

*A Joint Standard of AASHTO, ITE, and NEMA*

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## Transit Communications Interface Profiles part of the National Transportation Communications for ITS Protocol Standard on Control Center (CC) Objects

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In February 1997, the TCIP Technical Working Group organized the first subgroups to standardize the business area data interface objects. In March 1997, the TCIP TWG formed the On-Board/Control Center Subgroup to standardize the on-board data interface objects, which resulted in this document.

At the time that this document was prepared, the following individuals were active members of the TCIP Technical Working Group's On-board/Control Center Subgroup:

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- Federal Highway Administration
- Federal Transit Administration

## FOREWORD

This document uses only metric units.

This document is an NTCIP Device Data Dictionary Standard. Device Data Dictionary Standards provide definitions of data elements for use within NTCIP and TCIP systems.

The TCIP family of standards addresses Advanced Public Transportation Systems (APTS) data interfaces, and related automated transit tools and data. The standards also address the business requirements of the APTS data interfaces. In some cases, specialized terms were needed to define general classes of information. For example, different business areas needed to define data elements related to time, date and footnotes. Special data types were developed so that these data concepts were consistent across business areas, while specific needs were met. These data types are defined in this document.

For more information about NTCIP standards, visit the NTCIP Web site at <http://www.ntcip.org>. For a hardcopy summary of NTCIP information, contact the NTCIP Coordinator at the address below.

In preparation of this NTCIP document, input of users and other interested parties was sought and evaluated. Inquires, comments, and proposed or recommended revisions should be submitted to:

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### Approvals

This document was separately balloted and approved by AASHTO, ITE, and NEMA after recommendation by the Joint Committee on the NTCIP. Each organization has approved this standard as the following standard type, as of the date:

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### History

From 1997 to 1999, this document was referenced as ITE ST-ITS-TCIP-CC and/or NEMA TS 3.TCIP-CC. However, to provide an organized numbering scheme for the NTCIP documents, this document is now referenced as NTCIP 1407. The technical specification of NTCIP 1407 is identical to the former reference, except as noted in the development history below:

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NTCIP 1407 v01.02, December 31, 2000. November 2001 – Reformatted for printing; incremented version number and updated date; added and revised front matter; updated references to NTCIP and NEMA document numbers in Clause on References; updated references to ITE document numbers; inserted introduction text in Section on Requirements; deleted Annex A Comment Form; and inserted introduction text in Annex for the ASN.1 Script.

## INTRODUCTION

This document defines the Control Center data elements and messages that are supported by the Transit Communications Interface Profiles (TCIP). TCIP serves as the “transit” component of the National Transportation Communication for ITS Protocol.

There are three annexes to this document.

This document defines requirements that are applicable to all NTCIP and TCIP environments and also contains optional and conditional clauses that are applicable to specific environments for which they are intended.

The following keywords apply to this document: AASHTO, ITE, NEMA, NTCIP, TCIP, control center.

In 1992, the NEMA 3-TS Transportation Management Systems and Associated Control Devices Section began the effort to develop the NTCIP. Under the guidance of the Federal Highway Administration’s NTCIP Steering Group, the NEMA effort was expanded to include the development of communications standards for all transportation field devices that could be used in an Intelligent Transportation Systems (ITS) network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards.

In 1997, the ITE, in cooperation with the American Public Transit Association (APTA), the U.S. DOT’s Federal Transit Administration, and the U.S. DOT’s FHWA, began development of the TCIP. The TCIP Technical Working Group was accepted as a subdivision of the Joint Committee on the NTCIP.

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## Section 1 INTRODUCTION

### 1.1 SCOPE

The control center domain covers the data needs of the functions related to control center applications. The control center functions span various components and systems within transportation and operations. In general, the control center (or Transit Management Center) acts as the clearinghouse for all operations data related to providing, monitoring and measuring transit revenue services in real time. The control center concept merges various tasks performed by numerous individuals into a single center. Moreover, through electronic control and network connectivity, Computer Aided Dispatch (CAD) operators may control many of the functions on-board the transit vehicle (or advise the driver to perform those tasks). The Control Center objects support these functions and components.

