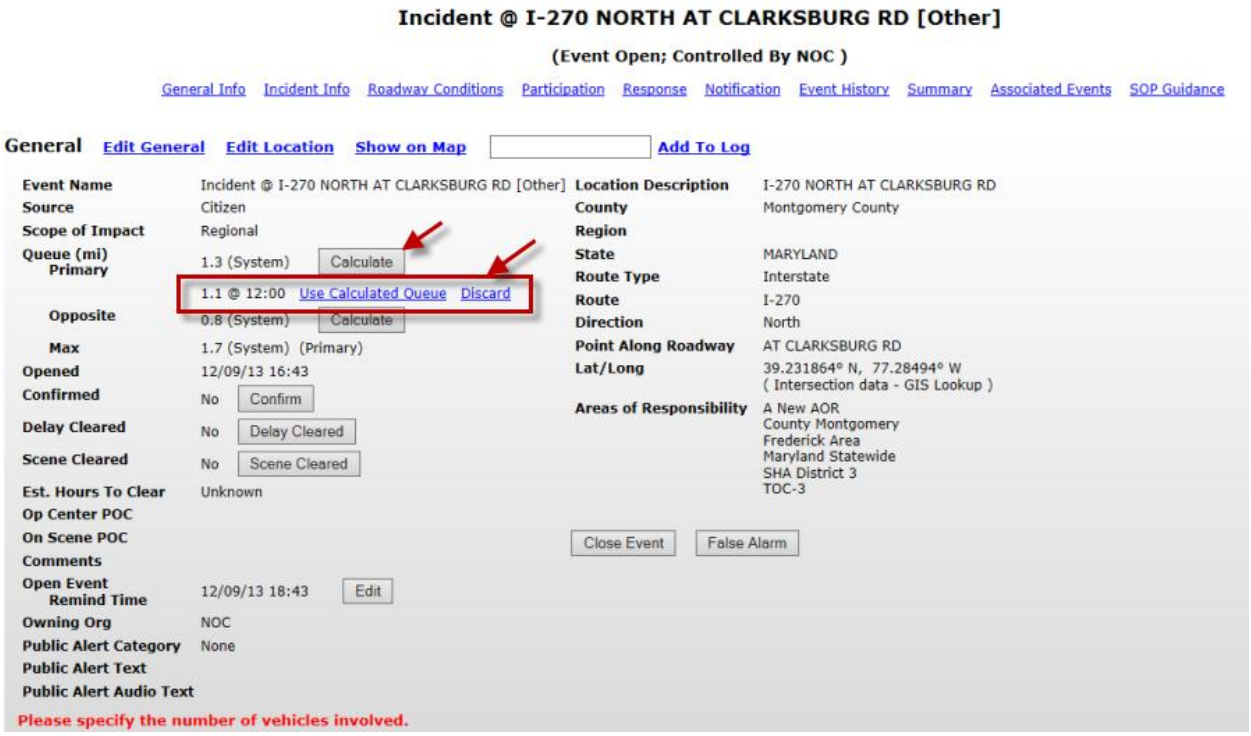


Figure 4-116. On-Demand Queue Calculation

4.3.2.3 Overriding Automatic Queue Calculation

A user can provide queue info for all three queues at any time by editing the general information for the event. If a user edits a current queue that is being automatically calculated by the system, automatic queue calculation will stop for that queue (be overridden). In this case the operator must click a checkbox acknowledging that the automatic queue calculation will be stopped before the fields are enabled to allow input.

The maximum queue length can also be edited. In order to update the maximum queue, the user must check the 'Edit Max Queue' checkbox to allow editing of the fields and the user must specify direction as well. Note: even after editing the maximum queue it will continue to be updated any time the event's current queue lengths are updated (either by the system or by an operator). If the user is editing a current queue length and maximum queue length at the same time he/she will not be allowed to specify a maximum queue length less than the new current queue length being specified.

Also, unlike the current queue lengths, the maximum queue length will be editable after the event is closed from the event details page.

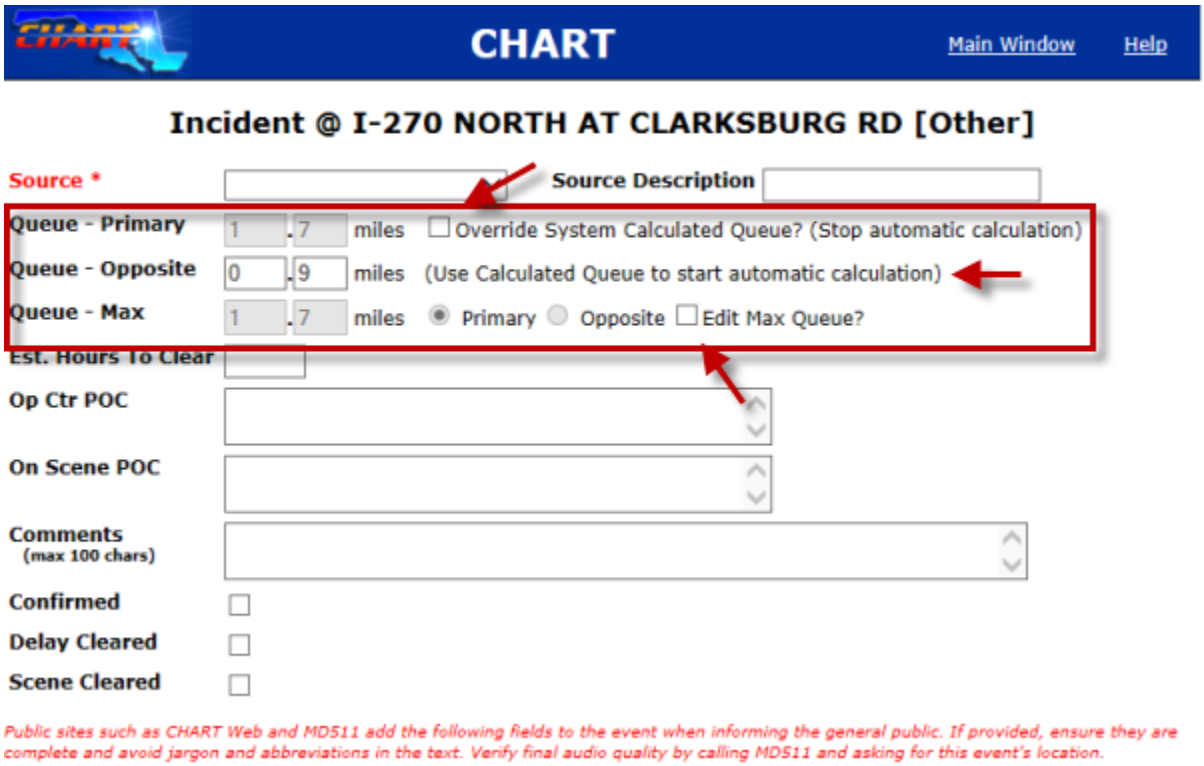


Figure 4-117. User Provided Queue Information

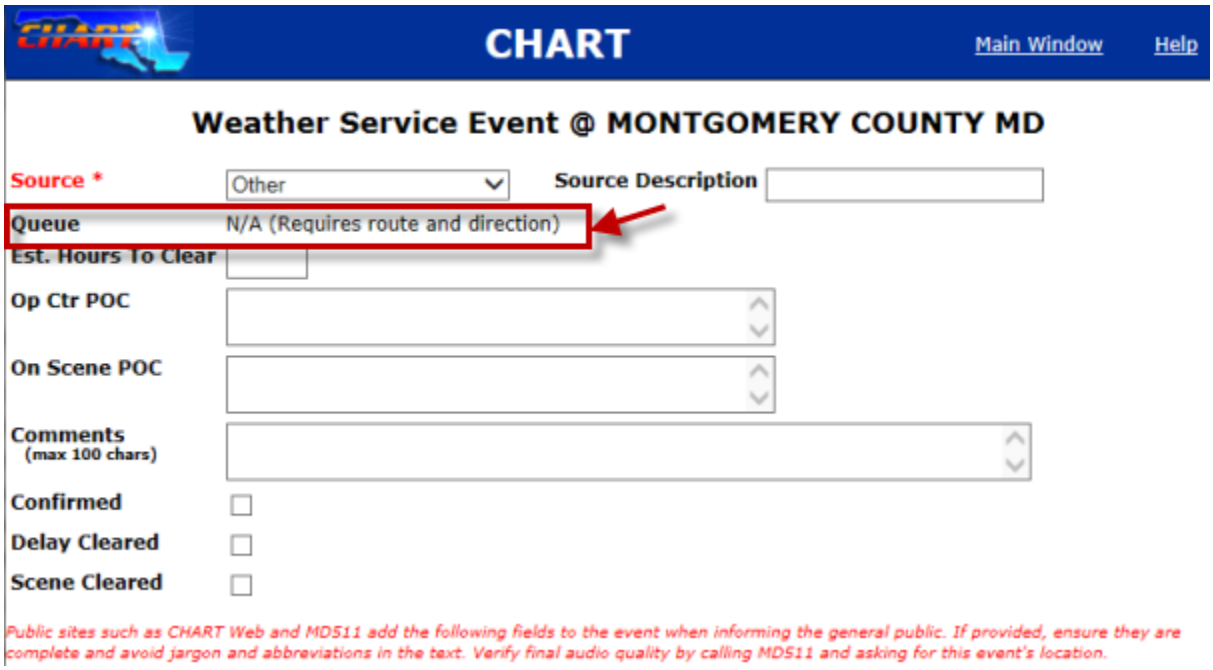


Figure 4-118. Queue Info Not Applicable on Edit -No Route / Direction

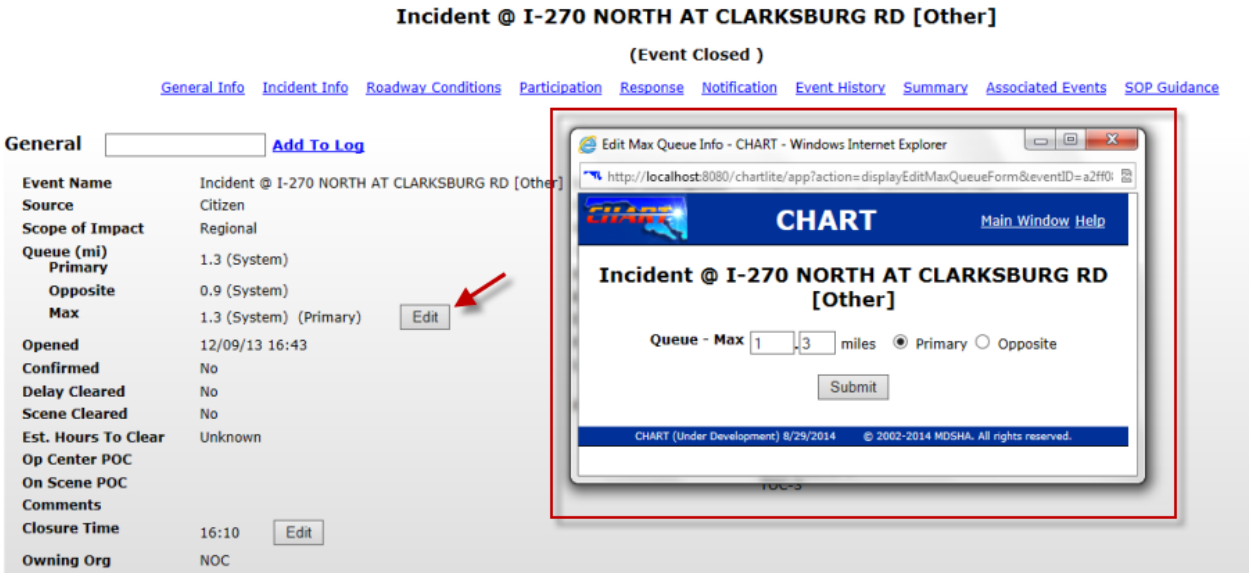


Figure 4-119. Editing Maximum Queue Info on Closed Event

4.3.2.4 Queue Calculation Warning Indicators

Any calculated queue may have a warnings associated with it as part of the calculation process or by growing stale (based on a System Profile setting). Any one of the following warnings may be associated with a queue:

- STALE (Information is older than System Profile Calculated Queue Length Stale Time. Ex. INRIX stops providing updated link data for a time.) Note: STALE warnings will display a timestamp to the user. Other warnings can be presumed current.
- EDGE (Boundary condition encountered during calculation. Ex. Road end at state boundary.)
- QUALITY (Maximum number of consecutive links encountered with low quality during calculation. Number of consecutive bad links and quality level specified in System Profile property.)

Only one warning can be associated with a calculated queue length and the order of importance is as listed above. When a warning exists for a queue (this can include maximum queue length) the queue information is displayed in red with the specified warning displayed.

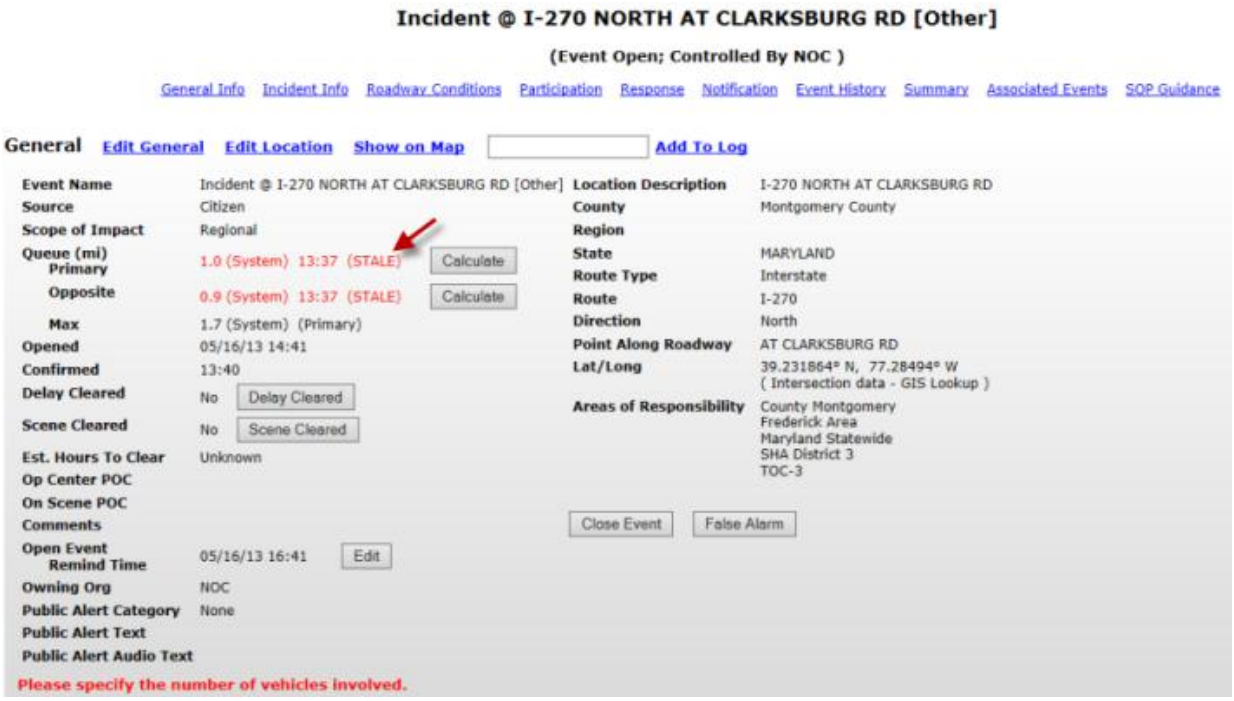


Figure 4-120. Queue Calculation Warning Display

4.4 Contact Management

This section describes the user interface changes to support the contact management changes in R14.

4.4.1 Main Menu

New links are added to the General section of the main menu: Contacts and Call Out Lists. These links are visible only if the user has the View Contact Info right. The links in this section of the menu are now in alphabetical order.

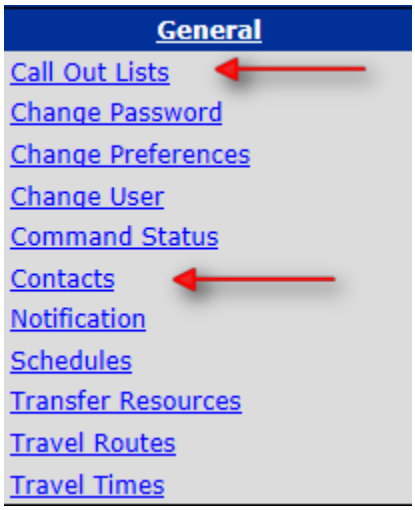


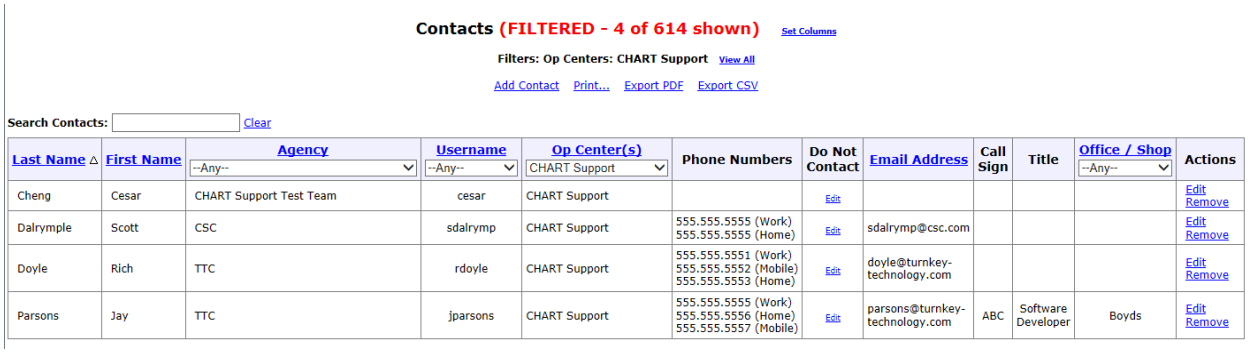
Figure 4-121. Contact Management General Menu Links

When the user clicks the Contacts link, the Contact List is displayed. Initially the list of contacts is filtered to show only the contacts associated with the user's operations center.

When the user clicks on the Call Out Lists link, the Call Out List List is displayed.

4.4.2 Contact List

The Contact List is viewable by a user with the View Contact Info right. It shows the contacts in the system, and is initially filtered to show only contacts associated with the operations center where the user is logged in. The initial filter can be removed to display all contacts by clicking on View All.



Last Name △	First Name	Agency	Username	Op Center(s)	Phone Numbers	Do Not Contact	Email Address	Call Sign	Title	Office / Shop	Actions
		--Any--	--Any--	CHART Support						--Any--	
Cheng	Cesar	CHART Support Test Team	cesar	CHART Support		Edit					Edit Remove
Dalrymple	Scott	CSC	sdalrymp	CHART Support	555.555.5555 (Work) 555.555.5555 (Home)	Edit	sdalrymp@csc.com				Edit Remove
Doyle	Rich	TTC	rdoyle	CHART Support	555.555.5551 (Work) 555.555.5552 (Mobile) 555.555.5553 (Home)	Edit	doyle@turnkey-technology.com				Edit Remove
Parsons	Jay	TTC	jparsons	CHART Support	555.555.5555 (Work) 555.555.5556 (Home) 555.555.5557 (Mobile)	Edit	parsons@turnkey-technology.com	ABC	Software Developer	Boyds	Edit Remove

Figure 4-122. Contact List

By default, the following columns are shown: Last Name, First Name, Agency, Username, Op Center, Phone Numbers, Do Not Contact, Email Address, Call Sign, Title, and Office/Shop. However, clicking on Set Columns allows the user to choose which columns to display, including the following additional columns: Notify (Allow Notification), Notification Groups, Call Out Lists, Additional AORs, Memo, Address, and Updated Time.

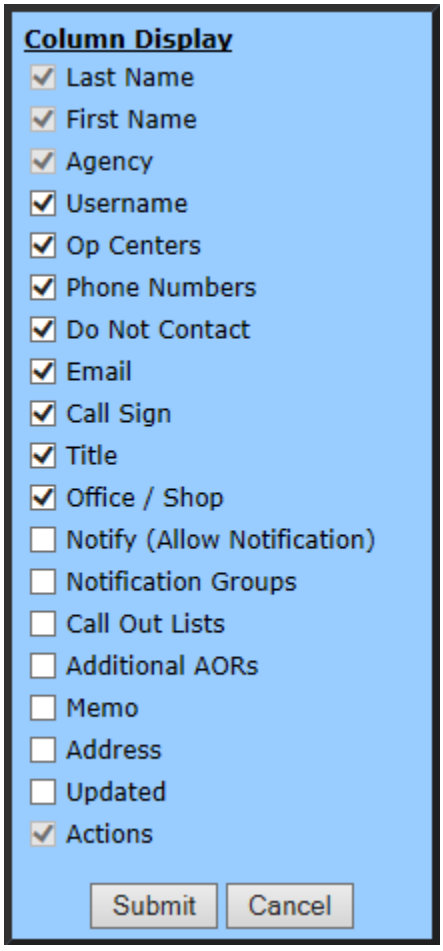


Figure 4-123. Contact List Column Selection

The user can sort, filter, and search the Contact List. Sorting may be performed on the columns: Last Name, First Name, Agency, Username, Op Centers, Email Address, Office/Shop, Notify flag, Notification Groups, Call Out Lists, Additional AORs, and Updated. Filtering may be performed on the columns: Agency, Username, Op Centers, Office / Shop, Notify, Notification Groups, Call Out Lists, Additional AORs, and Updated.

The user can search the list, based on the columns: Last Name, First Name, Agency, Email, Username, Call Sign. Only matching contacts are shown.

The user can view a printable version of the list (HTML) or can export the list in PDF or CSV formats. These actions use the current column visibility, sorting, and filtering, and search criteria.

The association between contacts and ATMS user accounts is not enforced by the system, but the Contact List indicates via a red background (see below) if a contact has an unknown username. If the username matches a known user, the Username column would show up as normal (white) background. The list can also be filtered by the Username column to see the same information, using the filter values: Unknown or Existing.

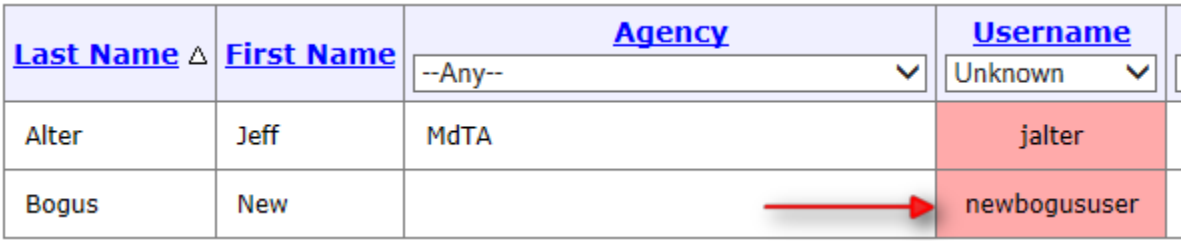


Figure 4-124. Contact List: Unknown User

The Contact List also indicates if the current time matches a contact's Do Not Contact schedule by graying out the phone number column (if it is displayed) to discourage users from calling the user:

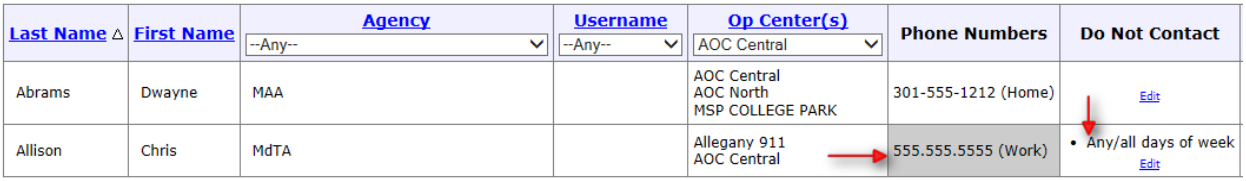


Figure 4-125. Contact List: Do Not Contact Status

A user with the Edit Do Not Contact Schedule right will see an Edit link in the Do Not Contact column which will bring up the Do Not Contact Schedule Editor.

A user with the Configure Contacts right will see links for Add Contact, Edit, and Remove. A user with the Configure Notification Group and Contact Associations or Configure Contact Email rights will see an Edit link for editing an existing contact.

4.4.3 Add/Edit Contact Form

The Add / Edit Contact Form is displayed when adding or editing a contact.

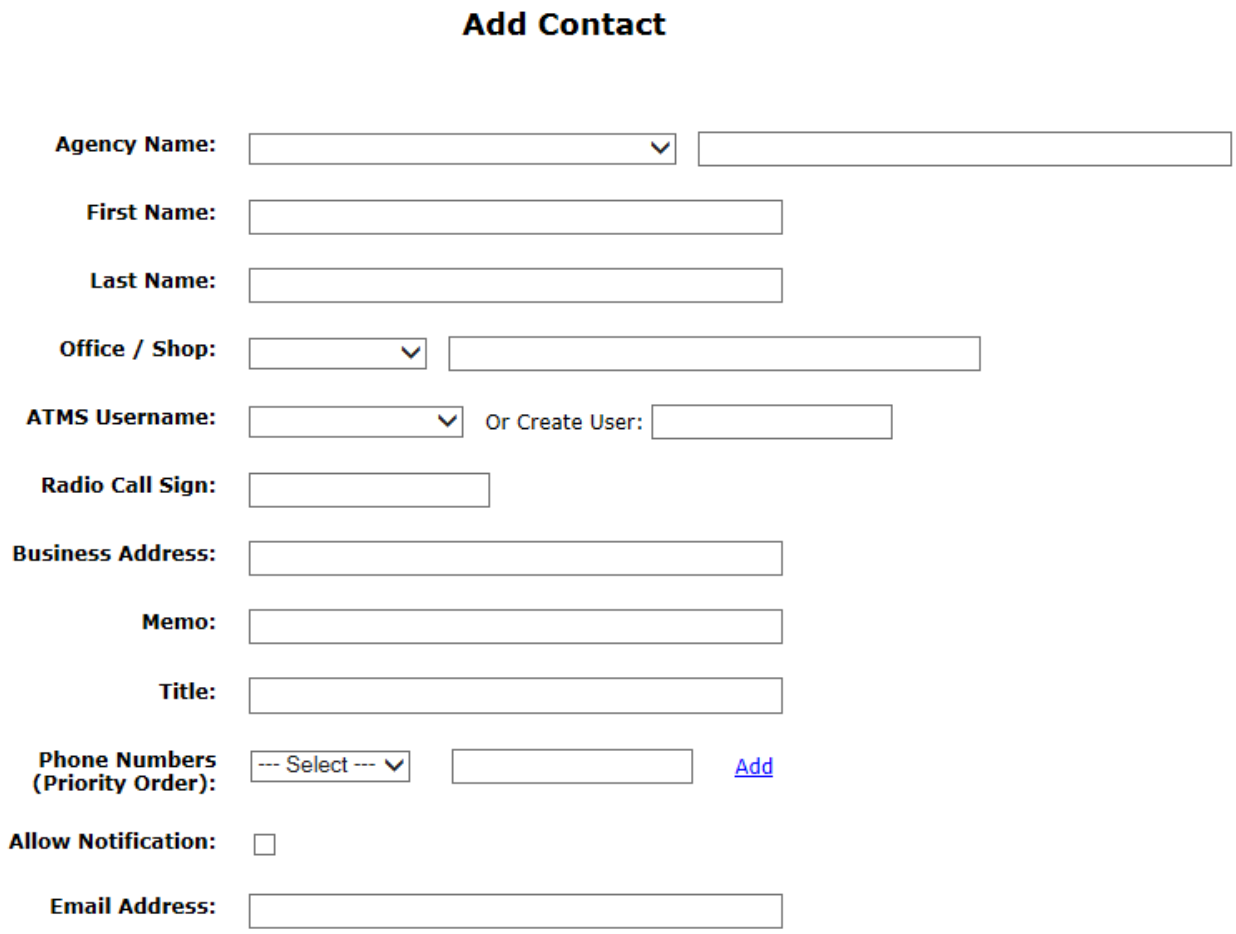


Figure 4-126. Add / Edit Contact Form (Top)

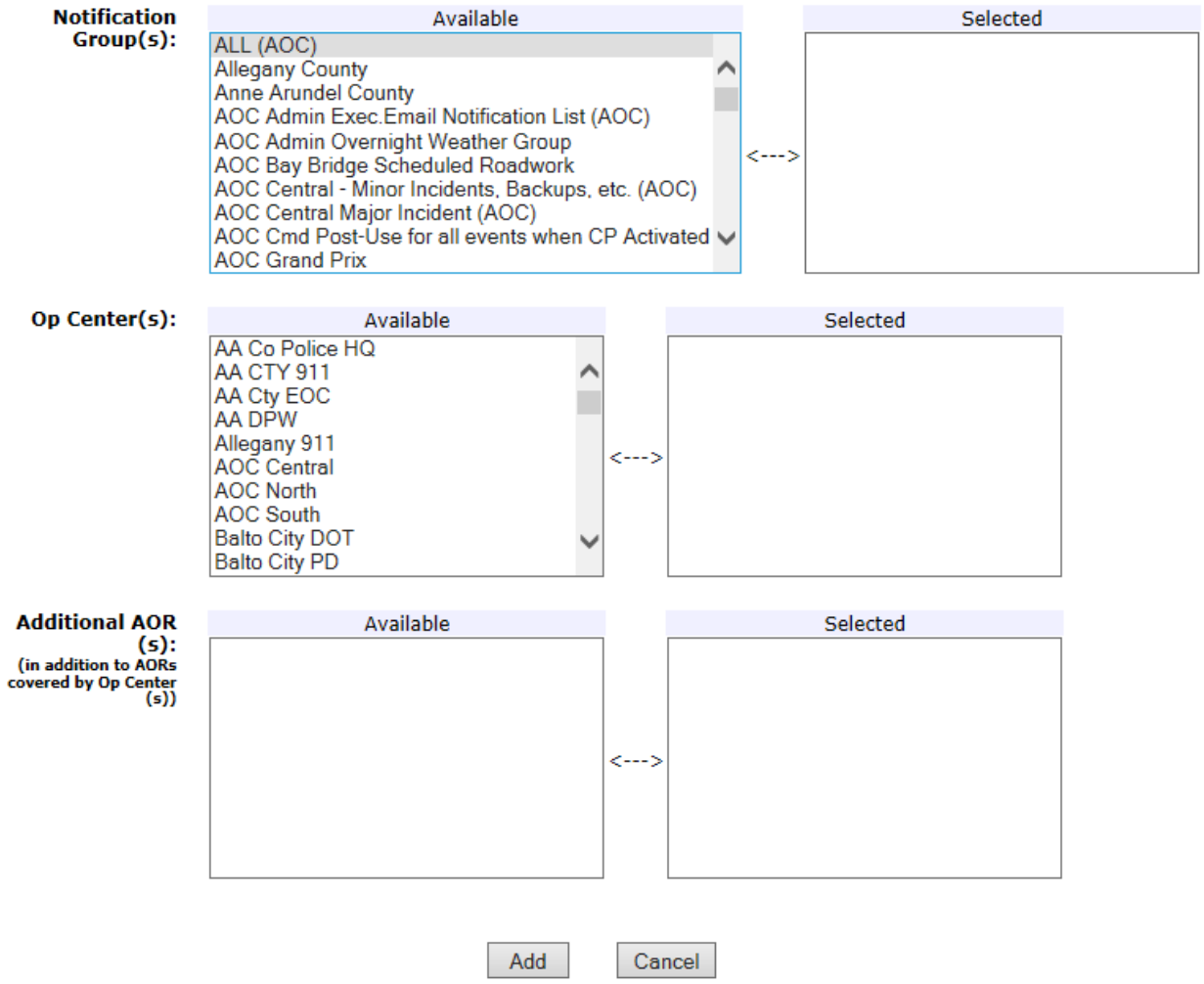


Figure 4-127. Add / Edit Contact Form (Bottom)

A user with the Configure Contacts right can add a contact or edit all fields of an existing contact, except that the Configure Notification Group and Contact Associations right is required for specifying the notification groups. A user with the Configure Contact Email right can edit the Allow Notification flag and Email Address fields for an existing contact. A user with the Configure Notification Group and Contact Associations right can specify notification groups for an existing contact. Any fields not editable (given the user's rights) are disabled on the form.

The Add / Edit contact form allows freeform text to be entered for the Agency Name, Office / Shop, and ATMS Username fields. For Agency and Office / Shop, all values used by existing contacts are selectable in a list to encourage reuse. For the ATMS Username, existing usernames not already assigned to contacts will be present in the list. If adding a contact and the ATMS Username field is set to a username that does not already exist, the Add User form will be displayed after the contact is added if the user has the Manage Users right.

A contact must have the First Name and Last Name specified, or Agency Name, or all three. Duplicate names (including the first/last name and/or agency name) are not allowed by the system. If the Allow Notification flag is set to true, the Email Address must also be specified.

Multiple Phone Numbers can be added in the order of priority, and the same type of phone number can be specified more than once in the list.

4.4.4 Remove Contact

A user with the Configure Contacts right can remove a contact by clicking on the Remove link in the Contacts list. If the contact has an associated ATMS username matching an existing user and the user performing the action has the ManageUsers right, the GUI will bring up a secondary prompt asking whether to remove the associated user in addition to the contact. Both the contact and the user account will be deleted if requested.

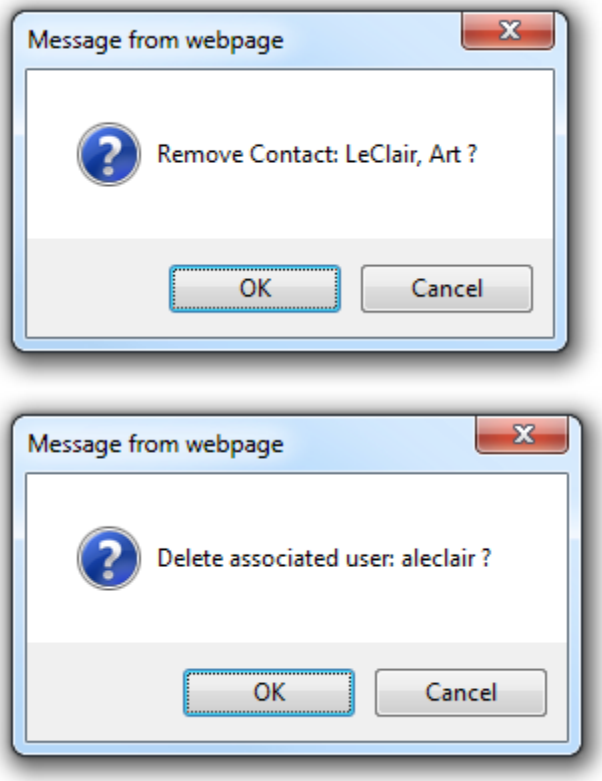


Figure 4-128. Remove Contact / User Prompts

4.4.5 Edit Do Not Contact Schedule Form

A user with the Edit Do Not Contact Schedule right can bring up the form for editing a contact's Do Not Contact schedule by clicking on the link in the Do Not Contact column in the Contact List. The form lists zero or more schedule entries, and changes are not saved until the user submits the form. The user can add, edit, and remove entries.

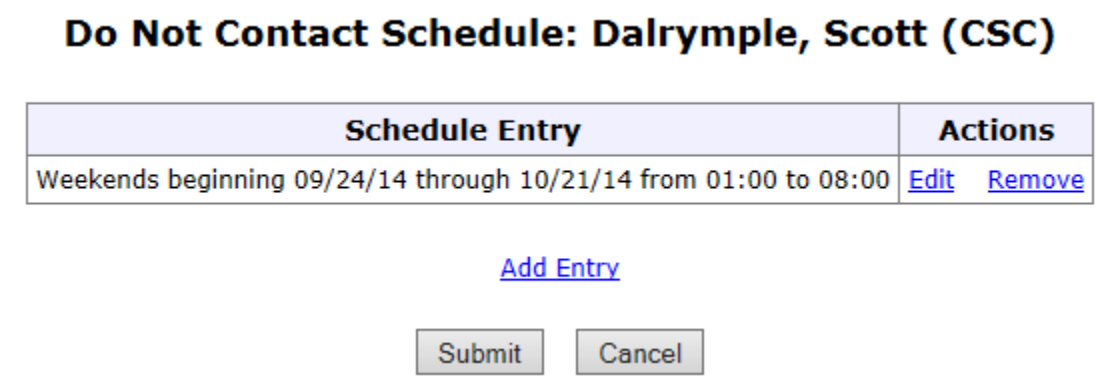


Figure 4-129. Do Not Contact Schedule Form

Clicking to Add or Edit an entry in the Do Not Contact Schedule brings up an overlay popup for specifying the schedule entry attributes:

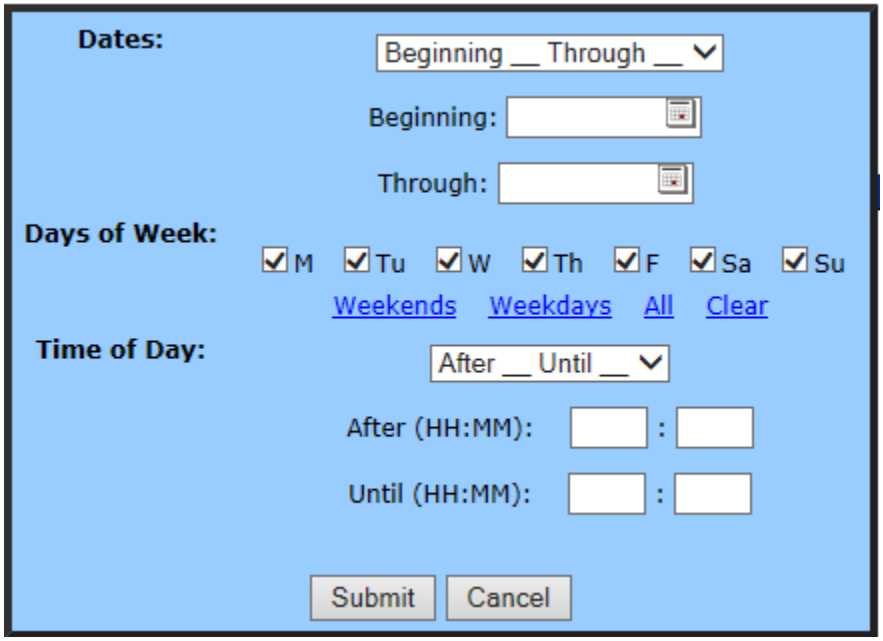


Figure 4-130. Add/Edit Do Not Contact Schedule Entry Form

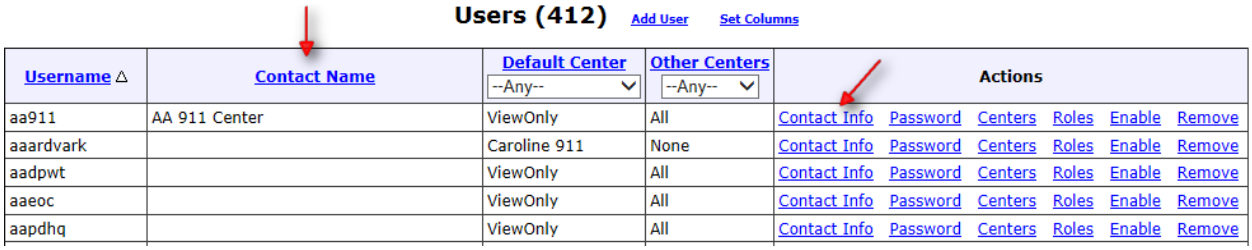
For the Dates field, these date range types are available: Unending, Beginning, Through, or Beginning/Through. The corresponding date fields are shown or hidden depending on which range type is selected. If Unending is selected, neither date field is shown. If Beginning is selected, only the Beginning date field is shown. If Through is selected, only the Through date field is shown. If Beginning/Through is selected, both date fields are shown.

The time range types are: All Day, After, Until, or After/Until. The corresponding time fields are shown or hidden as applicable for the selected time range type, similar to the date fields as described above.

If the date / time fields are displayed, they are required. Also, at least one day of week is required to be selected.

4.4.6 User List

For R14, the User List has a new Contact Name column which shows the name of the associated contact (or blank, if there is none). The user can sort on this column to see which users do not have associated contacts.



Users (412) Add User Set Columns

Username △	Contact Name	Default Center --Any--	Other Centers --Any--	Actions
aa911	AA 911 Center	ViewOnly	All	Contact Info Password Centers Roles Enable Remove
aaardvark		Caroline 911	None	Contact Info Password Centers Roles Enable Remove
aadpwt		ViewOnly	All	Contact Info Password Centers Roles Enable Remove
aaeoc		ViewOnly	All	Contact Info Password Centers Roles Enable Remove
aapdhq		ViewOnly	All	Contact Info Password Centers Roles Enable Remove

Figure 4-131. User List

The Contact Info link will be shown if the user has Configure Contact rights. Clicking on this link will bring up either the Add Contact form or the Edit Contact form (depending on whether the contact already exists). If it brings up the Add Contact form, the ATMS Username field will be prepopulated appropriately with the username.

4.4.7 Add User

After adding a user account, if the user performing the action also has the Configure Contacts right, the Add Contact form will be shown, with the ATMS Username field pre-populated.

4.4.8 Remove User

After removing a user account, if the user performing the action also has the Configure Contacts right, the user will be prompted about whether to remove the associated contact as well. If the user confirms, the contact will be removed.

4.4.9 Call Out List List

A user with the View Contact Info right can view the list of call out lists by clicking on the Call Out Lists link from the Main Menu.

Call Out Lists (7)

Show All Contacts Hide All Contacts

Name △	Type --Any--	Category --Any--	# Contacts	Contacts	Actions
Allegany Power	Allegany Power	Special Needs	20	– 1. Blackiston, Robbie 2. Branagan, Steve (SHA ITD) 3. Alfred, Henry (OOC) 4. Rawlins, Wesley (SHA CHART) 5. 0redirecttestlast, 0redirecttestfirst 6. Betzing, Gary (MdTA) 7. 0lastZ, 0firstZ (agencyZ3) 8. 0no_groups_test, firstx 9. 0Tlast, 0TFirst 10. 0testN2, 0testN 11. Ayd, Kevin (MdTA) 12. Balsh, Bill (SHA Hereford) 13. Barrow, Thomas (SHA CHART) 14. Bell, Doug (email) 15. Beltz, Bill (SHA OOM) 16. Belur, Gururaj (ACS) 17. Balcerek, Ron (Traffic Reporter) 18. Baechtel, Randy (SHA D6) 19. Austin, Todd (Skyline) 20. AOC, Central (MDTA)	Edit Delete
AOC North	AOC North	Agency	1	+	Edit Delete
AOC South	AOC South	Agency	2	+	Edit Delete
Private tow service	Private tow service	Agency	0		Edit Delete
SHA District Office D4	SHA District Office	Facility	3	+	Edit Delete
SHA District Office D7	SHA District Office	Facility	4	– 1. Allen, Peter (WRBS Radio) 2. Austin, Todd (Skyline) 3. Baker, Charles (Baltimore City TMC) 4. Baltimore City TMC	Edit Delete
SHA Shop Churchville	SHA Shop	Facility	1	+	Edit Delete

Figure 4-132. Call Out List List

The Name (event resource or type name), Type (event resource type name), Category (event resource type category), Number of Contacts, and Contacts columns are displayed. The list can be sorted on any of these columns (except Contacts), and filtered by the Type and Category columns. The names of the contacts in a call out list can be shown in the list by clicking on the "+" link and hidden using the "-" link. All contacts in the list can be shown by clicking on the Show All Contacts link, or hidden using the Hide All Contacts link. The expansion state for a given call list remains the same after sorting or filtering or after editing a call out list.

A user with the Edit Call Lists right will be presented with an Edit link. Creation and removal of call out lists is considered more an administrative function and will be more restricted than editing. A user with the Manage Event Resources right will be presented with a Delete link. (Creation of call out lists is done from the Event Resource List and Event Resource Type List pages and requires the Manage Event Resources right).

4.4.10 Event Resource List

The Event Resource List has a new Call Out List column indicating whether there is an associated call out list, and the number of contacts in the call out list.

System Event Resources (FILTERED - 39 of 1066 shown) Set Columns

Filters: Auto Configured: false, ResourceTypeCategory: Facility View All Reset Col Filters

Add Event Resource Event Resource Types

Description △	Type --Any--	Category Facility	Unit Name	AVL Vehicle	In Service --Any--	Camera --Any--	Call Out List	Actions
SHA District Office D1	SHA District Office	Facility	D1		Yes		YES (8)	Edit Remove Edit Call Out List Remove Call Out List
SHA District Office D2	SHA District Office	Facility	D2		Yes			Edit Remove Enable Call Out List
SHA District Office D3	SHA District Office	Facility	D3		Yes		YES (0)	Edit Remove Edit Call Out List Remove Call Out List
SHA District Office D4	SHA District Office	Facility	D4		Yes			Edit Remove Enable Call Out List

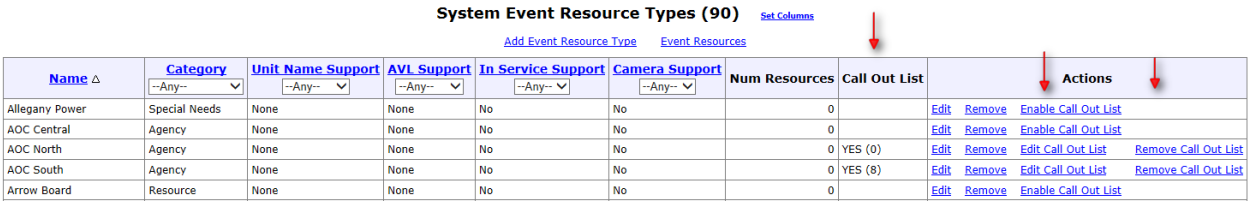
Figure 4-133. Event Resource List

The Enable Call Out List and Remove Call Out List links will be visible if a user has the Manage Event Resources right. If there is not already a call out list associated with the event resource, the user can create an empty call out list by clicking on Enable Call Out List. A user with the

Edit Call Lists right can click on the Edit Call Out List link to bring up the Edit Call Out List form. If an event resource is removed from the system, the associated call out list will automatically be removed as well.

4.4.11 Event Resource Type List

The changes to the Event Resource Type List are the same as to the Event Resource List. (See the description of changes for the Event Resource List.)



System Event Resource Types (90) Set Columns

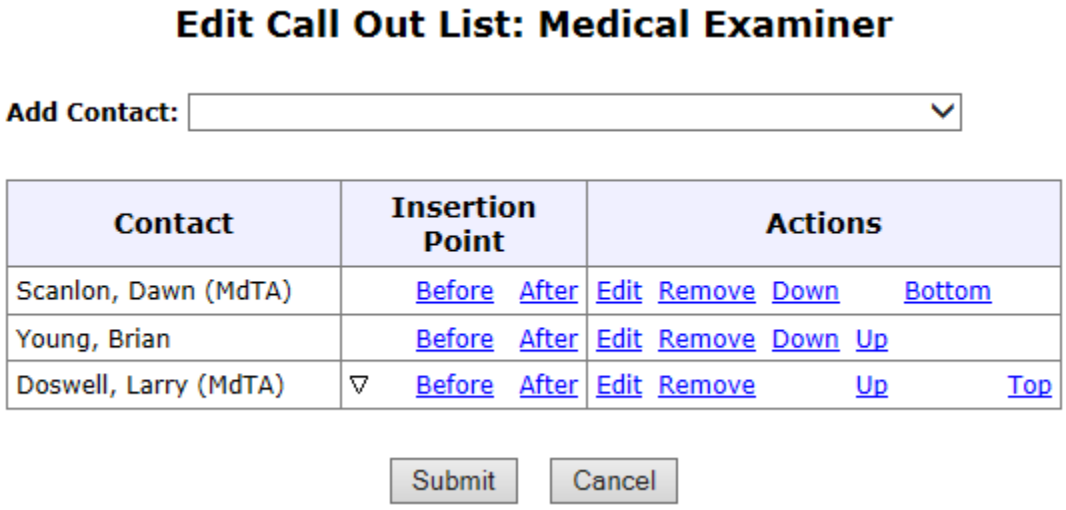
Add Event Resource Type Event Resources

Name △	Category --Any--	Unit Name Support --Any--	AVL Support --Any--	In Service Support --Any--	Camera Support --Any--	Num Resources	Call Out List	Actions
Allegany Power	Special Needs	None	None	No	No	0		Edit Remove Enable Call Out List
AOC Central	Agency	None	None	No	No	0		Edit Remove Enable Call Out List
AOC North	Agency	None	None	No	No	0	YES (0)	Edit Remove Edit Call Out List Remove Call Out List
AOC South	Agency	None	None	No	No	0	YES (8)	Edit Remove Edit Call Out List Remove Call Out List
Arrow Board	Resource	None	None	No	No	0		Edit Remove Enable Call Out List

Figure 4-134. Event Resource Type List

4.4.12 Edit Call Out List Form

The Edit Call Out List form can be invoked by a user with the Edit Call Lists right from the Call Out List List page.