The control center business area provides information on service and fleet performance both in real time and in summary form to Information Service Providers (ISP), Traffic Management Centers (TMC), Remote Traveler Support (RTS), Planning Subsystems (PS), and other transit management systems. It receives scheduling, routing, and other operations-related information (both planned and actual) from scheduling and the transit garage management (operations). Finally, the control center business area manages radio communications between the fixed and mobile radio units.

### 1.2 REFERENCES

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For draft revisions or amendments to this document, which may be under consideration by the relevant TCIP Working Group, and for recommended amendments of the Joint Committee on the NTCIP, visit the World Wide Web at <http://www.ntcip.org> or <http://www.ite.org>.

A copy of the database containing the TCIP data elements and messages for each of the business areas is available. To download a copy of the TCIP database, follow the instructions on either the NTCIP or ITE Websites.

Two types of references are cited in this section. Normative references contain provisions that apply when implementing this standard. Informative references contain rules and guidelines which may provide a more detailed understanding of the data, interface, format, profiles, or application of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standard listed below.

#### 1.2.1 Normative References

NTCIP 1400:2000, formerly referenced as ST-ITS-TCIP-FRAME, *Transit Communications Interface Profile Framework*, version 01.04.

NTCIP 1401:2000, formerly referenced as ST-ITS-TCIP-CPT, *Transit Communications Interface Profile, Standard on Common Public Transportation Objects*, version 01.02, December 1, 2000.

NTCIP 1404:2000, formerly referenced as ST-ITS-TCIP-SCH, *Transit Communications Interface Profile, Standard on Scheduling and Runcutting Objects*, version 01.02, December 1, 2000.

NTCIP 1405:2000, formerly referenced as ST-ITS-TCIP-SP, *Transit Communications Interface Profile, Standard on Spatial Representation of Transit Objects*, version 01.02, December 1, 2000.

NTCIP 1406:2000, formerly referenced as ST-ITS-TCIP-OB, *Transit Communications Interface Profile, Standard on On-Board Objects*, version 01.02, December 31, 2000.

ISO/IEC 8824:1994, *Abstract Syntax Notation One (ASN.1)*

SAE J1587 – *Joint SAE/TMC Recommended Practice for Electronic Data Interchange Between Microcomputer Systems in Heavy Duty Vehicle Applications*, January 1996.

SAE J1708 – *Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Applications*, October 1993.

### **1.2.2 Informative References**

Draft IEEE P1489/D 0.0.7, *Draft Standard for Data Dictionaries for Intelligent Transportation Systems*, Version 0.0.7, October 9, 1997.

Draft IEEE P1488/D 0.0.6, *Draft Standard for Message Set Template for Intelligent Transportation Systems*, Version 0.0.6, October 17, 1997.

SAE J1708 – *Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Applications*, October 1993.

SAE J1455 – *Joint SAE/TMC Recommended Environmental Practices for Electronic Equipment Design (Heavy-Duty Trucks)*, August 1994.

*The National Architecture for ITS*, U.S. Department of Transportation Joint Program Office, January 1997.

IEEE P1477 *Standard for Passenger Information System for Rail Transit Vehicles*. Draft: June 25, 1997.

IEEE P1477.1 *Standard for Passenger Information System for Rail Transit Vehicles – Logical Interfaces*. (TBD).

IEEE P1475 *Standard for the Functioning of and Interfaces among Propulsion, Friction Brake and Train-borne Master Control on Rail Rapid Transit Vehicles*. Draft D 3.1, February 1998.

IEEE P1473 *Communication Protocol on Trains*. Draft: February 5, 1998.

IEEE P1483 *Safety Standards for Software Systems*. Draft: D 0.10, January 7, 1998.

IEEE P1474.1 *Communications-Based Train Control Functional and Performance Requirements*. Draft: D 1.0, January 1998.

IEEE P1482 *Rail Vehicle Monitoring and Diagnostic Systems*. Draft 3.0, February 1998.

IEEE P1476 *Auxiliary Power Systems*. Draft: December 17, 1997.

IEEE P 1478 *Environmental Standards for Rail Transit Equipment*. Draft: Rev 2, October 1, 1997.

VDV Standard 420 – *Technical Requirements for Automatic Vehicle Location/Control Systems – Radio Data Transmission*, English Edition. Verband Deutscher Verkehrsunternehmen (German Association of Public Transport Operators), January 1992.

### 1.2.3 Contact Information

The American National Standards Institute (ANSI), as the U.S. representative on the ISO/IEC International Standards organization maintains a register of all ISO/IEC standards. They can be contacted as follows:

ANSI  
11 West 42<sup>nd</sup> Street, 13<sup>th</sup> Floor  
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(212) 642-4900  
[www.ansi.org](http://www.ansi.org)

The Society of Automotive Engineers develops and maintains the J1708/J1587 family of standards. These documents may be obtained from SAE at:

Society of Automotive Engineers  
400 Commonwealth Drive  
Warrendale, PA 15096  
(412) 772-4841  
[www.sae.org](http://www.sae.org)

The Institute of Electrical and Electronics Engineers (IEEE) develops and maintains the IEEE Standards on Data Dictionary and Message Set Template for Intelligent Transportation Systems. The IEEE Rail Communications Standards Committee develops and maintains the IEEE Rail standards. These draft documents may be obtained from IEEE at:

Institute of Electrical and Electronics Engineers  
445 Hoes Lane, P.O. Box 1331  
Piscataway, NJ 08855-1331  
(732) 981-0060  
[standards.ieee.org](http://standards.ieee.org)

The Intelligent Transportation Society of America (ITSA) distributes documents developed by the U.S. DOT Joint Program Office (JPO) on ITS. The National System Architecture may be obtained from ITSA at:

Intelligent Transportation Society of America  
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(202) 484-4584  
[www.itsa.org/public/archdocs/national.html](http://www.itsa.org/public/archdocs/national.html)  
or from Odetics at: [www.odetics.com/itsarch/](http://www.odetics.com/itsarch/)



## Section 2 TERMINOLOGY

For the purposes of this document and to standardize the terminology in the transit industry, the following definitions, abbreviations, acronyms, conventions and notations apply to this document.

### 2.1 BUSINESS AREA DEFINITIONS

<b>Inbound [communications]</b>	Communications originating at the mobile radio unit and directed to the fixed end.
<b>Mobile Unit</b>	A unit associated with a vehicle operated by a public transportation service provider that may be used to identify the vehicle. For example, the identifier of a mobile radio unit assigned to a person or vehicle may be used to identify the assigned person or vehicle.
<b>Outbound [communications]</b>	Communications originating at the fixed end and directed to the mobile radio unit.
<b>Vehicle Area Network</b>	A data communications network that is installed on a public transit vehicle. The network supports data exchange between various control center systems. Similar to a Local Area Network (LAN) in an office, a vehicle area network supports data communications primarily in a transit vehicle.

### 2.2 ABBREVIATIONS

<b>Ack</b>	Acknowledge
<b>Cd</b>	Code
<b>Ctrl</b>	Control
<b>Fac</b>	Facility
<b>ID</b>	Identification
<b>Max</b>	Maximum
<b>Min</b>	Minimum
<b>Msg</b>	Message
<b>Nbr</b>	Number
<b>Qty</b>	Quantity
<b>Rt</b>	Rate

### 2.3 ACRONYMS

<b>APC</b>	Automated Passenger Counter
<b>AVL</b>	Automated Vehicle Location
<b>AVI</b>	Automated Vehicle Identification
<b>CC</b>	Control Center
<b>DGPS</b>	Differential Global Positioning System
<b>FCU</b>	Fare Collection Unit
<b>GPS</b>	Global Positioning System
<b>MID</b>	Message Identification (used in SAE J1708/J1587)
<b>PID</b>	Parameter Identification (used in SAE J1708/J1587)
<b>OB</b>	On-Board
<b>VCH</b>	Vehicle Control Head

**VIN**            Vehicle Identification Number  
**VLU**            Vehicle Logic Unit



## **Section 3 BASIC CONCEPTS**

### **3.1 CONTROL CENTER BUSINESS AREA DOMAIN**

The Control Center functions span various centers and systems within transportation and operations. In general, the control center (or Transit Management Center) functions as the clearinghouse for all operations data related to providing, monitoring and measuring (in real-time) transit revenue services. The control center concept merges various tasks performed by numerous individuals operated by just a small technically trained staff. Moreover, through electronic control and network connectivity, Computer Aided Dispatch (CAD) operators may control many of the functions on-board the transit vehicle (or advise the driver to perform those tasks).