Edit Call Out List: Medical Examiner

Add Contact:

Contact	Insertion Point	Actions
Scanlon, Dawn (MdTA)	Before After	Edit Remove Down Bottom
Young, Brian	Before After	Edit Remove Down Up
▽ Doswell, Larry (MdTA)	Before After	Edit Remove Up Top

Submit Cancel

Figure 4-135. Edit Call Out List Form

The user can add a contact or remove a contact from the list. The Down / Up / Bottom / Top links allow the user to move a contact up or down within the list (which is in priority order). The Insertion Point links allow the user to specify a contact in the list relative to which new contacts will be added, which makes it easier to add contacts in the middle of the list (as opposed to adding them to the end of the list and moving them up with the Up link). The arrow indicates which contact is the current insertion point, and whether contacts will be added above (up arrow) or below (down arrow). For example, the screenshot indicates that a contact will be added after (below) Ayd, Kevin. When the form is first displayed, the insertion point is after the last contact in the list. The insertion point remains "sticky" after adding a contact, to allow multiple contacts

to be added at the same location. The Edit link is displayed only if the user has the Configure Contacts right, and clicking on it brings up the Edit Contact form.

4.4.13 System Profile Notification Settings

The "Notification Contacts" link is removed from the Notification Settings portion of the System Profile, as the Contacts link is now available via the main menu, and contacts are now conceptually independent of notification.

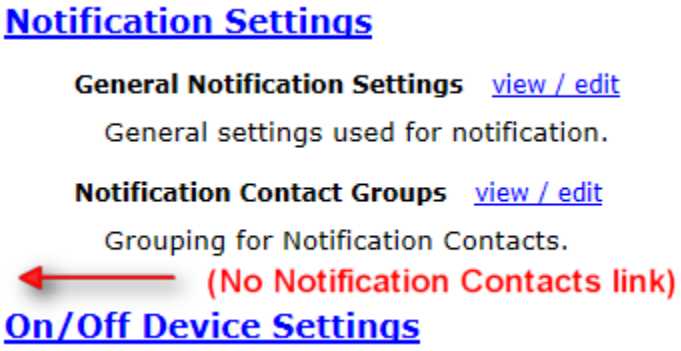


Figure 4-136. System Profile Notification Settings

4.4.14 Notification Groups List

For R14, the Notification Groups List has layout changes to save vertical space (in R13, all group members were shown for all groups by default, resulting in a very tall list). The Size column is added for R14, and the Group Members are not shown by default. Clicking on the "+" link causes the members to show up for a given group, and clicking on the "-" link hides them. Clicking on the Show All Members link expands the list to show all members in all groups. Clicking on the Hide All Members link hides the group members for all groups. The expansion state for each group stays unchanged when the page is redisplayed, such as after editing a group.

Notification Groups (62)

Add Notification Group Show All Members Hide All Members

Group Name △	Size	Group Members	Actions
00group0	5	+	Edit Remove
ALL (AOC)	22	+	Edit Remove
Allegany County	29	– Baechtel, Randy (SHA D6); Beckman, Kevin (SHA D6); Benner, Mark (SHA D6); Bittner, Dwayne (SHA D6); Brown, Robert (SHA D6); Coll, John (SHA D6); Cooksey, Norvel (SHA CHART); Cosner, Rick (SHA D6); Crawford, Tony (SHA D6); Davis, John (SHA D6); DeWitt, Todd (SHA D6); Flowers, Randy (SHA D6); Frazee, Lynn (SHA D6); Glenn, Rodney (SHA Hagerstown); Hampton, John (SHA D6); Lewis, Jerry (SHA D6); Martin, Trip (SHA D6); McMullen, Dan (MdTA); Minnich, Eric (SHA D6); Naile, Ronald (SHA D6); Needy, Wayne (SHA D6); Ritchie, Bob (SHA D6); Roberts, Glen (SHA D6); Sone, Kim (SHA D6); Triesh Sr., Charles (SHA D6); Walker, George (SHA D6); Wampler, Jim (SHA D6); Zebee, Linda (SHA D6); Zerbee, Linda (SHA D6)	Edit Remove
Anne Arundel County	35	+	Edit Remove
AOC Admin Exec.Email Notification List (AOC)	80	+	Edit Remove
AOC Admin Overnight Weather Group	7	+	Edit Remove

Figure 4-137. Notification Group List

4.4.15 System Profile Participation Settings

For R14, System Profile settings are added to allow the administrator to specify the names of event resource or type participants to be automatically added to a traffic event when an operator creates a new Incident of type Fatality, or if the HAZMAT flag is changed to true for an existing traffic event.

Automatically Add Participants for Fatality Incident

When non-empty, these fields specify the names of participants to be automatically added to an incident when it is created, if the incident is a fatality. The specified participant names (if any) must match names of event resource types found in the list of event resource types. Any names entered here that do not match will be ignored. (If you need more entry fields, submit the form and then edit again.)

Medical Examiner	Investigation crime-scer		

Automatically Add Participants for HAZMAT Incident

When non-empty, these fields specify the names of participants to be automatically added to an incident when it involves HAZMAT. The specified participant names (if any) must match names of event resource types found in the list of event resource types. Any names entered here that do not match will be ignored. (If you need more entry fields, submit the form and then edit again.)

HazMat	Fireboard		

Submit Cancel

Figure 4-138. System Profile Participation Settings

In R13, there existed a similar setting for Personal Injury, but that setting also included Fatality. For R14, Fatality is being split into an independent setting.

4.4.16 Traffic Event Details: Participation

The Participation section of the Traffic Event Details page has several changes for R14.

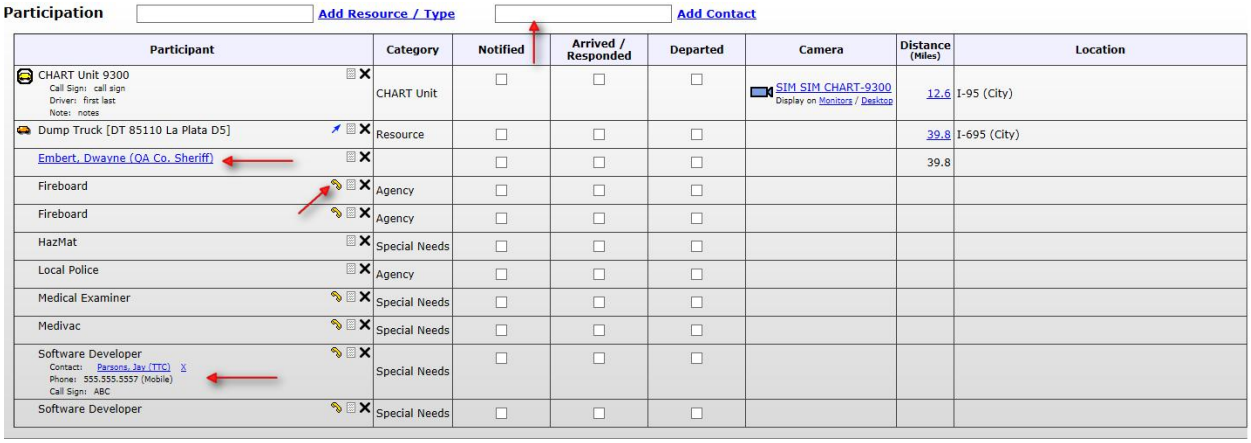


Figure 4-139. Participation Details

In addition to the participant type supported in R13 (i.e., Event Resource / Event Resource Type), a user with the Manage Traffic Events right can now add a standalone contact participant to a traffic event. A contact can also be selected to represent an event resource or an event resource type participant. These two types of participation records are described in more detail below. A user must have the View Contact Info right to view phone numbers and other personal information.

4.4.16.1 Event Resource / Type Participation

A participation involving an event resource or event resource type is supported in R14, as it was in R13. In R14, this feature is enhanced to allow the user to select a contact to represent the resource or resource type, if the resource or type has an associated call out list. If the event resourceor type does have a call out list, the yellow "phone" icon is shown on the right side of the participation name column, and clicking on the icon brings up the Select Contact from Call Out List form (see 4.4.17) which allows the user to select a contact from the call out list (either without specifying a phone number, or while also specifying a phone number). Once a contact is selected, the contact name (and phone number, if specified) is shown on the Traffic Event Details page under the name of the resource or type. The contact's name is shown as a link which allows the user to view more detailed information for the contact in an overlay (see Figure 4-140), select a phone number, or edit the contact's information (if the user has the Configure Contacts right). The user can also remove the contact from the participation record using the blue "X" link (obscured by overlay in the figure below – see Figure 4-139. Participation Details above instead). The user can change the contact representing the event resource or type by clicking on the phone icon and selecting a new contact from the call out list.

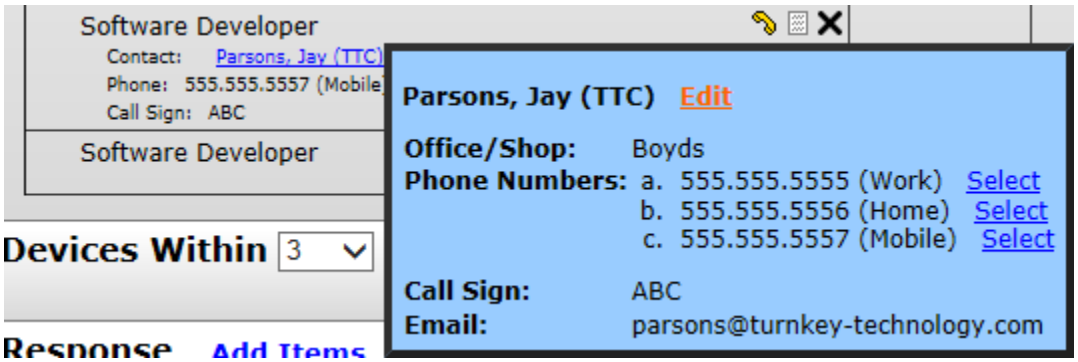


Figure 4-140. Contact Details Overlay For Participation

4.4.16.2 Standalone Contact Participation

A user can add a standalone contact participant by optionally entering search text and clicking on the Add Contact link above the Participation table on the Event Details page.

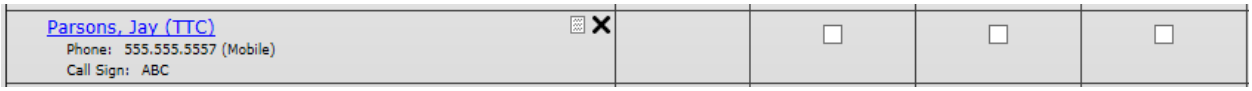


Figure 4-141. Standalone Contact Participation

When a standalone contact is added to the traffic event, the contact name is displayed as a link which allows the user to view more detailed information for the contact, select a phone number, or edit the contact's information (if the user has the Configure Contacts right). The details overlay is the same as the one shown for the event resource or type participation (see above). Unlike the event resource or type participation, however, there is no way to select a different contact for the participation record, or remove the contact from the participation record. In each case the user would need to remove the participation record for the contact and then add one for a different contact, if desired.

4.4.17 Select Contact from Call Out List Form

Clicking on the "phone" icon on the Traffic Event Details page for an event resource or type participation allows a user to select a contact from the call out list associated with the event resource or type.

If the traffic event has a geographic location, the list initially shows the subset of contacts in the call out list that are responsible for the location of the traffic event. To determine responsibility for a contact, the system includes areas of responsibility (AORs) assigned to operations centers which are assigned to the contact, and any additional AORs assigned to the contact. If no contacts match the location filter, then all contacts are shown in the list initially. If the list is filtered, the user can remove the filter by clicking View All to see all contacts in the call out list.

Select Contact for Software Developer (Incident @ I-270 EAST AT EXIT 5 MD 189 FALLS RD [Other]) (FILTERED - 1 of 3 shown)

Filters: Location: I-270 EAST AT EXIT 5 MD 189 FALLS RD View All

	Name / Agency	Office / Shop	Call Sign	Phone Numbers	Do Not Contact
Select	3. Parsons, Jay (TTC)	Boyds	ABC	555.555.5555 (Work) Select 555.555.5556 (Home) Select 555.555.5557 (Mobile) Select	

Figure 4-142. Select Contact From Call Out List (Filtered)

Select Contact for Software Developer (Incident @ I-270 EAST AT EXIT 5 MD 189 FALLS RD [Other]) (3)

	Name / Agency	Office / Shop	Call Sign	Phone Numbers	Do Not Contact
Select	1. Dalrymple, Scott (CSC)			555.555.5555 (Work) Select 555.555.5555 (Home) Select	M, Su through 10/13/14
Select	2. Doyle, Rich (TTC)			555.555.5551 (Work) Select 555.555.5552 (Mobile) Select 555.555.5553 (Home) Select	
Select	3. Parsons, Jay (TTC)	Boyds	ABC	555.555.5555 (Work) Select 555.555.5556 (Home) Select 555.555.5557 (Mobile) Select	

Figure 4-143. Select Contact From Call Out List (Unfiltered)

The Name/Agency, Office/Shop, Call Sign, Phone Numbers, and Do Not Contact schedule are shown for each user in the call out list. The priority index of the contact within the list is also displayed. If the contact's Do Not Contact schedule specifies that the contact should not be contacted at the present time, the row for the contact is shown in gray to discourage the user from selecting the contact unless there is a good reason to do so.

The Select link on the left side allows the user to select the contact without specifying a phone number. Clicking a Select link in the Phone Numbers column not only selects the contact, but also specifies a phone number that was used to reach that contact. The last used phone number is displayed on the Event Details page to assist operators in calling the contact the next time (if necessary).

4.4.18 Standalone Contact Participant Auto-Suggestion

When a user types characters into the Add Contact text field on the Traffic Event Details page (Figure 4-139), a list of suggestions is generated. Clicking on one of these suggestions causes it to be added to the traffic event.

The suggestions are limited in number to 15 and are generated using these priority rules:

1. last name starts with _____
2. agency name contains ____ (only used if no the contact has no first / last name)
3. first name starts with ____

For example, if the user types "t" and there are at least 15 contacts with a last name starting with "t", all 15 suggestions will be filled regardless of what agency or first name matches may exist:

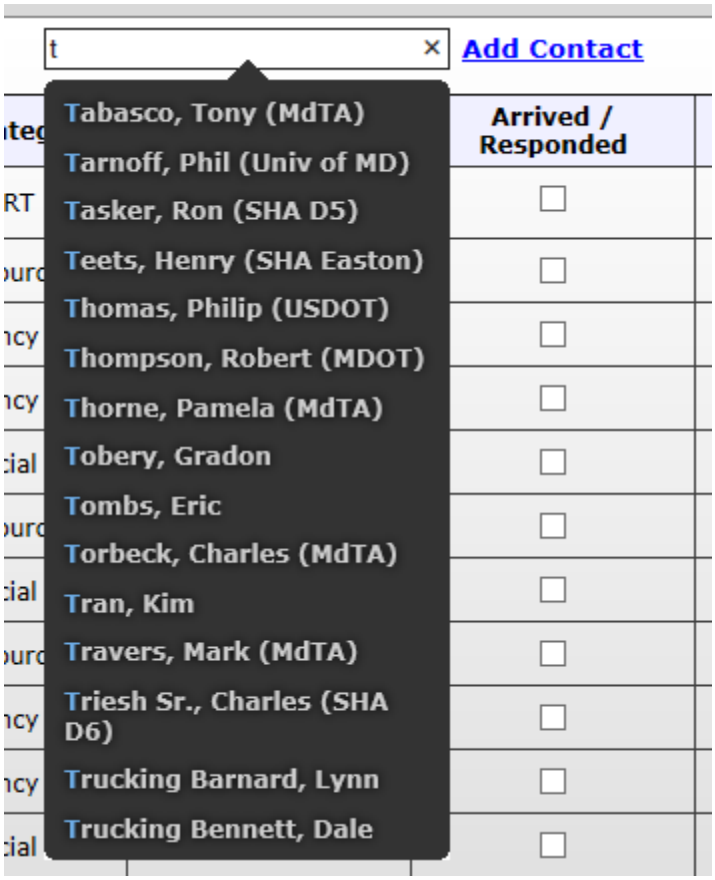


Figure 4-144. Contact Auto-Suggestion: Last Name Matches >= Limit

If there are less last name matches than the limit to display, some other matches may be displayed such as those matching on agency name and/or first name:

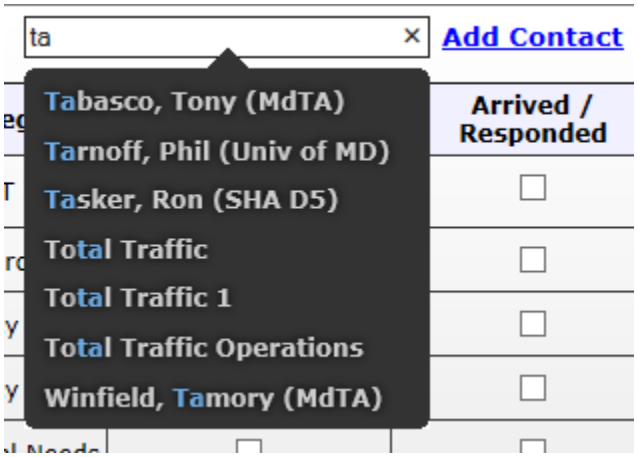


Figure 4-145. Contact Auto-Suggestion: Last Name Matches < Limit

4.4.19 Select Standalone Contact Participant Form

If the user clicks on the Add Contact link on the Traffic Event Details page, it brings up a form allowing the user to select a contact to add as a standalone participant. The form is displayed using the search text (if any) specified on the Traffic Event Details page. The list is initially filtered to show only contacts whose areas of responsibility (AORs) contain the event location, if the traffic event has a geo location. The location-based filter can be cleared. If the user selects a contact and submits the form, it is added to the traffic event in a standalone contact participation record.

Contacts (613) Set Columns

Search Contacts: par Clear

	Last Name △	First Name	Agency --Any--	Username --Any--	Op Center(s) --Any--	Phone Numbers	Do Not Contact	Email Address	Call Sign	Title	Office / Shop --Any--
○	Parish	Diedre	MdTA					dparish@mdta.state.md.us_bogus			
○	Parker	Bernard	SHA Annapolis					4438291551@vtext.com_bogus			
○	Parsons	Jay	TTC	jparsons	CHART Support	555.555.5555 (Work) 555.555.5556 (Home) 555.555.5557 (Mobile)		parsons@turnkey-technology.com	ABC	Software Developer	Boyds
○	Sparks	Cheryl	MdTA					4103650425@vtext.com_bogus			

Submit Cancel

Figure 4-146. Select Standalone Contact Participant Form

4.4.20 Event Lists: Open Events, Open / Closed Events, Op Center Report

The Event List pages that show participation records in R13 are the Open Events, Open / Closed Events, and Operations Center Report. For R14, these are enhanced to show contact information for both event / resource type participation records and standalone contact participation records. Additionally the user can add standalone contact participants from the list pages. NOTE – This functionality is not prototyped, and the R13 functionality is shown below for reference. The contact name and phone number (if the user has the View Contact Info right) is displayed below the event resource or type for an event resource / type participaation, or at the top level for a standalone contact participation.

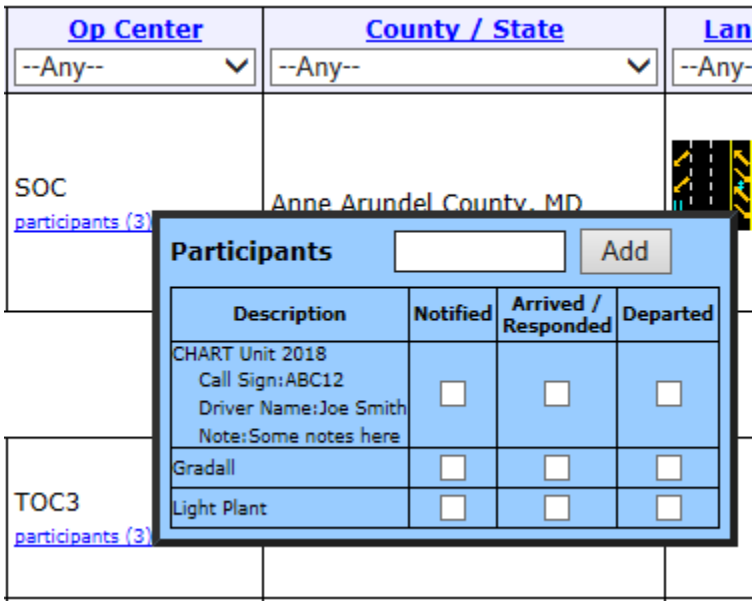


Figure 4-147. Event List Participation Overlay (R13 Version)

4.5 User Management Enhancements

This section describes changes related to user management to help administrators more easily manage user account related requests.

4.5.1 User Account Request

A link has been added to the login page to allow a person to request an administrator to set up a CHART ATMS user account for them.

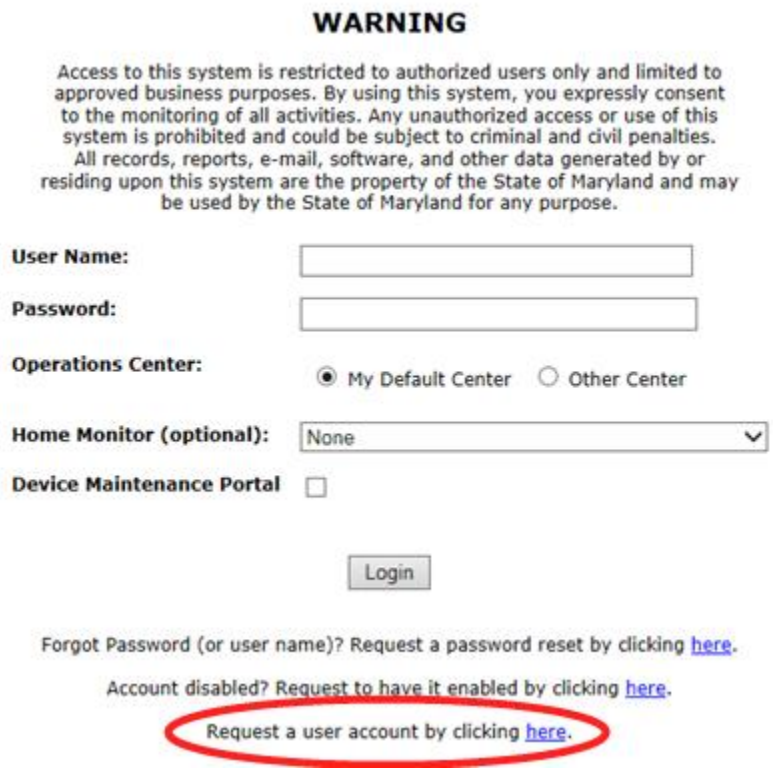


Figure 4-148 User Account Request Link

Upon clicking the link, a new form appears to collect information from the person making the request:

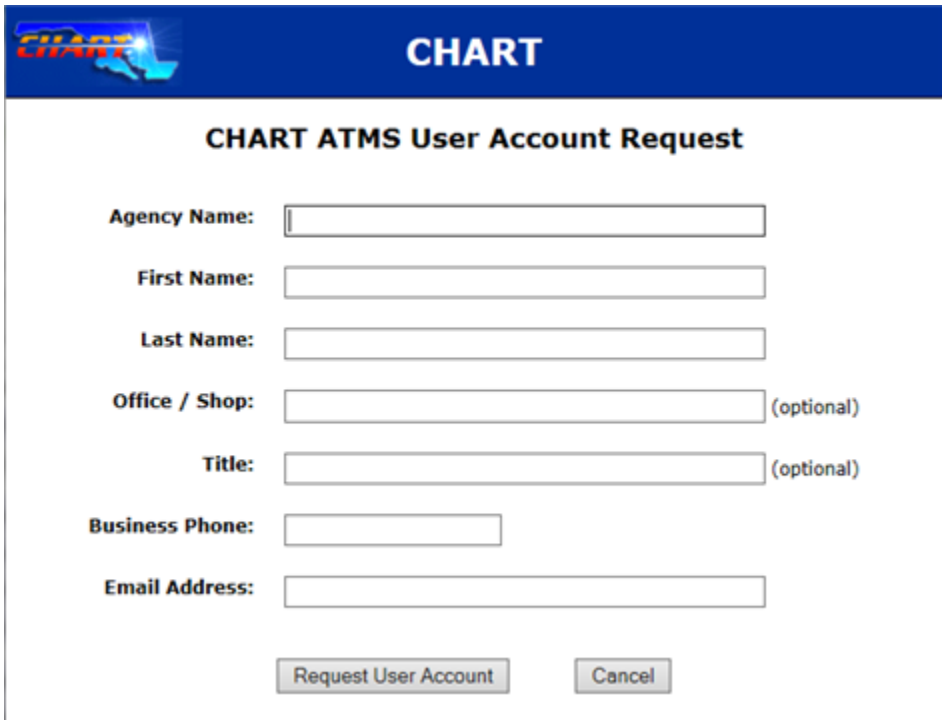


Figure 4-149 User Account Request Form

This form contains a subset of the Add Contact form which is discussed in 4.4.3 above and behaves in the same manner. The user must enter Agency Name and/or First Name and Last Name. The user must enter Business Phone and/or Email Address. Other entries on this form are optional. If the user clicks the Cancel button, the Login page will be shown. If the user clicks the Request User Account button, they will see a confirmation that their request has been received:

Figure 4-150 User Account Request Confirmation

After the user account request has been submitted, the system sends an e-mail to the notification group configured in the system profile to receive user account requests. The e-mail includes the person's name in the subject of the e-mail unless only an Agency Name was provided, in which case the agency name will appear. The from address and subject prefix are the same as those used for all notifications sent from CHART ATMS.

Below is an example of the e-mail that the administrator(s) will receive:

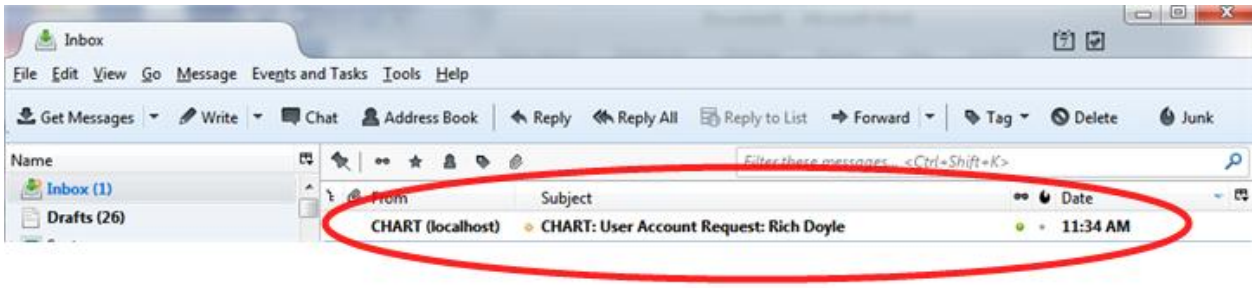


Figure 4-151 User Account Request E-Mail

The content of the e-mail contains the information entered on the user account request form and also a link that can be used by the administrator to help them add a user account for the person:

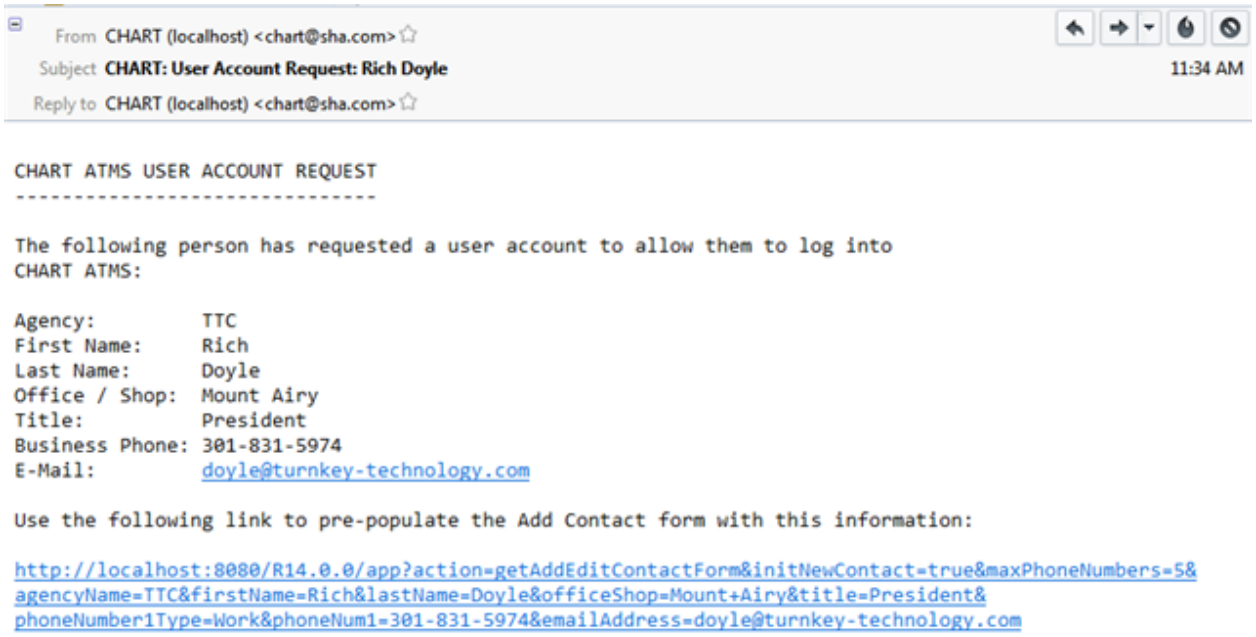


Figure 4-152 User Account Request E-Mail Body

If the administrator clicks the link, their browser will open (if not already opened) and the CHART ATMS login page will appear (unless they are already logged in). After the

administrator logs in, the Add Contact form will be shown and will be pre-populated with the data from the user account request form:

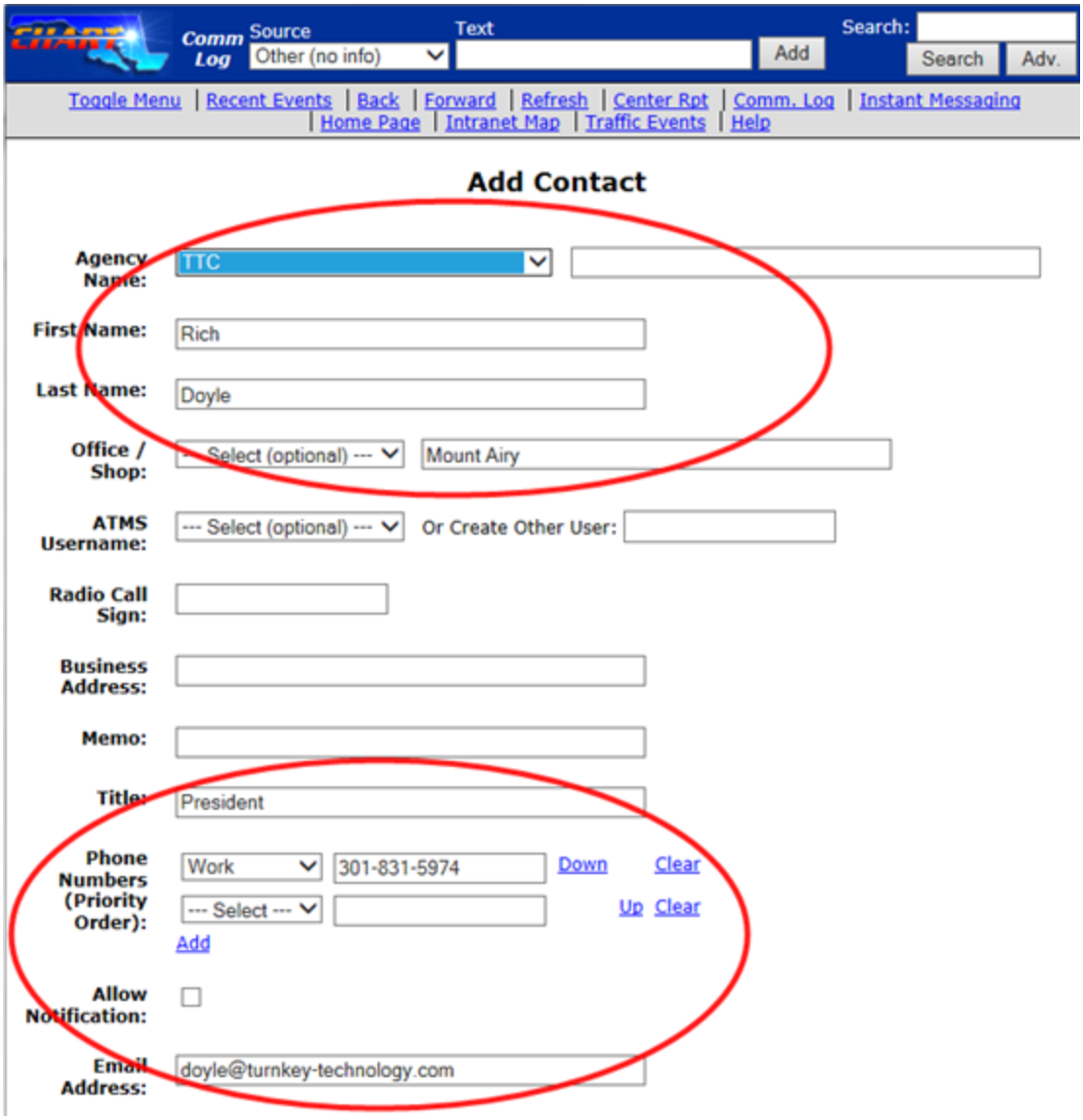


Figure 4-153 Pre-Populated Add Contact Form

At this point, the administrator completes the Add Contact operation as described in 4.4.3 above, including entry of a user name which will cause the Add User form to be displayed after submitting the Add Contact form.

The setting that specifies the notification group that is to receive user account requests is accessed via the system profile on the General User Management Settings form:

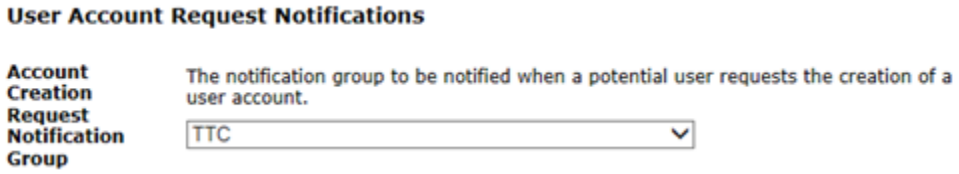


Figure 4-154 Account Creation Request Notification Group Setting

4.5.2 Enable User Account Request

A link has been added to the login page to allow a person to request an administrator to enable their CHART ATMS user account if it has been disabled.

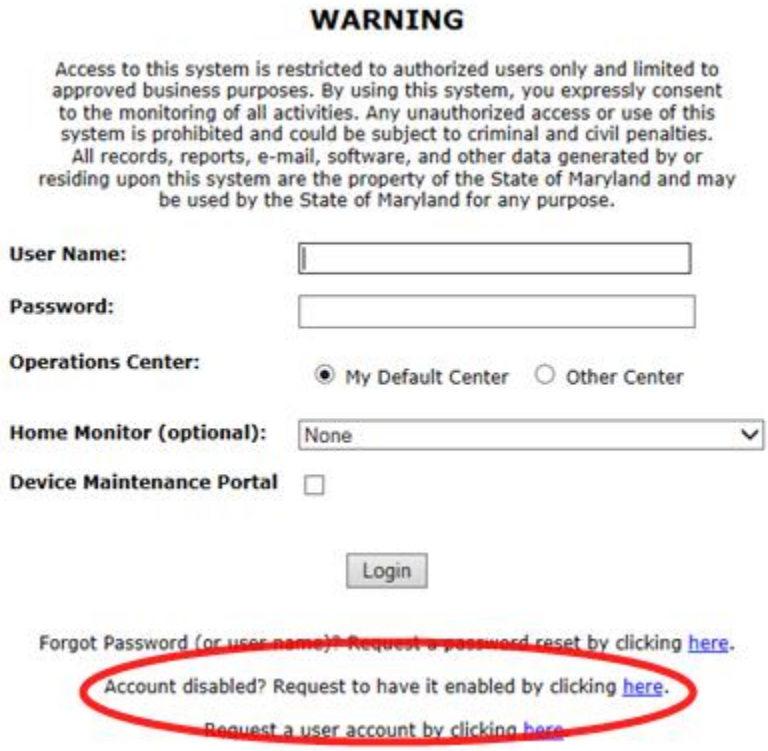


Figure 4-155 Enable User Account Link

Also, if the user has attempted to log in when their account is disabled, the error message will contain a link to allow them to request to have the account enabled:

Figure 4-156 Account Disabled Error Message with Enable Request Link

If the user clicks the link in the error message or the link at the bottom of the login form, the Enable User Account Request form is shown. If the user clicked the link in the error message, the user name field will be pre-populated:

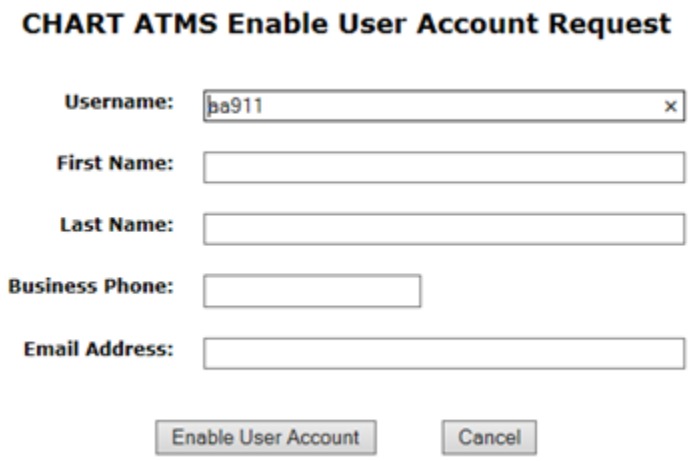
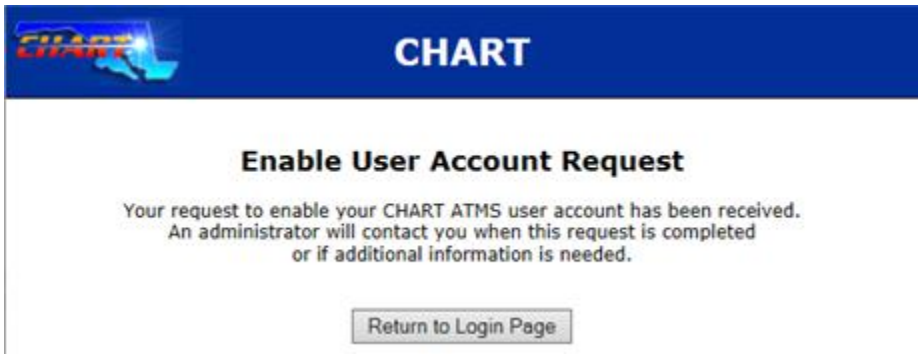


Figure 4-157 Enable User Account Request Form

The User Name, First Name, and Last Name fields are required. Business Phone or Email Address are required and the user can enter both if desired. The system will highlight empty required fields with a red border and will also indicate the validity of the phone number and e-mail address formats as they are typed. If the user clicks the Cancel button, the Login form will be shown. If the user clicks the Enable User Account button, a confirmation will be shown to indicate the request has been received:



The user may then click the Return to Login Page button to view the login page.

Upon receiving the request, the system will send an e-mail to the notification group configured in the system profile to receive enable user account requests. The e-mail subject will include the type of request in addition to the name of the person making the request to make it easier to manage the requests when the administrator has multiple requests in their in box. The from address and subject prefix are the same as those used for all notifications sent from CHART ATMS.

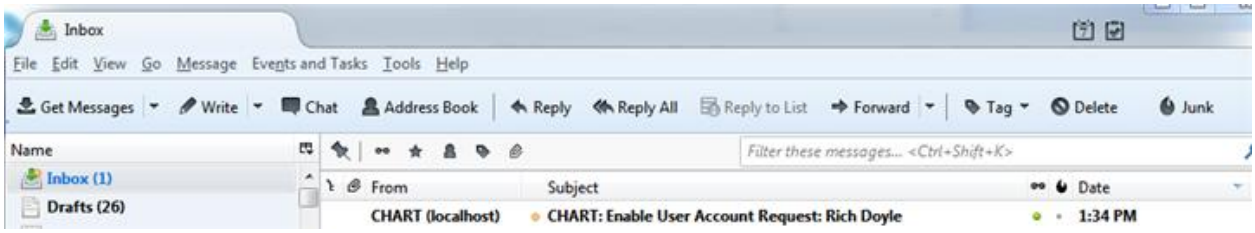
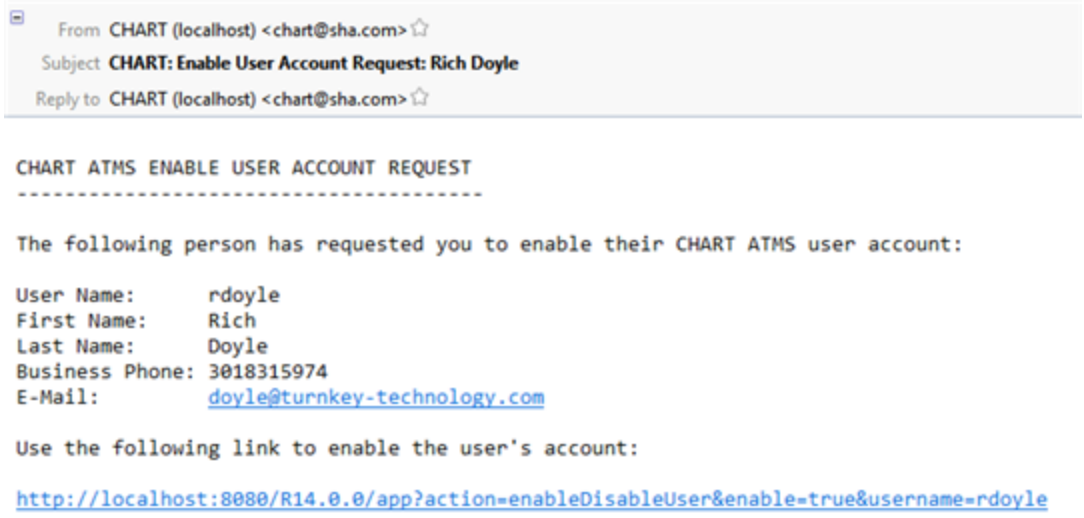


Figure 4-158 Enable User Account Request E-Mail

The e-mail body will contain the information entered by the user on the Enable User Account Form:

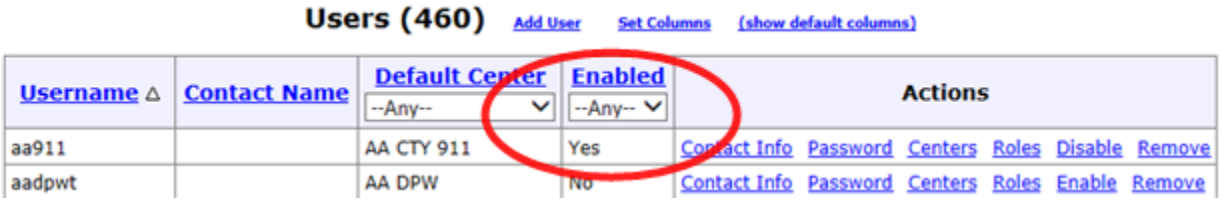


From CHART (localhost) <chart@sha.com>
Subject **CHART: Enable User Account Request: Rich Doyle**
Reply to CHART (localhost) <chart@sha.com>

```
CHART ATMS ENABLE USER ACCOUNT REQUEST
---------------------------------------

The following person has requested you to enable their CHART ATMS user account:

User Name:      rdoyle
First Name:     Rich
Last Name:      Doyle
Business Phone: 3018315974
E-Mail:         doyle@turnkey-technology.com

Use the following link to enable the user's account:

http://localhost:8080/R14.0.0/app?action=enableDisableUser&enable=true&username=rdoyle
```

Figure 4-159 Enable User Account Request E-Mail Body

In addition to the information entered by the user, the e-mail also contains a link that the administrator may choose to use to enable the user's account. When the link is clicked, if the administrator is already logged into CHART ATMS with their default browser, the system will enable the user's account and take the administrator to the Users list to allow them to verify. If the administrator is not logged into CHART ATMS with their default browser, their browser will open (if needed) and display the CHART ATMS Login Page. After logging in, the system will enable the user's account and show the Users list to allow them to verify.