It is important to note that some of these functions can be located on board the vehicle or in other parts of the transit agency. Nevertheless, the functions exist in the transit agency and possess an interface between the control center and other components. The component decomposition is included only to show the context from which the data requirements and potential message exchange needs of a transit management center were extracted. It does not intend to standardize naming, functionality or location of components for a specific control center.

### **3.2 CONTROL CENTER COMPONENTS AND DATA FLOWS**

Each of these functional areas associated with the control center business area has several subsystems within it. Distribution of these functions will vary depending on the architecture deployed by a public transportation agency. The representation of the architecture is for informational purposes only. Those listed below may not be an exhaustive list.

- On-board Control (See 3.2.1)
  - Sign and Annunciation Management (See 3.2.1.1)
  - Passenger Counting Management (See 3.2.1.2)
  - Fare Collection Management (See 3.2.1.3)
- Transit Garage Management (See 3.2.2)
  - Actual Vehicle and Operator Assignment Management (See 3.2.2.1)
  - Detour Management (Planned) (See 3.2.2.2)
  - Maintenance Management (See 3.2.2.3)
  - Manifest and Schedule Management (See 3.2.2.4)
- Dispatch/Operations Management (See 3.2.3)
  - Detour Management (dynamic) (See 3.2.3.1)
  - Dispatcher Assignment (operational areas of responsibilities) (See 3.2.3.2)
  - Supervisory Vehicle Management (See 3.2.3.3)
  - Dispatching (See 3.2.3.4)
  - Dynamic Scheduling/Service Restoration (See 3.2.3.5)
  - Roadway Status Report (See 3.2.3.6)
  - Transfer Connection Protection (See 3.2.3.7)
  - Incident Management (See 3.2.3.8)
- Communications Management Function (See 3.2.4)
  - Data Communications Management (See 3.2.4.1)
  - Voice Management (See 3.2.4.2)
  - Vehicle Registration/Deregistration, etc. (See 3.2.4.3)
  - Data Loading (download and upload) (See 3.2.4.4)
- Performance Monitoring (See 3.2.5)

- Schedule and Headway Adherence (See 3.2.5.1)
- Route Adherence (See 3.2.5.2)
- Vehicle Tracking (See 3.2.5.3)
- Performance Prediction (See 3.2.5.4)
- General Transit Management Function (See 3.2.6)
  - Data Archiving (Operations History Database) (See 3.2.6.1)
  - Data Collection (Operator Performance Monitoring Database) (See 3.2.6.2)

These functions are described below.

### **3.2.1 On-Board Control**

On-board control operations include remote monitoring and control of on-board devices. In particular, the control system may request information related to the performance of a (non-vehicle related) device such as the fare collection box, the vehicle control head or the automatic passenger counting device. It may also send instructions to the vehicle to activate or change the state of a device, such as the message on a sign or an announcement.

#### **3.2.1.1 Sign and Annunciation Management**

This component incorporates interior, exterior and annunciation management functions. Each of these functions requires a library of announcements and control parameters to manage the display or annunciation of the messages. The Passenger Information business area may signal information to this component or use the same data elements/messages as this component.

*Interior-stop sign control* consists of the display status and content of signs located on board the transit vehicle. Typically, information such as “next stop,” transfer connections, etc. are displayed. The control system receives status data from the device, and sends content information and basic control information (e.g., power on/off, brighten display, display configuration) to the device.

In *annunciation management*, the control center manages the announcement content, status and basic control functions of audio messages. Similar to interior-stop sign control, the control center receives status data from the device and sends content information and basic controls (e.g., power on/off, volume) to the device. This data interface may be constrained because of the transmission medium between the Control Center and vehicle. To the extent that the on-board objects support the data requirements, those objects have been specified.