Users (460) Add User Set Columns (show default columns)

Username △	Contact Name	Default Center	Enabled	Actions
		--Any--	--Any--	
aa911		AA CTY 911	Yes	Contact Info Password Centers Roles Disable Remove
aadpwt		AA DPW	No	Contact Info Password Centers Roles Enable Remove

Figure 4-160 Users List with Enabled Indicator

The setting that specifies the notification group that is to receive enable user account requests is accessed via the system profile on the General User Management Settings form:

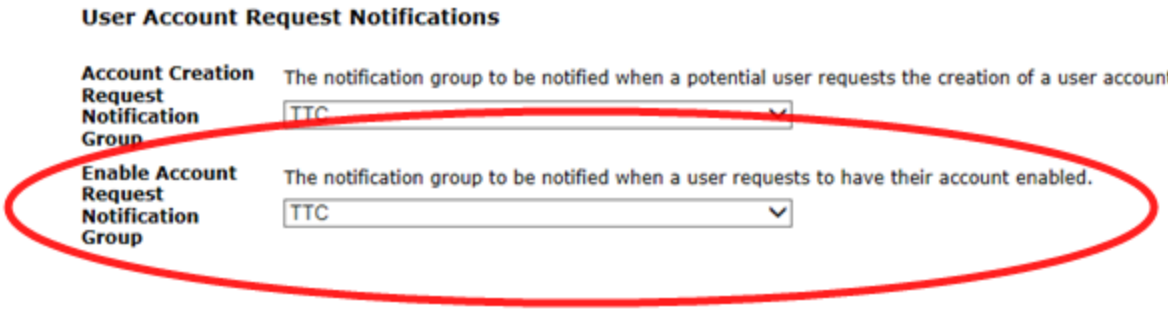


Figure 4-161 Enable User Account Request Notification Group Setting

4.5.3 Password Reset Request

A link has been added to the login page to allow a person to request to have their password reset:

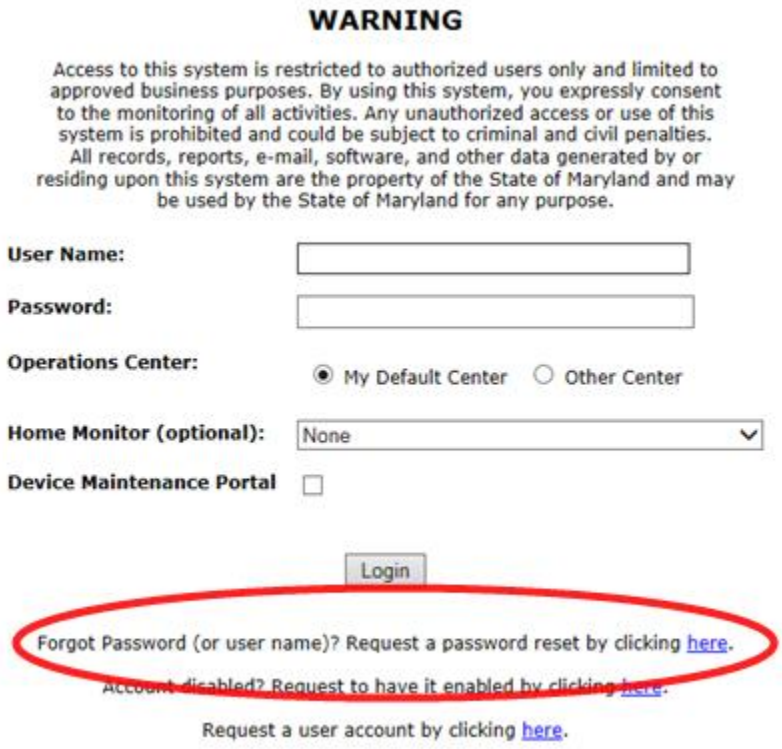
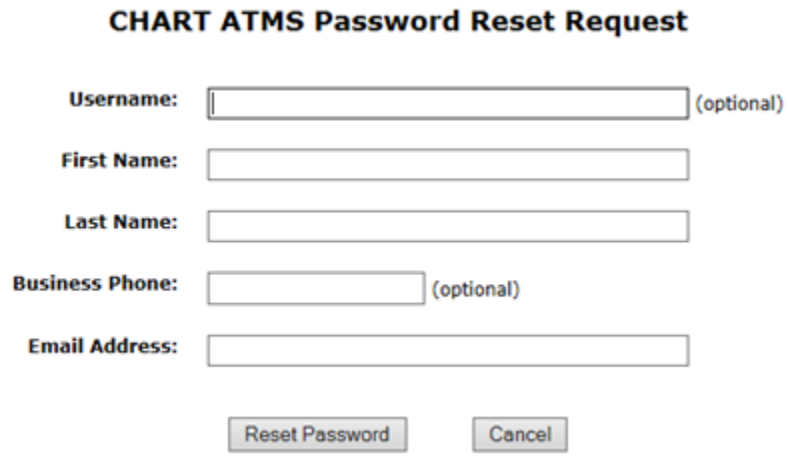


Figure 4-162 Password Reset Link

When the user clicks the link, the Password Reset Request form is shown:



Note the Username field is optional to allow this same request to be used if the person has forgotten their user name. The Business Phone field is also optional. All other fields are required. If the user clicks the Cancel button, the Login page is shown. If the user fills in the required fields and clicks the Reset Password button, the password reset request will be initiated.

An automated password reset process will be initated if the following conditions are met:

- The user has entered a user name on the password reset form
- The user name belongs to a valid CHART ATMS user account
- The CHART ATMS user account has an associated contact record
- The CHART ATMS contact record has an e-mail address that matches the e-mail address entered by the user on the password reset form

In all other cases, or if there is an unexpected error while initiating the automated process, a manual process will be used. See the sections below for details on both the automated and manual password reset processes.

4.5.3.1 Automated Password Reset

The automated password reset process is completed entirely by the end user. No administrative action is required. The system sends an e-mail to the end user that contains a link that can be used to reset their password. Upon clicking the link, the user's browser will open and the CHART ATMS Password Change Required form will be shown. The user will not be able to log in until they change their password. Following are details on the automated password reset process.

Immediately after clicking the Reset Password button the following confirmation message will appear to let the user know an e-mail has been sent:

Figure 4-163 Password Reset Request Confirmation - Automated Process

The user can click the Return to Login Page button to return to the login page but that step is not required.

The user will receive an e-mail from the system that provides instructions for them to reset their password. Following is an example of the e-mail as it will appear in their in-box:

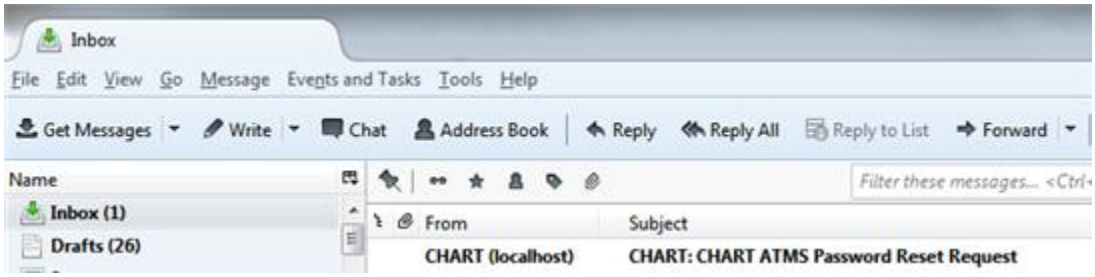


Figure 4-164 Password Reset E-Mail - Automated Process

Following is an example of the e-mail content:

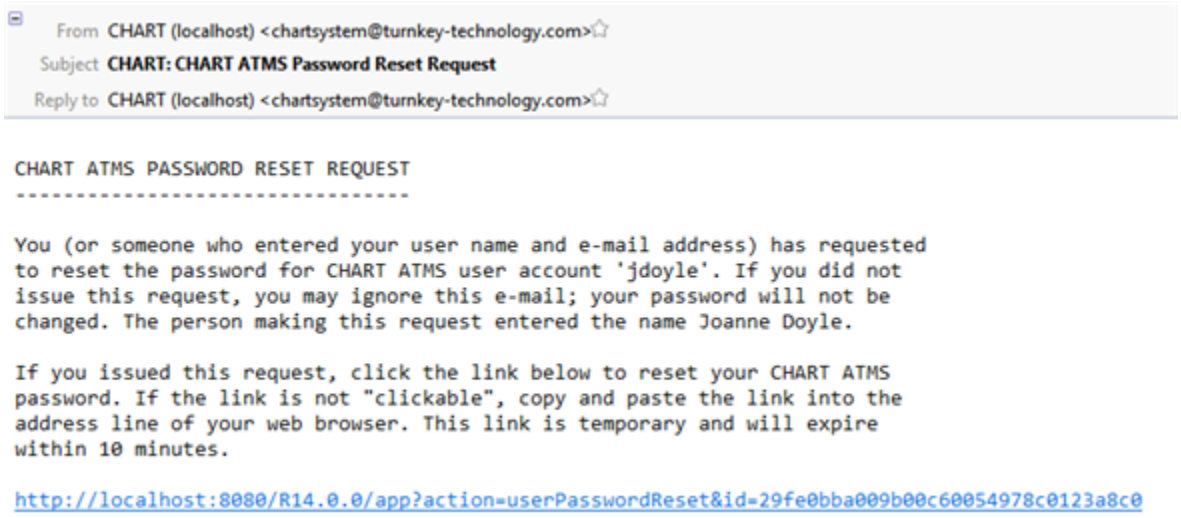


Figure 4-165 Password Reset E-Mail Content - Automated Process

If the user clicks the link contained in the password reset e-mail, their browser will open to the CHART ATMS page that requires the user to change their password before logging in. This is the exact same form that would be shown if the user attempts to log in after an administrator manually reset their password:

Figure 4-166 Password Change Required Form

The user can either choose to change their password or click the Exit button. If they click the Exit button they will need to repeat the entire process, for their password reset is temporary and the link can only be used one time.

4.5.3.2 Manual Password Reset

The manual password reset process is completed by an administrator. The system sends an e-mail to the notification group configured to receive password reset requests and the administrator must perform the password reset and then contact the end user to provide them with their new password (or user name and password if they have forgotten their user name). The user will then be forced to change their password when they attempt to log in using the new password.

After the user has clicked the Reset Password button on the Password Reset Request form, the following confirmation message will appear when the manual process has been initiated:

Figure 4-167 Password Reset Request Confirmation - Manual Process

The administrators that are part of the notification group set to receive password reset requests will receive an e-mail providing information regarding the password reset. Following is an example of how a password reset request will appear in the administrator's in-box:

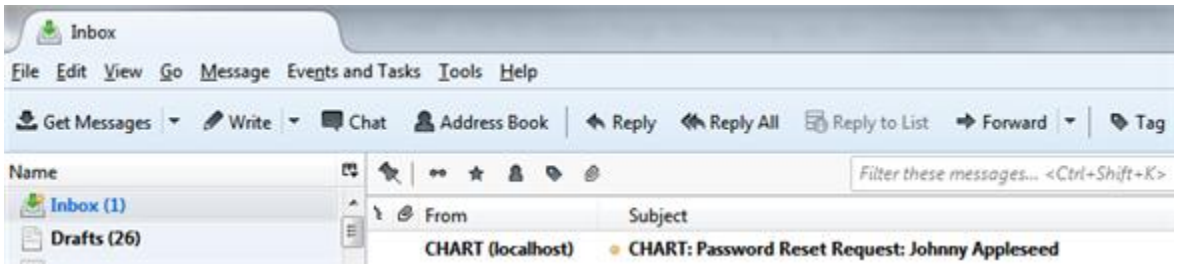


Figure 4-168 Password Reset E-Mail - Manual Process

Note that the subject contains the name the user entered to allow an administrator to more easily manage requests when there are more than one in their in-box. Following is an example of the e-mail content:

From CHART (localhost) <chartsystem@turnkey-technology.com>
Subject **CHART: Password Reset Request: Johnny Appleseed**
Reply to CHART (localhost) <chartsystem@turnkey-technology.com>

```
CHART ATMS PASSWORD RESET REQUEST
---------------------------------------

The following person has requested you to reset their CHART ATMS password:

User Name:      jappleseed
First Name:     Johnny
Last Name:      Appleseed
Business Phone: 555-555-5555
E-Mail:         jappleseed@turnkey-technology.com

This password reset must be performed manually because of the following reason:
A user account does not exist with the given user name.
```

Note that the bottom of the e-mail contains the reason why the automated process could not be used. Also note the e-mail does not contain a link to allow the administrator to perform an action because the path the administrator must take will vary on a case by case basis. They may need to find the contact information for the person so they can find the user name, may need to go directly to the user list, or may need to contact the user by phone or e-mail to validate their request.

4.5.3.3 Password Reset Request Configuration

Several system profile settings have been added to the user management section of the system profile to allow configuration of the password reset feature:

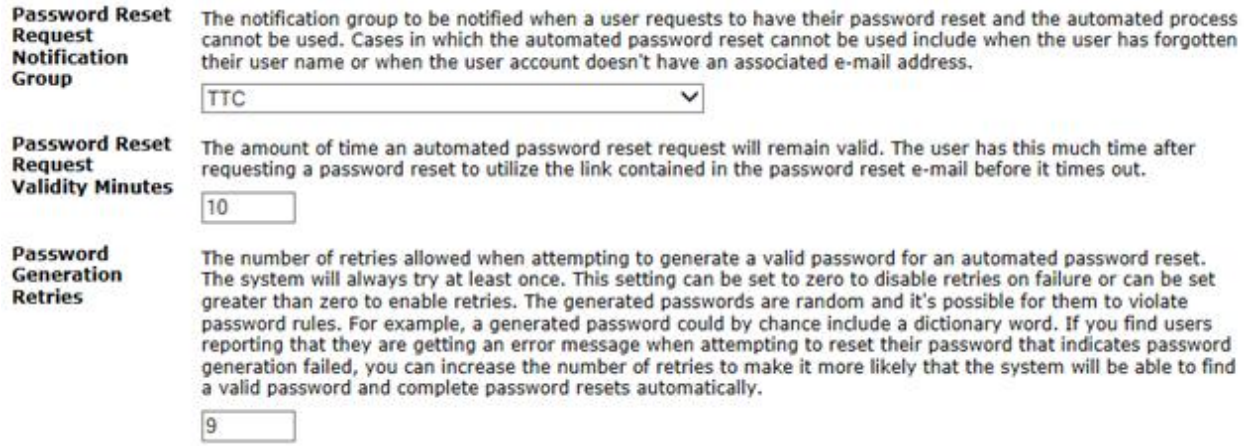


Figure 4-169 Password Reset System Profile Settings

The Password Reset Request Notification Group specifies the notification group that is to receive notifications for password reset requests that require the manual process to be used. This can be set to None to disable the ability for users to request to have their password reset.

The Password Reset Request Validity Minutes setting specifies the number of minutes the link for an automated password reset remains valid. If the user clicks the link in the e-mail after this much time has elapsed, they will get a message that tells them the request has timed out.

The Password Generation Retries setting specifies the maximum number of retries that will be performed when the system attempts to generate a temporary password that meets the current CHART ATMS password rules. This can be set to zero to disable retries, however it is recommended to allow retries because the random nature of password generation can lead to situations where the password breaks the password rules; for example it could contain a dictionary word. If a random password cannot be generated after this number of retries, the user will see an error message after they click the link contained in their password reset e-mail. The message will indicate password generation failed. If users start seeing this message, increasing the number of retries may help alleviate the problem. For example, if password rules are made more strict it could take more tries to randomly generate a valid password.

5 Acronyms/Glossary

Table 5-1defines acronyms and other terms used in this document.

Table 5-1. Acronyms & Glossary

TERM	DESCRIPTION
AOR	Area of Responsibility representing an area that a person, user, operations center, etc. is responsible for.
Call List (or Call Out List)	A list of contacts in priority order for the purpose of reaching someone responsible for something. In R14, call lists can be only be associated with event resources or event resource types. The term "Call Out List" is used in the GUI (at request of the MDSHA), while "Call List" is used in the requirements and code, but they both mean the same thing.
Contact	A record representing a person or agency that can be contacted. A contact may or may not support notification via email.
DMS	Dynamic Message Sign. An electronic sign used to display information to the traveling public.
Dynamic Message Sign	An electronic sign used to provide messages to motorists.
Functional right	A user right, granted to CHART users via Roles. Each operation on a device, including the ability to configure a device, view its sensitive information, and issue commands to the device are controlled by user rights. Users must possess the proper right to be able to perform these actions.
GIS	A Geographic Information System (GIS) is any system that captures, stores, analyzes, manages, and presents data that are linked to location
HAR	Highway Advisory Radio. A radio station used to broadcast programmable messages to motorists and other travelers regarding traffic and other delays.
On/Off Device	A CHART ATMS device that can be turned on or off (activated or deactivated) using an underlying electronic relay. Examples include a fog beacon and fog horn.
Participant	A resource or person that could potentially be involved with the management of traffic events. Prior to R14, only event resources or event resource types could be participants. In R14, a contact can be a participant also.
Participation	An instance of a participant actually being involved in the management of a specific traffic event. A "participation" is also (perhaps more correctly) referred to as "participation record", and it has more information than just the participant. It includes status flags, notes, etc.. Prior to R14, the only kind of participation was for an event resource or type. In R14, standalone contact participations are also supported (i.e., without an event resource / type specified). Also in R14, an event resource / type participation can include an optional associated contact responsible for the resource/type.
Relay	An electronic device that can be used to turn another electronic device on or off.
SOP	Standard Operating Procedure. Includes pertinent advisory information for operators and users.

6 Mapping To Requirements

Table 6-1shows how the requirements in the CHART R14 Requirements document map to design elements contained in this design.