For the *exterior sign management* function, the control center may manage the information on the headsign or other external signs. This information is usually packaged with the block, run and trip information. Similar to the interior-stop sign control, the control center receives status data from the sign and sends content information and basic control information (e.g., power on/off, brighten display, display configuration) back to the device.

#### **3.2.1.2 Passenger Counting Management**

The passenger counting management component collects boarding and alighting counts. This data may be associated with stop, trip and/or route information, and with precise time and location information. The data may be sent to data archiving to support the schedule updating process and/or calculate the number of people on board at any given time to support real-time operations.

#### **3.2.1.3 Fare Collection Management**

The fare collection management system reports and manages alarms, the driver’s fare collection interface (including log-on and validation procedures), stop level fare collection details, bad card lists, transaction unit health, and status information.

### **3.2.2 Transit Garage Management**

The Transit Garage Management (TrGM) component is divided into two areas: maintenance and operations. The maintenance area deals with vehicle maintenance history and maintenance reporting (including engine monitoring). The operations area deals with interfaces such as actual vehicle assignment, and actual and planned operator assignments. If known in advance, detour information is reflected in the planned operator assignment or manifest.

#### **3.2.2.1 Actual Vehicle and Operator Assignment Management**

The actual vehicle and operator assignment management function updates last-minute changes to the schedule. Some agencies may upload the entire tripsheet every day. Some agencies may not upload vehicle assignments; rather, vehicle assignments are made manually, and the Vehicle Registration/Deregistration function stores vehicle assignments.

#### **3.2.2.2 Detour Management (Planned)**

With the roadway status report function, the detour management function receives information on detours and road conditions and reroutes vehicles in transit service appropriately. The detour management functions keep track of the start- and end-time of the detour, estimated end-time and duration of detours, as well as alternative routes.

#### **3.2.2.3 Maintenance Management**

Also called **maintenance configuration control**, maintenance management consists of the capture and analysis of all device and vehicle health and status information. Data may be stored for batch retrieval or transmitted in real time by the vehicle. The information includes vehicle monitoring, (periodic and daily) maintenance, and fuel management. If analysis results indicate immediate action is necessary, this information will be flagged for the attention of the dispatchers; otherwise the information may be passed through to a vehicle maintenance history or maintenance management system (MMS). The vehicle maintenance history database is part of the maintenance management system. The (vehicle maintenance database) history includes the daily inventory of all installed VAN compatible electronic equipment on the vehicle, including operational status and the hardware, software and version ID's from each on-board component which is gathered each day at vehicle startup.

#### **3.2.2.4 Manifest and Schedule Management**

In manifest and schedule management, the trip tables and planned operator assignment information are managed. Changes to the actual schedule, vehicle or operator assignments may result from such events as dynamic detours, vehicle maintenance, or incident. Any deviations from the schedules are noted and adjusted. The duration of an incident and the resulting action are noted in the log. These notations may affect short- or long-term schedules and trigger changes in the data load function.

### **3.2.3 Dispatch/Operations Management**

The operations management component acts upon the information provided in messages handled by dispatching, on performance monitoring results, and on information communicated from external systems and centers.

#### **3.2.3.1 Detour Management (Dynamic)**

Detour management receives information from the Traffic Management Center or other source about unplanned potential and actual obstacles which will delay or obstruct transit service. This information may then be used for rerouting the transit vehicle (i.e., dynamic routing), overriding schedule and route adherence components, or dispatching instructions to operators and supervisors. This function, though

related to the detour management component in Transit Garage Management, deals with problems that occur during revenue service and that must be handled immediately to mitigate delays or obstructions. For example, a flooded road will prevent a transit vehicle from using a specific leg of a route. All the trips that traverse that leg will need to be detoured, and the stop points along that leg must be relocated along an alternate route.

### **3.2.3.2 Dispatcher Assignment (Operational Areas of Responsibilities)**

Dispatcher assignment includes the initial log-on/log-off procedures of each dispatcher. Within the message set are data elements that capture the dispatchers employee identification and work title.