Table 6-1. Mapping to Requirements

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1	ADMINISTER SYSTEMS AND EQUIPMENT		N/A	N/A
SR1.1.4.5.3.1	The system shall remove the contact if the user confirms that the contact should also be removed.	Contact Mgmt	Remove User	UserMgmtReqHdlr.processDeleteUser SD
SR1.1.4.13	The system shall allow a person to request an administrator to create a user account to allow them to access the system.	User Mgmt	Request User Account	N/A
SR1.1.4.13.1	The system shall require a person requesting a user account to provide the Agency Name or First Name and Last Name.	User Mgmt	Request User Account	N/A
SR1.1.4.13.2	The system shall require a person requesting a user account to provide Business Phone or E-Mail Address.	User Mgmt	Request User Account	N/A
SR1.1.4.13.3	The system shall allow a person requesting a user account to provide additional non-required information, including Agency Name, First Name, Last Name, Office/Shop, Job Title, Business Phone, and E-Mail Address (when those fields are not otherwise required).	User Mgmt	Request User Account	N/A
SR1.1.4.13.4	When a person submits a user account request the system shall send an e-mail to the notification group configured to receive user account requests.	User Mgmt	Request User Account	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.4.13.4.1	The e-mail subject line for a user account request shall contain the name of the person making the request or the agency name if the person's name was not entered.	User Mgmt	Request User Account	N/A
SR1.1.4.13.4.2	The e-mail for a user account request shall contain the following fields and the person's entry in those fields (if any): Agency Name, First Name, Last Name, Office/Shop, Job Title, Business Phone, and E-Mail Address.	User Mgmt	Request User Account	N/A
SR1.1.4.13.4.3	The e-mail for a user account request shall contain a link that when clicked attempts to show the Add Contact form populated with the following fields (if entered by the user): Agency Name, First Name, Last Name, Office/Shop, Job Title, Business Phone, and E-Mail Address. (If not already logged in, the user must first log in, and the user must have the rights required to add a contact.)	User Mgmt	Request User Account	N/A
SR1.1.4.14	The system shall allow a user to request to have their user account enabled.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.1	The system shall require the user to provide their user name when requesting to have their user account enabled.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.2	The system shall require the user to provide their First Name and Last Name when requesting to have their user account enabled.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.3	The system shall require the user to provide Business Phone or E-Mail Address when requesting to have their user account enabled.	User Mgmt	Request Enable User Account	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.4.14.4	The system shall allow the user to provide Business Phone or E-Mail Address (when those fields are not otherwise required) when requesting to have their user account enabled.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.5	When the user submits a request to enable their user account the system shall send an e-mail to the notification group configured to receive requests to enable a user account.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.5.1	The e-mail subject line for a request to enable a user account shall contain the name of the person making the request.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.5.2	The e-mail content for a request to enable a user account shall contain the following fields and the user's entry in those fields (if any): User Name, First Name, Last Name, Business Phone, and E-Mail Address.	User Mgmt	Request Enable User Account	N/A
SR1.1.4.14.5.3	The e-mail content for a request to enable a user account shall include a link that when clicked attempts to enable the user's account. (If not already logged in, the user must first log in and must have the rights required to enable a user account.)	User Mgmt	Request Enable User Account	N/A
SR1.1.4.15	The system shall allow a user to request to have their password reset.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.1	The system shall require a user requesting a password reset to provide their First Name, Last Name, and E-Mail Address.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.2	The system shall allow a user requesting a password reset to provide additional non-required information, including User Name and Business Phone.	User Mgmt	Request Password Reset	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.4.15.3	When a user submits a request to reset their password and has provided their user name, the system shall attempt to automatically reset the password.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.3.1	Automatic password reset shall require the user name entered by the user to exist in the system.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.3.2	Automatic password reset shall require the user name entered by the user to have an associated contact record in the system.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.3.3	Automatic password reset shall require the contact record associated with the user name entered by the user to have an e-mail address that matches the e-mail address entered by the user.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.3.4	Automatic password reset shall send an e-mail to the user's e-mail address to allow them to confirm their password reset request. (This is to protect against someone attempting to reset a different user's password.)	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.3.5	The e-mail sent to the user to confirm their password reset shall contain a link that when clicked shall cause the system to create a temporary password and then display a form to allow the user to change their password.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.4	When a user submits a request to reset their password and has not provided their user name or the system cannot otherwise automatically reset the password, the system shall send an e-mail to the notification group configured to receive requests to reset a user's password.	User Mgmt	Request Password Reset	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.4.15.4.1	The e-mail subject line for a password reset request shall contain the name of the person making the request or the agency name if the person's name was not entered.	User Mgmt	Request Password Reset	N/A
SR1.1.4.15.4.2	The e-mail for a password reset request shall contain the following fields and the person's entry in those fields (if any): User Name, First Name, Last Name, Business Phone, and E-Mail Address.	User Mgmt	Request Password Reset	N/A
SR1.1.8.1.1.1.1	The system shall default the state selection to MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.2	The system shall allow the user to specify the county in which the object is located.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.2.1	The system shall require the user to select a valid county from a list when specifying a county using the location form, if the selected state is MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.2.1.1	The system shall display the user's most recently used counties at the top of the counties list, if the state is MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.2.1.2	The system shall display all counties in MD, if the selected state is MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.2.2	The system shall allow the user to enter the county name as freeform text, if the selected state is not MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.3	The system shall allow the user to specify the region in which the object is located.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.3.1	The system shall require the user to select a predefined region from a list when specifying a region using the location form, if the selected state is MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.3.1.1	The system shall include the following regions in the list, if the selected state is MD: Statewide, Baltimore Region, Washington Region, Western Maryland, Eastern Shore, Northern Maryland, and Southern Maryland.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.3.2	The system shall allow the user to enter the region name as freeform text, if the selected state is not MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.4	The system shall not allow both a region and a county to be specified at the same time.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.5	The system shall allow the user to specify the type of route on which an object is located, such as interstate or state route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6	The system shall allow the user to specify the route on which the object is located.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6.1	The system shall provide a list of known routes from a GIS database for user selection if the user has selected a state, county, and route type, if known routes exist for the selections made.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6.1.1	The system shall require the user to select a route from the list of known routes, or select no route, if the selected state is MD and the list of known routes is available for the current selections.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6.1.2	The system shall allow the user to enter the route description as free form text, if the selected state is MD but the list of known routes could not be obtained from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.6.1.3	The system shall allow the user to specify whether to display the route number or the local road name when displaying the known route that came from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6.2	The system shall allow the user to specify the route description using free form text if the selected state is not MD.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6.3	The system shall allow the user to select the direction(s) of the route describing the side(s) of the roadway on which the object is located. (Some objects, such as traffic events, may be located on both sides of the roadway).	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.6.3.1	The available directions shall include: None, North, South, East, West, Inner Loop, Outer Loop, South/North, East/West and Inner Loop/Outer Loop.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7	The system shall allow the user to specify that the object's location is relative to a single feature on the route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.1	The system shall allow the user to specify a feature on the route relative to which the object is located, as described in the Specify Feature On Route requirements.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.1.1	The system shall automatically populate the geographic location of the object if a single intersection with another route is specified and the geographic location of the intersection is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.1.2	The system shall automatically populate the geographic location of the object if a single exit is specified and the geographic location of the exit is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.7.1.3	The system shall automatically populate the geographic location of the object if a single milepost is specified and the geographic location of the milepost is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.1.3.1	The system shall use interpolation to find the approximate coordinates for a milepost that is between two mileposts with known coordinates that are within some threshold distance of each other, if the milepost does not match a known milepost from the GIS database. (This location will likely be off the road to some extent, but the user can manually adjust the coordinates, as described in one of the requirements under Specify Object Location Using Map and Form).	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.2	The system shall allow the user to specify the object's proximity to the specified feature on the route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.2.1	The proximity values for describing the object's position relative to a single feature on the route shall include: AT, PAST, PRIOR TO, WEST OF, NORTH OF, EAST OF, and SOUTH OF.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.7.2.2	The system shall use a proximity value of 'AT' if the user does not specify a value.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8	The system shall allow the user to specify that the object is located between two features on the route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.1	The system shall allow the user to specify a feature on the route marking the beginning of the interval containing the object, as described in the Specify Feature On Route requirements.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.8.1.1	The system shall automatically populate the geographic location of the object using the beginning of the interval if an intersection with another route is specified and the geographic location of the intersection is available from the Spatial Web Service.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.1.2	The system shall automatically populate the geographic location of the object using the beginning of the interval if an exit is specified and the geographic location of the exit is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.1.3	The system shall automatically populate the geographic location of the object using the beginning of the interval if a milepost is specified and the geographic location of the milepost is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.2	The system shall allow the user to specify a feature on the route marking the end of the interval containing the object, as described in the Specify Feature On Route requirements.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.2.1	The system shall attempt to populate the geographic location of the object using the ending of the interval only if the geographic location is not available for the beginning of the interval.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.2.1.1	The system shall automatically populate the geographic location of the object using the ending of the interval if an intersection with another route is specified and the geographic location of the intersection is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.8.2.1.2	The system shall automatically populate the geographic location of the object using the ending of the interval if an exit is specified and the geographic location of the exit is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.2.1.3	The system shall automatically populate the geographic location of the object using the ending of the interval if a milepost is specified and the geographic location of the milepost is available from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.3	The system shall prevent the user from specifying a beginning and ending feature of an interval that are the same feature.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.4	The system shall allow the user to specify the object's proximity to the specified features on the route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.8.4.1	The proximity values for describing an object that is located between two features on the route shall include: 'FROM-TO' and 'BETWEEN'.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9	Specify Feature On Route	On/Off Devices	N/A	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.1	The system shall allow a user to specify a state milepost number as a feature on a route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.1.1	The system shall allow the user to specify a state milepost value using a freeform numerical value.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.2	The system shall allow a user to specify a county milepost number as a feature on a route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.2.1	The system shall allow the user to specify a county milepost value using a freeform numerical value.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.9.3	The system shall allow the user to specify an intersection with another route as a feature on a route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.3.1	The system shall provide a list of known intersecting routes from a GIS database for user selection if the user has selected a state, county, route type, and main route, if intersecting routes exist in the GIS database for the selections made.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.3.1.1	The system shall allow the user to select an intersecting route, if the selected state is MD and the list of intersecting routes is available from the GIS database for the current selections.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.3.1.2	The system shall allow the user to specify whether to display the route number or the local road name when displaying the known intersecting route that came from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.3.2	The system shall allow the user to specify the intersecting route description using free form text if the text does not match the route number (or name, if displaying known routes by name) of a known intersecting route retrieved from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.4	The system shall allow the user to specify an exit number as a feature on the route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.9.4.1	The system shall provide a list of known exit numbers from a GIS database for user selection if the user has selected a state, county, route type, and main route, if exit numbers exist in the GIS database for the selections made.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.9.4.2	The system shall allow the user to enter an exit number as free form text.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10	The system shall allow the user to specify a textual location description.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1	The system shall generate the object location description based on the values specified in the location fields, unless the location description has been overridden by the user.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.1	If no location information is specified, the textual location shall indicate the location is unknown.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2	If a main route is specified, the textual location shall be the main route, with further identifying information as available.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.1	The textual description shall include the route number or name, as specified by the "show name" option for the main route, if it is a known route from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.2	The textual description shall include the route description, if the main route was entered as free form text.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.3	The textual description based on the main route shall include direction if the user has specified a direction.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4	If the object location is relative to a feature (or features) on the route, the textual description shall include the object's location relative to the feature(s).	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4.1	The textual description shall include the proximity of the object to the specified feature(s).	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.10.1.2.4.1.1	If the object location's proximity is 'FROM-TO', the textual description shall be formatted as: FROM first feature description TO second feature description.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4.1.2	If the object location's proximity is 'BETWEEN', the textual description shall be formatted as: BETWEEN first feature description AND second feature description.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4.2	The textual description shall include a description of the specified feature(s) on the route.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4.2.1	If a feature on the route is an intersecting route, the feature description shall consist of the route number or name, as specified by the show name option for the intersecting route, if it is a known intersecting route from the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4.2.2	If a feature on the route is an intersecting route, the feature description shall consist of the route description, if the intersecting route was entered as free form text.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.2.4.2.3	If a feature on the route is an exit, the feature description shall consist of the exit number (and suffix, if applicable) followed by the name of the road to which the exit leads if a name is available from the GIS Service.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.3	If the object location was specified using a location alias, the system shall append the public name of the alias in parenthesis to the textual description of the location, if the public alias name is not the empty string.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.10.1.4	If a main route is not specified, the textual description shall include the county if the user has specified a county.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.5	If a main route is not specified, the textual description shall include the region if the user has specified a region.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.1.6	If a main route is not specified, the textual description shall include the state if the user has specified a state.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.2	The system shall allow the user to override the generated object location description and specify free form text as the location description.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.2.1	The system shall prompt for confirmation before allowing the user to override the location description, warning the user that overriding the location description is discouraged.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.2.2	The system shall warn the user again before allowing the overridden location description to be used.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.10.3	The system shall require the location description to be specified and contain at least one non-blank character.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.11	The system shall allow the user to pre-populate the location fields by selecting a named location known as a "location alias". (See the Manage Location Aliases requirements).	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.11.1	The list of location aliases shall be filtered to include only aliases located in the areas of responsibility that are associated with the user's operations center.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.1.11.1.1	The list of location aliases shall include all location aliases if no areas of responsibility are associated with the user's operations center.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.1.11.2	The system shall allow the user to view the full un-filtered list of location aliases in the system.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2	Specify Object Location Using Map and Form	On/Off Devices	N/A	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2	The system shall allow the user to specify an object's geographic location by clicking on the map in an appropriate way.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.1	The system shall use the specified geographic location to perform a GIS query to obtain other location information for the object, if the user has chosen to initiate a new location from the map (and is not just adjusting the coordinates for an existing location).	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.1.1	The system shall look up the U.S. state containing the specified geographic location for the object, if the location is within a state of interest which has a boundary defined in the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.1.1.1	The system shall update the State field in the associated object location form, if the state returned from the GIS query is different than the current selection.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.1.2	The system shall look up the county within a U.S. state containing the specified geographic location for the object, if the location is within a county of interest which has a boundary defined in the GIS database.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.2.2.1.2.1	The system shall update the County field in the associated object location form, if the county or state returned from the GIS query are different than the current selections.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.2	The system shall use the specified geographic location when the object's location information is saved.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.3	The system shall allow the user to adjust the coordinates of a previously specified location without modifying the data in the other location fields in the form.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.2.4	The system shall ask the user whether the coordinates specified via map click are for an adjustment of an existing location, or are for a new location, if the new coordinates are more than a configurable threshold distance from the previous coordinates.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.3	The system shall pan and/or zoom the map used for specifying an object's location when the user makes selections on the associated location form.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.3.1	The system shall pan and/or zoom the map when the State selection is changed on the Object Location form to show the selected state, if the extents of the state are known.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.3.2	The system shall pan and/or zoom the map when the County selection is changed on the Object Location form to show the selected county, if the extents of the county are known.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.1.8.1.2.3.4	The system shall pan and/or zoom the map when the Intersecting Feature selection is changed on the Object Location form to include an area around the intersecting feature, if the location of the intersecting feature is known.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.3.4.1	The system shall pan and/or zoom the map when the second Intersecting Feature selection is changed on the Object Location form (for a proximity of BETWEEN or FROM-TO) to include an area including both intersecting features, if the location of the intersecting features are known.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.3.4.3	The system shall ask the user whether to replace the previous coordinates, if the previous coordinates were specified by the user and the new location is more than a configurable threshold distance from the old location.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.4	The system shall display a map that can be used when specifying an object's location.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.5	The system shall allow the user to zoom in or out when using the map to specify an object location.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.6	The system shall allow the user to pan the map when using a map to specify an object's location.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.1.8.1.2.7	The system shall display a marker at the coordinates to indicate the currently specified location. The location of this marker will be updated as necessary to reflect changes in the specified location.	On/Off Devices	Specify On/Off Device Settings	OnOffDeviceGUIBase CD AddOnOffDevice-Submit Form SD
SR1.4	MANAGE CHART CONTROL		N/A	N/A (Heading)
SR1.4.1	CONTROL LOGIN		N/A	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.1.6	The system shall capture the userid and date/timestamp when a user logs in.		N/A	N/A
SR1.4.1.6.1	The system shall log messages generated from operations activities.		N/A	N/A
SR1.4.1.6.1.3	CHART II shall audit an operator making any device configuration changes.	On/Off Devices	Add On/Off Device Edit On/Off Device Remove On/Off Device	OnOffDeviceControlModule CD
SR1.4.2	PERFORM SHIFT HAND-OFF (INCOMING) AND VIEW OPERATIONS CENTER HOME PAGE		N/A	N/A (Heading)
SR1.4.2.11	View Operations Center Report		N/A	N/A (Heading)
SR1.4.2.11.3	The operations center report shall list all open traffic events that are being controlled by the operations center or that are within the operations center's AOR.		N/A	N/A (Existing)
SR1.4.2.11.3.1	The system shall display an indicator for the traffic event device usage portion of the operations report when a response message/action for the event is on the device's queue, but the message/action is not active on the device. [CHANGED IN R14]	On/Off Devices	View Op Center Report	Use Case Only
SR1.4.2.11.3.8	The system shall allow a user to view and manage participation records for an event in the Operations Center Report, as specified in the View / Manage Participations for Event in List requirements (SR 4.3.5.14)	Contact Mgmt	View Participations for Event in List; Add, Remove Participation for Event in List	Prototype only
SR1.4.2.11.4	The operations center report shall list all devices that are in maintenance mode and being controlled by the operations center.	On/Off Devices	View Op Center Report	Use Case Only
SR1.4.2.11.9	The list of devices shall include On/Off devices that are being controlled by the operations center.	On/Off Devices	View Op Center Report	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.5	CONTROL LOGOUT AND TRANSFER CONTROL		N/A	N/A
SR1.4.5.2	The system shall allow the user to transfer CHART control to another center (e.g., for shift change).		N/A	N/A
SR1.4.5.2.5	The system shall support the transfer of responsibility of On/Off devices that are in maintenance mode from one center to another.	On/Off Devices	Transfer Resources	OnOffDeviceGUIBase CD
SR1.4.5.3	The system shall require the user to transfer resources to another center (e.g., at the end of daily operations for Centers that aren't 24x7) before logging out except in the case of an emergency log out.	On/Off Devices	Log Out	Use Case Only
SR1.4.5.3.1	The system shall not allow the last user logged in to a Center to logoff while that Center has control of resources.	On/Off Devices	Log Out	Use Case Only
SR1.4.5.3.4	The system shall generate an alert if no users are logged in at the Center that is listed as the responsible Center for a shared resource.	On/Off Devices	Generate Unhandled Resources Alert	OnOffDeviceControlModule CD
SR1.4.5.3.4.1	The Unhandled Resource Alert shall be sent to the Center which has the unhandled resources. (The alert will immediately begin an Escalation Cycle, following the configured escalation path until it reaches an AMG where there is at least one user logged in.)	On/Off Devices	Generate Unhandled Resources Alert	OnOffDeviceControlModule CD
SR1.4.7	Search Operations Web Site		N/A	N/A
SR1.4.7.12	The system shall display all On/Off devices whose attributes match the searched word.	On/Off Devices	Search Operations Web Site	OnOffDeviceGUIBase CD
SR1.4.7.13	The system shall allow the user to limit the site search to specific types of items.	On/Off Devices	Search Operations Web Site	OnOffDeviceGUIBase CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.7.13.1	The site search shall search all searchable item types by default.	On/Off Devices	Search Operations Web Site	OnOffDeviceGUIBase CD
SR1.4.7.14	The system shall allow the user to specify if the site search is to be case sensitive or insensitive.	On/Off Devices	Search Operations Web Site	Use Case Only
SR1.4.7.14.1	The site search shall be case insensitive by default.	On/Off Devices	Search Operations Web Site	Use Case Only
SR1.4.9	View Map (General)		N/A	N/A
SR1.4.9.2	The system shall allow the user to choose the intended object, if clicking on objects that are overlapping in the map.	On/Off Devices	View Map	Use Case Only
SR1.4.9.3	The system shall display object identification information for multiple objects when the mouse cursor hovers over multiple overlapping objects in the home page map.	On/Off Devices	View Map	Use Case Only
SR1.4.11	MAINTAIN STANDARD OPERATING PROCEDURE (SOP) DOCUMENTS	SOPs	N/A	N/A
SR1.4.11.1	The system shall allow a user with the Manage SOP right to add an SOP document definition.	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD SOPDocumentFactoryImpl.createSOPDocument SD StandardOperatingProcedureReqHdlr.submitAddEditSOPDocumentForm SD
SR1.4.11.1.1	The system shall require an SOP document definition to contain a unique document name of 1 to 100 characters.	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD
SR1.4.11.1.2	The system shall require an SOP document definition to contain a customizable introductory header of 1 to 1000 characters.	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD
SR1.4.11.1.2.1	The customizable introductory header shall allow HTML fragments to be entered within the text field.	SOPs	Add SOP Document Definition	Use Case Only
SR1.4.11.1.3	The system shall allow an SOP document definition to contain an optional description.	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.11.1.4	The system shall require an SOP document definition to contain a correctly formatted URL pointing to the address of the SOP document the definition applies to.	SOPs	Add SOP Document Definition	Use Case Only
SR1.4.11.1.5	The system shall require an SOP document definition to specify one or more operations center(s) to which the definition applies.	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD SOPDB.addSOPDocument SD SOPDB.updateSOPOpCenters SD
SR1.4.11.1.5.1	The system shall allow an SOP document definition to be associated with ALL operations centers (current and future).	SOPs	Add SOP Document Definition	Use Case Only
SR1.4.11.1.6	The system shall allow an SOP document definition to specify zero or more event trigger(s) to which the definition applies.	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD SOPDB.addSOPDocument SD SOPDB.updateEventTriggers SD
SR1.4.11.1.6.1	The system shall support an event trigger for when a user indicates that an incident involves hazardous materials.	SOPs	Change Incident to HAZMAT	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.2	The system shall support an event trigger for when a user indicates that an incident involves off road activity.	SOPs	Change Incident Type	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.3	The system shall support an event trigger for when a user indicates that an incident involves police activity.	SOPs	Change Incident Type	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.4	The system shall support an event trigger for when a user indicates that an incident involves any weather closure.	SOPs	Change Incident Type	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.5	The system shall support an event trigger for when a user indicates that an incident involves a collision with fatality.	SOPs	Change Incident Type	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.6	The system shall support an event trigger for when a user indicates that an incident involves emergency roadwork.	SOPs	Change Incident Type	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.11.1.6.7	The system shall support an event trigger for when the cyclist or pedestrian vehicle count is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.8	The system shall support an event trigger for when the loaded commercial bus vehicle count is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.9	The system shall support an event trigger for when the loaded or unloaded school bus vehicle count is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.10	The system shall support an event trigger for when the lost-load or overturned vehicle count for any vehicle is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.11	The system shall support an event trigger for when the jack-knifed vehicle count for any vehicle is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.12	The system shall support an event trigger for when the motorcycle vehicle count is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.13	The system shall support an event trigger for when any tractor trailer vehicle count is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.14	The system shall support an event trigger for when any single unit truck vehicle count is changed from zero to non-zero.	SOPs	Change Incident Vehicle Counts	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD
SR1.4.11.1.6.15	The system shall support an event trigger for when the user indicates 100% of the roadway is closed for an event.	SOPs	Update Lane Status	SOPManagement.SOPManagement CD TrafficEventReqHdlr.displayEditIncidentDataForm SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.11.1.6.16	The system shall support an event trigger for when a congestion event is created.	SOPs	Create Event	SOPManagement.SOPManagement CD
SR1.4.11.1.6.17	The system shall support an event trigger for when an action event is created.	SOPs	Create Event	SOPManagement.SOPManagement CD
SR1.4.11.1.6.18	The system shall support an event trigger for when an action event is marked as a pothole, animal carcass 10-45, or citizen call action type.	SOPs	Change Action Event Types	SOPManagement.SOPManagement CD TrafficEventReqHdlr.viewEventDetails SD
SR1.4.11.1.6.19	The system shall support an event trigger for when an action event is marked with any signal action type.	SOPs	Change Action Event Types	SOPManagement.SOPManagement CD TrafficEventReqHdlr.viewEventDetails SD
SR1.4.11.1.6.20	The system shall support an event trigger for when a weather service event is created.	SOPs	Create Event	SOPManagement.SOPManagement CD
SR1.4.11.1.6.21	The system shall support an event trigger for when the form used to create a notification within the context of a traffic event is opened.	SOPs	Open Notification Form	SOPManagement.SOPManagement CD
SR1.4.11.1.6.22	The system shall support an event trigger for when a user successfully logs into the system.	SOPs	Log In	SOPManagement.SOPManagement CD
SR1.4.11.1.7	The system shall allow an SOP document definition to be set as having major distribution. (This attribute is tied to a user right that determines which SOPs a specific user will be shown. See SR1.4.12.1.1.)	SOPs	Add SOP Document Definition	SOPManagement.SOPManagement CD StandardOperatingProcedureHdlr.submitAddEditSOPForm SD
SR1.4.11.2	The system shall allow a user with the Manage SOP right to update an SOP document definition.	SOPs	Edit SOP Document Definition	SOPManagement.SOPManagement CD SOPDocumentFactoryImpl.updateSOPDocument SD StandardOperatingProcedureReqHdlr.submitAddEditSOPDocumentForm SD
SR1.4.11.3	The system shall allow a user with the Manage SOP right to remove an SOP document definition.	SOPs	Remove SOP Document Definition	SOPManagement.SOPManagement CD SOPDocumentFactoryImpl.removeSOPDocument SD chartlite.servlet.sop CD
SR1.4.11.3.1	The system shall prompt the user for confirmation before removing an SOP document definition.	SOPs	Remove SOP Document Definition	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.11.4	The system shall allow a user with the Manage SOP right or View SOP right to view the list of SOP document definitions.	SOPs	View SOP Document Definition List	SOPDocumentFactoryImpl.getSOPDocuments SD chartlite.servlet.sop CD
SR1.4.11.4.1	The SOP Document Definition List shall allow the following information to be viewed: Document Name, Description, Introductory Header, URL link, Distribution, Operations Center(s), and Event Trigger(s).	SOPs	View SOP Document Definition List	SOPManagement.SOPManagement CD SOPDocumentFactoryImpl.getSOPDocuments SD chartlite.servlet.sop CD
SR1.4.11.4.2	The SOP Document Definition List shall display the following columns by default: the Document Name, URL Link, Operations Centers, and Event Triggers.	SOPs	View SOP Document Definition List	Use Case Only
SR1.4.11.4.3	The SOP Document Definition List shall allow the user to choose to show or hide the following columns: Description, Introductory Header, URL Link, Distribution, Operations Centers, and Event Triggers.	SOPs	View SOP Document Definition List	Use Case Only
SR1.4.11.4.4	The SOP Document Definition List shall allow the user to set the column visibility back to the default state.	SOPs	View SOP Document Definition List	Use Case Only
SR1.4.11.5	The system shall allow the user to sort the SOP Document Definition List using the data in the following columns: Document Name, Operations Centers, and Event Triggers.	SOPs	View SOP Document Definition List	chartlite.servlet.sop CD
SR1.4.11.6	The system shall allow the user to filter the SOP Document Definition List by specific operations centers or all centers.	SOPs	View SOP Document Definition List	chartlite.servlet.sop CD
SR1.4.11.7	The system shall allow the user to filter the SOP Document Definition List by specific event triggers.	SOPs	View SOP Document Definition List	chartlite.servlet.sop CD
SR1.4.11.8	The system shall show the current filters that are applied to the SOP Document Definition list, if any.	SOPs	View SOP Document Definition List	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.11.9	The system shall allow the user to view all SOP Document definitions, removing any filters currently in use.	SOPs	View SOP Document Definition List	Use Case Only
SR1.4.12	STANDARD OPERATING PROCEDURE (SOP) POPUP	SOPs	N/A	N/A
SR1.4.12.1	The system shall display a popup message for SOP when an event trigger action is executed.	SOPs	View All SOP Popups	SOPDataClasses CD SOPTriggerMapUtil.getMapForTrigger SD
SR1.4.12.1.1	The system shall display an SOP popup message to the user if any SOP document definitions applies to the user's functional rights and match on the relevant operations center.	SOPs	View All SOP Popups	SOPDataClasses CD SOPTriggerMapUtil.getMapForTrigger SD
SR1.4.12.1.1.1	An SOP document definition shall apply to the user's functional rights if the definition is set to major distribution and the user has the View Major SOP Popups and/or View ALL SOP Popups right.	SOPs	View Major SOP Popups	SOPDataClasses CD SOPTriggerMapUtil.getMapForTrigger SD
SR1.4.12.1.1.2	An SOP document definition shall also apply to the user's functional rights if the definition is not set to major distribution and the user has the View ALL SOP Popups right.	SOPs	View All SOP Popups	SOPDataClasses CD SOPTriggerMapUtil.getMapForTrigger SD
SR1.4.12.1.1.3	A match of relevant operations center shall occur when the SOP document definition includes the controlling operations center of the event, where a traffic event with a controlling operations center is involved.	SOPs	View All SOP Popups	SOPDataClasses CD SOPTriggerMapUtil.getMapForTrigger SD
SR1.4.12.1.1.4	A match of relevant operations center shall also occur when the SOP document definition includes the operations center the user is logged into, where no traffic event with a mapped controlling operations center is involved.	SOPs	View All SOP Popups	SOPDataClasses CD SOPTriggerMapUtil.getMapForTrigger SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.12.1.3	The SOP popup message shall allow one or more document definition links to be displayed per event trigger action.	SOPs	View All SOP Popups	Use Case Only
SR1.4.12.1.4	The SOP popup message shall list the specified definition fields for each SOP document definition that matches the operator executed event trigger action.	SOPs	View Limited SOP Document Definition	Use Case Only
SR1.4.12.1.4.1	The SOP popup message shall contain the introductory header from the configured SOP document definition.	SOPs	View Limited SOP Document Definition	Use Case Only
SR1.4.12.1.4.2	The SOP popup message shall provide the HTML Link to the URL configured in the SOP document definition.	SOPs	View Limited SOP Document Definition	Use Case Only
SR1.4.12.1.4.3	The SOP popup message HTML Link text shall be the document name from the configured SOP document definition.	SOPs	View All SOP Popups	Use Case Only
SR1.4.12.1.4.3.1	If clicked, the SOP popup message HTML Link shall open and navigate to the configured URL in a new browser window or tab.	SOPs	View All SOP Popups	Use Case Only
SR1.4.12.1.5	The system shall provide a means for the operator to acknowledge that the SOP Popup message has been viewed. (Note: any such acknowledgement will not be recorded.)	SOPs	View All SOP Popups	Use Case Only
SR1.4.13	STANDARD OPERATING PROCEDURE (SOP) GUIDANCE SECTION	SOPs	N/A	N/A
SR1.4.13.1	The system shall display a section on the event details page to display applicable SOPs for any operator with the view Traffic Event right enabled.	SOPs	View SOP Guidance	SOPDataClasses CD SOPTriggerMapUtil.getSOPGuidanceDocuments SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.4.13.1.1	The SOP Guidance section shall display any SOP document definitions that contain the controlling operations center of the event and for which the event trigger conditions are currently met.	SOPs	View SOP Guidance	SOPDataClasses CD SOPTriggerMapUtil.getSOPGuidanceDocuments SD
SR1.4.13.1.1.1	The system shall default to the operations center the user is logged into for display within the SOP Guidance section when a traffic event does not have a controlling operations center.	SOPs	View SOP Guidance	SOPDataClasses CD SOPTriggerMapUtil.getSOPGuidanceDocuments SD
SR1.4.13.1.6	The SOP Guidance section shall allow one or more document definition links to be displayed for each matched event trigger condition.	SOPs	View SOP Guidance	Use Case Only
SR1.4.13.1.6.1	The SOP Guidance section shall contain the introductory header from each configured SOP document definition.	SOPs	View Limited SOP Document Definition	Use Case Only
SR1.4.13.1.6.2	The SOP Guidance section shall contain an HTML Link of the URL from each configured SOP document definition.	SOPs	View SOP Guidance	Use Case Only
SR1.4.13.1.6.2.1	The SOP Guidance section HTML Link text shall be the document name from each configured SOP document definition.	SOPs	View SOP Guidance	Use Case Only
SR1.4.13.1.6.2.2	The SOP Guidance section HTML Link shall open and navigate to the URL in a new browser window or tab each time an operator clicks on a configured SOP document link.	SOPs	View SOP Guidance	Use Case Only
SR1.5	INSTALL AND MAINTAIN DEVICES		N/A	N/A
SR1.5.2	PUT EQUIPMENT/ DEVICES ON-LINE		N/A	N/A
SR1.5.2.1	The system shall allow the user with appropriate rights to select (or modify) the equipment device parameters.	On/Off Devices	N/A	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.1	The system shall allow a suitably privileged user to specify the necessary configuration information to make a device usable.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.2	The system shall allow a suitably privileged user to change the name of a selected device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.3	The system shall allow a suitably privileged user to modify the configuration information for a device.	On/Off Devices	Edit On/Off Device	AddOnOffDevice-Submit Form SD
SR1.5.2.1.5	The system shall allow a suitably privileged user to add a new device which communicates via an implemented protocol.		N/A (General)	N/A (General)
SR1.5.2.1.5.13	The system shall support On/Off device communications.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.5.13.1	The system shall support On/Off device communications via a TCP/IP communications medium.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25	The system shall support setting configuration parameters for On/Off devices. (An On/Off device is a device that can simply be turned on or off. These devices are operated using an electronic relay, and therefore can be any type of device that can be operated using such a relay. Some examples are a fog horn or a flashing "congestion ahead" sign.)	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.1	Add / Copy On/Off Device	On/Off Devices	N/A	N/A
SR1.5.2.1.25.1.1	The system shall allow a user with the Manage On/Off Devices right for at least one organization to add an On/Off device.	On/Off Devices	Add On/Off Device	AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.25.1.2	The system shall allow the user to specify the configuration parameters of the new On/Off device, as defined by the Specify On/Off Device Configuration requirements in SR1.5.2.1.25.4.	On/Off Devices	Add On/Off Device	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.1.3	The system shall allow the user to pre-populate the configuration settings for creating a new On/Off device using the settings of an existing On/Off device.	On/Off Devices	Copy On/Off Device	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.2	Configure On/Off Device	On/Off Devices	N/A	N/A
SR1.5.2.1.25.2.1	The system shall allow a user with the Manage On/Off Devices right to modify the configuration parameters for an existing On/Off device owned by an organization for which the user has the Manage On/Off Devices right.	On/Off Devices	Edit On/Off Device	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.2.2	The system shall allow the user to specify the configuration parameters for the existing On/Off device, as defined by the Specify On/Off Device Configuration requirements in SR1.5.2.1.25.4.	On/Off Devices	Edit On/Off Device	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.3	Delete On/Off Device	On/Off Devices	N/A	N/A
SR1.5.2.1.25.3.1	The system shall allow a user with the Manage On/Off Devices right to delete an On/Off device from the system if the device is owned by an organization for which the user has the Manage On/Off Devices right.	On/Off Devices	Remove On/Off Device	Use Case Only
SR1.5.2.1.25.3.2	The system shall prompt the user for confirmation before deleting an On/Off device.	On/Off Devices	Remove On/Off Device	Use Case Only
SR1.5.2.1.25.3.3	The system shall support the Delete On/Off device command only if the On/Off device is in offline mode.	On/Off Devices	Remove On/Off Device	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.25.4	Specify On/Off Device Configuration	On/Off Devices	N/A	N/A
SR1.5.2.1.25.4.1	The system shall require the user to specify the name of the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.1.1	The system shall prevent the use of a name that is already in use by another On/Off device that exists in the system.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.2	The system shall require the user to specify the device type for the On/Off device. See SR1.5.2.1.25.5 for device type configuration.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.3	The system shall require the user to specify the model of the electronic relay used to control the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.3.1	The system shall allow the user to specify that an HWG-ER02a relay is used to control the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.3.1.1	The system shall require the user to specify the relay number that is to be used on the HWG-ER02a. (The device has two relays, only one of which will be used).	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.3.2	The system shall allow the user to specify that an HWG-ER02b relay (with the ER02a firmware) is used to control the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.3.2.1	The system shall require the user to specify the relay number that is to be used on the HWG-ER02b. (The device has two relays, only one of which will be used).	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.3.3	The system shall require that an On/Off device be offline before the model can be changed for an On/Off device that already exists in the system.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.4	The system shall require the user to specify the owning organization of the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.25.4.5	The system shall require the user to specify the maintaining organization of the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.6	The system shall require the user to specify the location of the On/Off device as specified in SR1.1.8.1.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.7	The system shall require the user to specify the communications settings for the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.7.1	The system shall allow the user to specify that TCP/IP communications are to be used for the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.7.1.1	The system shall require the user to specify the IP address and port used to communicate with the On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.8	The system shall require the user to specify whether or not the On/Off device should be automatically polled.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.8.1	The system shall require the user to specify the polling interval for the On/Off device if polling is enabled.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.8.2	The minimum polling interval for an On/Off device shall be 1 minute.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.8.3	The maximum polling interval for an On/Off device shall be 24 hours.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.8.4	The resolution for the On/Off device polling interval shall be in units of 1 minute.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.8.5	The default polling interval when adding an On/Off device shall be 5 minutes. (The user can override this value)	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.9	The system shall allow a suitably privileged user to specify alert and notification settings for an On/Off device.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.25.4.9.1	The system shall support setting a responsible Center for an On/Off device which is to receive the Device Failure Alert when the device goes into hardware failure.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.9.2	The system shall support setting a responsible Center for an On/Off device which is to receive the Device Failure Alert when the device goes into communications failure.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.9.3	The system shall support setting one or more notification groups to receive On/Off device communication failure notification messages.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.9.4	The system shall support setting one or more notification groups to receive On/Off device hardware failure notification messages.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.4.9.5	The system shall support setting an operations center or notification group to "None" to disable the sending of alerts and/or notifications.	On/Off Devices	Specify On/Off Device Settings	AddOnOffDevice-Submit Form SD
SR1.5.2.1.25.5	Configure On/Off Device Types	On/Off Devices	N/A	N/A
SR1.5.2.1.25.5.1	The system shall allow a user with the Configure System right to view the On/Off device types defined in the system.	On/Off Devices	View On/Off Device Type List	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.2	The system shall allow a user with the Configure System right to add an On/Off device type to the system.	On/Off Devices	Add On/Off Device Type	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.2.1	The system shall allow the user to specify the configuration of the new device type as detailed in SR1.5.2.1.25.5.5 Specify On/Off Device Type Configuration.	On/Off Devices	Add On/Off Device Type	OnOffDeviceGUIBase CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.25.5.3	The system shall allow a user with the Configure System right to edit an On/Off device type that exists in the system.	On/Off Devices	Edit On/Off Device Type	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.3.1	The system shall allow the user to specify the configuration of the existing device type as detailed in SR1.5.2.1.25.5.5 Specify On/Off Device Type Configuration.	On/Off Devices	Edit On/Off Device Type	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.4	The system shall allow a user with the Configure System right to remove an On/Off device type that exists in the system.	On/Off Devices	Remove On/Off Device Type	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.4.1	The system shall prevent the removal of an On/Off Device Type if it is currently used by one or more On/Off devices.	On/Off Devices	Remove On/Off Device Type	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.4.2	The system shall prompt the user to confirm their intention to remove an On/Off device type from the system.	On/Off Devices	Remove On/Off Device Type	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5	Specify On/Off Device Type Configuration	On/Off Devices	N/A	N/A
SR1.5.2.1.25.5.5.1	The system shall require the user to specify the name of the On/Off device type.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5.1.1	The system shall prevent the user from using a name that already exists for another On/Off device type that exists in the system.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5.2	The system shall require the user to specify whether the system default icons will be used to represent On/Off devices of the type, or custom icons will be used.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5.2.1	The system shall require the user to specify the directory name where the custom icons exist if custom icons will be used.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.1.25.5.5.2.2	The system shall require the user to specify the icon file name prefix used by the custom icons if custom icons will be used. (This prefix is used by the system to formulate an icon name for an icon that represents the device's current mode and status. It is anticipated that if a custom icon set is ever to be made, someone would make a copy of the icons supplied by the system, change the prefix, and edit the images. All of that is outside of the system and not a requirement of the system.)	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5.2.3	The system shall require the user to specify the icon image width if custom icons will be used.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5.2.4	The system shall require the user to specify the icon image height if custom icons will be used.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.1.25.5.5.2.5	The system shall use a generic set of icons to represent an on/off device type that is set to use the system default icons.	On/Off Devices	Specify On/Off Device Type Settings	OnOffDeviceGUIBase CD
SR1.5.2.10	The system shall allow the user with appropriate rights to put equipment on-line in CHART.		N/A	N/A (Existing)
SR1.5.2.10.6	The system shall log a message for Place a shared resource online.	On/Off Devices	Put On/Off Device Online	OnOffDeviceGUIBase CD
SR1.5.2.10.7	The system shall not exceed 15 seconds to change the status of a device from offline to online.	On/Off Devices	Put On/Off Device Online	OnOffDeviceGUIBase CD
SR1.5.2.10.14	The system shall allow a user with the Manage Device Comms right for the organization that owns an On/Off device to put the On/Off Device online.	On/Off Devices	Put On/Off Device Online	OnOffDeviceGUIBase CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.10.14.1	When an On/Off device is placed online, the system shall begin processing of the device's arbitration queue.	On/Off Devices	Put On/Off Device Online	OnOffDeviceGUIBase CD OnOffDeviceControlModule CD OnOffDeviceImpl.evaluateQueue SD
SR1.5.2.10.14.1.1	When there are one or more active items in the arbitration queue of an On/Off device, the system shall activate (turn on) the On/Off device.	On/Off Devices	Process On/Off Device Arbitration Queue	OnOffDeviceGUIBase CD OnOffDeviceControlModule CD OnOffDeviceImpl.evaluateQueue SD
SR1.5.2.10.14.1.2	When there are not any active items in the arbitration queue of an On/Off device, the system shall deactivate (turn off) the On/Off device.	On/Off Devices	Process On/Off Device Arbitration Queue	OnOffDeviceGUIBase CD OnOffDeviceControlModule CD OnOffDeviceImpl.evaluateQueue SD
SR1.5.2.10.14.1.3	The order of items in the arbitration queue of an On/Off device shall have no bearing on whether or not the device is activated or deactivated.	On/Off Devices	Process On/Off Device Arbitration Queue	OnOffDeviceGUIBase CD OnOffDeviceControlModule CD OnOffDeviceImpl.evaluateQueue SD
SR1.5.2.10.14.1.4	An item on the arbitration queue of an On/Off device shall be considered active if the response plan item that owns it is in an executed state and the device is online.	On/Off Devices	Process On/Off Device Arbitration Queue	OnOffDeviceGUIBase CD OnOffDeviceControlModule CD OnOffDeviceImpl.evaluateQueue SD
SR1.5.2.10.14.2	The system shall begin polling of an On/Off device when placed online if automatic polling is enabled for the device. (See SR7.3.2.1.1.7)	On/Off Devices	Put On/Off Device Online	OnOffDeviceGUIBase CD
SR1.5.2.12	The system shall allow the suitably privileged to take a device offline		N/A	N/A
SR1.5.2.12.3	Placing a device offline shall disable polling of that device.	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD
SR1.5.2.12.4	The system shall log a message for Take shared resource offline.	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD
SR1.5.2.12.9	The system shall allow a user with the Manage Device Comms right for the organization that owns an On/Off device to take the On/Off Device offline.	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD
SR1.5.2.12.9.1	The system shall stop arbitration queue processing for the device when an On/Off device is taken offline.	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.2.12.9.2	The system shall attempt to deactivate (turn off) an On/Off device when an On/Off device is taken offline (even if the system believes the device is already deactivated).	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD
SR1.5.2.12.9.2.1	The system shall allow the On/Off device to transition to offline mode even if the attempt to deactivate (turn off) the device fails.	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD
SR1.5.2.12.9.3	The system shall cease automatic polling of an On/Off device when the device is taken offline.	On/Off Devices	Take On/Off Device Offline	OnOffDeviceGUIBase CD
SR1.5.3	PERFORM ROUTINE MAINTENANCE. The system shall allow the user with appropriate rights to view the device status, and know why it's not on-line (including the key trouble ticket information) and know the problem is being addressed. The system shall also allow the user to take the device offline of maintenance or other adjustments including resetting the controller. Suggestion/example to be validated: e.g., integrate device maintenance web pages with CHART.		N/A	N/A (Heading)
SR1.5.3.1	The system shall allow a suitably privileged user to place a device in maintenance mode.		N/A	N/A (Existing)
SR1.5.3.1.8	The system shall allow a user with the Manage Device Comms right for the organization that owns an On/Off device to set the On/Off Device to maintenance mode.	On/Off Devices	Put On/Off Device Into Maintenance Mode	OnOffDeviceGUIBase CD
SR1.5.3.1.8.1	The system shall stop arbitration queue processing for the device when an On/Off device is set to maintenance mode.	On/Off Devices	Put On/Off Device Into Maintenance Mode	OnOffDeviceGUIBase CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.3.1.8.2	The system shall cease automatic polling of an On/Off device when the device is set to maintenance mode.	On/Off Devices	Put On/Off Device Into Maintenance Mode	OnOffDeviceGUIBase CD
SR1.5.3.1.8.3	The system shall attempt to deactivate (turn off) an On/Off device when an On/Off device is set to maintenance mode (even if the system believes the device is already deactivated).	On/Off Devices	Put On/Off Device Into Maintenance Mode	OnOffDeviceGUIBase CD
SR1.5.3.1.8.3.1	The system shall allow the On/Off device to transition to maintenance mode even if the attempt to deactivate (turn off) the device fails.	On/Off Devices	Put On/Off Device Into Maintenance Mode	OnOffDeviceGUIBase CD
SR1.5.3.1.8.4	The system shall allow a user with the Maintain On/Off Device right for the organization that owns an On/Off device to activate (turn on) the On/Off Device when in maintenance mode.	On/Off Devices	Send On/Off Device Maintenance Mode Command	SetDeviceState SD
SR1.5.3.1.8.5	The system shall allow a user with the Maintain On/Off Device right for the organization that owns an On/Off device to deactivate (turn off) the On/Off Device when in maintenance mode.	On/Off Devices	Send On/Off Device Maintenance Mode Command	SetDeviceState SD
SR1.5.4	RESPOND TO EQUIPMENT/ DEVICE OUTAGE. The system shall allow users with appropriate rights to notify maintenance personnel of an equipment outage that they have detected (or has been brought to their attention).		N/A	N/A (Heading)
SR1.5.4.7	The system shall generate a Device Failure Alert for all DMSs, TSSs, HARs, SHAZAMs, and On/Off devices capable of reporting that they are experiencing a hardware failure. [CHANGED IN R14]	On/Off Devices	Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.4.7.1	A device service shall send a Device Failure Alert when the device transitions into Hardware or Communications Failure. [CHANGED IN R14]	On/Off Devices	Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD
SR1.5.4.7.2	Device Failure Alerts shall be sent to the responsible Center as defined in the configuration of the failed device.	On/Off Devices	Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD
SR1.5.4.7.3	Device Failure Alerts shall be presented to the operator with a reference to the failed device.	On/Off Devices	Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD
SR1.5.4.7.4	Device Failure Alerts shall be issued only if no Device Failure Alert exists for that device (preventing many alerts when a device transitions in and out of the hardware or communication failure state). [CHANGED IN R14]	On/Off Devices	Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD
SR1.5.4.9	The system shall support automatic generation of a Device Failure Notification for all DMS, HAR, SHAZAM, and On/Off devices for which the system is capable of detecting a failure. [CHANGED IN R14]	On/Off Devices	N/A	N/A (General)
SR1.5.4.9.2	If configured to do so, the system shall send a notification to the communication failure notification group(s) configured for the device (if any) when a DMS, HAR, SHAZAM or On/Off device transitions from a communication failed status to a status of OK. [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.4.9.3	The system shall send a notification to the communication failure notification group configured for the device (if any) when a DMS, HAR, SHAZAM, or On/Off device transitions from a communication failed status to a status of hardware failed if the communication failure notification group configured for the device is different than the hardware failure notification group configured for the device. (This prevents duplicate notifications; if the groups are different, that means when the device transitions to hardware failed it is no longer the communication failure group's responsibility. If the groups are the same, the group will receive the hardware failure notification due to requirement SR1.5.4.9.4.) [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD
SR1.5.4.9.5	If configured to do so, the system shall send a notification to the hardware failure notification group(s) configured for the device (if any) when a DMS, HAR, SHAZAM, or On/Off device transitions from a hardware failed status to a status of OK. [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.4.9.6	The system shall send a notification to the hardware failure notification group(s) configured for the device (if any) when a DMS, HAR, SHAZAM, or On/Off device transitions from a hardware failed status to a status of communication failed if the hardware failure notification group configured for the device is different than the communication failure notification group configured for the device. (This prevents duplicate notifications; if the groups are different, then when the device transitions to communication failed it is no longer the recipient's responsibility. If the groups are the same, the recipients will receive the communication failure notification due to preceding requirements.) [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD
SR1.5.4.9.7	If configured to do so, the system shall issue a notification to the hardware failure notification group(s) configured for the device (if any) when a DMS, HAR, SHAZAM, or On/Off device transitions to the hardware failed status and remains there for more than a configurable number of communication attempts to the device. (This allows configuration such that a notification is sent when a hardware failure is first detected) [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.4.9.8	If configured to do so, the system shall issue a notification to the communication failure notification group(s) configured for the device (if any) when a DMS, HAR, SHAZAM, or On/Off device transitions to the communication failed state and remains there for more than a configurable number of communication attempts to the device. (This allows configuration such that a notification is sent when a communication failure is first detected) [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD
SR1.5.4.9.9	If configured to do so, the system shall issue a notification when a DMS, HAR, SHAZAM, or On/Off device transitions to the OK state and remains there for more than a configurable communication attempts to the device. [CHANGED IN R14]	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD
SR1.5.5	VIEW DEVICE LISTS		N/A	N/A (Heading)
SR1.5.5.7	The system shall allow the user to choose the columns to display in a device list.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.7.1	The column containing the device name shall always be displayed.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.7.2	The system shall store the user's selection for columns to be displayed and initially show only the selected columns the next time the list is shown.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.7.2.2	The user's column display selection shall be per device list. (The settings for the DMS list can be different than those for the HAR list, etc.)	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.10	The system shall indicate the current filtering criteria.	On/Off Devices	Filter On/Off Device List	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.5.11	The system shall allow multiple filter criteria to be combined to perform an "and" operation.	On/Off Devices	Filter On/Off Device List	Use Case Only
SR1.5.5.12	The system shall allow the user to view the Default Device List from a Device List that is filtered. [CHANGED IN R14]	On/Off Devices	Filter On/Off Device List	Use Case Only
SR1.5.5.13	The system shall allow the user to view all devices from any device list that is filtered.	On/Off Devices	Filter On/Off Device List	Use Case Only
SR1.5.5.14	The system shall allow the user to view the list of On/Off devices that exist in the system.	On/Off Devices	View On/Off Device List	Use Case Only
SR1.5.5.14.1	The system shall allow the user to view the following detailed information for each On/Off device that exists in the system: Description, Location, Device Type, Model, Device State (commanded), Device State (actual), Status, Last Update, Route, Direction, County, Connection Site, Owning Organization, Maintaining Organization, State Mile Post, and Show on Map Indicator.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.14.1.1	The Device State (commanded) shown in the On/Off device list shall be the state of the device (on or off) as last commanded by the system.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.14.1.2	The Device State (actual) shown in the On/Off device list shall be the state of the device (on or off) as last queried from the device.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.14.1.3	The following details in the On/Off device list shall be shown by default: Description, Location, Device State (actual), Status, Last Update, Route, Direction, County.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.5.14.1.4	The following details in the On/Off device list shall be hidden by default: Device Type, Model, Device State (commanded), Connection Site, Owning Organization, Maintaining Organization, State Mile Post, and Show on Map Indicator.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.14.1.5	The system shall allow the user to set the visible columns according to the requirements specified in SR1.5.5.7 and its sub-requirements.	On/Off Devices	Manage On/Off Device List Columns	Use Case Only
SR1.5.5.14.2	The system shall allow the user to sort the On/Off device list by any of the following: Description, Location, Device Type, Model, Device State (commanded), Device State (actual), Status, Last Update, Route, Direction, County, Connection Site, Owning Organization, Maintaining Organization, State Mile Post, and Show on Map Indicator.	On/Off Devices	Sort On/Off Device List	Use Case Only
SR1.5.5.14.3	The system shall allow the user to filter the On/Off device list by any of the following: Device Type, Model, Device State (commanded), Device State (actual), Status, Route, Direction, County, Connection Site, Owning Organization, Maintaining Organization, and Show on Map Indicator.	On/Off Devices	Filter On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.3.1	Requirements SR1.5.5.10, SR1.5.5.11, SR1.5.5.12, and SR1.5.5.13 regarding filtering of device lists shall apply to the On/Off device list.	On/Off Devices	Filter On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.4	The system shall allow a user to view the Default On/Off device list.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.5.14.4.1	The Default On/Off device list shall display only On/Off devices that meet the device filter criteria for the user's operations center.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.4.1.1	The operations center device filter shall include the On/Off devices contained in the area(s) of responsibility associated with the user's operations center (if any areas of responsibility are associated with the user's operations center).	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.4.1.2	The operations center device filter shall include the On/Off devices contained in the user's operations center's folders (if there are any On/Off devices in those folders).	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.4.1.3	The operations center device filter shall include all On/Off devices if no areas of responsibility are associated with the user's operations center and no On/Off devices are contained in the user's operations center's folders.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.4.1.4	The user shall be able to remove the operations center device filter in order to view all On/Off devices in the system.	On/Off Devices	Filter On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.5	The system shall allow the user to display a list of online On/Off devices.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.6	The system shall allow the user to display a list of online On/Off devices that have a device state (actual) of "On".	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.7	The system shall allow the user to display a list of offline On/Off devices.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.8	The system shall allow the user to display a list of On/Off devices in maintenance mode.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.5.14.9	The system shall allow the user to display a list of On/Off devices with a communications failure.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.5.14.10	The system shall allow the user to display a list of On/Off devices with a status of comm marginal.	On/Off Devices	View On/Off Device List	OnOffDeviceDynList CD
SR1.5.6	The system shall provide a device maintenance portal; a view of the system tailored to device maintenance personnel.		N/A	N/A
SR1.5.6.7	After login to the device maintenance portal, the system shall show a home page tailored to device maintenance activities.		N/A	N/A
SR1.5.6.7.1	The device maintenance portal home page shall allow the user to search for a device.		Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.1	The search feature on the device maintenance portal home page shall search only DMSs, HARs, SHAZAMs, Detectors, Cameras, and On/Off devices. [CHANGED IN R14]	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.2	The search feature on the device maintenance portal home page shall search data fields of each device to determine if a device matches the search string.		Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.2.7	The search fields for On/Off devices shall include device name, location description, and controlling op center name.	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.3	The search feature on the device maintenance portal home page shall use a case insensitive search.	On/Off Devices	Search Maint Portal for Device	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.6.7.1.4	The results from the search feature on the device maintenance portal home page shall show the devices that matched the search, organized by device type, with limited supporting data as specified in the requirements below.	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.4.1	The device maintenance portal search results shall show an icon for each device that indicates its type and status.	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.4.2	The device maintenance portal search results shall show the name of each matching device.	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.4.3	The device maintenance portal search results shall show the location description for each matching device (if any).	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.1.4.4	The device maintenance portal search results shall provide access to the details page for each device shown.	On/Off Devices	Search Maint Portal for Device	Use Case Only
SR1.5.6.7.2	The device maintenance portal home page shall allow the user to view a list of devices.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.1	The device maintenance portal shall allow the following types of devices to be listed: DMSs, HARs, SHAZAMs, Detectors, Cameras, On/Off devices. [CHANGED IN R14]	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.2	The device maintenance portal shall allow device lists to be pre-filtered when they are requested to be displayed.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.2.2	The system shall allow the lists of devices shown within the device maintenance portal to be pre-filtered based on device mode and status.	On/Off Devices	View Maint Portal Device List	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.6.7.2.2.4	The system shall allow the user to bypass any pre-filtering of a device list shown within the device maintenance portal to view all devices of the selected type.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.3	The system shall show the number of devices that appear in a device list shown within the device maintenance portal.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.4	If a device list is filtered, the system shall show the number of devices that would appear in the list if the filtering is removed.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.5	If a device list is filtered, the system shall show the filter(s) that are being used.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.6	If a device list is filtered, the system shall allow the user to remove all filters that are being used.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.7	Device lists shown within the device maintenance portal shall contain an icon for each device which identifies its type and current status.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.8	Device lists shown within the device maintenance portal shall show the name of each device.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.9	Device lists shown within the device maintenance portal shall show the location description (if any) for each device.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.11	Device lists shown within the device maintenance portal shall allow the user to view a details page for each device.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.12	Device lists shown within the device maintenance portal shall by default be filtered using the filter criteria for the user's operations center.	On/Off Devices	View Maint Portal Device List	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.6.7.2.12.1	The operations center device filter shall include the devices contained in the area(s) of responsibility associated with the user's operations center (if any areas of responsibility are associated with the user's operations center).	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.12.2	The operations center device filter shall include the devices contained in the user's operations center's folders (if there are any devices in those folders).	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.7.2.12.3	The operations center device filter shall include all devices if no areas of responsibility are associated with the user's operations center and no devices are contained in the user's operations center's folders.	On/Off Devices	View Maint Portal Device List	Use Case Only
SR1.5.6.8	The device maintenance portal shall allow the user to view a details page for each device of the following types: DMSs, HARs, SHAZAMs, Detectors, Cameras, On/Off devices. [CHANGED IN R14]	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.8.1	The content of a device details page within the device maintenance portal shall be left justified.	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.8.2	The details page for a device shown within the device maintenance portal shall show the name and location of the device at the top of the page, below the page header.	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.8.3	The details page for a device shown within the device maintenance portal shall provide access to any actions that may be performed on the device by the user at the top of the page, below the device name/location.	On/Off Devices	View Maint Portal Device Details	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.6.8.3.1	The actions that may be accessed by the user for a device within the device maintenance portal shall match the actions available to the same user within the standard CHART GUI, except for the deviations listed in the requirements below. (The actions available are based on the device status and the user's rights)	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.8.3.6	The actions that may be accessed by the user for a device within the device maintenance portal shall exclude the ability to copy the device.	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.8.3.7	The actions that may be accessed by the user for a device within the device maintenance portal shall exclude the ability to remove the device.	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.8.4	The details page data for a device shown within the device maintenance portal shall match the details page data shown within the standard CHART GUI for the same device accessed by the same user, except as specified in the sub-requirements below.	On/Off Devices	View Maint Portal Device Details	Use Case Only
SR1.5.6.9	The device maintenance portal shall allow the user to return to the device maintenance portal home page from any other page that is displayed within the portal.	On/Off Devices	View Maint Portal Home Page	Use Case Only
SR1.5.6.10	The device maintenance portal shall allow the user to attempt to logout from any page that is displayed within the portal.	On/Off Devices	Log Out of Maint Portal	Use Case Only
SR1.5.6.10.1	When the user requests to log out from the device maintenance portal, the system shall warn the user of any devices that are in maintenance mode and controlled by the user's center.	On/Off Devices	Log Out of Maint Portal	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.7	VIEW DEVICE DETAILS		N/A (Heading)	N/A
SR1.5.7.8	View Device Location		N/A	N/A
SR1.5.7.8.1	The location information displayed for a device shall include a location description, latitude/longitude, state, county or region, route type, route number (or name, and flag to indicate which to use), direction (including bidirectional directions), proximity to intersecting feature (if any), and intersecting feature information (if any).	On/Off Devices	View Device Location	Use Case Only
SR1.5.7.8.1.1	When displaying location information for a device, intersecting feature information shall include intersecting route type, route number (or name, and flag to indicate which to use), state or county milepost, or available exit information.	On/Off Devices	View Device Location	Use Case Only
SR1.5.7.9	View On/Off Device Details	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.1	The system shall show the name/description of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.2	The system shall show the location description of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.3	The system shall show a list of all traffic events currently using the On/Off device as part of their response plan, if any.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.3.1	The system shall indicate whether a traffic event is active on the On/Off device's arbitration queue.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.4	The system shall show the name of the controlling operations center if the On/Off device is in maintenance mode and has a controlling operations center.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.5	The system shall show the operational status of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.7.9.5.1	Operational status shall indicate whether the On/Off device is online, in maintenance mode, or offline.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.5.2	Operational status shall indicate if the On/Off device has a communications failure.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.5.3	Operational status shall indicate whether the On/Off device is hardware failed.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.6	The system shall show the date/time of the last change in status of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.7	The system shall show the date/time the system last contacted the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.8	The system shall show the last commanded state of the On/Off device (on or off).	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.9	The system shall show the last actual state of the On/Off device (on or off) as queried from the device at the time the device was last contacted.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10	The system shall allow a user with the View On/Off Device Configuration or Configure On/Off Device right for the device's owning organization to view the configuration settings for an On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.1	The system shall display the model of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.2	The system shall display the device type of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.3	The system shall display the relay number used to control the device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.4	The system shall display the owning organization of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.5	The system shall display the maintaining organization of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.7.9.10.6	The system shall display the network connection site of the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.7	The system shall show the location details of the On/Off device as specified in SR1.5.7.8.1 and its subrequirements.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.8	The system shall allow the user viewing the details screen for an On/Off device with a known geographic location to show the location of the device on the home page map.	On/Off Devices	View On/Off Device Location on Map	Use Case Only
SR1.5.7.9.10.9	The system shall display the IP Address and Port used to communicate with the On/Off device if the user has the View Sensitive On/Off Device Config right for the device's owning organization.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.10	The system shall indicate if polling is enabled for the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.11	The system shall display the polling rate if polling is enabled for the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.12	The system shall show the alert and notification settings for the On/Off device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.12.1	The system shall show the operations center that is to receive communication failure alerts for the On/Off device, if any.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.12.2	The system shall show the operations center that is to receive hardware failure alerts for the On/Off device, if any.	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.7.9.10.12.3	The system shall show the notification group(s) that will receive communication failure notifications for the On/Off device (if any).	On/Off Devices	View On/Off Device Details	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.7.9.10.12.4	The system shall show the notification group(s) that will receive hardware failure notifications for the On/Off device (if any).	On/Off Devices	View On/Off Device Details	Use Case Only
SR1.5.9	View Devices On Map		N/A	N/A (Heading)
SR1.5.9.6	The system shall allow the user to view On/Off devices on the map.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.1	The system shall display an On/Off device on the map in a layer that contains only On/Off devices.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.2	The system shall indicate on the map whether an On/Off device is currently activated (turned on) by displaying a different icon for the On/Off device.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3	The system shall allow the user to click on an On/Off device on the map to display summary information in a map popup.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.1	The system shall display the name of the On/Off device in the On/Off device map popup.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.2	The system shall display the type of the On/Off device in the On/Off device map popup.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.3	The system shall allow the user to click on a link in the On/Off device map popup to invoke the On/Off details page in the working window.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.4	The system shall display a list of open traffic events that currently have the On/Off device in their response plans, in the On/Off device popup.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.4.1	The system shall indicate whether a traffic event is active on the On/Off device's arbitration queue, in the On/Off device map popup.	On/Off Devices	View On/Off Devices on Map	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.5.9.6.3.4.2	The system shall allow the user to click on a traffic event listed in the On/Off device map popup to invoke the Traffic Event Details page in the working window.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.4.3	The system shall allow a user with the Respond to Traffic Event right to execute an On/Off device response plan item from the On/Off device map popup if the response plan item is not currently executed.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.4.4	The system shall allow a user with the Respond to Traffic Event right to revoke execution of an On/Off device response plan item from the On/Off device map popup if the response plan item is currently executed.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.3.5	The system shall indicate whether the On/Off device is activated (turned on) in the On/Off device map popup.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.5.9.6.4	The system shall display the On/Off device type and name when the mouse cursor hovers over an On/Off device icon in the map.	On/Off Devices	View On/Off Devices on Map	Use Case Only
SR1.6	MAINTAIN CONTACTS AND NOTIFICATION SYSTEM	Contact Mgmt	N/A	N/A (Heading)
SR1.6.1	MAINTAIN CONTACTS	Contact Mgmt	N/A	N/A (Heading)
SR1.6.1.1	The system shall allow a user with the Configure Contacts right to add a Contact, specifying information as defined in the Specify Contact Information requirements (SR1.6.1.8).	Contact Mgmt	Add Contact	ContactManagement CD ContactManagerImpl.addContact SD ContactReqHdlr.getAddEditContactForm SD ContactReqHdlr.addEditContact SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.1.4	The system shall display the Add User form with the username pre-populated after adding a contact with a specified ATMS username, if the person adding the contact has the Manage Users right and the ATMS username does not match a known user.	Contact Mgmt	Add Contact	ContactReqHdlr.addEditContact SD Prototype
SR1.6.1.2	The system shall allow a user with the Configure Contacts, Configure Contact Email, or Configure Notification Group And Contact Associations right to edit a Contact, as defined in the Specify Contact Information requirements (SR1.6.1.8). (Note that each of these rights allows a different subset of information to be edited).	Contact Mgmt	Edit Contact	ContactManagement CD ContactManagerImpl.setContactConfig SD ContactReqHdlr.getAddEditContactForm SD ContactReqHdlr.addEditContact SD
SR1.6.1.2.2	The system shall display the date/time the Contact was last updated.	Contact Mgmt	Edit Contact	ContactManagement CD
SR1.6.1.3	The system shall allow a user with the Configure Contacts right to remove a Contact from the system.	Contact Mgmt	Remove Contact	ContactManagement CD ContactManagerImpl.removeContact SD ContactReqHdlr.removeContact SD
SR1.6.1.3.1	The system shall prompt the user for confirmation before removing the contact.	Contact Mgmt	Remove Contact	Prototype only
SR1.6.1.3.2	The system shall prompt a user with the Manage Users right as to whether to delete the ATMS user account matching the ATMS username of the contact when removing a contact with an ATMS username, if the matching user account exists.	Contact Mgmt	Remove Contact	Prototype only.
SR1.6.1.3.2.1	The system shall delete the user account matching the contact's ATMS username if the user confirmed that it should be deleted.	Contact Mgmt	Remove Contact	ContactReqHdlr.removeContact SD
SR1.6.1.6	The system shall allow a user with the View Contact Info right to view the list of Contacts.	Contact Mgmt	View Contact List	ContactManagement CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.6.1	The system shall allow a user to search the Contact List to display contacts containing search text in any of the following fields: Last Name, First Name, Agency, Email Address, ATMS Username, or Call Sign.	Contact Mgmt	Search Contact List	Prototype only
SR1.6.1.6.1.1	The system shall reapply the search text after a sort or filter operation is performed.	Contact Mgmt	Search Contact List	ContactMgmtServletClasses CD Prototype
SR1.6.1.6.1.2	The system shall allow the user to clear the search text while viewing the Contact List.	Contact Mgmt	Search Contact List	Prototype only
SR1.6.1.6.14	The system shall allow a user viewing the Contact List to view the following information for each contact: Last Name, First Name, Agency, ATMS Username, Op Centers, Phone Numbers, Do Not Contact Schedule, Email Address, Call Sign, Title, Office / Shop, Notify Via Email flag, Notification Groups, Call Lists, Additional AORs, Memo, Business Address, Last Updated Time.	Contact Mgmt	View Contact List	ContactList CD, Prototype
SR1.6.1.6.14.1	The system shall show the following information in the Contact List by default: Last Name, First Name, Agency, ATMS Username, Op Centers, Phone Numbers, Do Not Contact Schedule, Email Address, Call Sign, Title, and Office / Shop.	Contact Mgmt	View Contact List	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.6.14.2	The system shall allow the user to show or hide the following information in the Contact List: ATMS Username, Op Centers, Phone Numbers, Do Not Contact Schedule, Email Address, Call Sign, Title, Office / Shop, Notify Via Email flag, Notification Groups, Call Lists, Additional AORs, Memo, Business Address, and Last Updated Time.	Contact Mgmt	View Contact List	ContactMgmtServletClasses CD Prototype
SR1.6.1.6.14.2.1	The system shall allow the user to view the default set of columns for the Contact List, if the current set of columns displayed differs from the default.	Contact Mgmt	View Contact List	Prototype only
SR1.6.1.6.14.2.2	The system shall remember the visibility of the Contact List columns the next time the user views the list.	Contact Mgmt	View Contact List	Prototype only
SR1.6.1.6.14.3	The system shall indicate if a contact's ATMS username does not match any known ATMS user in the system, if displaying the ATMS Username in the Contact List.	Contact Mgmt	View Contact List	ContactList CD Prototype
SR1.6.1.6.14.4	The system shall indicate if a contact's Do Not Contact schedule includes the current time, if displaying Phone Numbers in the Contact List.	Contact Mgmt	View Contact List	Prototype only
SR1.6.1.6.15	The system shall allow a user viewing the Contact List to sort the list by Last Name, First Name, Agency, ATMS Username, Op Centers, Email Address, Office / Shop, Notify Via Email flag, Notification Groups, Call Lists, Additional AORs, or Last Updated Time.	Contact Mgmt	Sort Contact List	Prototype ContactMgmtServletClasses CD
SR1.6.1.6.15.1	The system shall sort the Contact List on the Last Name by default.	Contact Mgmt	Sort Contact List	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.6.16	The system shall allow a user viewing the Contact List to filter the list by Agency, ATMS Username existence, Op Centers, Office / Shop, Notify Via Email flag, Notification Groups, Call Lists, Additional AORs, and Last Updated Time.	Contact Mgmt	Filter Contact List	ContactMgmtServletClasses CD ContactList CD Prototype
SR1.6.1.6.16.1	The system shall allow the user to clear the filters in the Contact List.	Contact Mgmt	Filter Contact List	Prototype only
SR1.6.1.6.16.2	The system shall display a description of the currently active filters in the Contact List, if any filters are active.	Contact Mgmt	Filter Contact List	Prototype only
SR1.6.1.6.16.3	The system shall display the number of filtered items shown in the Contact List (if applicable), and the total number of items available to be shown.	Contact Mgmt	Filter Contact List	Prototype only
SR1.6.1.6.16.4	The system shall initially filter the Contact List to show only contacts associated with the user's operations center, if some contacts are associated with the user's operations center.	Contact Mgmt	Filter Contact List	Prototype only
SR1.6.1.6.16.4.1	The system shall initially show all contacts in the Contact List if no contacts are associated with the user's operations center.	Contact Mgmt	Filter Contact List	Prototype only
SR1.6.1.6.17	The system shall allow a user viewing the Contact List to export the list as a PDF file.	Contact Mgmt	Export Contact List as PDF File	DynListStreaming CD DynListStreamReqHdlr SD
SR1.6.1.6.17.1	The system shall apply the current filter and sort criteria when generating the Contact List PDF file.	Contact Mgmt	Export Contact List as PDF File	DynListStreaming CD DynListStreamReqHdlr SD
SR1.6.1.6.18	The system shall allow a user viewing the Contact List to export the list as a CSV file.	Contact Mgmt	Export Contact List as CSV File	DynListStreaming CD DynListStreamReqHdlr SD
SR1.6.1.6.18.1	The system shall apply the current filter and sort criteria when generating the Contact List CSV file.	Contact Mgmt	Export Contact List as CSV File	DynListStreaming CD DynListStreamReqHdlr SD
SR1.6.1.6.19	The system shall allow a user viewing the Contact List to print the list.	Contact Mgmt	Print Contact List	DynListStreaming CD DynListStreamReqHdlr SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.6.19.1	The system shall apply the current sort and filtering criteria when the user prints the Contact List.	Contact Mgmt	Print Contact List	DynListStreaming CD DynListStreamReqHdlr SD
SR1.6.1.8	Specify Contact Information	Contact Mgmt	Specify Contact Information	N/A (Heading)
SR1.6.1.8.1	The system shall allow a user with the Configure Contacts right to specify the Agency Name for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.1.1	The system shall allow a user specifying the Agency Name to select one of the agency names already in use by other contacts in the system.	Contact Mgmt	Specify Contact Information	ContactReqHdlr.getAddEditContactForm SD Prototype
SR1.6.1.8.2	The system shall allow a user with the Configure Contacts right to specify the First and Last Name for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.3	The system shall require the First and Last Name and/or the Agency Name to be specified for a contact.	Contact Mgmt	Specify Contact Information	ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.4	The system shall allow a user with the Configure Contacts right to specify the Office/Shop for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.4.1	The system shall allow a user specifying the Office/Shop to select one of the office / shop values already in use by other contacts in the system.	Contact Mgmt	Specify Contact Information	ContactReqHdlr.getAddEditContactForm SD Prototype
SR1.6.1.8.5	The system shall allow a user with the Configure Contacts right to specify the ATMS Username for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.5.1	The system shall allow a user specifying the ATMS Username to select a username of an existing user in the system.	Contact Mgmt	Specify Contact Information	ContactReqHdlr.getAddEditContactForm SD Prototype
SR1.6.1.8.6	The system shall allow a user with the Configure Contacts right to specify the Radio Call Sign for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.7	The system shall allow a user with the Configure Contacts right to specify the Business Address for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.8.8	The system shall allow a user with the Configure Contacts right to specify a Memo for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.9	The system shall allow a user with the Configure Contacts right to specify the Title for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.10	The system shall allow a user with the Configure Contacts right to specify the Phone Numbers for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.10.1	The system shall allow a user specifying a phone number to choose the type of phone number: Work, Home, Mobile, Pager, Fax, or Other.	Contact Mgmt	Specify Contact Information	ContactManagement CD Prototype
SR1.6.1.8.10.2	The system shall allow more than one phone number of the same type to be specified.	Contact Mgmt	Specify Contact Information	ContactManagement CD Prototype
SR1.6.1.8.10.3	The system shall allow a user with the Configure Contacts right to specify the priority order of the phone numbers for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD Prototype
SR1.6.1.8.11	The system shall allow a user with the Configure Contacts or Configure Contact Email right to specify the Notify via Email flag for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.12	The system shall allow a user with the Configure Contacts or Configure Contact Email right to specify the Email Address for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.12.1	The system shall require the Email Address to be specified if the Notify via Email flag is set to true.	Contact Mgmt	Specify Contact Information	ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.13	The system shall allow a user with the Configure Contacts or Configure Notification Group And Contact Associations right to specify the notification groups containing the contact.	Contact Mgmt	Specify Contact Information	ContactReqHdlr.addEditContact SD Prototype