### **3.2.3.3 Supervisory Vehicle Management**

The supervisor vehicle management component tracks and manages the supervisor, (and perhaps other non-revenue) vehicles. A supervisor vehicle outfitted with a tracking/navigation suite transmits its position to Dispatch. The information may then be displayed as part of the dispatching component. Supervisors register and deregister their vehicles in a manner similar to transit vehicle operators. Voice and data messages may be exchanged between dispatch and the supervisor. This function may also manage the dispatch and coordination of non-revenue vehicles such as tow trucks and repair vans.

### **3.2.3.4 Dispatching**

The dispatching component includes the exchange of messages among the dispatchers, field supervisors and operators, display of the fleet or selected fleet configurations, and the reporting of performance monitoring component results through the screen display. This component includes the functions performed by the dispatcher and dispatcher supervisor.

### **3.2.3.5 Dynamic Scheduling/Service Restoration**

Dynamic scheduling aids in the automatic or manual rescheduling of trips, blocks and operator duties. The function is based on the results of the performance monitoring component and information from other sources, such as traffic management centers, emergency management, supervisors or dispatch. This rescheduling may include adding another vehicle, smoothing bunching, and restoring headways after a vehicle is pulled off the road, etc.

### **3.2.3.6 Roadway Status Report**

The roadway status report receives information on the conditions of the roads from information service providers, traffic management centers and other systems which monitor traffic, pavement and weather conditions. Since much of this information comes from other ITS centers, the data items are included by reference.

### **3.2.3.7 Transfer Connection Protection**

Transfer connection protection is similar to dynamic scheduling in that schedules are managed in real time. The transfer connection protection function specifically ensures the transfers between transit vehicles at a specific location.

### **3.2.3.8 Incident Management**

Requirements for the incident management function are contained in the TCIP Standard on Incident Management Objects (NTCIP 1402).

### **3.2.4 Communications Management**

#### **3.2.4.1 Data Communications Management**

The data communications management component manages the radio transmissions of the fleet including switching from data to voice. This function captures and releases the data traffic exchanged between the mobile and fixed end. The component operates differently depending on the radio equipment and the polling or exception reporting strategy. Polling reporting assigns a slot for surveying each vehicle during a designated frame over a short-time cycle. Exception reporting relies on the vehicle to report changes from normal operations or on a specified reporting schedule.

#### **3.2.4.2 Voice Management**

The voice management component manages the traffic between radio interfaces. This system directs the signals to their appropriate destination.

#### **3.2.4.3 Vehicle Registration/Deregistration and Operator Log-on/Log-out**

Upon startup of the vehicle, the operator must sign on through the control head or other data unit (e.g., mobile data unit, fare transaction unit). The vehicle registration and operator log-on information are then automatically sent to the control center. Information input for initialization procedures includes operator identification, assigned block and/or run. These data and the transit assigned vehicle identification code are transmitted to the computer aided dispatch system. This information is typically recorded in a short-term database as the operator performance history is processed and validated against the data from the planned operator assignment function. A vehicle may receive specific control, default reporting procedures or updates of information following registration and log-on. For vehicle polling purposes, a vehicle may be assigned a specific slot in which to report.

#### **3.2.4.4 Data Load (download/upload)**

At specific times of day, batch downloading of data from and uploading of data to the vehicle is required. The data downloaded includes block, stop point inventory, bad card lists, fare zones, event information combined with trip tables, and announcement libraries. Performance data, trip recorder, bridge filter data, and fare collection data are uploaded at the end of a block or at specific (low-radio volume) times of the day.

### **3.2.5 Performance Monitoring**

The performance monitoring component is composed of functions that measure and report the performance of the transit fleet in meeting its service objectives. Some or all of these functions may be used in any given implementation. Moreover, the functions may overlap in managing and interpreting real-time information against the service objectives. Dispatch/Operations Management staff typically perform these task or use the same software as the personnel who perform these tasks.