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.8.14	The system shall allow a user with the Configure Contacts right to specify the Operations Centers for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.8.15	The system shall allow a user with the Configure Contacts right to specify the Additional AORs for a contact.	Contact Mgmt	Specify Contact Information	ContactManagement CD ContactManagerImpl.addContact SD ContactManagerImpl.setContactConfig SD
SR1.6.1.9	The system shall allow a user with the Edit Do Not Contact Schedule right to edit a user's Do Not Contact Schedule.	Contact Mgmt	Edit Do Not Contact Schedule	ConditionSchedule CD ContactManagement CD ContactManagerImpl.setContactSchedule SD DoNotContactScheduleReqHdlr.setDoNotContactSchedule SD
SR1.6.1.9.1	The system shall allow a user editing a contact's Do Not Contact Schedule to view the schedule entries.	Contact Mgmt	Edit Do Not Contact Schedule	DoNotContactScheduleReqHdlr.getDoNotContactScheduleForm SD Prototype
SR1.6.1.9.2	The system shall allow a user editing a contact's Do Not Contact Schedule to add a schedule entry, specifying information as defined in the Specify Do Not Contact Schedule Entry requirements (SR 1.6.1.9.4.*).	Contact Mgmt	Add Do Not Contact Schedule Entry	DoNotContactScheduleReqHdlr.addEditDoNotContactScheduleEntry SD DoNotContactScheduleReqHdlr.setDoNotContactSchedule SD
SR1.6.1.9.3	The system shall allow a user editing a contact's Do Not Contact Schedule to edit a schedule entry, specifying information as defined in the Specify Do Not Contact Schedule Entry requirements (SR 1.6.1.9.4.*).	Contact Mgmt	Edit Do Not Contact Schedule Entry	DoNotContactScheduleReqHdlr.addEditDoNotContactScheduleEntry SD DoNotContactScheduleReqHdlr.setDoNotContactSchedule SD
SR1.6.1.9.4	Specify Do Not Contact Schedule Entry	Contact Mgmt	Specify Do Not Contact Schedule Entry	N/A (Heading)
SR1.6.1.9.4.2	The system shall require the user to select a date range type of Unending, Beginning, Through, or Beginning / Through for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	ConditionSchedule CD
SR1.6.1.9.4.2.1	The system shall default to a date range type of Unending for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.9.4.2.2	The system shall require the user to specify a begin date if the date range type is Beginning or Beginning / Through for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype ConditionSchedule CD
SR1.6.1.9.4.2.3	The system shall require the user to specify an end date if the date range type is Through or Beginning / Through for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype ConditionSchedule CD
SR1.6.1.9.4.3	The system shall require the user to specify at least one day of week for a Do Not Contact schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype only
SR1.6.1.9.4.3.1	The system shall default to all days of the week for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype only
SR1.6.1.9.4.4	The system shall require the user to specify a time-of-day range type of All Day, After, Until, or After / Until for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	ConditionSchedule CD
SR1.6.1.9.4.4.1	The system shall default to a time-of-day range of All Day for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype only
SR1.6.1.9.4.4.2	The system shall require the user to specify a start time of day if the time-of-day range type is After or After / Until for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype ConditionSchedule CD
SR1.6.1.9.4.4.3	The system shall require the user to specify an end time of day if the time-of-day range type is Until or After / Until for a Do Not Contact Schedule entry.	Contact Mgmt	Specify Do Not Contact Schedule Entry	Prototype ConditionSchedule CD
SR1.6.1.9.5	The system shall allow a user editing a contact's Do Not Contact Schedule to remove an entry from the schedule.	Contact Mgmt	Remove Do Not Contact Schedule Entry	DoNotContactScheduleReqHdlr.removeDoNotContactSchedule SD DoNotContactScheduleReqHdlr.setDoNotContactSchedule SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.1.9.5.1	The system shall automatically remove a Do Not Contact Schedule Entry if the date range type is Through or Beginning / Through and the current date is past the end date by some grace period as specified via a server properties file setting.	Contact Mgmt	Remove Do Not Contact Schedule Entry	NotificationModule_ContactMgmt CD ContactScheduleCleanupTask.run SD
SR1.6.2	MAINTAIN NOTIFICATION GROUPS		N/A	N/A
SR1.6.2.1	The system shall allow a user with the Configure Notification Groups right to add a Notification Group.		Add Notification Group	NotificationManagement CD NotificationMgmtReqHdlr.getAddEditNotificationGroupForm SD
SR1.6.2.1.2	The system shall allow a user to specify the contacts that belong in the notification group.	Contact Mgmt	Add Notification Group	NotificationManagement CD NotificationMgmtReqHdlr.getAddEditNotificationGroupForm SD
SR1.6.2.1.2.1	The system shall allow the user to add a contact to a new notification group only if the contact has an email address specified and a Notify via Email flag set to true.	Contact Mgmt	Add Notification Group	NotificationMgmtReqHdlr.getAddEditNotificationGroupForm SD
SR1.6.2.2	The system shall allow a user with the Configure Notification Groups right or Configure Notification Group and Contact Associations right to edit a Notification Group, as specified in subrequirements.	Contact Mgmt	Edit Notification Group	NotificationManagement CD NotificationMgmtReqHdlr.getAddEditNotificationGroupForm SD
SR1.6.2.2.2	The system shall allow a user with the Configure Notification Groups right or the Configure Notification Group and Contact Associations right to configure the notification group's contacts.	Contact Mgmt	Edit Notification Group	NotificationManagement CD NotificationMgmtReqHdlr.getAddEditNotificationGroupForm SD
SR1.6.2.2.2.1	The system shall allow the user to add a contact to an existing notification group only if the contact has an email address specified and a Notify via Email flag set to true.	Contact Mgmt	Edit Notification Group	NotificationMgmtReqHdlr.getAddEditNotificationGroupForm SD
SR1.6.2.4	The system shall allow a user with the View Contact Info right to view the list of Notification Groups.	Contact Mgmt	View Notification Groups List	NotificationManagement CD NotificationServletClasses CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.2.4.2	The column listing for Notification Groups shall include Contacts included in the Notification Group.	Contact Mgmt	View Notification Groups List	Prototype only
SR1.6.4	MAINTAIN CALL LISTS (A "call list" is a prioritized list of Contacts associated with an object in the system to facilitate coordination with a representative contact. A call lists helps an operator find a contact with whom he/she can coordinate when using certain event resources or types as participants in a traffic event).	Contact Mgmt	N/A	N/A (Heading)
SR1.6.4.1	The system shall allow a user with the Manage Event Resources right to create a call list for an event resource.	Contact Mgmt	Create Call List for Event Resource	ContactManagement CD NotificationModule_ContactMgmt CD ContactManagerImpl.addCallList SD CallListReqHdlr.createEmptyCallList SD
SR1.6.4.2	The system shall allow a user with the Manage Event Resources right to create a call list for an event resource type.	Contact Mgmt	Create Call List for Event Resource Type	ContactManagement CD NotificationModule_ContactMgmt CD ContactManagerImpl.addCallList SD CallListReqHdlr.createEmptyCallList SD
SR1.6.4.3	The system shall allow a user with the Manage Event Resources right to remove a call list associated with an event resource.	Contact Mgmt	Remove Call List for Event Resource	ContactManagement CD NotificationModule_ContactMgmt CD ContactManagerImpl.removeCallList SD
SR1.6.4.4	The system shall allow a user with the Manage Event Resources right to remove a call list associated with an event resource type.	Contact Mgmt	Remove Call List for Event Resource Type	ContactManagement CD NotificationModule_ContactMgmt CD ContactManagerImpl.removeCallList SD
SR1.6.4.5	The system shall allow a user with the Edit Call Lists right to edit a call list.	Contact Mgmt	Edit Call List	ContactManagement CD NotificationModule_ContactMgmt CD ContactManagerImpl.setCallListConfig SD
SR1.6.4.5.1	The system shall display the name and agency of contacts in the call list, in priority order, when a user is viewing the form to edit a call list.	Contact Mgmt	Edit Call List	Prototype only
SR1.6.4.5.2	The system shall allow a user with the Configure Contacts right to edit a contact's information, when the user is viewing the form to edit a call list.	Contact Mgmt	Edit Call List	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.4.5.3	The system shall allow a user editing a call list to add a contact to the call list.	Contact Mgmt	Add Contact to Call List	CallListReqHdlr.addContactToCallList SD
SR1.6.4.5.4	The system shall allow a user editing a call list to remove a contact from the call list.	Contact Mgmt	Remove Contact from Call List	CallListReqHdlr.removeContactFromCallListEditorData SD CallListReqHdlr.setCallListConfig SD
SR1.6.4.5.5	The system shall allow a user editing a call list to move a contact up or down in priority relative to the other contacts in the list.	Contact Mgmt	Specify Call List Priority Order	CallListReqHdlr.moveContactInCallListEditorData SD CallListReqHdlr.setCallListConfig SD
SR1.6.4.6	The system shall allow a user with the View Contact Info right to view the list of call lists.	Contact Mgmt	View Call List List	ContactMgmtServletClasses CD OtherContactMgmtLists CD Prototype
SR1.6.4.6.1	The system shall display the following information for each call list in the list of call lists: Name (event resource or type name), Type (event resource type description), Category (event resource type category), and the Number of Contacts in the call list.	Contact Mgmt	View Call List List	OtherContactMgmtLists CD Prototype
SR1.6.4.6.2	The system shall allow the user to view the names and/or agencies of the contacts in an individual call list when viewing the list of call lists.	Contact Mgmt	View Call List List	Prototype only
SR1.6.4.6.3	The system shall allow a user viewing the list of call lists to sort the list by Name, Type, Category, or Number of Contacts.	Contact Mgmt	Sort Call List List	Prototype ContactMgmtServletClasses CD
SR1.6.4.6.4	The system shall allow a user viewing the list of call lists to filter the list by Type or Category.	Contact Mgmt	Filter Call List List	Prototype ContactMgmtServletClasses CD
SR1.6.4.6.4.1	The system shall allow a user viewing the list of call lists to clear the filters, if any filters are active.	Contact Mgmt	Filter Call List List	Prototype only
SR1.6.4.6.4.2	The system shall display a description of the currently active filters for the list of call lists, if any filters are active.	Contact Mgmt	Filter Call List List	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR1.6.4.6.4.3	The system shall display the number of filtered items shown in the list of call lists (if applicable), and the total number of items available to be shown.	Contact Mgmt	Filter Call List List	Prototype only
SR1.7	MANAGE EVENT RESOURCES		N/A (Heading)	N/A (Heading)
SR1.7.1	Manage Event Resource Types		N/A	N/A (Heading)
SR1.7.1.4	The system shall allow a user with the Manage Event Resources right to remove an event resource type.		Remove Event Resource Type	N/A (Existing)
SR1.7.1.4.2	The system shall remove the call list associated with the event resource type (if any) when the event resource type is removed.	Contact Mgmt	Remove Event Resource Type	Use Case Only
SR1.7.2	Manage Individual Event Resources		N/A	N/A (Heading)
SR1.7.2.4	The system shall allow a user with the Manage Event Resources right to remove an event resource.		Remove Event Resource	N/A (Existing)
SR1.7.2.4.1	The system shall remove the call list associated with the event resource (if any) when the event resource is removed.	Contact Mgmt	Remove Event Resource	Use Case Only
SR2	PREPARE FOR EVENTS AND EMERGENCIES			N/A (Heading)
SR2.3	MAINTAIN TRAFFIC PLANS. The system shall allow the system administrator to create, modify, and delete FITMs [copies only] and alternate routes, and device plans.		N/A	N/A (Heading)
SR2.3.3	MAINTAIN DEVICE PLANS		N/A	N/A (Heading)
SR2.3.3.1	The system shall allow the system administrator to create device plans.		N/A	N/A
SR2.3.3.1.20	The allowable plan items shall include activating (turning on) an On/Off device.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.1	Specify On/Off Device Plan Item Properties	On/Off Devices	N/A	N/A
SR2.3.3.1.20.1.1	The system shall allow the user to specify an On/Off device to be activated.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR2.3.3.1.20.1.2	The system shall create a description of the On/Off device plan item that includes the device type, the name of device, and the fact that the plan item is used to activate (turn on) the device.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.2	Add On/Off Device Plan Item	On/Off Devices	N/A	N/A
SR2.3.3.1.20.2.1	The system shall allow a user with the Modify Plans right to create a new On/Off device plan item.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.2.2	The system shall allow the user to specify the properties of the new On/Off device plan item, as defined in the Specify On/Off Device Plan Item Properties requirements.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.3	Add Multiple On/Off Device Plan Items	On/Off Devices	N/A	N/A
SR2.3.3.1.20.3.1	The system shall allow a user with the Modify Plans right to select multiple On/Off devices for which plan items will be added.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.3.2	The system shall allow the user to search for On/Off devices for which plan items will be added.	On/Off Devices	Add On/Off Device Plan Items	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.4	Remove On/Off Device Plan Item	On/Off Devices	N/A	N/A
SR2.3.3.1.20.4.1	The system shall allow a user with the Modify Plans right to delete an On/Off device plan item from an existing plan.	On/Off Devices	Remove On/Off Device Plan Item	OnOffDeviceGUIPlans CD
SR2.3.3.1.20.4.2	The system shall prompt the user for confirmation before deleting an On/Off device plan item.	On/Off Devices	Remove On/Off Device Plan Item	OnOffDeviceGUIPlans CD
SR2.3.3.7	View Device Plans		N/A	N/A
SR2.3.3.7.2	The system shall provide sort and search capabilities for the lists of device plans.		View Plans	OnOffDeviceGUIPlans CD
SR2.3.3.7.2.1	The system shall provide a free form text search capability for searching for device plans.		View Plans	OnOffDeviceGUIPlans CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR2.3.3.7.2.1.4	The device plan text search capability shall allow searching for free form text in device names in device plans.	On/Off Devices	View Plans	OnOffDeviceGUIPlans CD
SR2.3.3.7.4	The system shall allow the user to view all plan items in a plan.	On/Off Devices	View Plans	OnOffDeviceGUIPlans CD
SR3	MONITOR TRAFFIC AND ROADWAYS		N/A (Heading)	N/A (Heading)
SR3.3	ISSUE ALERT OR POST INFORMATION		N/A	N/A
SR3.3.10	The system shall prevent duplicate, non-closed alerts from being displayed to users.		Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD
SR3.3.10.3	Two Device Failure Alerts shall be considered duplicates when the devices they reference are the same device.	On/Off Devices	Send On/Off Device Failure Alert	AlertManagement CD OnOffDeviceControlModule CD
SR3.4	RECEIVE AND RESPOND TO ALERT		N/A	N/A
SR3.4.2	A suitably privileged user shall be able to manage alerts through the following states: New, Accepted, Delayed, and Closed.		N/A	N/A
SR3.4.2.6	A suitably privileged user shall be able to Resolve alerts in the New, Accepted, and Delayed states.		Resolve Device Failure Alert	Use Case Only
SR3.4.2.6.3	Clicking the Resolve link of a Device Failure Alert shall take the user to the Details Page for that device.	On/Off Devices	Resolve Device Failure Alert	Use Case Only
SR3.5	ISSUE NOTIFICATION	Contact Mgmt	N/A (Heading)	N/A (Heading)
SR3.5.1	The system shall allow a user with the right to Send Notifications to send a notification.	Contact Mgmt	Send Notification	NotificationManagement CD NotificationManagerImpl.sendNotification SD
SR3.5.1.2	The system shall allow the user to specify notification recipients.	Contact Mgmt	Specify Notification Contacts	NotificationManagement CD NotificationManagerImpl.sendNotification SD
SR3.5.1.2.1	The system shall allow notifications to be sent to one or more individual Contacts.	Contact Mgmt	Specify Notification Contacts	NotificationManagement CD NotificationManagerImpl.sendNotification SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR3.5.1.2.1.2	The system shall allow an individual Contact to be specified as a recipient when sending a notification only if it has an email address and a Notify via Email flag set to true.	Contact Mgmt	Specify Notification Contacts	NotificationReqHdlr.getContactsEligibleForNotificationJSON SD
SR3.5.1.2.1.3	The system shall send a notification to an individual contact only if it has an email address and a Notify via Email flag set to true.	Contact Mgmt	Send Notification	NotificationManagerImpl.sendNotification SD
SR3.5.1.2.2	The system shall allow notifications to be sent to one or more Notification Groups.	Contact Mgmt	Specify Notification Contacts	NotificationManagement CD NotificationManagerImpl.sendNotification SD
SR3.5.1.2.2.2	The system shall send a notification to a contact contained in a specified notification group only if it has an email address and a Notify via Email flag set to true.	Contact Mgmt	Send Notification	NotificationManagerImpl.sendNotification SD
SR3.5.1.2.3	The system shall allow the user to specify any combination of contact groups and individual contacts in a single notification request.	Contact Mgmt	Specify Notification Recipients	NotificationManagement CD NotificationManagerImpl.sendNotification SD
SR3.5.1.2.4	The system shall allow the user to search the list of notification recipients.	Contact Mgmt	Specify Notification Recipients	N/A (Existing functionality, but needs to be tested with the new contact definitions)
SR3.5.1.2.4.1	The system shall allow the user to search for individual contacts to notify.	Contact Mgmt	Specify Notification Recipients	N/A (Existing functionality, but needs to be tested with the new contact definitions)
SR3.5.1.3	The system shall allow a suitably privileged user to send a notification from an open traffic event.	Notification	Send Notification For Event	
SR3.5.1.3.4	The system shall provide a "Suggest" button to generate the notification message from event details.	Event Notification	Send Notification For Event	
SR3.5.1.3.4.4	The notification suggestion shall include the event's largest current queue length if any non-zero current queue length is specified in the traffic event.	Queues	Suggest Notification Text	

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR3.5.1.3.4.4.1	The queue length notification suggestion shall include the direction of event's largest current queue length if specified in the traffic event.	Queues	Suggest Notification Text	
SR3.5.1.3.4.4.1.1	The queue length direction for the notification suggestion shall be abbreviated according to the Lane Direction Abbreviations for notifications as stored in the System Profile.	Queues	Suggest Notification Text	
SR4	MANAGE EVENTS		N/A (Heading)	N/A (Heading)
SR4.1	Record and Update Event Status			N/A
SR4.1.12	The system shall allow a suitably privileged user to perform all the same editing activities for an event in the Pending state as for an event in the Open state except for those activities which are not relevant for an event in the Pending state.			N/A (Included for Reference)
SR4.1.12.1	The system shall prohibit execution of response plan items in an event in the Pending state. (This naturally precludes revocation of response plan items in a Pending traffic event.)	On/Off Devices	Execute Response Plan Items	Use Case Only
SR4.2	OPEN EVENT		N/A (Heading)	N/A (Heading)
SR4.2.3	DEPLOY RESOURCES. The system shall allow the user to view the pre-defined decision support plans to suggest the course of action and notifications, and execute the selected (or modified) course of action. The ability to record the deploying of the resources only applies to user generated events – not External Events. *		N/A	N/A (General)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.2	EVALUATE EVENT RESPONSE RECOMMENDATIONS. The system shall display the most appropriate corresponding recommended response plan from the pre-defined decision support plans, based on the event type, conditions, day of week and time of day (e.g., to determine closest open maintenance shop), location, and area of responsibility.			N/A (Included for context)
SR4.2.3.2.1	The system shall display the recommended DMS, HAR, Detector, CCTV camera, monitor, and On/Off device usage and the corresponding message/control, based on the event location.[CHANGED IN R14]	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.2.1.1	The recommended device usage will be available only if the traffic event has a latitude and longitude specified.	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.2.1.2	The system shall consider all applicable devices located within a configurable radius of the traffic event.	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.2.1.2.1	Devices that do not have a lat/long specified will not be displayed.	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.2.1.2.3	The system shall include both CHART and external devices as applicable that are located within the specified radius of the traffic event.	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.2.1.2.8	View Nearby Devices On Map		N/A	N/A
SR4.2.3.2.1.2.8.1	The system shall allow the user to view the devices near the traffic event on a map while viewing the traffic event details.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.1	The system shall initially pan and zoom the nearby devices map to show an extent containing the locations of all devices within the specified radius from the traffic event.	On/Off Devices	View Close Devices Map	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.2.1.2.8.1.2	The system shall pan and zoom the nearby devices map to show an extent containing the locations of all devices within the specified radius from the traffic event, when the user changes the radius selection.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.3	The system shall allow the user to choose the map layers to be displayed on the nearby devices map.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.3.5	The system shall allow the user to choose whether to display On/Off devices on the nearby devices map.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.6	The system shall allow the user to add devices to the traffic event's response plan from the nearby devices map.		View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.6.3	The system shall allow the user to clear the selection of devices that are selected in the nearby devices map.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.6.6	The system shall allow the user to select On/Off devices to be added to the response plan using the nearby devices map.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.6.7	The system shall indicate whether an On/Off device is already in the traffic event's response plan on the nearby devices map, using a modification to the On/Off device icon.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.7	The system shall allow the user to close all object popups displayed on the nearby devices map with a single action.	On/Off Devices	View Close Devices Map	Use Case Only
SR4.2.3.2.1.2.8.1.8	The system shall allow the user to trigger an immediate refresh of the object data on the nearby devices map (without refreshing the entire traffic event details page).	On/Off Devices	View Close Devices Map	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.2.1.2.14	The system shall display details for each recommended On/Off device as available, including Name/Location Description, Distance from the Event, Route, Direction, Intersecting Feature, Action Description, Current Device State (on or off), Current Mode (online/offline/maintenance), and current status.	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.2.1.2.14.1	The system shall allow a user with the Respond to Traffic Event right to choose to add a recommended On/Off device to the response plan of the event.	On/Off Devices	View Close Devices	Use Case Only
SR4.2.3.3	SELECT/ MODIFY COURSE OF ACTION. The system shall allow the user to accept, modify, or bypass the decision support recommendations for device usage, message, and control; for resource requests and notifications; for equipment type; and for equipment location.		N/A	N/A (General)
SR4.2.3.3.1	SELECT/ DESELECT RESOURCE OR DEVICE. The system shall allow the user to select or deselect the resources, equipment, and devices (DMS, HAR, SHAZAM, On/Off device, camera, monitor) that are to be used for the response in CHART events (excludes external events). [CHANGED IN R14]	On/Off Devices	N/A	N/A (General)
SR4.2.3.3.1.6	The system shall allow a suitably privileged user to remove selected response plan item(s) from the response plan of an open traffic event.	On/Off Devices	Remove Response Plan Items	OnOffDeviceGUIResponsePlan CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.3.1.8	If a traffic event has a defined location, the system shall display the select list of DMS, HAR, Camera, or On/Off devices to add to the response plan sorted by distance from the traffic event. [CHANGED IN R14]	On/Off Devices	Select On/Off Device for Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.8.1	If a device does not have a defined lat/lon location it will be shown at the end of the select list. [CHANGED IN R14]	On/Off Devices	Select On/Off Device for Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.13	The system shall allow a user with the Respond To Traffic Event right to add On/Off devices to a response plan of an open traffic event.	On/Off Devices	Select On/Off Device for Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.14	The system shall allow a user with the Respond To Traffic Event right to search for devices and plans to add to a response plan of an open event. [NEW BUT ALREADY IMPLEMENTED]	On/Off Devices	Search for Devices and Plans to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.14.1	The system shall allow the user to search all Cameras, DMSs, HARs, On/Off Devices, and Plans when adding items to a response plan of an open event.	On/Off Devices	Search for Devices and Plans to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.14.2	The system shall allow the user to search only Cameras when adding items to a response plan of an open event. [NEW BUT ALREADY IMPLEMENTED]	On/Off Devices	N/A	N/A
SR4.2.3.3.1.14.3	The system shall allow the user to search only DMSs when adding items to a response plan of an open event. [NEW BUT ALREADY IMPLEMENTED]	On/Off Devices	N/A	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.3.1.14.4	The system shall allow the user to search only HARs when adding items to a response plan of an open event. [NEW BUT ALREADY IMPLEMENTED]	On/Off Devices	N/A	N/A
SR4.2.3.3.1.14.5	The system shall allow the user to search only On/Off devices when adding items to a response plan of an open event.	On/Off Devices	Search for Devices and Plans to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.14.6	The system shall allow the user to search only Plans when adding items to a response plan of an open event, as specified in SR4.2.3.3.7.2 and its subrequirements. [NEW BUT ALREADY IMPLEMENTED]	On/Off Devices	N/A	N/A
SR4.2.3.3.1.14.7	If the system finds exactly one matching device or plan when searching for devices and/or plans to add to the response plan of an open event, the system shall add the device or plan to the response plan without requiring user selection.	On/Off Devices	Search for Devices and Plans to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.1.15	The system shall allow a user with the Manage Traffic Events right to select a contact to represent an event resource or type participation, if the resource or type has a Call List containing contacts.	Contact Mgmt	Select Contact from Call List	GUIDataTrafficEventParticipation CD, addContactParticipationToEvent SD
SR4.2.3.3.1.15.1	The system shall display the contacts in the Call List associated with the event resource or event resource type participating in the traffic event, when the user chooses to select a contact from a call list.	Contact Mgmt	Select Contact from Call List	GUIServletTrafficEventClasses CD
SR4.2.3.3.1.15.1.1	The system shall display the contacts in order of priority when showing the selectable contacts in the call list.	Contact Mgmt	Select Contact from Call List	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.3.1.15.1.2	The system shall initially show the AOR-filtered subset of contacts in the call list, if the AOR-filtered subset is not empty (as defined in sub-requirements).	Contact Mgmt	Select Contact from Call List	Prototype only
SR4.2.3.3.1.15.1.2.1	The system shall include a contact in the AOR-filtered subset if the traffic event has a geographic location, and an AOR assigned to an operations center assigned to the contact contains the geographic location.	Contact Mgmt	Select Contact from Call List	Prototype only
SR4.2.3.3.1.15.1.2.2	The system shall include a contact in the AOR-filtered subset if the traffic event has a geographic location, and an Additional AOR assigned to the contact contains the geographic location.	Contact Mgmt	Select Contact from Call List	Prototype only
SR4.2.3.3.1.15.1.3	The system shall show all contacts in the contact list if the AOR-filtered subset is empty.	Contact Mgmt	Select Contact from Call List	Prototype only
SR4.2.3.3.1.15.1.4	The system shall allow a user to remove the AOR filter to display all contacts in the contact list, if the list is filtered by AOR.	Contact Mgmt	Select Contact from Call List	Prototype only
SR4.2.3.3.1.15.1.5	The system shall display the following information for a contact in the call list: Name (First and Last), Agency, Office / Shop, Call Sign, Phone Numbers, and Do Not Contact Schedule.	Contact Mgmt	Select Contact from Call List	OtherContactMgmtLists CD, Prototype
SR4.2.3.3.1.15.1.5.1	The system shall display the phone numbers for a contact only if the user has the View Contact Info right.	Contact Mgmt	Select Contact from Call List	Use Case Only
SR4.2.3.3.1.15.1.5.2	The system shall indicate if the current time is included in the contact's Do Not Contact Schedule.	Contact Mgmt	Select Contact from Call List	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.3.1.15.2	The system shall allow a user with the View Contact Info right to select the contact from the call list and at the same time specify which of the contact's phone numbers was used to reach the contact.	Contact Mgmt	Select Contact from Call List	GUIServletTrafficEventClasses CD, setContactPhoneNumberInParticipation SD
SR4.2.3.3.1.15.3	The system shall allow the user to select the contact from the call list without specifying which phone number was used to reach the contact.	Contact Mgmt	Select Contact from Call List	GUIServletTrafficEventClasses CD, setContactPhoneNumberInParticipation SD
SR4.2.3.3.1.16	The system shall allow a user with the Manage Traffic Event right to remove a contact from an event resource or event resource type participation.	Contact Mgmt	Remove Contact from Resource / Type Participation	GUIServletTrafficEventClasses CD, removeContactFromResourceOrType SD
SR4.2.3.3.1.17	Manage Standalone Contact Participation	Contact Mgmt	N/A	N/A (Heading)
SR4.2.3.3.1.17.1	The system shall allow a user with the Manage Traffic Events right to add a standalone contact (i.e., without specifying an event resource or type) as a participant in a traffic event.	Contact Mgmt	Add Standalone Contact Participation	TrafficEventManagement_Participation CD, TrafficEventGroup.addContactParticipation SD
SR4.2.3.3.1.17.1.1	The system shall allow a user with the Manage Traffic Events right to enter text to specify a contact to add as a standalone contact participant.	Contact Mgmt	Add Standalone Contact Participation	TrafficEventManagement_Participation CD
SR4.2.3.3.1.17.1.1.1	The system shall allow a user with the Manage Traffic Events right to enter text to search for a contact to add as a standalone contact participant.	Contact Mgmt	Add Standalone Contact Participation	Prototype only
SR4.2.3.3.1.17.1.1.2	The system shall allow a user with the Manage Traffic Events right to select a contact from a list of contacts matching the specified search text (if any) to add as a standalone participant to a traffic event.	Contact Mgmt	Add Standalone Contact Participation	Prototype only
SR4.2.3.3.1.17.1.2	The system shall allow a user with the Manage Traffic Events right to add a standalone contact participant while viewing the Traffic Event Details.	Contact Mgmt	Add Standalone Contact Participation	ParticipationReqHdlr.addContactParticipationToEvent SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.3.1.17.1.2.1	The system shall automatically suggest a limited number of contacts as the user enters search text for adding a standalone contact participant while viewing the Traffic Event Details.	Contact Mgmt	Add Standalone Contact Participation	Prototype only
SR4.2.3.3.1.17.1.2.1.1	The system shall make contact suggestions based on the following priority order: "last name starts with", "agency name contains" (only if last and first names are not specified), and "first name starts with".	Contact Mgmt	Add Standalone Contact Participation	Prototype only
SR4.2.3.3.1.17.1.2.1.2	The system shall allow the user to select one of the suggested contacts to add the contact to the traffic event as a standalone participant.	Contact Mgmt	Add Standalone Contact Participation	Prototype only
SR4.2.3.3.1.17.2	The system shall allow a user with the Manage Traffic Events right to remove a standalone contact participation from a traffic event while viewing the Event Details.	Contact Mgmt	Remove Standalone Contact Participation	TrafficEventManagement_Participation CD
SR4.2.3.3.1.17.3	The system shall allow a user with Manage Traffic Events and View Contact Info rights to select which of a contact's phone numbers was last used to reach a standalone contact participating in a traffic event (i.e., a contact not associated with an event resource or an event resource type).	Contact Mgmt	Select Phone Number for Standalone Contact Participant	TrafficEventManagement_Participation CD, TrafficEventGroup.setContactPhoneNumberInParticipation SD
SR4.2.3.3.1.18	The system shall allow a user with Manage Traffic Events and View Contact Info rights to select which of a contact's phone numbers was last used to reach a contact associated with an event resource or an event resource type participating in a traffic event.	Contact Mgmt	Select Phone Number for Contact Associated with Event Resource / Type	TrafficEventManagement_Participation CD, TrafficEventGroup.setContactPhoneNumberInParticipation SD
SR4.2.3.3.7	SELECT DEVICE PLAN OR PLAN ITEMS		N/A	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.3.7.1	The system shall allow the user to choose a device plan to be used for the response.	On/Off Devices	Search or Select Plan or Plan Items to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.7.2	The system shall provide search capabilities for searching for device plans to include in the response.		Search or Select Plan or Plan Items to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.7.2.1	The system shall provide a free form text search capability for searching for device plans to include in the response.		Search or Select Plan or Plan Items to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.7.2.1.3	The device plan text search capability shall allow searching for free form text in device names in device plans.	On/Off Devices	Search or Select Plan or Plan Items to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.7.6	The system shall allow the user to view the plan items contained in a device plan when selecting a device plan to be used in a response.	On/Off Devices	Search or Select Plan or Plan Items to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.7.7	The system shall allow the user to choose specific items from a device plan to be used for the response.	On/Off Devices	Search or Select Plan or Plan Items to Add to Response Plan	OnOffDeviceGUIResponsePlan CD
SR4.2.3.3.7.8	If any DMS or HAR devices included in the device plan or individual plan items selected for use in the response already exist in the response, the system shall utilize the message for the device as specified in the device plan or individual plan items, overriding any message previously selected for that device in the response.[CHANGED IN R14]	On/Off Devices	N/A	N/A
SR4.2.3.4	EXECUTE COURSE OF ACTION			N/A (Heading)
SR4.2.3.4.11	The system shall allow a suitably privileged user to execute the response plan.	On/Off Devices	Execute Response Plan Items	Use Case Only
SR4.2.3.4.12	The system shall allow a suitably privileged user to execute selected individual response plan items.	On/Off Devices	Execute Response Plan Items	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.4.12.2	When a response plan item for an On/Off device is executed, the system shall add an entry to the device's arbitration queue (if an item for the response plan item is not already present on the queue) and cause the associated device's arbitration queue to perform an evaluation to determine if a device state change is needed. (See SR1.5.2.10.14.1 for requirements regarding the processing of an On/Off device arbitration queue).	On/Off Devices	Execute On/Off Device Response Plan Item	Use Case Only
SR4.2.3.4.13	The system shall allow a suitably privileged user to revoke the response plan item execution.	On/Off Devices	Revoke Response Plan Items	Use Case Only
SR4.2.3.4.13.2	When an On/Off device response plan item is revoked the system shall cause the associated device's arbitration queue to perform an evaluation to determine if a device state change is needed. (See SR1.5.2.10.14.1 for requirements regarding the processing of an On/Off device arbitration queue).	On/Off Devices	Revoke On/Off Device Response Plan Item	Use Case Only
SR4.2.3.4.14	The system shall allow a suitably privileged user to revoke the response plan execution.	On/Off Devices	Revoke Response Plan Items	Use Case Only
SR4.2.3.5	View Response Plan		N/A	N/A (Heading)
SR4.2.3.5.1	The system shall allow the user to view a list of response plan items that are being used in the response plan of an open traffic event.	On/Off Devices	View Response Plan	Use Case Only
SR4.2.3.5.2	The system shall display a description of the device being used in the response plan.	On/Off Devices	View Response Plan	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.5.3	The system shall display a description or other representation of the contents of the message being used in the response plan if the response plan item is for a device capable of displaying/playing a message. [CHANGED IN R14]	On/Off Devices	N/A	N/A
SR4.2.3.5.3.2	The system shall indicate the action it will take when the response plan item is executed if the device is not capable of displaying/playing a message.	On/Off Devices	View Response Plan	Use Case Only
SR4.2.3.5.4	The system shall display the last known state for each response plan item.	On/Off Devices	View Response Plan	Use Case Only
SR4.2.3.5.5	The system shall display the state for each response plan item indicating if the message has been modified since the item was last executed if the response plan item is for a device capable of displaying/playing a message. [CHANGED IN R14]	On/Off Devices	N/A	N/A
SR4.2.3.5.6	The system shall display the state for each response plan item indicating if the item has been executed.	On/Off Devices	View Response Plan	Use Case Only
SR4.2.3.5.7	The system shall display the state of each response plan item to indicate whether the item's action has been performed.	On/Off Devices	View Response Plan	Use Case Only
SR4.2.3.5.7.3	The system shall indicate if the On/Off device is activated (turned on).	On/Off Devices	View Response Plan	Use Case Only
SR4.2.3.5.8	The system shall allow a user with the respond to traffic event right to view a traffic event response plan preview map		View Response Plan Preview Map	Use Case Only
SR4.2.3.5.8.2	The preview map shall show the location of each device in the traffic event response plan.	On/Off Devices	View Response Plan Preview Map	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.2.3.5.8.3	The user shall be able to click on any response device on the preview map and see the planned message for the device as defined in the response plan if the device is capable of displaying/playing a message. [CHANGED IN R14]	On/Off Devices	N/A	N/A
SR4.2.3.5.11	The system shall display the current active message on a device in the response plan if requested by the user and the device is capable of displaying/playing a message. [CHANGED IN R14]	On/Off Devices	N/A	N/A (General)
SR4.3	RESPOND TO AND MONITOR EVENT		N/A (Heading)	N/A (Heading)
SR4.3.1	MONITOR EVENT. The system shall allow the user to view and update the status of devices, resources responding to an event, and the event response activities.		N/A	N/A (General)
SR4.3.1.1	MONITOR RESOURCE STATUS.		N/A	N/A (Heading)
SR4.3.1.1.10	View Event Participation Details (Event Details)	Contact Mgmt	N/A	N/A (Heading)
SR4.3.1.1.10.1	The system shall allow a user with the View Traffic Event Details or Manage Traffic Events rights to view detailed information describing a participant's involvement in a traffic event (i.e., "participation").	Contact Mgmt	View Event Participation Details	Prototype only
SR4.3.1.1.10.1.1	The system shall display information about an event resource or event resource type's participation in a traffic event.	Contact Mgmt	View Event Resource or Type Participation Details	Prototype only
SR4.3.1.1.10.1.1.1	The system shall display the event resource or event resource type description, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.1.1.10.1.1.1.1	The system shall display a description of an individual AVL-associated resource that is representing its corresponding resource type, if applicable, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.2	The system shall display the name of a camera associated with an event resource participating in a traffic event, if applicable, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.2.1	The system shall allow a user to navigate to the Camera Details page for a camera associated with an event resource, if applicable, while viewing the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.2.2	The system shall allow a user to display a camera associated with an event resource participating in a traffic event on a local monitor, if applicable, while viewing the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.2.3	The system shall allow a user to display a camera associated with an event resource participating in a traffic event in a desktop video window, if applicable, while viewing the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.3	The system shall display the distance in miles between an AVL-associated event resource and the traffic event, if both the event and the resource have geographic locations, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.1.1.10.1.1.3.1	The system shall allow the user to display an AVL-associated event resource on the map, if both the event and the resource have geographic locations, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.4	The system shall display a description of the location of an AVL-associated event resource, if available, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.5	The system shall display the resource type category of an event resource or event resource type participating in a traffic event, when displaying the participation details for an event.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.6	The system shall display information about a contact associated with an event resource or event resource type participation, if a contact is associated, as described in the View Contact Participation Information requirements (SR4.3.1.1.10.1.9.*)	Contact Mgmt	View Event Resource or Type Participation Details	Prototype only
SR4.3.1.1.10.1.1.7	The system shall indicate if an event resource type participating in a traffic event has event resources from which a resource can be selected to represent the resource type.	Contact Mgmt	View Event Resource or Type Participation Details	N/A (existing)
SR4.3.1.1.10.1.1.8	The system shall indicate if an event resource or event resource type participating in a traffic event has an associated call list containing contacts.	Contact Mgmt	View Event Resource or Type Participation Details	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.1.1.10.1.2	The system shall display information about a standalone contact's participation in a traffic event (i.e., a contact not associated with an event resource or event resource type), as described in the View Contact Participation Information requirements (SR4.3.1.1.10.1.9.*)	Contact Mgmt	View Standalone Contact Participation Information	TrafficEventManagement_Participation CD
SR4.3.1.1.10.1.3	The system shall indicate whether a participant has been marked as Notified when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.3.1	The system shall display the time corresponding to when a participant was notified, if the participant has been marked as Notified, when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.4	The system shall indicate whether a participant has been marked as Arrived / Responded when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.4.1	The system shall display the time corresponding to when a participant was arrived / responded, if the participant has been marked as Arrived / Responded, when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.5	The system shall indicate whether a participant has been marked as Departed when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.5.1	The system shall display the time corresponding to when a participant was departed, if the participant has been marked as Departed, when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.1.1.10.1.6	The system shall display the participant's call sign, if it was previously specified for the participation record.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.7	The system shall display the participant's driver name, if it was previously specified, when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.8	The system shall display the participant's Notes field, if it was previously specified, when displaying the participation details for an event.	Contact Mgmt	View Event Participation Details	N/A (existing)
SR4.3.1.1.10.1.9	View Contact Participation Information	Contact Mgmt	N/A	N/A (Header)
SR4.3.1.1.10.1.9.1	The system shall display a contact's first and last name, if the contact has a first / last name, when displaying the contact's participation information for an event.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.2	The system shall display a contact's agency, if the contact has an agency, when displaying the contact's participation information for an event.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.3	The system shall display the phone number used to reach the contact, if it was specified and if the user has the View Contact Info right, when displaying the contact's participation information for an event.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.3.1	The system shall display the phone number type for a phone number displayed as part of the contact's participation information for an event.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.4	The system shall display a contact's radio call sign, if the contact has a radio call sign, when displaying the contact's participation information for an event.	Contact Mgmt	View Contact Participation Information	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.1.1.10.1.9.5	The system shall allow a user to view detailed information for a contact participating in a traffic event.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.1	The system shall show the first and last name as part of the detailed information for a contact participating in a traffic event, if the contact has a first / last name.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.2	The system shall show the agency as part of the detailed information for a contact participating in a traffic event, if the contact has an agency.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.3	The system shall show the office / shop as part of the detailed information for a contact participating in a traffic event, if the contact has an office / shop.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.4	The system shall show the phone numbers as part of the detailed information for a contact participating in a traffic event, if the contact has phone numbers and the user has the View Contact Info right.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.4.1	The system shall show the phone number type for a phone number displayed as part of the detailed information for a contact participating in a traffic event.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.5	The system shall show the radio call sign as part of the detailed information for a contact participating in a traffic event, if the contact has a radio call sign.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.1.10.1.9.5.6	The system shall show the email address as part of the detailed information for a contact participating in a traffic event, if the contact has an email address and the user has the View Contact Info right.	Contact Mgmt	View Contact Participation Information	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.1.1.10.1.9.5.7	The system shall allow a user with the Configure Contacts right viewing the detailed contact information to edit a contact's information.	Contact Mgmt	View Contact Participation Information	Prototype only
SR4.3.1.3	MONITOR DEVICE STATUS		N/A	N/A (Heading)
SR4.3.1.3.7	The system shall allow the user to view and manipulate a device's arbitration queue (also known as message queue or device queue).[CHANGED IN R14]	On/Off Devices	View Arbitration Queue	Use Case Only
SR4.3.1.3.7.1	The system shall allow the user to view the arbitration queue (also known as a message queue or device queue). [CHANGED IN R14]	On/Off Devices	View Arbitration Queue	Use Case Only
SR4.3.1.3.7.1.5	Device queue entries displayed shall be sorted based on their priority level.	On/Off Devices	View Arbitration Queue	Use Case Only
SR4.3.1.3.7.1.6	Device queue entry attributes displayed shall include the message being set if the device supports displaying/playing messages. [CHANGED IN R14]	On/Off Devices	N/A	N/A
SR4.3.1.3.7.1.7	Device queue entry attributes displayed shall include the event the entry is associated with.	On/Off Devices	View Arbitration Queue	Use Case Only
SR4.3.1.3.7.1.8	The system shall display the latest queue status.	On/Off Devices	View Arbitration Queue	Use Case Only
SR4.3.1.3.7.1.9	The system shall display the latest device status.	On/Off Devices	View Arbitration Queue	Use Case Only
SR4.3.1.3.7.2	The system shall allow the user to manually arbitrate the message queue.	On/Off Devices	Manually Arbitrate Arbitration Queue	Use Case Only
SR4.3.1.3.7.5	The system shall allow a suitably privileged user to force the system to evaluate a device's arbitration queue. [CHANGED IN R14]	On/Off Devices	Force Arbitration Queue Evaluation	Use Case Only
SR4.3.3	MANAGE AFFECTED AREA TRAFFIC		N/A (Heading)	N/A (Heading)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2	The system shall calculate queue lengths on the roadway an event is located on in both directions from the event. (For one-directional events this includes "rubber-necking" flow.)	Queues	Auto Calculate Queue For Event	TrafficEventGroup.initQueueCalcIfNec SD TrafficEventFactoryImpl.queueCalcDataUpdate SD
SR4.3.3.2.2	The system shall calculate queue length from the data collected from pre-defined detectors and probes, and display it to CHART users and the traveling public.		N/A (Heading)	N/A (Heading)
SR4.3.3.2.2.1	The system shall have the capability to calculate queue length from detector data.		N/A (Not Implemented)	N/A (Not Implemented)
SR4.3.3.2.2.1.1	The system shall support calculating queue length in real time at the polling frequency of the detector.	Queues	N/A (Not Implemented)	N/A (Not Implemented)
SR4.3.3.2.2.2	The system shall have the capability to calculate queue length from third-party real-time travel time probe measurements, as compared with similarly provided historical travel time data.	Queues	Calculate Queue For Event	TravelRouteModule CD LinkQueueCalculatorImpl.processLinkDataUpdateImpl SD
SR4.3.3.2.2.2.1	The system shall support automatically calculating queue length in real time at a configurable frequency.	Queues	Auto Calculate Queue For Event	TravelRouteModule CD LinkQueueCalculatorImpl.doAutoCalcIfNeeded SD
SR4.3.3.2.2.2.1.1	The configurable queue length calculation frequency shall be managed as a multiple of the probe data collection rate. (1 means calculate on every update; 2 means every other; 5 means every 5th update, etc.)	Queues	Auto Calculate Queue For Event	TravelRouteModule CD LinkQueueCalculatorImpl.doAutoCalcIfNeeded SD
SR4.3.3.2.2.2.1.2	The system shall begin automatic calculation of current queue lengths and maximum queue length as soon as an event is opened.	Queues	Auto Calculate Queue For Event	TravelRouteModule CD LinkQueueCalculatorImpl.calculateQueue SD TrafficEventModule CD TrafficEventGroup.initQueueCalcIfNec SD
SR4.3.3.2.2.2.1.3	The system shall stop automatic calculation of current queue lengths and maximum queue length once an event is closed.	Queues	Auto Calculate Queue For Event	TravelRouteModule CD LinkQueueCalculatorImpl.removeQueueCalculation SD TrafficEventModule CD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.2.2.1.4	Automatic calculation of current queue lengths shall be configurable such that queue length calculation may be disabled system wide. (Note: automatic calculation can also be disabled for a single queue. See SR4.3.3.2.3.1.3.)	Queues	Auto Calculate Queue For Event	
SR4.3.3.2.2.2.2	The system shall label a calculated queue length value as having been last updated by the system.	Queues	Calculate Queue For Event	TravelRouteModule CD QueueCalculator.doCalc SD
SR4.3.3.2.2.2.3	The system shall allow an operator to request an on-demand calculation of a current queue length for an open traffic event.	Queues	Request On Demand Queue Calculation For Event	TravelRouteModule CD LinkQueueCalculatorImpl.calculateQueue SD
SR4.3.3.2.2.2.3.1	After an on-demand calculation of a current queue length value, the system shall allow the operator to request that the calculated value be stored into the current queue length field.	Queues	Accept Calculated Queue	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.3.1.1	When the the system stores an on-demand calculated value into a current queue length per operator request, this shall force the system to resume (or continue) calculating the current queue length automatically at the configured queue length calculation frequency, provided automatic calculation of queue lengths is enabled system-wide.	Queues	Resume Automatic Queue Calculation	TravelRouteModule CD LinkQueueCalculatorImpl.scheduleQueueCalculation SD TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.3.2	After an on-demand calculation of a current queue length value, the system shall allow the operator to request that the calculated value be ignored (not stored).	Queues	Discard Calculated Queue	
SR4.3.3.2.2.2.4	The system shall label system calculated queue length values with at most one status indicator. (This applies whether the value was calculated by the system automatically or on demand.)	Queues	Calculate Queue For Event	TravelRouteModule CD QueueCalculator.doCalc SD TrafficEventGroup.setCurrentQueueInfo SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.2.2.4.1	If automatic queue length calculations are enabled and the timestamp of a system calculated current queue length is older than a configurable length of time, the system shall mark the value as stale.	Queues	Mark System Calculated Queue As Stale	StaleQueueTimerTask.run SD, TrafficEventGroup.markQueueStaleIfNec SD
SR4.3.3.2.2.2.4.2	If the full length of a calculated current queue length cannot be determined due to an edge condition (e.g., near a state boundary or where the primary route terminates), the system shall mark the value as potentially underestimated due to an edge condition.	Queues	Calculate Queue For Event	TravelRouteModule CD QueueCalculator.doCalc SD QueueCalculator.processLink SD TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.4.3	If the calculation of a current queue length is terminated due to finding a configurable number of consecutive links of quality less than a configurable minimum quality, the system shall include the length of the bad quality links and mark the value as potentially incorrect due to bad data quality.	Queues	Calculate Queue For Event	TravelRouteModule CD QueueCalculator.doCalc SD QueueCalculator.processLink SD TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.4.4	In the event that multiple status labels apply to a calculated current queue length, only the highest priority status shall be shown, with the priority being stale (highest priority), edge, quality (lowest priority).	Queues	Calculate Queue For Event	TravelRouteModule CD QueueCalculator.doCalc SD QueueCalculator.processLink SD
SR4.3.3.2.2.2.5	The system shall be capable of calculating queue lengths for every open event that has a primary route, direction (one-directional or bi-directional), and a latitude and longitude.	Queues	Calculate Queue For Event	TravelRouteModule CD QueueCalculator.doCalc SD LinkQueueCalculatorImpl.findStartingLinkForQueue SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.2.2.6	The system shall automatically update the maximum queue length for every open event, based on current queue lengths, whether they are system-calculated or operator-provided. (Note: this occurs regardless of whether automatic calculation of current queue lengths is enabled or disabled.)	Queues	Update Max Queue For Event	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.6.1	For a one-directional event, the system shall automatically increase the maximum queue length based on only the current queue length in the primary direction.	Queues	Update Max Queue For Event	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.6.2	For a bi-directional event, the system shall automatically increase the maximum queue length based on the current queue lengths for any direction.	Queues	Update Max Queue For Event	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.2.6.3	The maximum queue length shall assume the labels associated with the current queue length from which it is derived: Source (System or Operator), Direction (Primary, Opposite, or a nominal roadway direction), and status (edge or quality, but never stale). (Note: Normally a stale current queue length can never drive a maximum queue length update, as it would have fed the maximum queue length before it went stale.)	Queues	Update Queue Info For Event	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3	The system shall support the automatic recording of queue length data.		N/A (Heading)	N/A (Heading)
SR4.3.3.2.2.3.1	The system shall log queue length data in operator-friendly English text format in the event history log.	Queues	Log Queue Info To Event History Log	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.1.1	The queue length data logged in the event history log shall include a labeled value for all current queue lengths.	Queues	Log Queue Info To Event History Log	TrafficEventGroup.setCurrentQueueInfo SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.2.3.1.1.1	Labeling for each current queue length logged to the event history log shall include the direction (NB, SB, EB, WB, IL, OL), source (System or Operator), and zero or one status labels (stale, edge, quality).	Queues	Log Queue Info To Event History Log	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.1.2	The queue length data logged in the event history log shall include a labeled value for the most recently saved maximum queue length.	Queues	Log Queue Info To Event History Log	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.1.2.1	Labeling for the maximum queue length logged to the event history log shall include the direction (NB, SB, EB, WB, IL, OL), source (System or Operator), and zero or one status values (edge or quality). (Note: Being a historical value, maximum queue length cannot grow stale.)	Queues	Log Queue Info To Event History Log	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.1.3	The system shall log queue length data in the event history log at the time the event is opened.	Queues	Log Queue Info To Event History Log	TrafficEventGroup.initQueueCalcIfNec SD
SR4.3.3.2.2.3.1.4	The system shall log queue length data in the event history log at the time the event is closed.	Queues	Log Queue Info To Event History Log	TrafficEventModule CD
SR4.3.3.2.2.3.1.5	The system shall log queue length data in the event history log at a configurable interval while the event is open.	Queues	Log Queue Info To Event History Log	QueueTimerTask.run SD TrafficEventGroup.markQueueStaleAndLogIfNec SD
SR4.3.3.2.2.3.1.6	The system shall log queue length data in the event history log each time the maximum queue length is updated after the event is closed. (Note: only the maximum queue can be updated after the event is closed, and only by an operator.)	Queues	Log Queue Info To Event History Log	TrafficEventGroup.setMaxQueueInfo SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.2.3.2	The system shall archive queue length data in structured machine-friendly format. (This data will not be operator viewable, but is intended to be analyzed by UMD-provided reporting tools.)	Queues	Archive Event Queue Info	TrafficEventGroup.setCurrentQueueInfo SD TrafficEventGroup.setMaxQueueInfo SD
SR4.3.3.2.2.3.2.1	The system shall archive the current queue length value every time a current queue length value or one of its labels (as noted in subrequirements) changes.	Queues	Archive Event Queue Info	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.2.1.1	Each structured current queue length value archived will be labeled as being either system-calculated or operator-supplied.	Queues	Archive Event Queue Info	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.2.1.2	Each structured current queue length value archived shall be labeled by direction (north, south, east, west, inner or outer).	Queues	Archive Event Queue Info	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.2.1.3	Each structured curent queue length value archived shall be labeled with zero or one status (stale, edge, quality) matching the status of the current queue length value being archived.	Queues	Archive Event Queue Info	TrafficEventGroup.setCurrentQueueInfo SD
SR4.3.3.2.2.3.2.1.3.1	In the event that more than one status for a structured current queue length value applies, the highest priority status shall be archived, with the ordering being stale (highest priority), edge, quality (lowest priority).	Queues	Archive Event Queue Info	TravelRouteModule CD QueueCalculator.doCalc SD QueueCalculator.processLink SD
SR4.3.3.2.2.3.2.2	The system shall archive the maximum queue length value every time the maximum queue length value or one of its labels (as noted in subrequirements) changes.	Queues	Archive Event Queue Info	TrafficEventGroup.setMaxQueueInfo SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.2.3.2.2.1	Each structured maximum queue length value archived shall be labeled as either system-calculated or an operator-supplied, matching the current queue length value from which it was derived.	Queues	Archive Event Queue Info	TrafficEventGroup.setMaxQueueInfo SD
SR4.3.3.2.2.3.2.2.2	Each structured maximum queue length value archived shall be labeled by direction (north, south, east, west, inner or outer) matching the current queue length value from which it was derived.	Queues	Archive Event Queue Info	TrafficEventGroup.setMaxQueueInfo SD
SR4.3.3.2.2.3.2.2.3	Each structured maximum queue length value archived shall be labeled with zero or one status (edge or quality) matching the current queue length value from which it was derived. (Note: Being a historical value, maximum queue length cannot grow stale.)	Queues	Archive Event Queue Info	TrafficEventGroup.setMaxQueueInfo SD
SR4.3.3.2.2.3.2.2.3.1	In the event that more than one status for a structured maximum queue length value applies, the highest priority status shall be archived, with the ordering being edge (highest priority), quality (lowest priority).	Queues	Archive Event Queue Info	TrafficEventGroup.setMaxQueueInfo SD
SR4.3.3.2.2.4	The system shall support recording of queue length data in the direction of the roadway having the event.	Queues	Display Event Queue Info	TrafficEventModule CD
SR4.3.3.2.2.5	The system shall support recording of queue length data in the opposite direction of the roadway having the event.	Queues	Display Event Queue Info	TrafficEventModule CD
SR4.3.3.2.2.6	The system shall support an updating display of queue length data for an open event.	Queues	Display Event Queue Info	TrafficEventGroup.setCurrentQueueInfo SD TrafficEventGroup.setMaxQueueInfo SD
SR4.3.3.2.3	The system shall support the manual entering of queue length data.		N/A (Heading)	N/A (Heading)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.3.2.3.1	The system shall allow a user with the Manage Traffic Events right to specify any of the current queue lengths of an open traffic event in miles, to one-tenth mile precision.	Queues	Specify Current Queue For Event	
SR4.3.3.2.3.1.1	The system shall label a manually-entered current queue length as having been last updated by an operator.	Queues	Specify Current Queue For Event	
SR4.3.3.2.3.1.2	The system shall clear any status labels (stale, edge, quality) upon entry of an operator-specified current queue length.	Queues	Specify Current Queue For Event	
SR4.3.3.2.3.1.3	The system shall stop automatically calculating the edited current queue length for an event after it has been manually edited by a user.	Queues	Stop Automatic Queue Calculation	TravelRouteModule CD LinkQueueCalculatorImpl.removeQueueCalculation SD
SR4.3.3.2.3.1.4	The system shall require the user to acknowledge automatic calculation of a queue will be stopped before allowing a manual override of a current queue length.	Queues	Specify Current Queue For Event	
SR4.3.3.2.3.2	The system shall allow a user with the Manage Traffic Events right to specify the maximum queue length and direction of an open or closed traffic event in miles, to one-tenth mile precision.	Queues	Specify Max Queue For Event	
SR4.3.3.2.3.2.1	The system shall label a manually-entered maximum queue length as having been last updated by an operator.	Queues	Specify Max Queue For Event	
SR4.3.3.2.3.2.2	The system shall continue automatically updating a maximum queue length after it has been manually updated by a user.	Queues	Specify Max Queue For Event	
SR4.3.5	VIEW EVENT LIST		N/A (Header)	N/A (Header)
SR4.3.5.1	The system shall allow the user to view a list of Open events in the system.		N/A	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.5.1.14	The system shall allow the user to view the devices that have been selected in the response plan of each event.	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.1.14.1	The system shall display an indicator for traffic event device usage portion of the event list pages when a response message/action for the event is on the device's queue, but the message/action is not active on the device. [CHANGED IN R14]	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.1.14.1.1	The system shall indicate when a response message/action for the event is on the device's queue, the device is blank/inactive, and the device is offline. [CHANGED IN R14]	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.1.14.1.2	The system shall indicate when a response message/action for the event is on the device's queue, the device is blank/inactive, and the device is in maintenance mode. [CHANGED IN R14]	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.1.14.1.3	The system shall indicate when a response message/action for the event is on the device's queue, the device is blank/inactive, and the device has a hardware failure. [CHANGED IN R14]	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.1.14.1.4	The system shall indicate when a response message/action for the event is on the device's queue, the device is blank/inactive, and the device has a communications failure. [CHANGED IN R14]	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.1.14.1.5	The system shall indicate when a response message for the event is on the device's queue, but another message with higher priority is active, for devices that support displaying/playing messages.[CHANGED IN R14]	On/Off Devices	N/A	N/A

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.5.5	The system shall provide an Open Events and Devices With Messages summary page.	On/Off Devices	N/A	N/A
SR4.3.5.5.3	The Open Events and Devices With Messages summary page shall include all On/Off devices that are currently online and active (turned on).	On/Off Devices	View Open Events and Devices With Messages	Use Case Only
SR4.3.5.8	The system shall allow the user to specify whether response devices should be hidden or displayed in the traffic event list.	On/Off Devices	View Traffic Events	Use Case Only
SR4.3.5.14	View / Manage Participations for Event in List	Contact Mgmt	N/A	N/A (Heading)
SR4.3.5.14.1	View Participations for Event in List	Contact Mgmt	N/A	N/A (Heading)
SR4.3.5.14.1.1	The system shall allow the user to view the number of participants assigned to a traffic event displayed in an applicable list if the traffic event is of a type that supports participation.	Contact Mgmt	View Participations for Event in List	N/A (existing)
SR4.3.5.14.1.2	The system shall allow a user with the View Event Details right to view the participants assigned to a traffic event shown in an applicable list, if the traffic event is of a type that supports participation.	Contact Mgmt	View Participations for Event in List	N/A (existing)
SR4.3.5.14.1.2.1	The system shall allow a user to view the notified, arrived/responded, and departed flags for each participant assigned to an open traffic event shown in an applicable list.	Contact Mgmt	View Participations for Event in List	N/A (existing)
SR4.3.5.14.1.2.1.1	The system shall indicate whether the arrived/responded and departed flags are currently in auto-detection mode or manual mode, if those flags are not set to true, when displaying the participation records for an open traffic event in an applicable list.	Contact Mgmt	View Participations for Event in List	N/A (existing)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.5.14.1.2.2	The system shall allow the user to view information for a contact participating in a traffic event shown in an applicable list.	Contact Mgmt	View Participations for Event in List	Use Case Only
SR4.3.5.14.1.2.2.1	The system shall allow the user to view information for a contact associated with an event resource or type participation for a traffic event in an applicable list.	Contact Mgmt	View Participations for Event in List	Use Case Only
SR4.3.5.14.1.2.2.2	The system shall allow the user to view the contact information for a standalone contact participation for a traffic event in an applicable list.	Contact Mgmt	View Participations for Event in List	Use Case Only
SR4.3.5.14.1.2.2.3	The system shall allow the user to view the contact first / last name, agency, office/shop, and call sign for a contact participating in a traffic event shown in an applicable list.	Contact Mgmt	View Participations for Event in List	Use Case Only
SR4.3.5.14.1.2.2.4	The system shall allow a user with the View Contact Info right to view the phone numbers, do not contact schedule, and email of a contact participating in a traffic event shown in an applicable list.	Contact Mgmt	View Participations for Event in List	Use Case Only
SR4.3.5.14.2	Add Participation to Event in List	Contact Mgmt	N/A	N/A (Heading)
SR4.3.5.14.2.3	The system shall allow a user with the Manage Traffic Events right to add an event resource or event resource type participant to an open traffic event in an applicable list, if the event is of a type that supports participation.	Contact Mgmt	N/A	N/A (existing)
SR4.3.5.14.2.3.1	The system shall allow a user with the Manage Traffic Events right to perform a text search to find an event resource or event resource type to add as a participant to an open traffic event in an applicable list, if the traffic event is of a type that supports participation.	Contact Mgmt	N/A	N/A (existing)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.5.14.2.4	The system shall allow a user with the Manage Traffic Events right to add a standalone contact participant to an open traffic event in an applicable list, if the event is of a type that supports participation.	Contact Mgmt	Add Standalone Contact Participation to Event in List	GUIServletTrafficEventClasses CD addContactParticipationToEvent SD
SR4.3.5.14.2.4.1	The system shall allow a user with the Manage Traffic Events right to perform a text search to find a contact to add as a participant to an open traffic event in an applicable list, if the traffic event is of a type that supports participation.	Contact Mgmt	Add Standalone Contact Participation to Event in List	Prototype only
SR4.3.5.14.3	Remove Participation from Event in List	Contact Mgmt	N/A	N/A (Heading)
SR4.3.5.14.3.2	The system shall allow a user with the Manage Traffic Events right to remove an event resource or type participation record from an open traffic event in an applicable list.	Contact Mgmt	Remove Participation from Event in List	N/A (existing)
SR4.3.5.14.3.3	The system shall allow a user with the Manage Traffic Events right to remove a standalone contact participation record from an open traffic event in an applicable list.	Contact Mgmt	Remove Participation from Event in List	GUIServletTrafficEventClasses CD
SR4.3.5.14.4	Modify Participation for Event in List	Contact Mgmt	N/A	N/A (Heading)
SR4.3.5.14.4.1	The system shall allow a user with the Manage Traffic Event right to toggle the notified, arrived/responded, and departed flags for each participant assigned to an open traffic event shown in an applicable list.	Contact Mgmt	N/A	N/A (existing)
SR4.3.5.15	The system shall allow a user to view and manage participation records for an event in the Open Events list or Open/Closed Events list, as specified in the View / Manage Participations for Event in List requirements (SR 4.3.5.14)	Contact Mgmt	View Participations for Event in List; Add, Remove Participation for Event in List	Prototype only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.7	View Priority Event List	Priority Event List	N/A (Heading)	N/A (Heading)
SR4.3.7.4	The priority event list shall display the following data for each traffic event: Event name (location is included in the name), time opened, controlling op center, duration, lanes closed, vehicles involved, largest current queue length, estimated time to clear, op center point of contact, on scene point of contact, names of participants that have arrived or responded, names of DMSs in the response plan of the traffic event, and comments. [CHANGED FOR LevA1077]	Queues	Provide Info For Priority Events List	
SR4.3.7.7	The system shall automatically choose the events to appear in the priority event list and the order in which they appear when the priority event list is set to automatic mode.	Priority Event List	Provide Info For Priority Events List	
SR4.3.7.7.8	The system shall include open traffic events that have any current queue length longer than a configurable number of miles in the priority event list when the priority event list is in automatic mode.	Queues	Provide Info For Priority Events List	
SR4.3.7.7.8.2	The current queue length threshold used to trigger the inclusion of a traffic event in the priority event list when in automatic mode shall be configurable via the system profile.	Queues	Provide Info For Priority Events List	

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR4.3.7.7.9	The system shall order the priority event list as follows when in automatic mode: Fatality, Overturned tractor trailer involved, HAZMAT, Jack-Knifed tractor trailer involved, loaded school bus involved, loaded commercial bus involved, located on interstate or US route and at least 50% of travel lanes blocked in one direction, any current queue length greater than configured threshold. [CHANGED FOR LevA1077]	Queues	Provide Info For Priority Events List	
SR4.4	CLOSE EVENT		N/A	N/A
SR4.4.4	RECORD EVENT CLOSURE		N/A	N/A
SR4.4.4.3	The system shall automatically remove all response plan items from the associated device arbitration queues and update the map appropriately when an event is closed. [CHANGED IN R14]	On/Off Devices	Close Traffic Event	Use Case Only
SR4.4.4.15	The system shall display a reminder to enter the queue length prior to closing an event, if the maximum queue length is zero.	Queues	Close Event	
SR7	MANAGE CHART PERFORMANCE. This process allows CHART managers and others to assess and enhance the effectiveness of CHART by reviewing and evaluating the performance of CHART operations, event management, traffic flow management, and devices and software performance. This process also includes simulation of event management and traffic management based on historical data.			N/A (Heading)
SR7.3	MANAGE AND MEASURE DEVICE PERFORMANCE			N/A (Heading)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR7.3.1	The system shall monitor and report CHART system (hardware and software) operation status, and device, detector, and sensor operation status.		N/A	N/A
SR7.3.1.7	The system shall log operations messages associated with the monitoring of system status.		N/A	N/A
SR7.3.1.7.5	The system shall log a message for Change in shared resource hardware status.	On/Off Devices	Detect On/Off Device Failure	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.1.15	The system shall provide self-checking (suggestion/example: e.g., re-poll every 5 minutes) and self-healing where possible given current software and hardware constraints.	On/Off Devices	Poll On/Off Device	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2	CHECK AND VALIDATE SYSTEM AND STATUS. The system shall initiate the capture of data from polling for devices and hardware.		N/A	N/A (Heading)
SR7.3.2.1	The system shall monitor and ping for system services at pre-defined periodicity.		N/A	N/A (General)
SR7.3.2.1.1	The system shall provide a mechanism to poll devices for status on a configurable interval basis.	On/Off Devices	N/A	N/A (General)
SR7.3.2.1.1.7	The system shall support the polling of On/Off devices.	On/Off Devices	Poll On/Off Device	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1	The system shall automatically poll an On/Off device on its configured polling interval while it is online if polling is enabled in the device configuration.	On/Off Devices	Poll On/Off Device	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR7.3.2.1.1.7.1.1	When an On/Off device is polled, the system shall set the state of the device to match the desired state of the device as currently specified in the system. (In other words, if the system wishes for the device to be activated (turned on) because there are active items in the device's arbitration queue, the system will command the device to be activated when it is polled.)	On/Off Devices	Poll On/Off Device	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1.2	The system shall update the device status, last status timestamp, and last contact timestamp based on the results of polling the device.	On/Off Devices	Poll On/Off Device	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1.2.1	The system shall set the On/Off device status to comm failed if the system cannot communicate with the device during a poll.	On/Off Devices	Poll On/Off Device Detect On/Off Device Failure	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1.2.2	The system shall set the On/Off device status to hardware failed if the device state does not match the commanded state during a poll.	On/Off Devices	Poll On/Off Device Detect On/Off Device Failure	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1.2.3	The system shall set the On/Off device status to OK if the device can be contacted and the device state matches the commanded state following the poll.	On/Off Devices	Poll On/Off Device Detect On/Off Device Failure	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1.2.4	The system shall update the On/Off device last status timestamp with each poll.	On/Off Devices	Poll On/Off Device Detect On/Off Device Failure	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.1.7.1.2.5	The system shall update the On/Off device last contact timestamp if the device can be contacted during a poll.	On/Off Devices	Poll On/Off Device Detect On/Off Device Failure	OnOffDeviceControlModule CD OnOffDeviceImpl CD OnOffDeviceImpl.pollNow SD
SR7.3.2.1.2	The system shall allow a suitably privileged user to force a status poll of a selected pollable device.	On/Off Devices	Poll On/Off Device	Use Case Only

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR7.3.2.1.2.1	The system shall allow a user with the Manage Device Comms right for the organization that owns an On/Off device to initiate a poll of the device outside of the automatic polling cycle.	On/Off Devices	Poll On/Off Device	Use Case Only
SR7.3.2.1.2.1.1	The system shall not alter the polling cycle due to user initiated poll commands.	On/Off Devices	Poll On/Off Device	Use Case Only
SR7.3.4	SYSTEM/DEVICE ATTEMPT CORRECTIVE ACTION			N/A
SR7.3.4.1	The system shall determine the device failure type and attempt self-correction Suggestions/examples: e.g., rebooting, failover.		N/A	N/A
SR7.3.4.1.1	The system shall inform operators of a device communications failure if it is unable to communicate with a particular device during polling.	On/Off Devices	Poll On/Off Device Detect On/Off Device Failure	Use Case Only
SR7.3.4.1.2	The system shall inform the operators of a device failure.	On/Off Devices	View On/Off Device List View On/Off Device Details	Use Case Only
SR7.3.5	NOTIFY NOC OF DEVICE/ SYSTEM STATUS			N/A
SR7.3.5.3	The system shall provide current device status to CHART users and clear indications in CHART when a device is in a repair or maintenance mode.	On/Off Devices	View On/Off Device List View On/Off Device Details	Use Case Only
SR7.3.5.4	The system shall provide automatic device status notification to others such as maintenance personnel, CHART systems integration team, and the device owner.	On/Off Devices	Send On/Off Device Notification	OnOffDeviceControlModule CD
SR9	SYSTEM MAINTAINABILITY, AVAILABILITY, SECURITY, AND DATA DISTRIBUTION			N/A (Heading)
SR9.4	Data Distribution		N/A	N/A (Heading)

Tag	Requirement	Feature	Use Cases	Other Design Elements
SR9.4.1	The system shall allow a system administrator to control a user's access to information in the system by granting/denying user functional rights.		N/A	N/A
SR9.4.1.2	The system shall allow a system administrator to control a user's access to device related information.		N/A	N/A
SR9.4.1.2.10	The system shall allow a system administrator to control a user's access to sensitive configuration data associated with On/Off devices by granting/denying the View On/Off Device Sensitive Config functional right on a per organization basis.	On/Off Devices	View On/Off Device Details	Use Case Only
SR9.4.2	The system shall protect certain information maintained in the system by limiting a user's access to /view of that information based on the user's functional rights.		N/A	N/A (General)
SR9.4.2.12	The system shall allow a user with the View On/Off Device Sensitive Config functional right for an On/Off device's owning organization to view sensitive configuration data for the On/Off Device.	On/Off Devices	View On/Off Device Details	Use Case Only
SR9.4.2.12.1	Sensitive configuration data for an On/Off device shall include the IP address and port.	On/Off Devices	View On/Off Device Details	Use Case Only
SR14	OPERATIONAL ENVIRONMENT		N/A (Heading)	N/A (Heading)
SR14.1	The system shall support Internet Explorer Version 9 and Internet Explorer 10.	SOPs, Queues, Contact Mgmt, On/Off Devices	N/A	N/A

7 Use Case Diagrams

The use case diagrams depict new functionality for CHART ATMS R14 and also identify existing features that will be enhanced. The use case diagrams exist in the Enterprise Architect design tool in the chartdesign project, under the CHART-ATMS-R14 folder.

7.1 SOP

7.1.1 SOP

This diagram shows the uses related to the Standard Operating Procedure feature for R14.

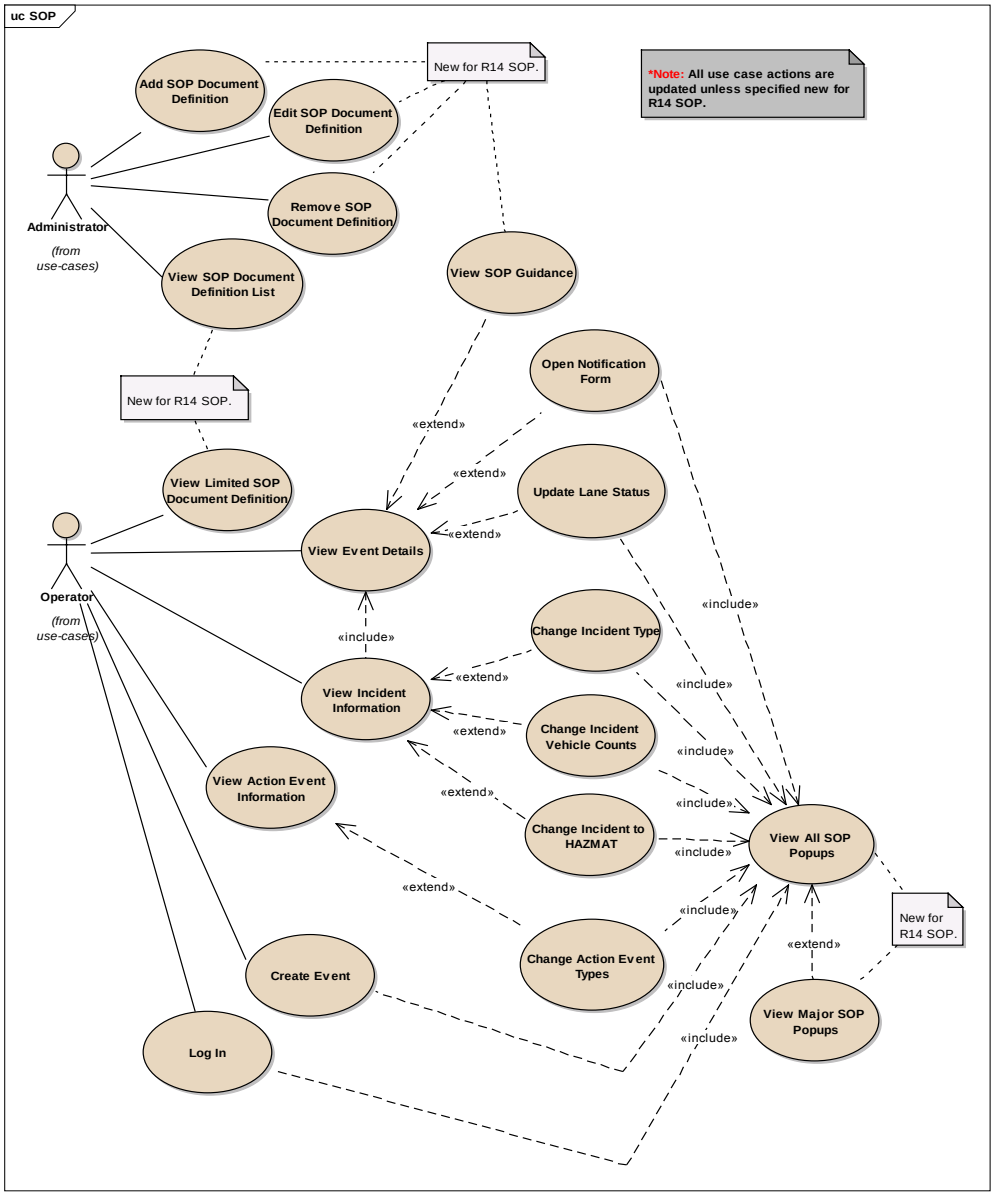


Figure 7-1. SOP Feature Use Cases

7.1.1.1 Add SOP Document Definition

An administrator with the Manage SOP Right can add an SOP Document Definition to CHART ATMS. The SOP Document Definition includes a unique document name (1 to 100 chars), a customizable introductory header (1 to 1000 chars), optional description (0 to 100 chars), URL to SOP Document, one or more Operations Centers the SOP applies to or all current Operations Centers, zero or more Event Triggers the SOP applies to, and Major/All Distribution for SOP.

7.1.1.2 Change Action Event Types

A user with the Manage Traffic Event right may change the action event types for an event. For R14, an SOP event trigger will be added for when the user selects one of the following action types: Pothole, Animal Carcass 10-45, or Citizen Call. The event trigger for when the user selects any Signal related action type will also be tested. Upon execution for either event trigger, the applicable SOP document definitions will be displayed within the SOP popup.

7.1.1.3 Create Event

A user with the Manage Traffic Event right may create an event in CHART ATMS. For R14, the action of creating a(n) Congestion, Action, or Weather Service event will be updated and will represent individual SOP event triggers. Upon clicking the event creation button for any of these types, the applicable SOP document definitions will be displayed within the SOP popup.

7.1.1.4 Change Incident to HAZMAT

A user with the Manage Traffic Event right may check an incident as involving hazardous materials. For R14, an SOP event trigger will be added for when the HAZMAT checkbox for an incident is checked. If a change is detected, then the applicable SOP document definitions will be displayed within the SOP popup.

7.1.1.5 Change Incident Type

A user with the Manage Traffic Event right may change the incident type for an event. For R14, an SOP event trigger will be added for when an incident type of Off Road Activity, Police Activity, Collision with Fatality, Emergency Roadwork, or any Weather Closure type has been selected. If so, then applicable SOP document definitions will be displayed within the SOP popup.

7.1.1.6 Change Incident Vehicle Counts

A user with the Manage Traffic Event right may change the vehicle counts for specific involvement type for an incident. For R14, an SOP event trigger will be added for when an incident vehicle count has changed from 0 to 1 for a specific group of vehicles and types. If a change is detected in one of these groups, then the applicable SOP document definitions will be displayed within the SOP popup.

7.1.1.7 Edit SOP Document Definition

An administrator with the Manage SOP Right can edit an SOP Document Definition. The admin may edit the SOP Document Definition's customizable introductory header, optional description,

URL to SOP Document, Operations Centers the SOP applies to, Event Triggers the SOP applies to, and the Major/All Distribution for the SOP.

7.1.1.8 Log In

A user with a valid username and password may login to CHART ATMS. For R14, an SOP event trigger will be added upon successful logon of a user on the CHART Disclaimer page. Applicable SOP document definitions will be displayed within the SOP popup when the event trigger occurs.

7.1.1.9 Open Notification Form

A user with the Manage Traffic Event right and Send Notification right may open the Notification Form from an event. For R14, the action of opening the notification form will be updated as an event trigger and will display applicable SOP document definitions within the SOP popup.

7.1.1.10 Remove SOP Document Definition

An administrator with the Manage SOP Right can remove an SOP Document Definition from CHART ATMS. The administrator will be forced to acknowledge the removal action.

7.1.1.11 Update Lane Status

A user with the Manage Traffic Event right may view and update the Lane Status for an event that supports Roadway Configuration. For R14, this will be updated to check for when the user specifies that 100% of the travel lanes in either direction have been closed. When this event triggers occurs, applicable SOP document definitions will be considered for display within the SOP Popup.

7.1.1.12 View Action Event Information

A user with the Manage Traffic Event right may view the Action Event Information details for an action event. For R14, this will be updated to include support for SOP action event related triggers.

7.1.1.13 View All SOP Popups

An operator with the View All SOP Popup Right can view an SOP Popup message when a trigger condition is executed. CHART ATMS will display SOP Document Definitions that match the following criteria: contain the executed trigger condition, contain the controlling Op Center of the event or of the center the operator is logged into, and have Major Distribution set or not set. For each document definition, only limited fields will be displayed within the popup (see View Limited SOP Document Definition). SOP document links will be embedded within the document name and will open in a separate window. The popup will be acknowledged by the operator using a close button or by pressing ESC.

7.1.1.14 View Event Details

A user with the Manage Traffic Event right may view the details of an event. For R14, a new section labeled SOP Guidance will be added to the Event Details page to list relevant SOP documents. (see SOP Guidance Use Case). The View Event Details page will also be updated to

support event triggers related to incidents, action events, roadway configuration, and notification for when display of an SOP popup may occur. (See SOP Popups Use Case).

7.1.1.15 View Incident Information

A user with the Manage Traffic Event right may view the Incident Information details for an incident. For R14, this will be updated to include support for SOP incident related triggers.

7.1.1.16 View Limited SOP Document Definition

An operator with the Basic Operations Right can view limited data of an SOP Document Definition in CHART ATMS. The view only fields of the SOP Document Definition displayed include the SOP document name, the SOP introductory header with optional HTML embedded text, and the HTML link to the SOP Document URL. The limited column data will be also be used in display of SOP definitions within popups and in the SOP Guidance section.

7.1.1.17 View Major SOP Popups

An operator with the View Major SOP Popups Right can view an SOP Popup message when a trigger condition is executed. CHART ATMS will display SOP Document Definitions that match the following criteria: contain the executed trigger condition and contain the controlling Op Center of the event or of the center the operator is logged into. If the user has only the View Major SOP Popups Right, then only definitions which have the Major Distribution set will be considered for display. If the user contains the View All SOP Popups Right in addition to the View Major SOP Popups right then definitions that meet the above criteria will be considered regardless of the distribution set. For each document definition, only limited fields will be displayed within the popup (see View Limited SOP Document Definition and View All SOP popups).

7.1.1.18 View SOP Document Definition List

An administrator in CHART ATMS with the Manage SOP Right can view all or select fields for each SOP Document Definition listed on the SOP Document Definition List. The default view for a user with the Manage SOP right will be the Document Name, Introductory Header, SOP Link, Operations Centers, and Event Triggers. The administrator may sort the list on the document name, operations centers, and event triggers. Filtering will also be allowed on a single or all operations center and a single event trigger only.

7.1.1.19 View SOP Guidance

In response to a request to View Event Details from an Operator, the System will list each SOP Document Definition that matches trigger condition criteria within the current event state. The timing of when the trigger conditions occurred within the event is not considered. CHART ATMS will display SOP Document Definitions that match the following criteria: contain matched trigger conditions, contain the controlling operations center of the event or of the center the operator is logged into, and which have the Major Distribution set or not set. For each document definition, only limited fields will be displayed within the popup (see View Limited SOP Document Definition). For each definition displayed, the SOP document link will be embedded within the document name and will open in a separate window.

7.2 On/Off Devices

7.2.1 Folders

This diagram shows use cases related to system folders that apply to CHART ATMS R14.

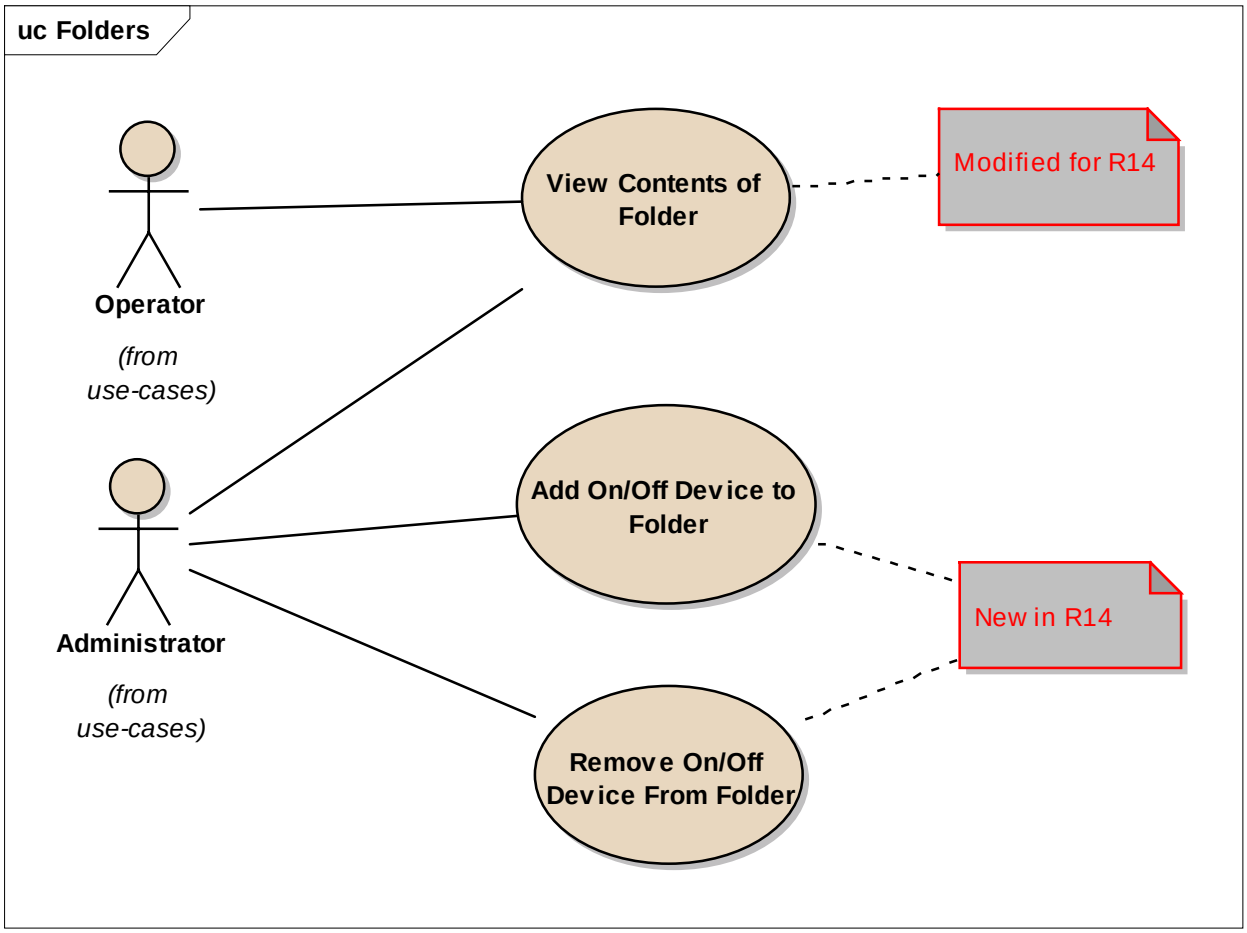


Figure 7-2. On/Off Devices Folder Use Cases

7.2.2 Maintenance GUI

This diagram shows use cases related to the device maintenance portal that are modified in R14 to support on/off devices.

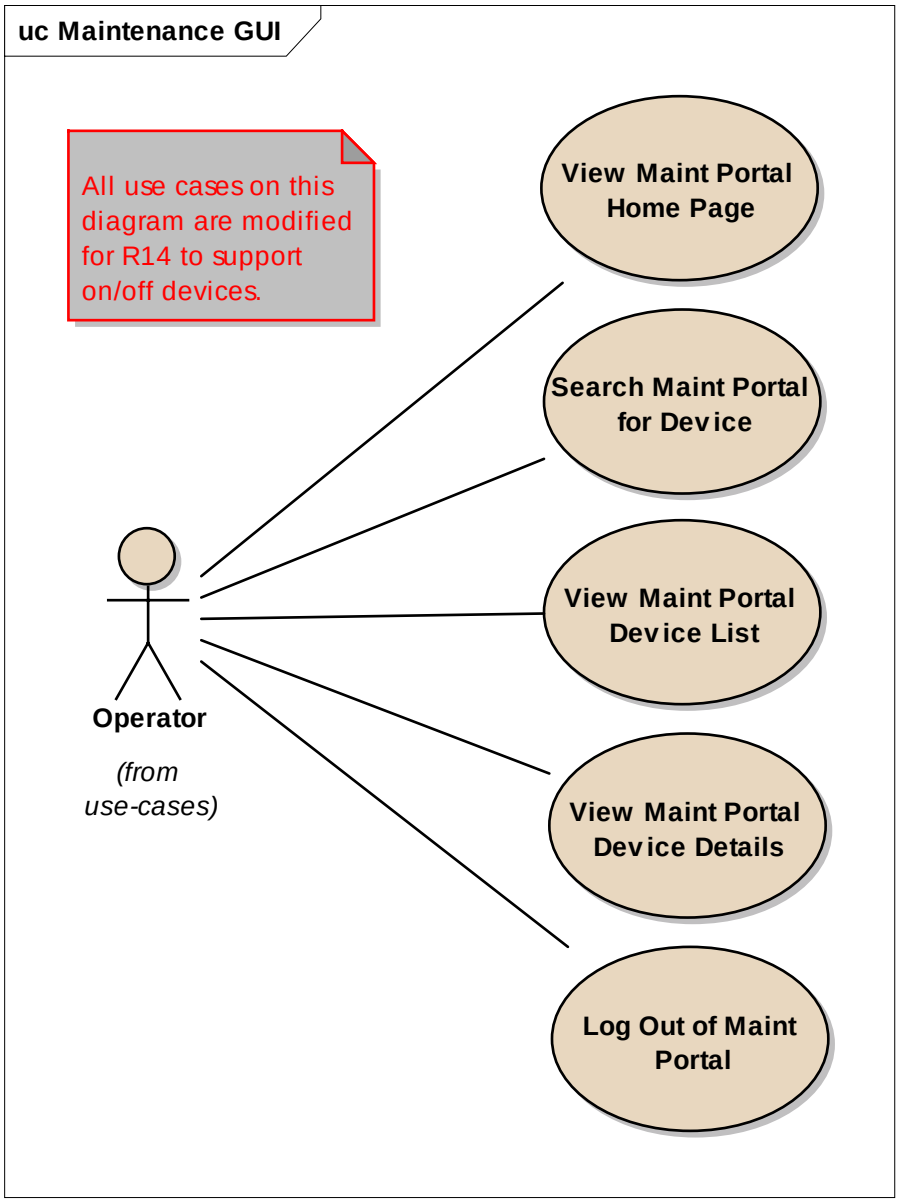


Figure 7-3. On/Off Devices Maintenance Portal Use Cases

7.2.3 Maps

This diagram shows use cases related to CHART ATMS maps that are new or changed in R14 to support on/off devices.

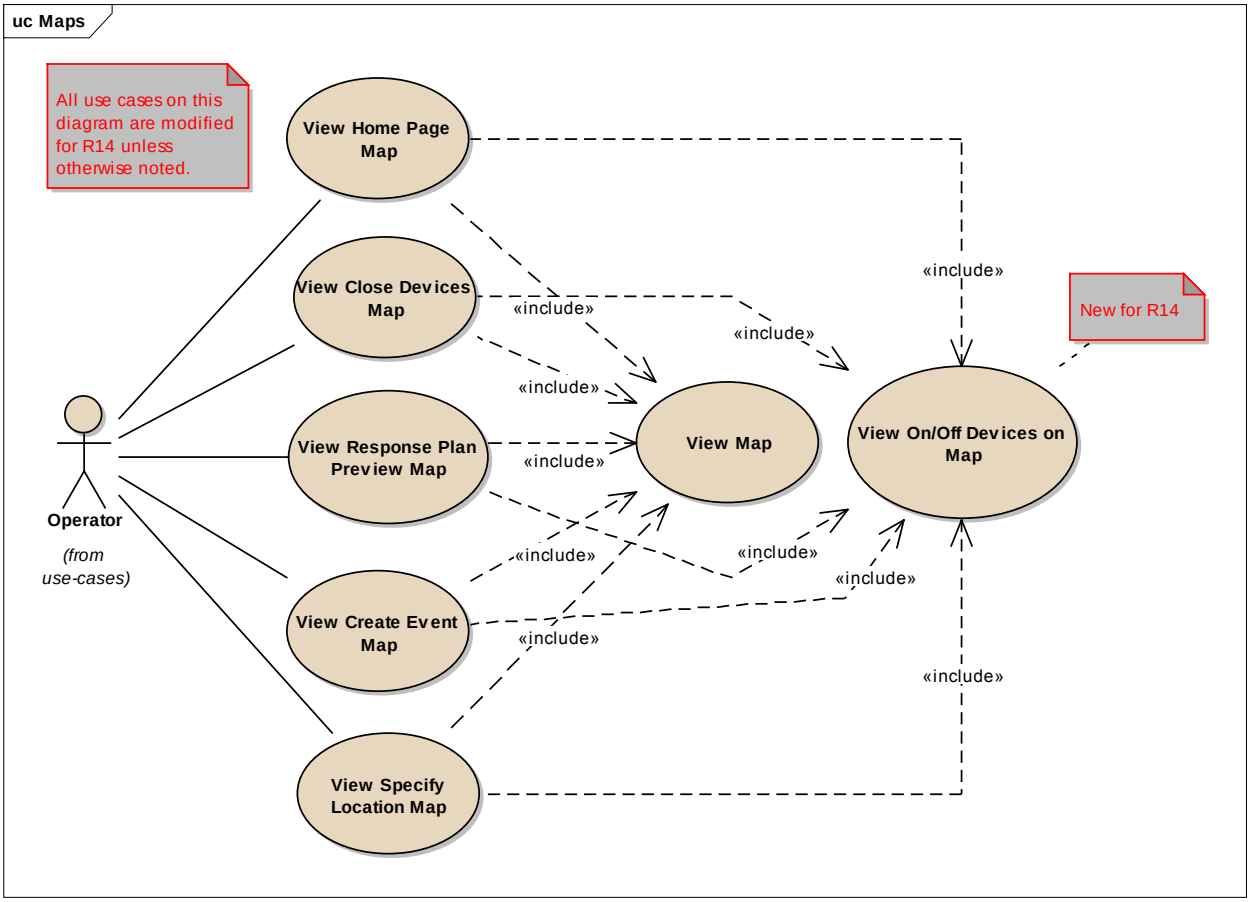


Figure 7-4. On/Off Devices Map Use Cases

7.2.4 On/Off Device Configuration

This diagram shows the use cases related to the configuration of on/off devices in CHART ATMS.

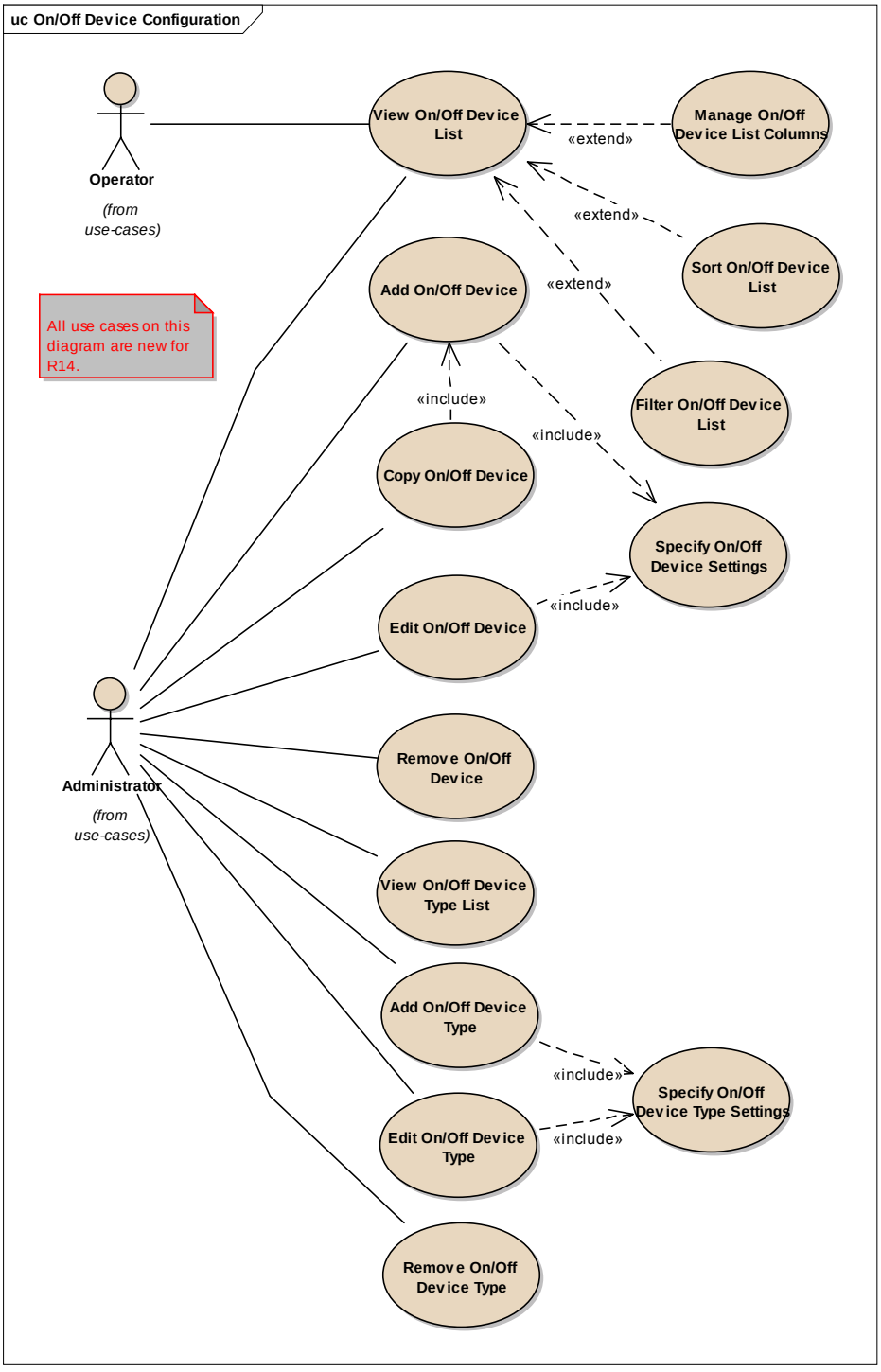


Figure 7-5. On/Off Devices Configuration Use Cases

7.2.5 On/Off Device Operation

This diagram shows use cases related to operating an on/off device. This includes mode changes, polling, maintenance commands, and operation of an online device via it's arbitration queue.

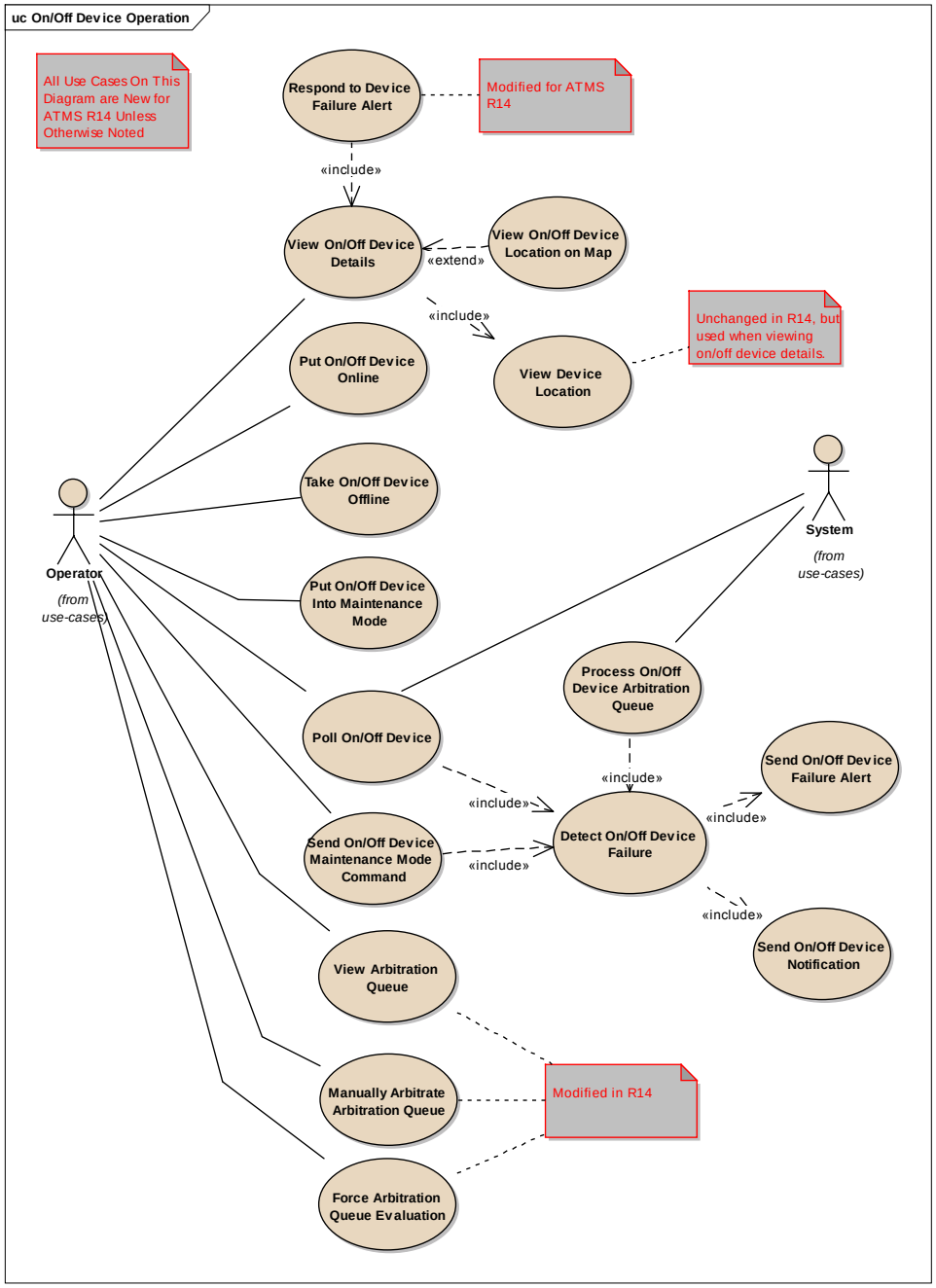


Figure 7-6. On/Off Devices Operation Use Cases

7.2.6 On/Off Device Miscellaneous

This diagram shows miscellaneous use cases that are changed in CHART ATMS R14 to include on/off devices.

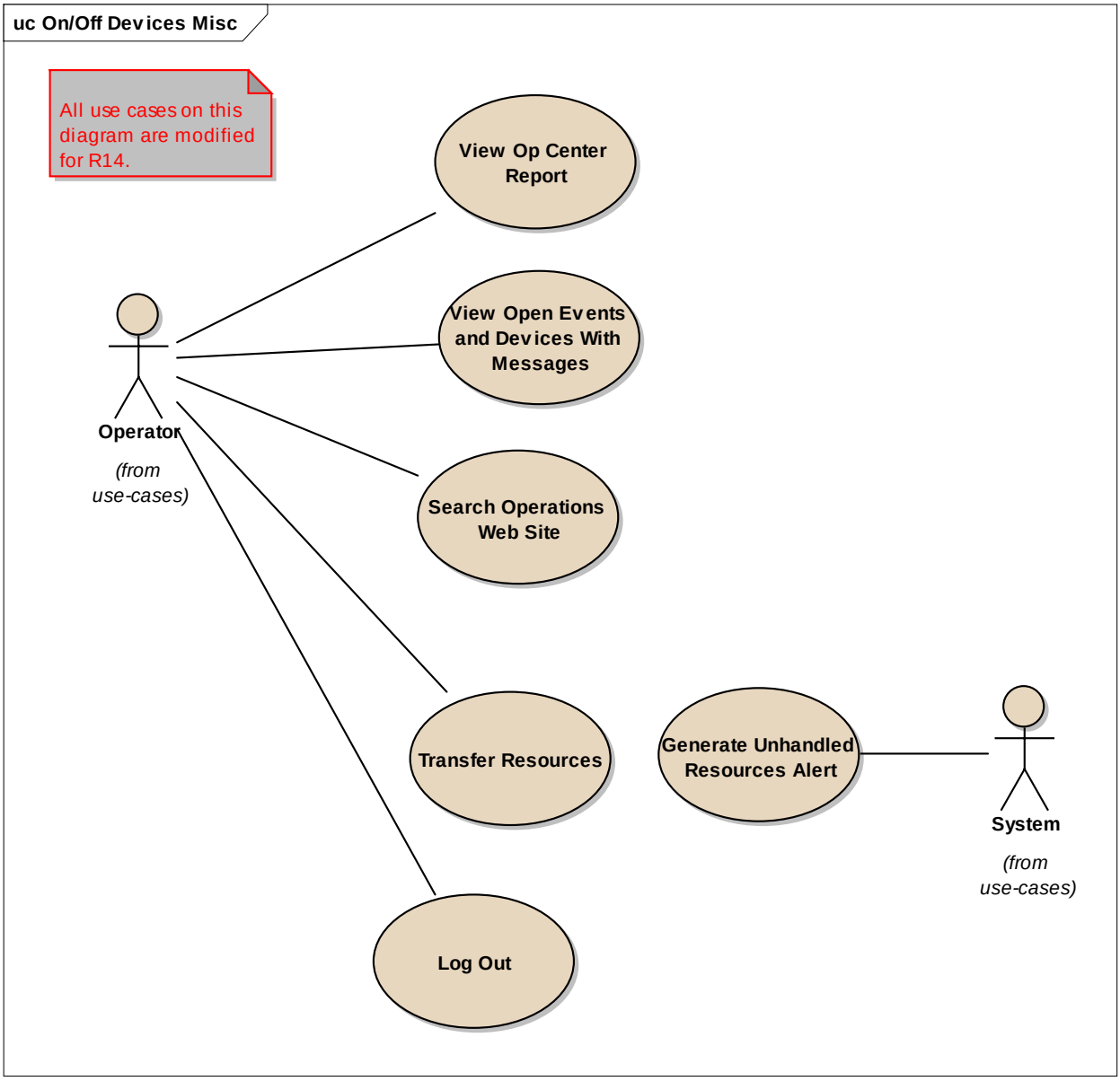


Figure 7-7. On/Off Devices Miscellaneous Use Cases

7.2.7 Plans

This diagram shows use cases related to Device Plans that are new or modified in R14. Support is added to allow on/off devices to be included in plans.

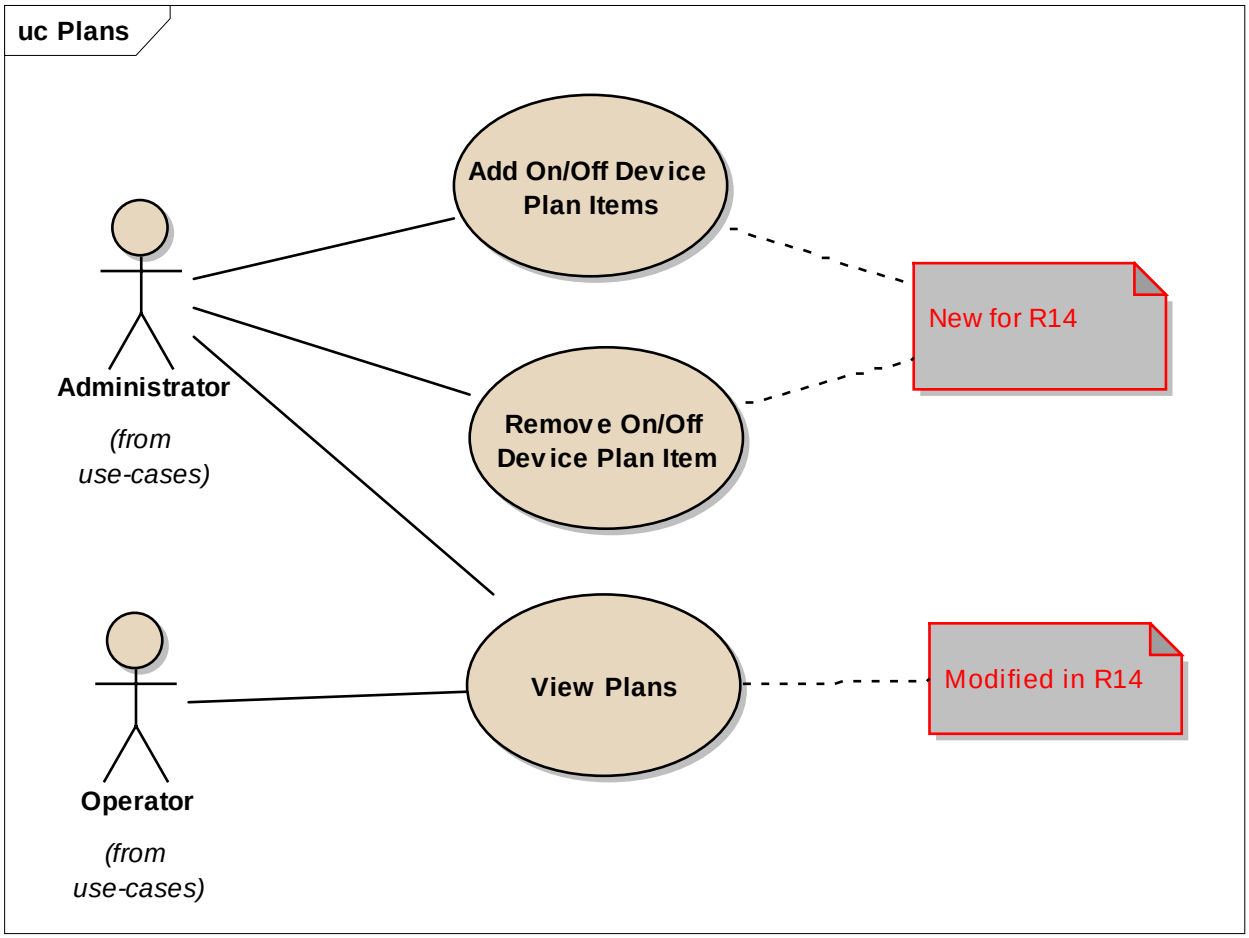


Figure 7-8. On/Off Devices Plans Use Cases

7.2.8 Traffic Events

This diagram shows use cases related to traffic events that are added or modified to support on/off devices in R14.

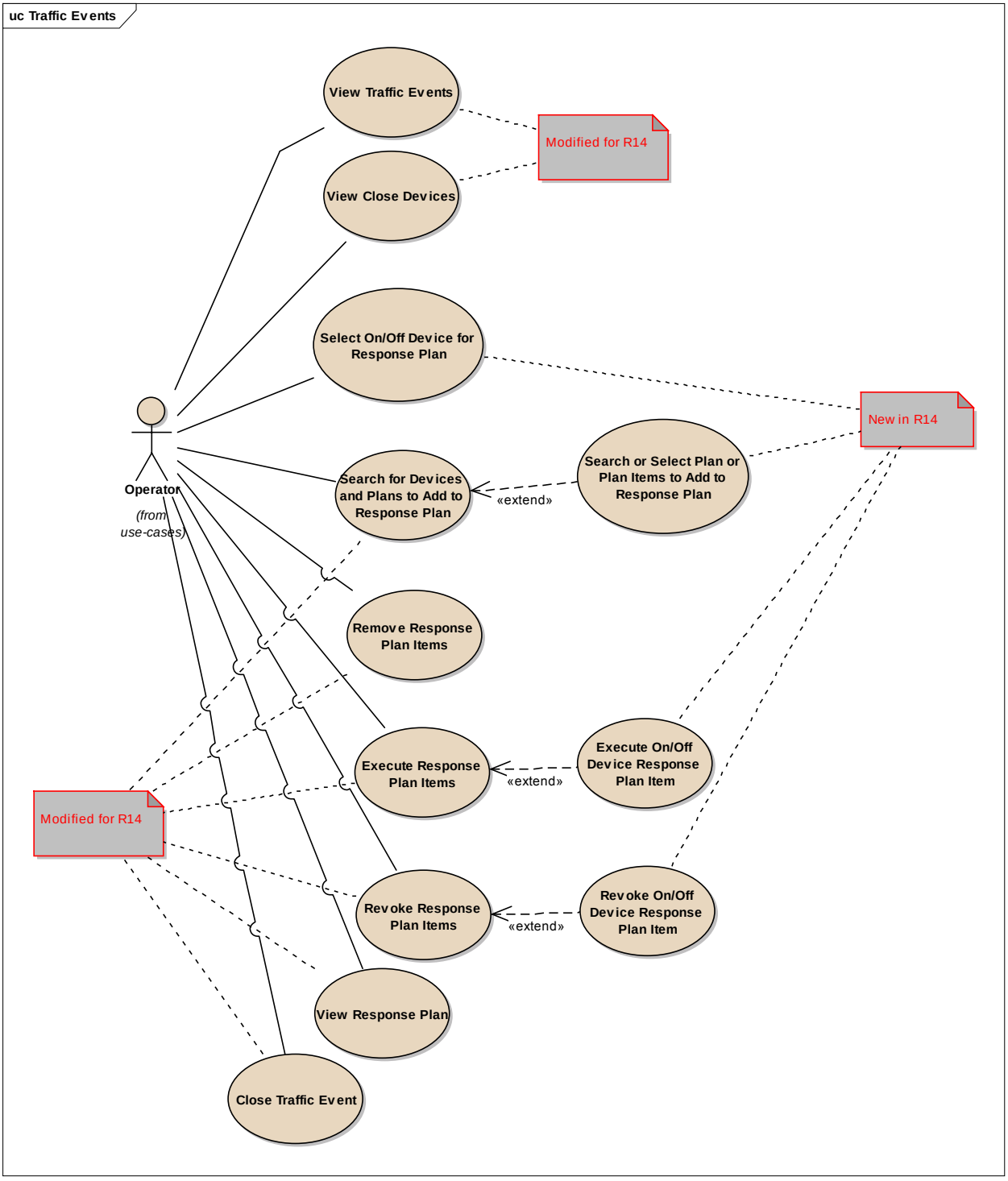


Figure 7-9. On/Off Devices Traffic Event Use Cases

7.2.9 Use Case Details

7.2.9.1 Add On/Off Device

The system shall allow a user with the Manage On/Off Devices right for at least one organization to add an on/off device to the system. The user must specify configuration settings for the new device as detailed in the Specify On/Off Device Settings use case. The system will log a message to the operations log when a user adds an on/off device to the system.

7.2.9.2 Add On/Off Device Plan Items

The system will allow a user with the Modify Plans right to add one or more plan items used to specify that an on/off device is to be activated as part of the plan. In addition to including the device ***t***o be activated, each plan item will contain a system generated description that includes the device type, the name of the device, and the fact that the plan item is used to activate the device. The system will allow the user to select from a list of all on/off devices in the system, or to search for on/off devices for which a plan item is to be added.

7.2.9.3 Add On/Off Device Type

The system will allow a user with the Configure System right to add an on/off device type to the system. The user must enter the settings for the on/off device as specified in the Specify On/Off Device Type settings use case.

7.2.9.4 Add On/Off Device to Folder

The system will allow a user with the Configure System right to add an on/off device to a folder.

7.2.9.5 Close Traffic Event

The system allows a user with the Manage Traffic Event right to close a traffic event. This use case is updated in R14 to ensure all on/off device response plan items get removed from the arbitration queue of the on/off devices when the event is closed.

7.2.9.6 Copy On/Off Device

The system will allow a user that has the permission required to add an On/Off device to copy an existing On/Off device. The system will pre-populate the add on/off device form with the settings from the device that is copied, except for the name field which will include text to indicate it is a copy. The user can then override the name field as desired as they complete the process of adding the device as specified by the Add On/Off device use case.

7.2.9.7 Detect On/Off Device Failure

During any attempt to poll or command an on/off device, the system may detect a communication or hardware failure. A communication failure is detected when there is any type of communication failure while communicating with the device during an attempt to command or poll the device. A hardware failure is detected when the system contacts the device, commands it, then queries the device's current status and it does not match the commanded state. The system will detect a previously failed device to be OK when the system commands/polls the device successfully. When the system detects that an on/off device has changed status, it will log a message in the operations log.

7.2.9.8 Edit On/Off Device

The system will allow a user with the Manage On/Off Device right for the owning organization of an on/off device to edit its configuration settings as specified in the Specify On/Off Device Settings use case. The system will log a message to the operations log when a user edits the configuration of an on/off device.

7.2.9.9 Edit On/Off Device Type

A user with the Configure System right can edit the settings for an existing on/off device type as specified in the Specify On/Off Device Type Settings use case.

7.2.9.10 Execute On/Off Device Response Plan Item

When an on/off device response plan item is executed, an entry for the response plan item is added to the arbitration queue of the on/off device (unless an entry for the response plan item already exists on the arbitration queue) and the arbitration queue is commanded to evaluate. See the Process On/Off Device Arbitration Queue use case for more details.

7.2.9.11 Execute Response Plan Items

The system allows a user with the Respond To Traffic Event right to execute response plan items, except for the case when the event is closed or in a pending state. Items can be executed individually, multiple items can be executed, or the user can choose to execute all items. This feature is modified in R14 to allow on/off device response plan items to be executed.

7.2.9.12 Filter On/Off Device List

In addition to the standard default filter and other "canned" filters mentioned in the View On/Off Device List use case, the system allows the user to do custom filtering using the following columns: device type, model, device state (commanded), device state (actual), status, route, direction, county, connection site, owning organization, maintaining organization, and the show on map indicator. Filters from multiple columns can be combined, or the user can choose to just filter on a single column. The system will show when any filter is in place and will allow the user to remove the filter on a per column basis or to remove all filters to view all on/off devices in the system. Note that at any time when viewing the on/off device list, the user can return to the default op center filtering.

7.2.9.13 Force Arbitration Queue Evaluation

A user with the Configure Arbitration Queue right can force the arbitration queue to re-evaluate its entries (instead of waiting for this to happen in the background). This applies to on/off devices as of R14; see Process On/Off Device Arbitration Queue for details on the processing that will take place when a user forces evaluation.

7.2.9.14 Generate Unhandled Resources Alert

The system will generate an unhandled resources alert when it detects resources whose controlling op center has no logged in users. The alert is sent to the back up operations center configured for the operations center that has the controlled resources for which the alert is

generated. In CHART ATMS R14, on/off devices in maintenance mode are added as resources that could cause this alert to be generated.

7.2.9.15 Log Out

A user that is logged into the system can log out of the system, provided there are other users logged into their center or their center is not in control of any resources (open traffic events or maintenance mode devices). If the center is in control of one or more resources and there are no other users logged into the center, the system will require the user to transfer the resources to another center before logging out. In CHART ATMS R14, on/off devices in maintenance mode are added as devices that can prevent a user from logging out when no other users are logged into the center.

7.2.9.16 Log Out of Maint Portal

The system allows the user to log out of the maint portal. If there are any devices still in maintenance mode (including on/off devices, added in R14), the system will warn the user but still allow them to log out with devices in that mode.

7.2.9.17 Manage On/Off Device List Columns

By default, the on/off device list will show the following columns of information for each on/off device: description / location, device state (actual), status, last update time stamp, route, direction, and county, as available. The following columns of information will also be available, but hidden by default: device type, model, device state (commanded), connection site, owning organization, maintaining organization, state mile post, and the "show on map" link. The user can choose to show or hide columns, and the system will remember their preference the next time they view the on/off device list, even if they log out of the system. The system will require that the description/location column always be visible, however.

While most columns listed above are self explanatory, the following information explains those that are not. The "device state (actual)" is the state of the device (on or off) as the system last queried from the device. In contrast, "device state (commanded)" is the last commanded state and does not mean the device is actually in that state, although it should be unless there is a hardware failure. The "show on map" column includes a link for each device that has a lat/long to allow the user to easily viewed on the home page map.

7.2.9.18 Manually Arbitrate Arbitration Queue

A user with the Configure Arbitration Queue right can manually set the priority of items in the queue. For on/off devices, the reordering of items is supported, but has no effect on the state of the device since all active entries on the queue desire the same action; for the device to be activated. This would be the same as if a DMS had multiple items on its queue that have the exact same message; reordering items in such a queue would always result in that same message being displayed.

7.2.9.19 Poll On/Off Device

The system will allow a user with the Maintain On/Off Device right for the owning organization of the device to poll the device while it is online. When polling the device for status, if the system detects the device state (on or off) does not match the desired, commanded state, the

system will send a command to place the device in the desired state. The system will show the user detailed status regarding commands that are sent to the device and the status of the polling operation. If a communication failure or hardware failure is detected during the poll, or the device was previously failed and is determined to be OK, the device status will be updated appropriately, including the last status timestamp and last contact timestamp (if contacted). See the Detect On/Off Device Failure use case for details on the detection of communication and hardware failures.

The system will periodically poll the device while it is online if automatic polling is enabled for the device. If the user polls a device that has automatic polling enabled, the system will not alter the automated polling cycle. (If the user polls a device that is due to be automatically polled in another minute, for example, the automatic poll will still happen at that time.)

7.2.9.20 Process On/Off Device Arbitration Queue

When an on/off device is online, the system will periodically evaluate the device's arbitration queue to determine if the device state needs to be changed, based on usage from traffic events. When a traffic event response plan contains the on/off device and the user executes the response plan item, the system will place an associated item on the on/off device's arbitration queue. When the device is online, if there are ANY such items on the arbitration queue for an executed response plan item, the system will activate (turn on) the on/off device. The system will not deactivate (turn off) the on/off device until there are no such items remaining on device's arbitration queue (or the device is taken offline or put into maintenance mode).

7.2.9.21 Put On/Off Device Into Maintenance Mode

The system will allow a user with the Manage Device Comms right for the owning organization of an on/off device to put the device into maintenance mode. When the device is put into maintenance mode, the system will stop arbitration queue processing for the device, send it a "deactivate" command (even if the system already believes the device is not active), and then transition to the maintenance mode state. If the command to deactivate (turn off) the device fails, this will not keep the device from transitioning to the maintenance mode state. The system will stop automatic polling of the on/off device (if enabled) when the device is put into maintenance mode.

7.2.9.22 Put On/Off Device Online

A user with the Manage Device Comms right for the owning organization of an on/off device can put the on/off device online if it is currently offline or in maintenance mode. When the device is put online, the system will resume automated polling, if enabled in the device configuration, and will resume processing of the device's arbitration queue. The system will log a message to the operations log when a user places an on/off device online.

7.2.9.23 Remove On/Off Device

A user with the Manage On/Off Device right for an on/off device's owning organization can remove the on/off device from the system. The system will only allow this action to be performed if the device is offline. The system will prompt the user for confirmation to help prevent accidental removals. The system will log a message to the operations log when a user removes an on/off device from the system.

7.2.9.24 Remove On/Off Device From Folder

A user with the Configure System right can remove an on/off device from a folder.

7.2.9.25 Remove On/Off Device Plan Item

A user with the Modify Plans right can remove an on/off device plan item from a plan. The system will prompt the user to confirm this action.

7.2.9.26 Remove On/Off Device Type

The system will allow a user with the Configure System right to remove an existing on/off device type from the system if there are no on/off device configurations using that type. The system will prompt the user to confirm their action to help prevent accidental removal.

7.2.9.27 Remove Response Plan Items

The system allows a user with the Respond To Traffic Event right to remove one or more response plan items from the response plan of an event. The user can select an individual item, choose multiple items, or choose to remove all items. This feature is updated in R14 to allow on/off device response plan items to be removed.

7.2.9.28 Respond to Device Failure Alert

A user with the Manage Device Failure Alerts right can choose to resolve a device failure alert. The system will handle this request by showing the user the details page for the device for which the alert was generated. CHART ATMS R14 adds the ability for this feature to work with on/off devices.

7.2.9.29 Revoke On/Off Device Response Plan Item

When an On/Off Device Response Plan Item is revoked, the system will set the item to "not executed" and command the device's arbitration queue to evaluate. See the Process On/Off Device Arbitration Queue use case for details.

7.2.9.30 Revoke Response Plan Items

The system allows a user with the Respond To Traffic Event right to revoke execution of one or more response plan items from the response plan of an event. The user can select an individual item, choose multiple items, or choose to revoke execution of all items. This feature is updated in R14 to allow on/off device response plan items to be revoked.

7.2.9.31 Search Maint Portal for Device

The device maintenance portal allows the user to search for a device. This feature is modified in R14 to include on/off devices in the search. The following on/off device fields will be searched: name, location description, operations center name. The search is case insensitive. The search results page will show all devices that matched the search,organized by device type, including on/off devices. For each device, the following information is shown: name, location description, and an icon that represents the device type and status. The system will allow the user to view the details page for a device shown in the search results.

7.2.9.32 Search Operations Web Site

The system allows a user to search the application for items that match text provided by the user. The following types of items are searched: traffic events, highway advisory radios (HAR), detectors, plans, monitors, dynamic message signs (DMS), operations centers, SHAZAMs, cameras, video tours, and as of CHART ATMS R14, on/off devices. By default, the search searches all of the object types listed above with a case insensitive search. Optionally, the user can choose to limit the search to specific object types, or to make the search case sensitive. All objects that match the search are shown on a search results page, which is modified in CHART ATMS R14 to also show any on/off devices that match the search criteria.

7.2.9.33 Search for Devices and Plans to Add to Response Plan

A user with the Respond to Traffic Event right can search for devices and plans to add to the response plan of an event, including on/off devices as of R14. The user can also limit the search to a specific type of device, and in R14 this includes on/off devices. If during a search the system finds exactly one matching item, the system will automatically add that item to the response plan without requiring further user selection. If multiple items match, the search results will be shown to allow the user to select the devices, plans, or individual plan items to be included. This includes a new section of the search results for on/off devices added in R14 as well as plan items that can be on/off device plan items, also added in R14.

7.2.9.34 Search or Select Plan or Plan Items to Add to Response Plan

If the search for devices and plans is limited to only plans, or the user chooses to select from the list of plans, the search/selection is different than when searching devices and plans, searching a specific device type, or when selecting devices. When only plans are involved, the search results/selection page is specific to plans. It will be initially filtered based on criteria in the event (event type, county, etc.) and if the user did a search, it will also be filtered by that free form text. The user can change the filtering and/or free form text as desired while searching for plans to include, and can choose to add all items in a plan, or individual items. In R14, the list of plan items can contain on/off device plan items. If the entire plan is added to the traffic event response plan, those on/off device plan items will be included. Also, if the user chooses to select individual plan items to include, on/off devices can be selected.

7.2.9.35 Select On/Off Device for Response Plan

The system will allow a user with the Respond To Traffic Event right to view a list of on/off devices for the purpose of adding one or more devices to the response plan of a traffic event as response plan items. If the traffic event has a lat/long, the device list will be sorted by distance from the traffic event. Devices without a lat/long will appear at the end of the list. The list will initially be filtered if the user's op center has one or more areas of responsibility defined or has one or more on/off devices in a system folder assigned to their center. If the user doesn't have any areas of responsibility assigned and they don't have any on/off devices in folders assigned to their center, the list will include all on/off devices in the system. If initially filtered, the user can choose to see all devices and the filter will be removed.

7.2.9.36 Send On/Off Device Failure Alert

An on/off device can be configured to send alerts when a communication failure is detected or when a hardware failure is detected, or both. In either case, the alert is sent to the operations center configured to receive comm failure alerts or hardware failure alerts respectively. The system allows configuration such that these are the same center. The system will ensure that only one device failure alert is open for an on/off device at one time, preventing multiple alerts for the same device. This is especially helpful for a device that is fluctuating between OK, hardware failed, and/or comm failed states. No alert will be sent when a device transitions from a failed state to the OK state.

7.2.9.37 Send On/Off Device Maintenance Mode Command

When an on/off device is in maintenance mode, the system will allow a user with the Maintain On/Off Device right for the device's owning organization to send maintenance mode commands to the device. The user can command the device to activate (turn on) or to deactivate (turn off), regardless of the current status of the device. (The command to deactivate can be sent even if the device is not currently active, for example.)

7.2.9.38 Send On/Off Device Notification

If an on/off device is so configured, the system will send notifications to the configured notification group(s) when an on/off device is detected to be hardware failed, comm failed, and optionally (based on a configuration file setting) when a device is detected to be OK after it was previously failed. The criteria for detecting a communication failure, hardware failure, or OK status are specified in the Detect On/Off Device Failure use case. For notifications, however, the device must stay in a new state for N consecutive attempts to command/poll it before a notification will be sent for that state. N is defined separately for communication failures, hardware failures, and OK status and will exist in a configuration file. A restart will be required if any of these values are changed in the configuration file. When a notification group is configured to receive both communication failures and hardware failures, the system will prevent sending a second notification to that group when the device transitions between the hardware and communication failure states.

7.2.9.39 Sort On/Off Device List

The user can sort the on/off device list by any of the following columns (when visible): description, location, device type, model, device state (actual), device state (commanded), status, last update time stamp, route, direction, county, connection site, owning organization, maintaining organization, state mile post, and the show on map indicator. The sort can be done in ascending or descending order.

7.2.9.40 Specify On/Off Device Settings

The system will allow the user to specify configuration settings for an on/off device during an add or edit operation. The device name must be specified and cannot match the name of any other on/off device that already exists in the system. The device type must be selected to further identify the type of on/off device. Examples include fog horn and congestion warning sign. These types are configurable in the system profile. See the View On/Off Device Type List use case.

The model must also be specified. This is the model of the relay device used to control the device connected to it. So if the device type is "fog horn" for example, this is the model of the relay device used to turn the fog horn on or off, not the model of the "fog horn" itself. The system will support specifying a model of HWG-ER02a or HWG-ER02b. The HWG-ER02b model is only supported if it has been loaded with the ER02a firmware. The ability to choose a different model lets maintainers know the actual model that is deployed, even though the system will operate both models of devices identically using the ER02a protocol. Note that the system will require the device to be set in the offline mode before it will allow the model to be changed for a device that already exists in the system.

Both the ER02a and ER02b models contain 2 relays on a single device, and the system requires the user to specify which of those relays is to be used.

The system requires the user to enter both an owning and maintaining organization.

The system requires the user to enter the location of the device.

The system requires the user to specify the communication settings for the device. Currently only TCP/IP communications are supported, and the IP Address and port are required.

The system will allow the user to indicate the device should be automatically polled. If polling is enabled, the polling interval must be specified. The minimum polling interval is 1 minute, and the maximum is 24 hours. The polling interval resolution is one minute. The default polling interval when adding a device is 5 minutes, however the user can override this value.

The system allows the user to enter alert and notification settings for the device. An operations center to receive device failure alerts for a communication failure can be specified. An operations center to receive device failure alerts for a hardware failure can be specified. One or more notification groups to receive hardware failure notifications can be specified. One or more notification groups to receive communication failure notifications can be specified.

7.2.9.41 Specify On/Off Device Type Settings

When adding a new on/off device type to the system, or editing an existing one, the system will allow the following settings to be specified. The system will require the user to enter a name for the on/off device type. The system will require that the name is not currently in use for any other on/off device type in the system.

The system will require the user to indicate whether or not custom icons will be used for the on/off device type. If the user indicates custom icons will NOT be used, the system will utilize a standard set of icons that will be used to represent an on/off device of this type in its various modes and states. If the user indicates custom icons will be used, they must first be installed manually (without the use of CHART ATMS) into the web server(s) hosting the CHART ATMS GUI(s). The user must then specify the name of the subdirectory within the ATMS images/onOffDevices directory where the custom images are located. The user must specify the file name prefix the icons use. The system appends to this name to arrive at the full file names to use based on the device's state and mode. The user must also specify the icon size (width and height) to be used when displaying the icons on a map.

7.2.9.42 Take On/Off Device Offline

The system will allow a user with the Manage Device Comms right for the owning organization of an on/off device to take the device offline. When the device is taken offline, the system will stop arbitration queue processing for the device, send it a "deactivate" command (even if the system already believes the device is not active), and then transition to the offline state. If the command to deactivate (turn off) the device fails, this will not keep the device from transitioning to the offline state. The system will stop automatic polling of the on/off device (if enabled) when the device is taken offline.

7.2.9.43 Transfer Resources

The system will allow an operator to transfer resources (traffic events and devices in maintenance mode) that are controlled by their center to another center that has at least one logged in user. A user with the Transfer Any Shared Resource right can transfer resources between any centers (not just their own). In CHART ATMS R14, on/off devices in maintenance mode are added as resources that can be transferred.

7.2.9.44 View Arbitration Queue

The system allows the user to view the arbitration queue for any arbitrated device (DMS, HAR, and as of R14, on/off devices). The entries are sorted by their priority, however priority has no effect on on/off devices because the action requested (activate the device) is the same for every queue entry. If a device supports displaying / playing a message, the requested message is shown (does not apply to on/off devices). The event associated with each queue entry is shown. The latest queue status and device status is also shown when viewing the arbitration queue.

7.2.9.45 View Close Devices

The system allows the user to view devices close to a traffic event when viewing the details for the event. This feature is changed in R14 to include on/off devices in the list of close devices, and to allow on/off devices to be added to the response plan of the event from the close device list if the user has the Respond to Traffic Event right. The close device list only applies if the event has a lat/long specified, and only devices that also have a lat/long are considered (including on/off devices). Only devices within a user selected radius of the event are included in the close devices list. The following details will be shown for each on/off device that appears in the close devices list: Name, Location Description, Distance from the Event, Route, Direction, Intersecting Feature, Action Description, Current Device State (activated/on or deactivated/off), current mode (online, offline, or maint), and the current status.

7.2.9.46 View Close Devices Map

CHART ATMS allows a map to be viewed for a traffic event that shows all devices close to the event. "Close" is defined by a radius (in miles) that can be set by the user. This map is being modified for R14 to include on/off devices. When this map is displayed, it will be panned/zoomed such that all devices deemed "close" will appear on the map, including on/off devices. If the user changes the radius setting, the map will again pan/zoom such that all "close" devices are shown. The user can choose to show/hide map layers, including the layer that includes on/off devices. A user with the Respond to Traffic Event right can add devices to the response plan of an event by selecting devices on this map and then choosing to add them to the

response plan, including on/off devices. If a user has made a selection, the system will allow the user to clear their selections without adding the devices to the response plan. If a device is already included in the response plan of the event, the system will indicate this fact via the icon shown for the device and the drag over text that is shown when the user drags their mouse over the device icon. This functionality is also included for on/off devices. If the user has opened popups on this map, the user can close all of them at one time (including those for on/off devices). The user can request the map to refresh the data for all devices shown on the map, including on/off devices.

7.2.9.47 View Contents of Folder

The system allows a user to view the content of a folder. For R14, the content of a folder includes any on/off devices that have been added to the folder. The following information will be shown for each on/off device: Description/Location, Device State (actual), Status, and a list of events that are currently using the device as part of their response plan (and an indication of which of those are active on the device's arbitration queue).

7.2.9.48 View Create Event Map

CHART ATMS includes a map that can be used when creating a new traffic event. This map is updated in R14 to include on/off devices.

7.2.9.49 View Device Location

The following information is displayed when viewing the location for a device: location description, lat/long, state, county or region, route type, route number (or name, and flag to indicate which to use), direction (including bi-directional directions), proximity to intersecting feature (if any), and intersecting feature information (if any). Intersecting feature information includes intersecting route type, route number (or name, and flag to indicate which to use), state or county milepost, or available exit information. If the proximity type is between or from/to, two intersecting features may be displayed.

7.2.9.50 View Home Page Map

CHART ATMS provides a map on the home page of the application. This map is modified in R14 to allow On/Off Devices to be viewed on the map. See the View On/Off Devices on Map use case for details.

7.2.9.51 View Maint Portal Device Details

The maintenance portal allows the details to be viewed for any device shown in a device list or on the search results page. This feature is updated in R14 to allow the details for an on/off device to be viewed in the maintenance portal. The details page for a device in the maintenance portal shows the same data that is available on the device details page in the main CHART ATMS portal, with a few exceptions that are unchanged for R14, none of which apply to on/off devices. Specific formatting for device details applies to the maintenance portal, however. All information is left justified, and the name and location description are shown at the top of the page. The actions available for the device will match the actions available via the main CHART ATMS portal based on the user's rights, except for Copy and Remove, which are not supported

in the maintenance portal. All actions appear at the top of the page beneath the name and location description.

7.2.9.52 View Maint Portal Device List

The device maintenance portal allows users to view a list of devices. This feature is updated in R14 to allow a list of on/off devices to be viewed. Device lists can be pre-filtered by mode and status, or the user may choose to view all devices of that type that exist in the system. The default filter shows only devices in areas of responsibility associated with the user's op center (if any) and devices in any folders assigned to the op center. If the user's op center does not have any areas of responsibility associated and there are no devices included in any folders associated with the op center, all devices in the system will be shown. The number of devices displayed is shown, and if filtered, the number of devices that would appear if the list was not filtered is also shown. Any filters in use will be displayed and the user can remove all filters with a single action. The information included for each device in a device list includes name, location description, and an icon that represents the device type and status. A user can choose to view the details page for any device shown in a device list.

7.2.9.53 View Maint Portal Home Page

The maint portal home page provides access to the search feature and device lists. This page is accessible from every other page in the maint portal, including the on/off device list and on/off device details pages being added for R14.

7.2.9.54 View Map

CHART ATMS allows the user to view various types of maps throughout the system. CHART ATMS maps show icons to represent the locations of various objects defined within the system. In R14, the ability to view on/off devices is added to some of these maps as specified in other use cases. General map features that apply to all objects shown on maps also apply to on/off devices, as follows:

1. If icons on the map overlap, the system will allow the user to click on any of the overlapping icons to see a list of all objects that are overlapping so they may choose the desired object.

2. When the user hovers their mouse over overlapping items, the system will show the user identification information for each of the overlapping items.

7.2.9.55 View On/Off Device Details

The system will allow a user to view the detailed status and configuration information, although some configuration information is only available to users with specific user rights. The system will show the device name, location, current state (on or off, both commanded and as queried from the device), operational status, status time stamp, and last contact time stamp. The operational status will include the mode of the device (online, offline, maintenance) and the status (OK, communication failed, hardware failed). If the device is in maintenance mode, the system will show the operations center that is responsible for the device (controlling op center). If the device is online, the system will show the list of traffic events that have an item on the device's arbitration queue (if any), and will indicate which have an item which is active.

The configuration details shown for an on/off device will include the model, device type, relay number, owning and maintaining organizations, network connection site, location details, automatic polling enabled/disabled flag, polling interval (if polling is enabled), and the alert/notification settings. The alert/notification settings include the name of the op center to be alerted if a communication failure is detected (if any), the name of the op center to be alerted if a hardware failure is detected (if any), the names of notification groups to be notified when a communication failure is detected (if any), and the names of notification groups to be notified when a hardware failure is detected (if any). If the user has the View Sensitive On/Off Device Config right for the device's owning organization, the system will show the configured IP address and port used to communicate with the device.

7.2.9.56 View On/Off Device List

Users of CHART ATMS can view the list of On/Off devices that exist in the system. By default, the list will be filtered to include only the On/Off devices in the areas of responsibility assigned to the user's op center plus those in any folders assigned to the user's op center. If there are no areas of responsibility assigned to the op center and no on/off devices in folders assigned to the op center, all On/Off devices will be shown. The system will also allow the on/off device list to be initially filtered to include only online devices, only online devices that are also active, only those offline, only those in maint mode, only those with a comm failure, only those with a hardware failure, or only those with a comm marginal status.

7.2.9.57 View On/Off Device Location on Map

The system will allow a user viewing the details of an on/off device to view the device on the home page map if the device has a latitude and longitude defined as part of its location details.

7.2.9.58 View On/Off Device Type List

The system will allow a user with the Configure System right to view the list of on/off device types that are defined in the system. These types can be assigned to on/off devices to further classify them. Some examples of these types are fog horn, fog beacon, and congestion warning sign.

7.2.9.59 View On/Off Devices on Map

The system will allow on/off devices to be displayed on a CHART ATMS map. All on/off devices shown on a map will appear on their own layer. The icon used to represent an on/off device will be the icon configured for the device type assigned to the on/off device, and different versions of the icon will be used to represent the current device mode and status, including whether or not the on/off device is activated (turned on). The user can drag their mouse over an on/off device on the map to see the device name, type, and whether or not the device is activated. The user can click on the icon for an on/off device to view a popup (also known as a callout) that shows details about the device. The following information is included in the popup: name, device type, device state (activated/on or deactivated/off), and the list of traffic events that currently include the device in their response plan. In the list of traffic events, the system will indicate which (if any) are active on the device's arbitration queue. The system will allow various actions to be performed directly from the map popup for an on/off device. The user can choose to view the details page for the device or for any of the traffic events shown in the popup.

If the response plan item for a traffic event is executed and the user has the Respond To Traffic Event right, the user can revoke execution of the response plan item. If the response plan item for a traffic event is not executed and the user has the Respond To Traffic Event right, the user can execute the response plan item.

7.2.9.60 View Op Center Report

An operator can view the op center report for the center they are logged into, or the report for any other center. This report shows all traffic events controlled by the center, and all devices in maintenance mode controlled by the center. The list of traffic events also shows any response devices that are in use, along with the associated message if the device is capable of displaying a message. If the message/action for the device is not currently active on the device, an indicator will be shown to specify why. For a device that supports displaying/playing messages, a message may not be active due to a higher priority message being active. For all devices, their message/action may not be active due to the device being offline or in maintenance mode, or if the response plan item is not currently executed.

This use case is changed in CHART ATMS R14 to include on/off devices that are being used in the response plan of a traffic event, and to include on/off devices in the list of maintenance mode devices controlled by the center.

7.2.9.61 View Open Events and Devices With Messages

The system allows the user to view all open events and devices with messages. Like the traffic event list, the user can choose to show or hide the devices that exist in each event's response plan. This page is modified in R14 to show on/off devices that exist in an event's response plan when the user chooses to view devices. Also, the list of devices with messages is changed to also include any on/off devices that are currently activated (turned on).

7.2.9.62 View Plans

The system allows the user to view the list of plans that exist in the system and includes sorting, filtering, and search capability. The search capability is modified in R14 to also search the names of on/off device plan items. The user can also view all plan items in a plan, and in R14, this will include on/off device plan items.

7.2.9.63 View Response Plan

The system will allow the user to view the items in a traffic event's response plan. This use case is modified in R14 to show any on/off device response plan items that have been added to the traffic event's response plan. For each item in the response plan, the system will show a description of the device, a description of the message (if the device is capable of displaying/playing a message), the action the item will invoke (if the device is not capable of displaying/playing a message; e.g. for on/off devices), and an indicator to show the status of the item. The status will indicate if the item has been executed and whether or not the item is currently active on the device's arbitration queue. For an on/off device, the system will show if the on/off device is currently activated (turned on).

7.2.9.64 View Response Plan Preview Map

The system provides a map that shows all devices currently included in the response plan for a traffic event. This map is modified for R14 to include on/off devices that are in the response plan of the event.

7.2.9.65 View Specify Location Map

CHART ATMS includes a map that can be used when setting or changing the location of a traffic event or device. R14 adds the ability to view on/off devices on this map.

7.2.9.66 View Traffic Events

The system allows the user to view a list of traffic events that exist in the system (open, open and closed, pending, external). For open events, the user can choose to view the devices in the response plan of the event. As of R14, this will include on/off devices that exist in the response plan. The system indicates if the device is active and if not, will show the reason why. A device may be in the response plan but not active if the device is offline, in maintenance mode, hardware failed, or communications failed. If the device is capable of displaying/playing a message, it might not be active if there is a higher priority message active (does not apply to on/off devices).

7.3 Traffic Event Queue Calculation

7.3.1 Traffic Event Queue Calculation

This use case diagram describes the use cases related to traffic event queue calculation for R14.

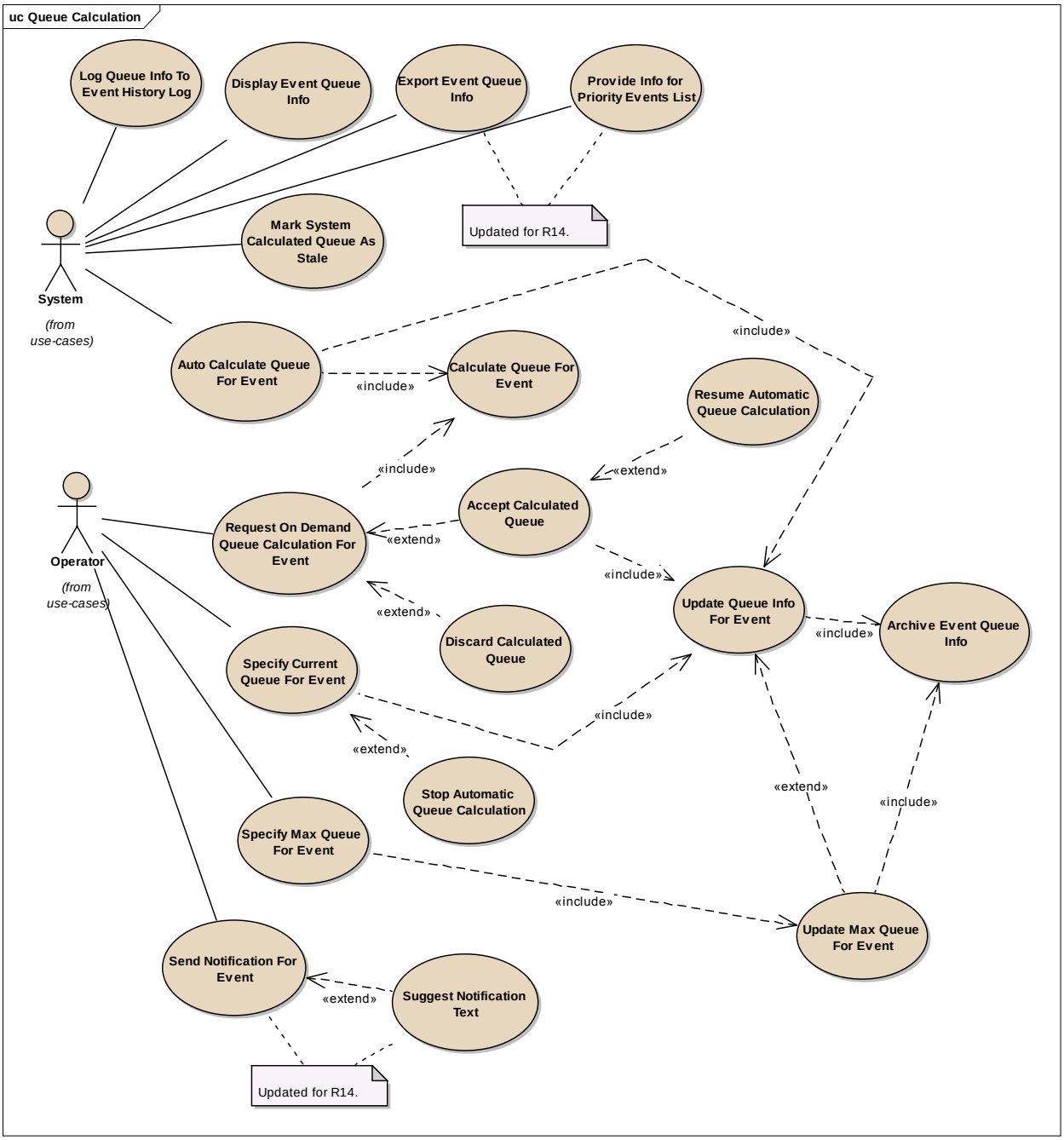


Figure 7-10. Queue Calculation Use Cases

7.3.1.1 Accept Calculated Queue (UseCase)

After an operator requests an on-demand queue calculation the operator can choose to accept the info and update the traffic event with the new info for the specified queue.

7.3.1.2 Archive Event Queue Info (UseCase)

The system will archive queue info to the database in a machine-friendly format. The information will not be viewable by operators as it is intended for use by UMD reporting tools. . Queue info for both directions will be archived whenever it is updated. The info will include: source (system or operator), queue length, direction, timestamp, and an optional warning indicator (stale, edge, or quality). Queue info for maximum queue will also be archived whenever it is updated. The info will include: source (system or operator), queue length, direction, timestamp, and an optional warning indicator (stale, edge, or quality). (Note: Maximum queue will not go stale merely because it has been a while since it was updated; it will only become stale if the source data is stale at the time it becomes the maximum value.)

7.3.1.3 Auto Calculate Queue For Event (UseCase)

The system will automatically calculate a queue length for both directions (2 queues) on an open traffic event on the route the event is located on. Note: a queue will only be calculated if an operator hasn't overridden that queue value (operator supplied value). Automatic calculation will occur on a configurable frequency. The frequency is manages as a multiple of the third party data collection rate. Auto calculation of queue begins when the Event is opened and ends at closure. The automatic calculation feature can be disabled on a system-wide basis.

7.3.1.4 Calculate Queue For Event (UseCase)

The system will calculate queue length for an open traffic events that has a specified route, direction and a latitude / longitude for the route the event is located on. The calculation will be based on third-part real-time travel time probe measurements as compared with historical data from the same source. Calculated queue lengths will be identified as being supplied by the system (as opposed to an operator). Calculated queue lengths can have a warning indicator in the following cases (in order of precedence) : data is stale (based on a configurable stale time), road end is reached (edge/boundary condition), or the data is of low quality (based on configurable settings).

7.3.1.5 Discard Calculated Queue (UseCase)

After an operator requests an on-demand queue calculation the operator can choose to discard the info.

7.3.1.6 Display Event Queue Info (UseCase)

The system will update queue info on an open event details page on the next page refresh after a regularly scheduled automatic queue calculation update. Queue info for and event will include current queue info (1 for each direction of the event) and maximum queue info.

7.3.1.7 Export Event Queue Info (UseCase)

The system will be modified in R14 to export the current queue and maximum queue values. Export of current queue values will be based on functional rights.

7.3.1.8 Log Queue Info To Event History Log (UseCase)

The system will log queue info to a traffic event's history log in a plain text format. Queue info for both directions will be logged. The info will include: source (system or operator), queue length, direction, timestamp, and an optional warning indicator (stale, edge, quality). Queue info for maximum queue will also be logged. The info will include: source (system or operator), queue length, direction, timestamp, and an optional warning indicator (edge, quality). Queue info will be logged at: event open, event close, periodically while the event is open at configurable intervals. Max queue info will also be logged when updated after event closure.

7.3.1.9 Mark System Calculated Queue As Stale (UseCase)

The system will mark system provided values for event queues length as stale for open events if automatic queue calculation is enabled for the system. A queue length will be determined to be stale if its timestamp is before the current time minus a configurable number of minutes.

7.3.1.10 Provide Info for Priority Events List (UseCase)

The system will be modified for R14 to use the new "current" queue values when providing info for the priority events list.

7.3.1.11 Request On Demand Queue Calculation For Event (UseCase)

An operator can request an on-demand queue calculation for an open event that meets the criteria for queue calculation.

7.3.1.12 Resume Automatic Queue Calculation (UseCase)

When an operator chooses to update the traffic event with a system provided on-demand queue calculation; If the queue information being replaced in the traffic event is current being overridden with an operator supplied value, automatic queue calculation will resume for that queue.

7.3.1.13 Send Notification For Event (UseCase)

An operator with the send notification right, can create a notification from within the context of a traffic event. The notification should contain details about the event including the event type, location, and roadway details.

7.3.1.14 Specify Current Queue For Event (UseCase)

An operator with Manage Traffic Event right can specify a current queue length for an open traffic event. The system will require the user to acknowledge that automatic queue calculations for the specified queue will be stopped if queue value is currently system provided and the operator completes the update (i.e. user is overriding the system provided value). The queue info will be identified as being provided by an operator and will never have associated warning status values.

7.3.1.15 Specify Max Queue For Event (UseCase)

An operator with Manage Traffic Event right can specify a maximum queue length for an traffic event whether open or closed. The queue information will be identified as being provided by an

operator. The maximum queue info for an event will continue to update automatically after being updated manually by an operator.

7.3.1.16 Stop Automatic Queue Calculation (UseCase)

The system will stop automatic queue calculation for specified queue when an operator overrides a system provided value with an operator supplied value.

7.3.1.17 Suggest Notification Text (UseCase)

An operator is encouraged to use the suggestion generation capability when sending an event notification. The suggestion includes information about the event type, location, roadway details, scene status, and queue length. For R14 the notification text will include the largest current queue length and the direction for that queue abbreviated according to the Lane Direction Abbreviations for notifications as stored in the System Profile.

7.3.1.18 Update Max Queue For Event (UseCase)

The maximum queue info for a traffic event can be updated using two mechanisms: update from a current queue update or update via operator supplied maximum queue value. If the incoming queue length is supplied from a current queue update and is greater than the event's maximum queue, the maximum queue will be updated with the incoming queue info. Note: for a one-directional event, only the primary direction is considered when updating the maximum queue value. When queue info is updated for an event it will be archived to the database.

7.3.1.19 Update Queue Info For Event (UseCase)

The queue information for a traffic event (one queue for each direction of the event) can be updated using 3 mechanisms: update via automatic queue calculation, update via on-demand queue calculation, and update via operator supplied queue value. For automatic queue calculation updates the actual queue length value will only be updated if the change is larger than a configured distance. This queue information will be identified as being system supplied and may contain a warning indicator. For on-demand queue calculation updates the information will also be identified as being system supplied and may contain a warning indicator. For operator queue updates the information will be identified as being supplied by an operator and will also never contain a warning indicator. If the incoming queue length is greater than the event's maximum queue, the maximum queue will also be updated with the incoming queue info.

7.4 Contact Management

This section contains use case diagrams for the R14 Contact Management feature.

7.4.1 Contact Management

This diagram shows functionality related to the management of contacts.

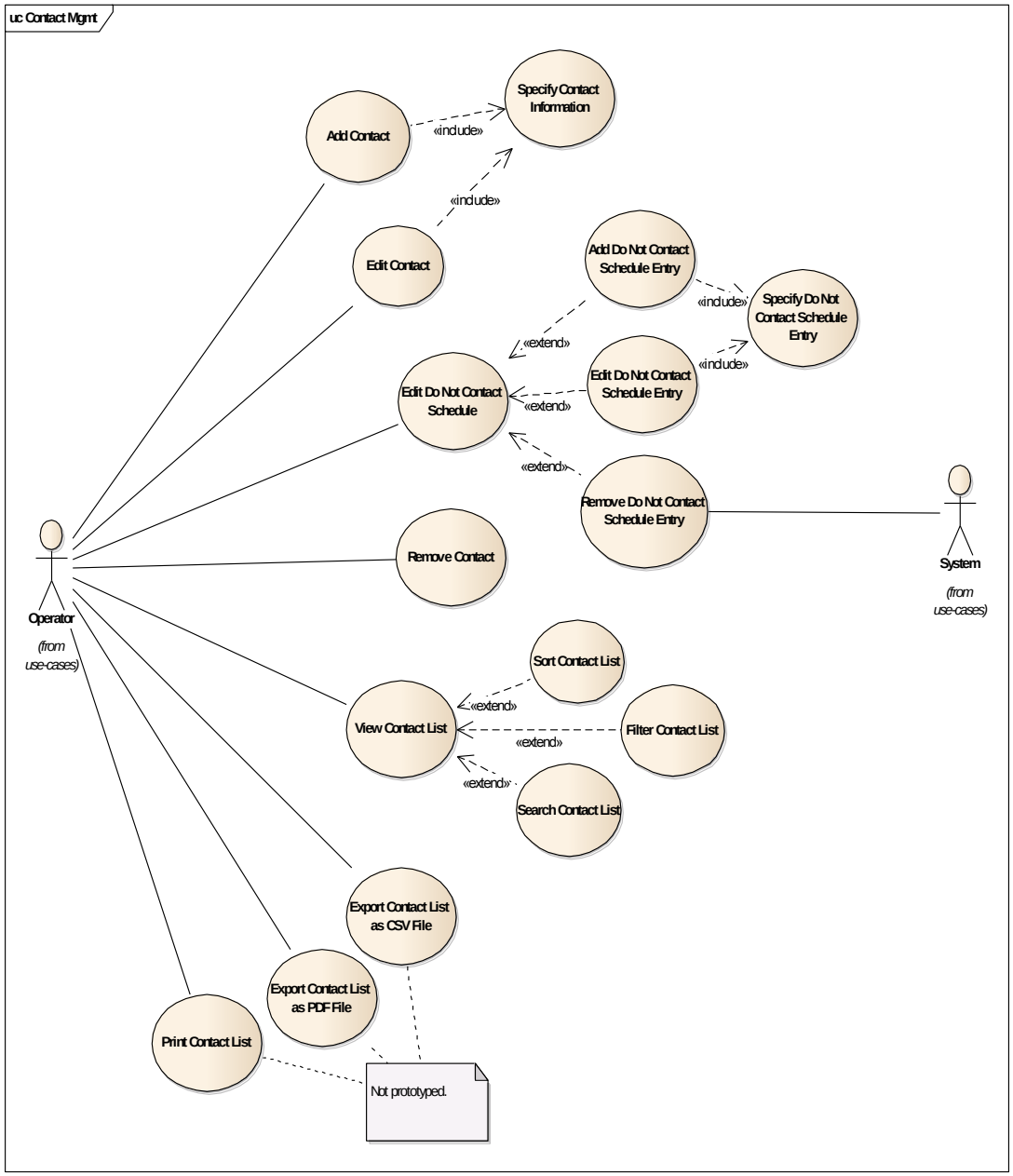


Figure 7-11. Contact Management Use Cases

7.4.1.1 Add Contact

The system will allow a user with the Configure Contacts right to add a new Contact, specifying information as defined in the Specify Contact Information use case. The system will display the Add User form with the username pre-populated after adding a contact with a specified ATMS username, if the person adding the contact has the Manage Users right and the ATMS username does not match a known user.

7.4.1.2 Edit Contact

The system will allow a user with the Configure Contacts, Configure Contact Email, or Configure Notification Group and Contact Associations right to edit an existing Contact, specifying information as defined in the Specify Contact Information use case. (Note that each of these rights allows a different subset of information to be edited. Configure Contacts allows all fields to be edited, but the other rights allow only certain notification-specific fields to be edited). The system will display the last update time for the contact.

7.4.1.3 Specify Contact Information

The system will allow a user adding or editing a Contact to specify the following information: Agency Name, First and Last Name, Office / Shop, ATMS Username, Radio Call Sign, Business Address, Memo, Title, Phone Numbers, Allow Notification flag, Email Address, Notification Groups, Op Centers, and Additional AORs. The system will allow the user to specify the type of each phone number: Work, Home, Mobile, Pager, Fax, or Other. The system will allow more than one phone number of the same type to be specified. The system will allow the user to specify the priority order of phone numbers for a contact. The system will require that the First and Last Name are specified, or that the Agency is specified. (Note: All three may be specified). The system will allow the user to select a value already in use by other contacts for the Agency and Office / Shop fields. The system will allow a user to specify an ATMS Username matching the username of an existing user in the system. The system will require the Email Address to be specified if the Allow Notification flag is set to true.

A user with the Configure Contacts right will be able to specify all of the above information. A user without the Configure Contacts right, but with the Configure Contact Email right will be able to edit the contact to specify the Allow Notification flag and the Email Address, but not the other fields. A user without the Configure Contacts right, but with the Configure Notification Group and Contact Associations right will be able to edit the contact to specify the notification groups, but not the other fields.

7.4.1.4 Edit Do Not Contact Schedule

The system will allow a user with the Edit Do Not Contact Schedule right to edit a user's Do Not Contact Schedule. The system will allow the user to view the schedule entries.

7.4.1.5 Add Do Not Contact Schedule Entry

The system will allow a user editing a contact's Do Not Contact Schedule to add a schedule entry, specifying information as defined in the Specify Do Not Contact Schedule Entry use case.

7.4.1.6 Edit Do Not Contact Schedule Entry

The system will allow a user editing a contact's Do Not Contact Schedule to edit a schedule entry, specifying information as defined in the Specify Do Not Contact Schedule Entry use case.

7.4.1.7 Specify Do Not Contact Schedule Entry

The system will require a user to specify the date range, days of week, and time of day range when adding or editing a Do Not Contact Schedule entry. The system will require the user to select a date range type of Unending, Beginning, Through, or Beginning / Through. The system will default to a date range type of Unending. The system will require the user to specify a begin date if the date range type is Beginning or Beginning / Through. The system will require the user to specify an end date if the date range type is Through or Beginning / Through. The system will require the user to specify at least one day of week for a Do Not Contact schedule entry. The system will default to all days of the week. The system will require the user to select a time of day range type of All Day, After, Until, or After / Until. The system will default to a time of day range of All Day. The system will require the user to specify a start time of day if the time of day range type is After or After / Until. The system will require the user to specify an end time of day if the time of day range type is Until or After / Until.

7.4.1.8 Remove Do No Contact Schedule Entry

The system will allow a user editing a contact's Do Not Contact Schedule to remove an entry from the schedule. The system will remove a Do Not Contact Schedule Entry if the date range type is Through or Beginning / Through and the current date is past the end date.

7.4.1.9 Remove Contact

The system will allow a user with the Configure Contacts right to remove a contact from the system. The system will prompt the user for confirmation before removing the contact. The system will prompt a user with the Manage Users right as to whether to delete the ATMS user account matching the ATMS username of the contact when removing a contact with an ATMS username, if the matching user account exists. The system will remove the matching user account if the user confirms that it should be deleted.

7.4.1.10 View Contact List

The system will allow a user with the View Contact Info right to view the Contact List.

The system will allow the user to view the following information: Last Name, First Name, Agency, ATMS Username, Op Centers, Phone Numbers, Do Not Contact Schedule, Email Address, Call Sign, Title, Office / Shop, Allow Notification flag, Notification Groups, Call Lists, Additional AORs, Memo, Business Address, and Last Updated Time. The system will show the following information by default: Last Name, First Name, Agency, ATMS Username, Op Centers, Phone Numbers, Do Not Contact Schedule, Email Address, Call Sign, Title, and Office / Shop.

The system will allow the user to show or hide the following information: ATMS Username, Op Centers, Phone Numbers, Do Not Contact Schedule, Email Address, Call Sign, Title, Office / Shop, Allow Notification flag, Notification Groups, Call Lists, Additional AORs, Memo, Business Address, Last Updated Time. The system will allow the user to view the default set of

columns, if the current set of columns displayed differs from the default. The system will save the column visibility and will apply it the next time the user views the list (even after logging out).

The system will indicate if a contact's ATMS username does not match any known ATMS user in the system, if displaying the ATMS Username in the Contact List. The system will indicate if a contact's Do Not Contact schedule includes the current time, if displaying Phone Numbers in the Contact List.

7.4.1.11 Sort Contact List

The system will allow a user viewing the Contact List to sort the list by Last Name, First Name, Agency, ATMS Username, Op Centers, Email Address, Office / Shop, Allow Notification flag, Notification Groups, Call Lists, Additional AORs, or Last Updated Time. The system will sort on the Last Name by default.

7.4.1.12 Filter Contact List

The system will allow a user viewing the Contact List to filter the list by Agency, ATMS Username, Op Centers, Office / Shop, Allow Notification flag, Notification Groups, Call Lists, Additional AORs, and Last Updated Time. The system will allow the user to clear the filters in the Contact List. The system will display a description of the currently active filters. The system will display the number of filtered items shown, and the total number of items available to be shown.

The system will initially filter the Contact List to show only contacts associated with the user's operations center. The system will initially show all contacts in the Contact List if no contacts are associated with the user's operations center.

7.4.1.13 Search Contact List

The system will allow a user viewing the Contact List to specify search text for searching the list. The system will display only the contacts where the column text contains the search text for the following columns: Last Name, First Name, Agency, Email Address, ATMS Username, or Call Sign. The system will reapply the search text after a sort or filter function is performed in the Contact List. The system will allow the user to clear the search text.

7.4.1.14 Export Contact List as CSV File

The system will allow a user viewing the Contact List to export the list as a CSV file. The system will apply the current filter and sort criteria when generating the Contact List CSV file.

7.4.1.15 Export Contact List as PDF File

The system will allow a user viewing the Contact List to export the list as a PDF file. The system will apply the current filter and sort criteria when generating the Contact List PDF file.

7.4.1.16 Print Contact List

The system will allow a user viewing the Contact List to print the list. The system will apply the current sort and filtering criteria when the user prints the Contact List.

7.4.2 Call List Management

This diagram shows functionality related to the management of call lists.

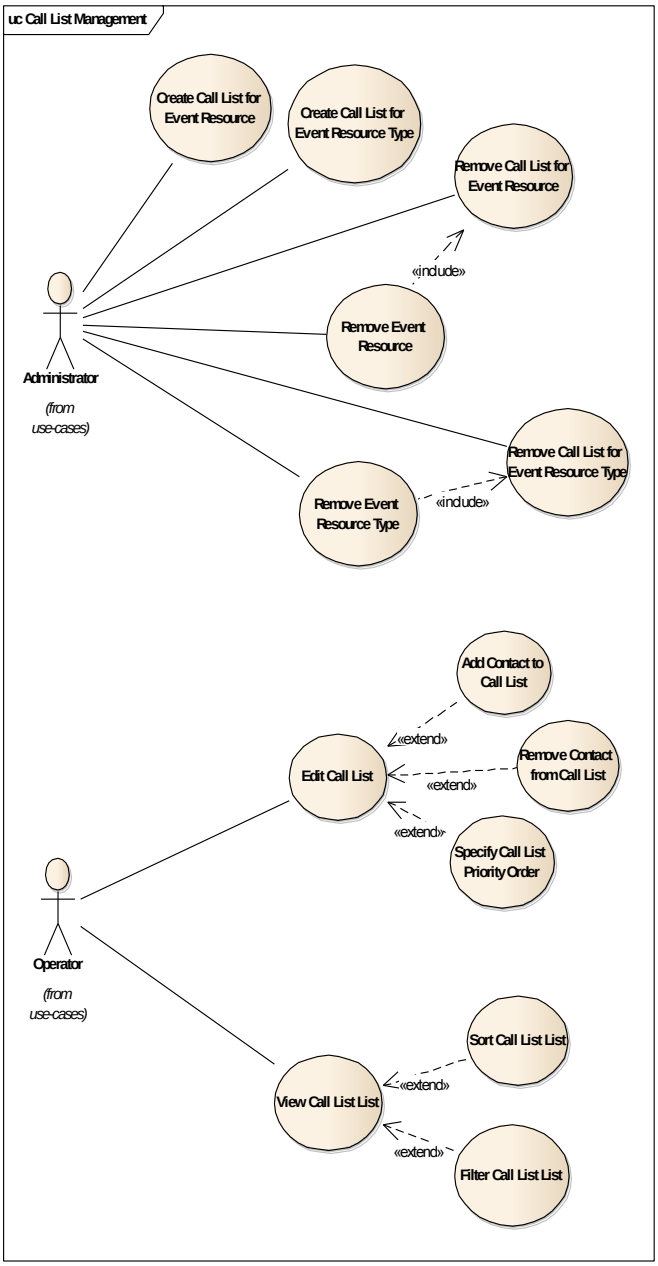


Figure 7-12. Call List Management Use Cases

7.4.2.1 Create Call List for Event Resource

The system will allow a user with the Manage Event Resources right to create a call list for an event resource.

7.4.2.2 Create Call List for Event Resource Type

The system will allow a user with the Manage Event Resources right to create a call list for an event resource type.

7.4.2.3 Remove Call List for Event Resource

The system will allow a user with the Manage Event Resources right to remove a call list associated with an event resource.

7.4.2.4 Remove Event Resource

The system will allow a user with the Manage Event Resources right to remove an event resource. New for R14: The system will remove the call list associated with the event resource (if any) when the event resource is removed.

7.4.2.5 Remove Call List for Event Resource Type

The system will allow a user with the Manage Event Resources right to remove a call list associated with an event resource type.

7.4.2.6 Remove Event Resource Type

The system will allow a user with the Manage Event Resources right to remove an event resource type. New for R14: The system will remove the call list associated with the event resource type (if any) when the event resource type is removed.

7.4.2.7 Edit Call List

The system will allow a user with the Edit Call Lists right to edit a call list. The system will display the name and agency of contacts in the call list, in priority order. The system will allow a user with the Configure Contacts right to invoke the form to edit the contact's information when viewing the editing form for a call list.

7.4.2.8 Add Contact to Call List

The system will allow a user editing a call list to add a contact to the call list.

7.4.2.9 Remove Contact from Call List

The system will allow a user editing a call list to remove a contact from the call list.

7.4.2.10 Specify Call List Priority Order

The system will allow a user editing a call list to move a contact up or down in priority relative to the other contacts in the list.

7.4.2.11 View Call List List

The system will allow a user with the View Contact Info right to view the list of call lists. The system will display the following information for each call list in the list of call lists: Name (event resource or type name), Type (event resource type description), Category (event resource type category), and the Number of Contacts in the call list. The system will allow the user to

view the names and/or agencies of the contacts in an individual call list when viewing the list of call lists.

7.4.2.12 Sort Call List List

The system will allow a user viewing the list of call lists to sort the list by Name, Type, Category, or Number of Contacts.

7.4.2.13 Filter Call List List

The system will allow a user viewing the list of call lists to filter the list by Type or Category. The system will allow the user viewing the list of call lists to clear the filters, if any filters are active. The system will display a description of the currently active filters for the list of call lists, if any filters are active. The system will display the number of filtered items shown in the list of call lists (if applicable), and the total number of items available to be shown.

7.4.3 Contact Usage: Notification

This diagram shows Notification functionality affected by the R14 Contact Management feature.

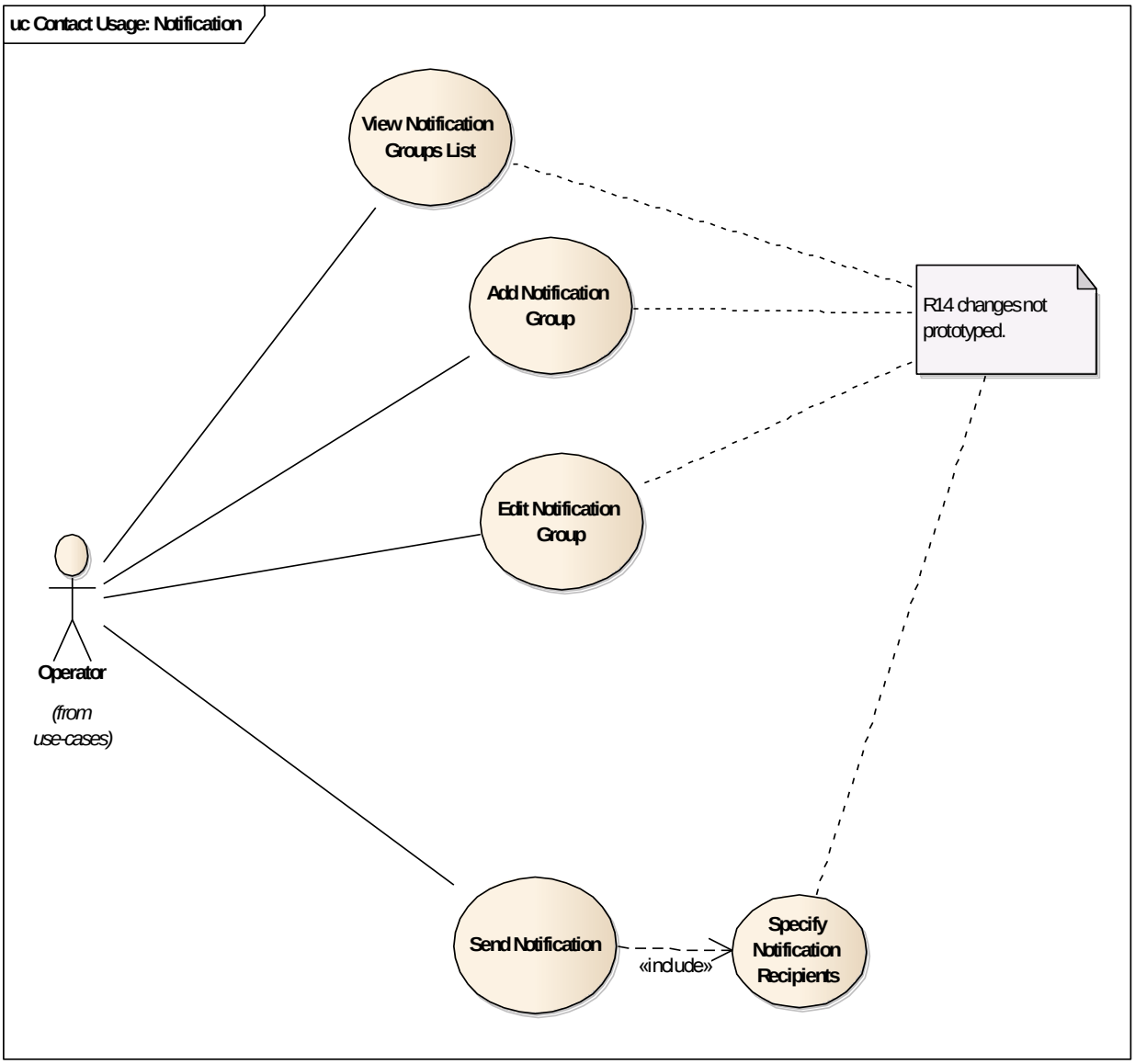


Figure 7-13. Contact Usage Notification Use Cases

7.4.3.1 View Notification Groups List

The system will allow a user with the View Notification Recipients right to view the list of Notification Groups. The Notification Groups List will include columns for the Group Name and Contacts. (NOTE - This functionality already exists prior to R14, but the nature of the contacts is changing so this page may need to be touched, and the layout will be improved to not show all group members by default).

7.4.3.2 Add Notification Group

The system will allow a user with the Configure Notification Groups right to create a notification group. The system will require the user to specify a name for the new notification group. The system will allow a user to specify the contacts that belong in the notification group. New for R14: The system will allow the user to add a contact to a new notification group only if the contact has an email address specified and a Allow Notification flag set to true.

7.4.3.3 Edit Notification Group

The system will allow a user with the Configure Notification Groups or Configure Notification Group and Contact Associations right to invoke the form for editing a notification group. The system will allow a user with the Configure Notification Groups right to change the name of the notification group. The system will allow a user with the Configure Notification Groups right or the Configure Notification Group and Contact Associations right to configure the notification group's contacts. New for R14: The system will allow the user to add a contact to an existing notification group only if the contact has an email address specified and an Allow Notification flag set to true.

7.4.3.4 Send Notification

The system will allow a user with the Send Notifications right to send a notification. New for R14: The system will send a notification to a contact (either contained in the notification group or specified as an individual) only if it has an email address and an Allow Notification flag set to true.

7.4.3.5 Specify Notification Recipients

The system will allow the user to specify notification recipients. The system will allow the user to specify any combination of notification groups and individual contacts. The system will allow the user to search for individual contacts and notification groups. New for R14: The system will allow an individual Contact to be specified as a recipient when sending a notification only if it has an email address and an Allow Notification flag set to true.

7.4.4 Contact Usage: Traffic Events

This diagram shows Traffic Event Management functionality affected by the R14 Contact Management feature.

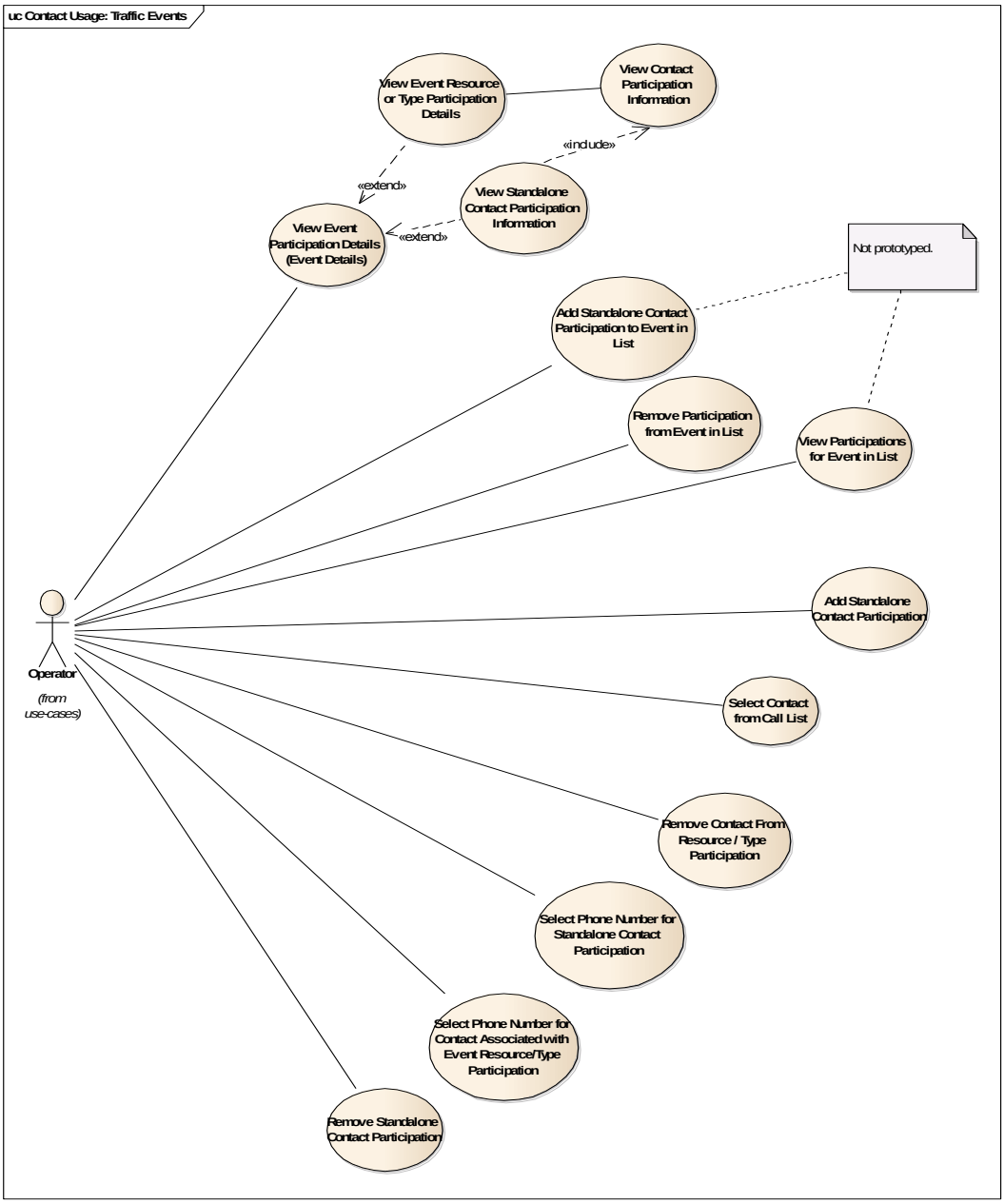


Figure 7-14. Contact Usage Traffic Events Use Cases

7.4.4.1 View Event Participation Details (Event Details)

The system will allow a user with the View Event Details or Manage Traffic Events right to view the Event Details including the Participation Details.

The system will allow a user with the View Traffic Event Details or Manage Traffic Events rights to view detailed information describing a participant's involvement in a traffic event (i.e., "participation").

The system will display the participant's Call Sign, Driver Name, and Notes, if any of these fields were previously specified for the participation record.

The system will indicate whether a participant has been marked as Notified, Arrived / Responded, and/or Departed. The system will display the time corresponding to when the participant entered these states, if applicable.

7.4.4.2 View Event Resource or Type Participation Details

Existing functionality:

The system will display information about an event resource or event resource type's participation in a traffic event. The system will display the event resource or event resource type description. The system will display a description of an individual AVL-associated resource that is representing its corresponding resource type, if applicable. The system will display the resource type category of an event resource or event resource type participating in a traffic event. The system will indicate if an event resource type participating in a traffic event has event resources from which a resource can be selected to represent the resource type.

The system will display the name of a camera associated with an event resource participating in a traffic event, if applicable. The system will allow a user to navigate to the Camera Details page for a camera associated with an event resource, if applicable. The system will allow a user to display a camera associated with an event resource participating in a traffic event on a local monitor, if applicable. The system will allow a user to display a camera associated with an event resource participating in a traffic event in a desktop video window, if applicable.

The system will display the distance in miles between an AVL-associated event resource and the traffic event, if both the event and the resource have geographic locations. The system will allow the user to display an AVL-associated event resource on the map, if both the event and the resource have geographic locations. The system will display a description of the location of an AVL-associated event resource, if available.

New for R14:

The system will indicate if an event resource or event resource type participating in a traffic event has an associated call list containing contacts.

The system will display information about a contact associated with an event resource or event resource type participation, if a contact is associated, as described in the View Contact Participation Information use case.

7.4.4.3 View Standalone Contact Participation Information

The system will display information about a standalone contact's participation in a traffic event (i.e., a contact not associated with an event resource or event resource type), as described in the View Contact Participation Information use case.

7.4.4.4 View Contact Participation Information

The system will display information for a contact participating in a traffic event (either associated with an event resource or event resource type, or as a standalone participant).

The system will display a contact's first and last name, if the contact has a first / last name. The system will display a contact's agency, if the contact has an agency. The system will display the phone number and phone number type used to reach the contact, if it was specified and if the user has the View Contact Info right. The system will display a contact's radio call sign, if the contact has a radio call sign.

The system will allow a user to view detailed information for a contact participating in a traffic event, including first/last name, agency, office/shop, phone numbers and phone number types (if the user has the View Contact Info right), radio call sign, and email address (if the user has the View Contact Info right). The system will allow a user with the Configure Contacts right viewing the contact's detailed information to edit the contact's information.

7.4.4.5 Add Standalone Contact Participation to Event in List

The system will allow a user with the Manage Traffic Events right to add a standalone contact participant to an open traffic event in the Open Events List, Open/Closed Events List, or Operations Center Report, if the event is of a type that supports participation. The system will allow the user to perform a text search to find a contact to add as a participant.

7.4.4.6 Remove Participation from Event in List

The system will allow a user with the Manage Traffic Events right to remove an event resource or type participation record from an open traffic event in an applicable list.

New for R14: The system will allow a user with the Manage Traffic Events right to remove a standalone contact participation record from an open traffic event in an applicable list.

7.4.4.7 View Participations for Event in List

The system will allow the user to view the number of participants assigned to a traffic event displayed in an applicable list if the traffic event is of a type that supports participation. The system will allow a user with the View Event Details right to view the participants assigned to a traffic event shown in an applicable list (the Open Events List, Open/Closed Events List, or Operations Center Report), if the traffic event is of a type that supports participation.

The system will allow the user to view information for a contact participating in a traffic event shown in an applicable list (the Open Events List, Open/Closed Events List, or Operations Center Report). The system will allow the user to view information for a contact associated with an event resource or type participation or for a standalone contact participation. The system will allow the user to view the contact first / last name, agency, office/shop, and call sign. A user with the View Contact Info right will be able to view the phone numbers, do not contact schedule, and email of the contact as well.

The system will allow a user to view the notified, arrived/responded, and departed flags for each participant assigned to an open traffic event shown in an applicable list. The system will indicate whether the arrived/responded and departed flags are currently in auto-detection mode or manual mode, if those flags are not set to true, when displaying the participation records for an open traffic event in an applicable list.

7.4.4.8 Add Standalone Contact Participation

The system will allow a user with the Manage Traffic Events right to add a standalone contact (i.e., without specifying an event resource or type) as a participant in a traffic event. The system will allow a user with the Manage Traffic Events right to enter text to specify a contact to add as a standalone contact participant. The system will allow a user Manage Traffic Events right to enter text to search for a contact to add as a standalone contact participant. The system will allow a user with the Manage Traffic Events right to select a contact from a list of contacts matching the specified search text (if any) to add as a standalone participant to a traffic event.

The system will allow a user with the Manage Traffic Events right to add a standalone contact participant while viewing the Traffic Event Details. The system will automatically suggest a limited number of contacts as the user enters search text for adding a standalone contact participant while viewing the Traffic Event Details. The system will make contact suggestions based on the following priority order: "last name starts with", "agency name contains" (only if last and first names are not specified), and "first name starts with". The system will allow the user to select one of the suggested contacts to add the contact to the traffic event as a standalone participant.

7.4.4.9 Select Contact from Call List

The system will allow a user with the Manage Traffic Events right to select a contact to represent an event resource or an event resource type participation, if the resource or type has a Call List containing contacts.

The system will display the contacts in the Call List associated with the event resource or event resource type participating in the traffic event, when the user chooses to select a contact from a call list. The system will display the contacts in order of priority when showing the selectable contacts in the call list.

The system will initially show the AOR-filtered subset of contacts in the call list, if the AOR-filtered subset is not empty. The system will show all contacts in the contact list if the AOR-filtered subset is empty. The system will include a contact in the AOR-filtered subset if the traffic event has a geographic location, and an AOR assigned to an operations center assigned to the contact contains the geographic location. The system will include a contact in the AOR-filtered subset if the traffic event has a geographic location, and an Additional AOR assigned to the contact contains the geographic location. The system will allow a user to remove the AOR filter to display all contacts in the contact list, if the list is filtered by AOR.

The system will display the following information for a contact in the call list: Name, Agency, Office / Shop, Call Sign, Phone Numbers, and Do Not Contact Schedule. The system will display the phone numbers for a contact only if the user has the View Contact Info right. The system will indicate if the current time is included in the Do Not Contact Schedule. The system will allow a user with the View Contact Info right to select the contact and at the same time specify which of the contact's phone numbers was used to reach the contact. The system will also allow the user to select the contact without specifying which phone number was used to reach the contact.

7.4.4.10 Remove Contact from Resource / Type Participation

The system will allow a user with the Manage Traffic Event right to remove a contact from a resource / type participation.

7.4.4.11 Select Phone Number for Standalone Contact Participation

The system will allow a user with Manage Traffic Events and View Contact Info rights to select which of a contact's phone numbers was last used to reach a standalone contact participating in a traffic event (i.e., a contact not associated with an event resource or an event resource type).

7.4.4.12 Select Phone Number for Contact Asssociated with Event Resource / Type Participation

The system will allow a user with Manage Traffic Events and View Contact Info rights to select which of a contact's phone numbers was last used to reach a contact associated with an event resource or an event resource type participating in a traffic event.

7.4.4.13 Remove Standalone Contact Participation

The system will allow a user with the Manage Traffic Events right to remove a standalone contact participation from a traffic event (i.e., a participation representing a contact rather than an event resource or an event resource type) while viewing the Traffic Event Details.

7.4.5 Contact Usage: User Mgmt

This diagram shows User Management functionality affected by the R14 Contact Management feature.

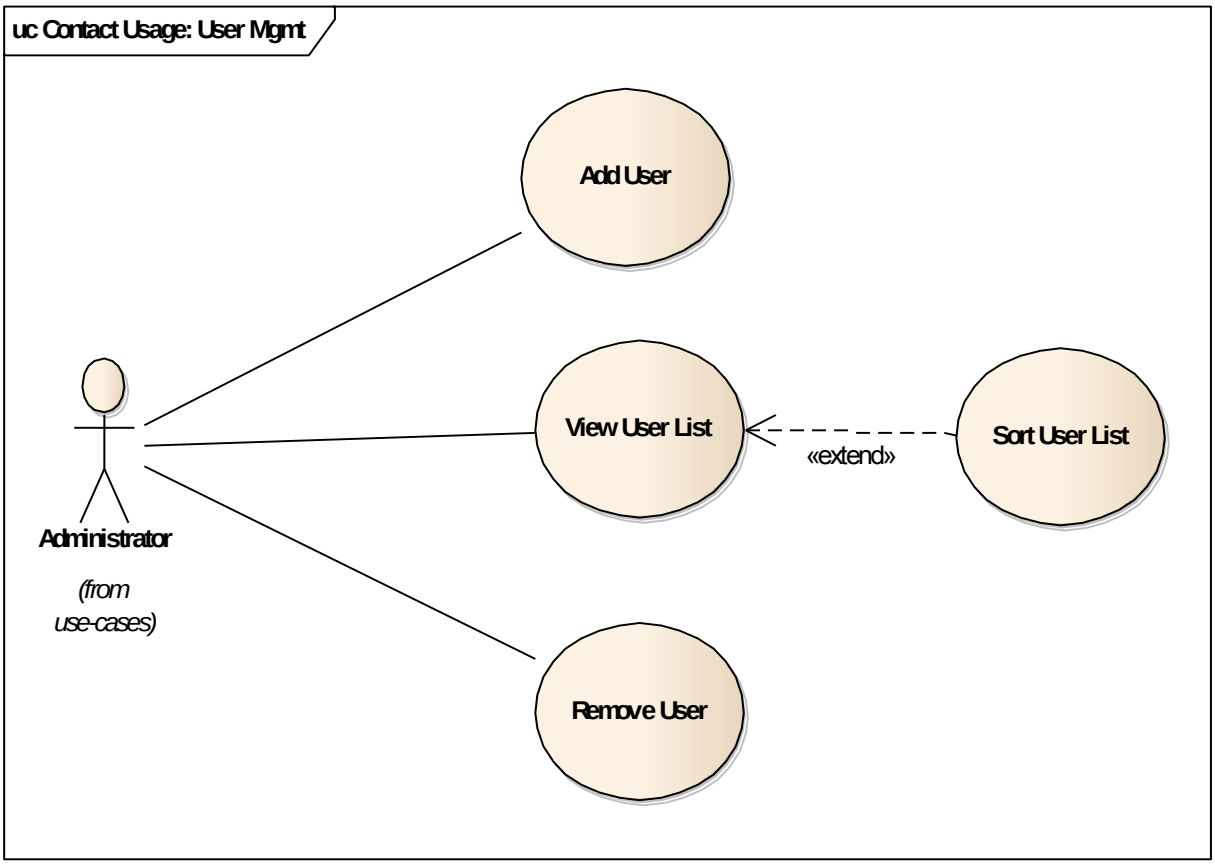


Figure 7-15. Contact Usage User Management Use Cases

7.4.5.1 Add User

The system will allow a user with the Configure Users right to add a user.

New for R14: The system will display the Add Contact form (pre-populated with the username) after creating a new user, if the person adding the user has the Configure Contacts right and there is not already a contact with a matching ATMS username.

7.4.5.2 View User List

The system will allow a user with the View User Configuration or Configure Users right to view the list of users in the system. The system will allow the following information to be viewed for each user: User Name, Contact Name (new for R14), Default Center, Other Centers capability, Selected Other Centers, account Enabled/Disabled status, Assigned Roles, Last Login time stamp, Last Login Center, and Created time stamp.

Also new for R14: The system will allow a user with the Configure Contacts right viewing the user list to bring up the Add Contact form with the ATMS username pre-populated, if no contact exists in the system with a matching ATMS username. The system will allow a user with the

Configure Contacts right viewing the user list to bring up the Edit Contact form, if a contact exists in the system with a matching ATMS username.

7.4.5.3 Sort User List

The system will allow the user to sort the User List using the data in the following columns: User Name, Contact Name (new for R14), Default Center, Other Centers capability, Selected Other Centers, account Enabled/Disabled status, Assigned Roles, Last Login time stamp, Last Login Center, and Created time stamp.

7.4.5.4 Remove User

The system will allow a user with the Configure Users right to delete a user account.

New for R14: The system will prompt a system administrator with the Configure Contacts right as to whether to remove the contact with the same ATMS username as the account being deleted, if such a contact exists in the system. The system will remove the contact if the user confirms that the contact should also be removed.

7.5 Enhancements (LevA PRs)

This section contains use cases for LevA PRs that have been included as part of CHART ATMS R14.

7.5.1 User Management Enhancements (User Requests)

This diagram shows the use cases for the user management enhancements to allow a user to request an account for CHART ATMS, request to have an existing account enabled, or to request to have their password reset.

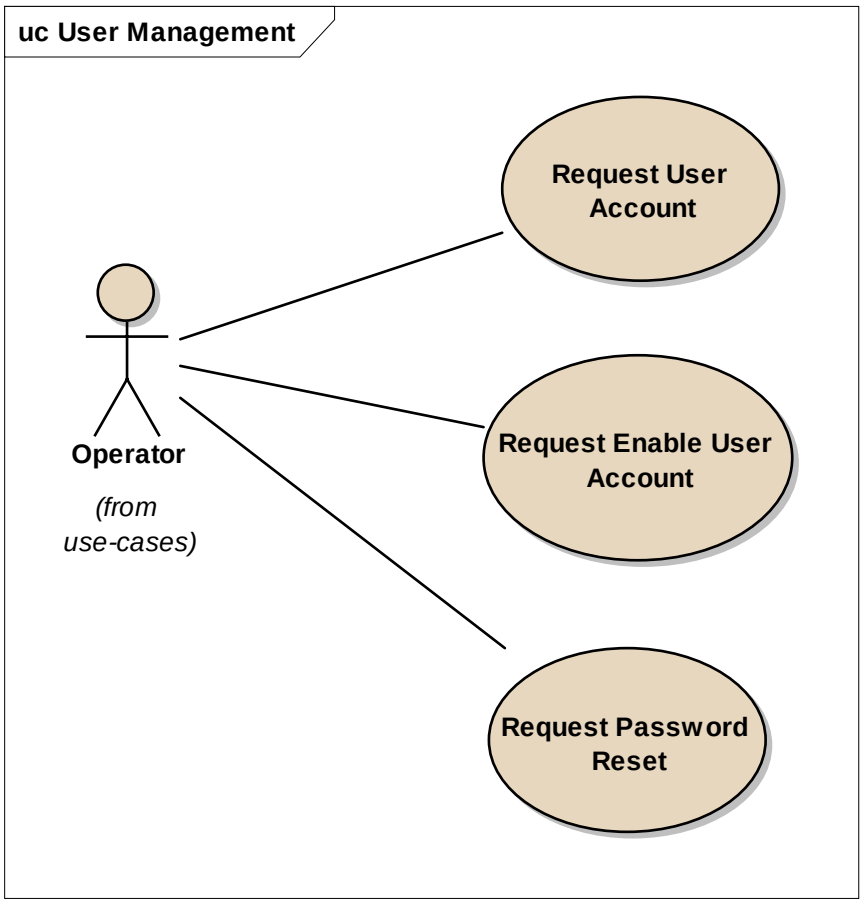


Figure 7-16 User Management Enhancements Use Cases

7.5.1.1 Request User Account

The system shall allow a user to request that a user account be created to allow them to log into the system. The system will require the user to enter their Agency Name, First and Last Name, or both. The system will allow the user to enter their office/shop and job title. The system will require the user to enter their business phone, e-mail address, or both. Upon submitting the form, the system will send an e-mail to a notification group configured to receive such requests and the

e-mail will include the information entered by the user on the form. The e-mail will also contain a link to allow the administrator to view the Add Contact form pre-populated with the information entered by the user.

7.5.1.2 Request Enable User Account

The system shall allow a user to request for a user account to be enabled. The system will require the user to enter their User Name, First Name, and Last Name. The system will require the user to enter their business phone, e-mail address, or both. Upon submitting the form, the system will send an e-mail to a notification group configured to receive such requests and the e-mail will include the information entered by the user on the form. The e-mail will also contain a link to allow the administrator to enable the user's account (after they are logged into CHART ATMS).

7.5.1.3 Request Password Reset

The system shall allow a user to request to have their password reset. The system will allow the user to enter their user name or leave the field blank if they have also forgotten their user name. The system will require the user to enter their first name, last name, and e-mail address. The system will allow the user to enter their business phone. Upon submitting the form, the system will attempt to initiate an automated password reset if the user has entered a valid user name and an e-mail address that matches the contact record associated with the user account. If the automated reset process cannot be used for any reason, the system will send an e-mail to the notification group configured to receive password reset requests and the e-mail will contain the information entered by the user on the request form.

When the automated password reset process can be used, the system will send an e-mail to the end user with a temporary link they can use to reset their password. When the user clicks the link, their browser will take them to a page where they will be forced to choose a new password. After changing their password they will be logged into the system.

8 System Interfaces Design (IDL)

For convenient viewing, new and modified IDL designs are included in a separate document for viewing with a browser. Open the file `index.htm`. See the example in Figure 8-1 for where to find links to the classes → IDLInterfaces diagrams.

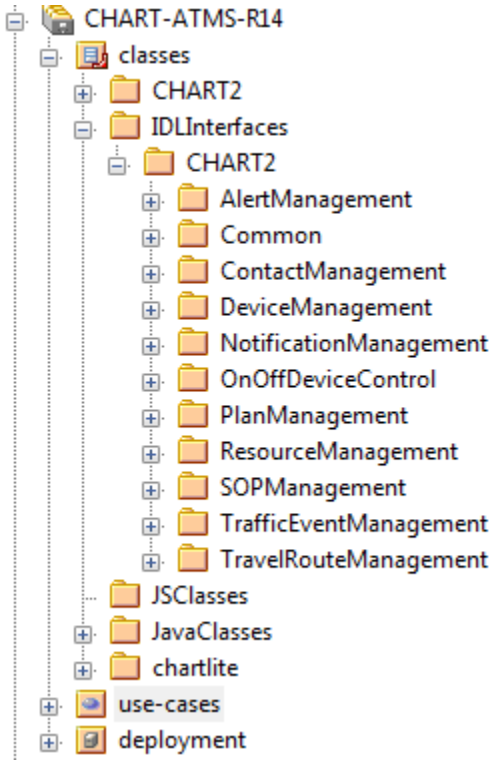


Figure 8-1. Where to Find IDL Interfaces Classes in HTML Design

9 Package Designs

For convenient viewing, new and modified package designs are included in a separate document for viewing with a browser. Open the file `index.htm`. See Figure 9-1 for where to find links to the classes → CHART2 diagrams and classes → chartlite diagrams.

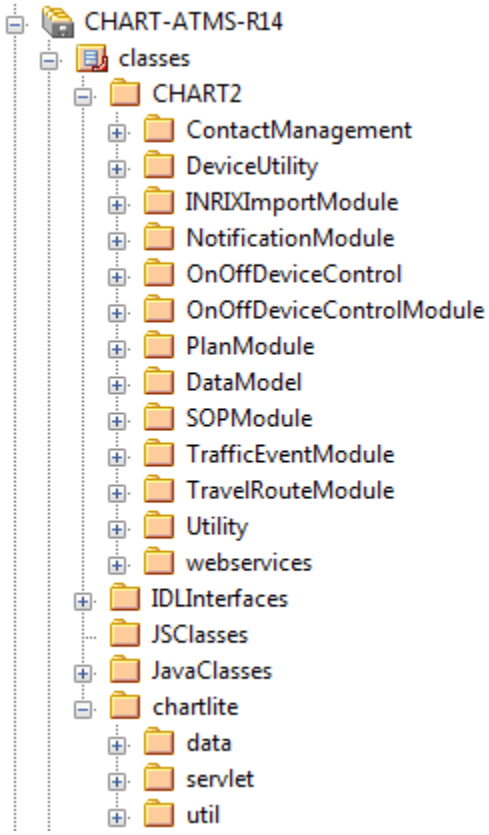


Figure 9-1. Where to Find CHART2 Classes in HTML Design