#### **3.2.5.1 Schedule and Headway Adherence**

The schedule adherence function monitors a transit vehicle in revenue service to ensure that it passes through a timepoint at a certain time. The time that a vehicle arrives at a timepoint location is compared to the trip time at the timepoint location. This function may reside on board the vehicle or at the control center. The results, particularly exceptions, are sent to dispatching. A rolling average over a timepoint interval may be used as "probe" value. Headway adherence measures the actual frequency of service along a route or line. This function measures the time difference between sequential trips (i.e., buses) along a corridor or route.

### **3.2.5.2 Route Adherence**

The route adherence function verifies that the transit vehicle is located on the correct road. The function compares the current transit vehicle location with the location projected from the actual run and block information (i.e., manifest and schedule management). The results, particularly exceptions, are transmitted to Dispatching.

### **3.2.5.3 Vehicle Tracking**

The vehicle tracking function receives the vehicle position from on-board navigation sensors or wayside devices. The vehicle tracking function depends on the type of tracking sensor used. For Differential Global Position System (DGPS) sensor measurements, this function requires differential correction measurements from a differential station; for wayside devices such as signposts, the tracking algorithm requires the location of the wayside devices; for dead reckoning (wheel revolutions), calibration parameters are required. The result of this function is the location of a specific vehicle at a specified time. The vehicle location representation will depend on the type of display schematic (e.g., map database) and timepoint representation. Vehicle tracking is most useful for responding to emergencies.

### **3.2.5.4 Performance Prediction**

Performance prediction is a function which estimates the time of arrival, running time (alternatively passenger wait time), headway and other performance measures for individual vehicles, lines, and the fleet. This function is used to support dynamic remote information services and other passenger information components.

## **3.2.6 General Transit Management Function**

This function deals with shared resources, activities, functions and systems used generally by the other components.

### **3.2.6.1 Data Archiving (Operations History Database)**

The control center collects information on most of the operations, performance and services handled by a transit organization. The data collected provides quantitative and qualitative information on the level of service provided and the degree to which service objectives were met. Furthermore, it provides feedback on how well planning, service planning, and other organizational units set the parameters to model service objectives. Aggregated information based on the performance monitoring component is collected and stored in a "data-warehouse" for use in decision-support functions and tools.

### **3.2.6.2 Data Collection (Operator Performance Monitoring Database)**

The data collection function includes information on the actual operator and vehicle operations, performance and transactions (exchanges of messages, vehicle performance monitoring) between vehicles and dispatching. This information is usually only stored for a short-time.

## **3.3 CLASSIFICATION SCHEME**

### **3.3.1 National Architecture Classification Scheme**

This business area falls into the three level categories in the National Architecture Classification as described in the Framework document and the IEEE P1489 Annex B. The Level 1 category is a top-level class used to describe system management; Level 2 specializes the management nodes to include transit management. Level 3 further specializes transit management into scheduling/runcutting, transit incidents, garage management and control center.

---

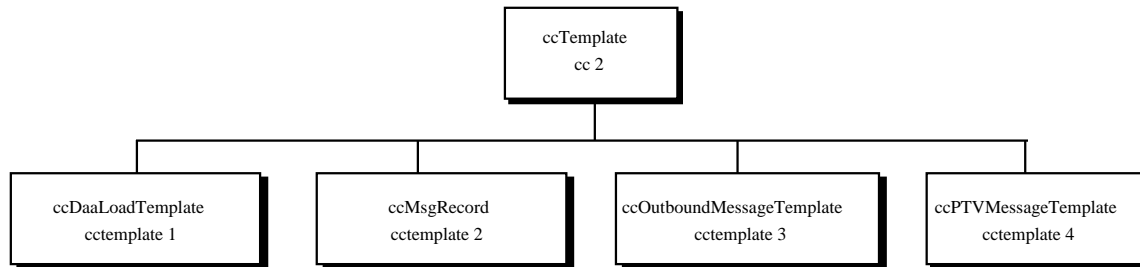
Level 1	Level 2	Level 3
System Management	Transit Management	Control Center

---

### 3.3.2 TCIP Classification Tree

The control center business area supports object classes to represent data used by control center functions (or components).

**Figure 3.1 TCIP Control Center Template Tree Structure**







## Section 4 REQUIREMENTS

### 4.1 DATA DICTIONARY

This section defines those data dictionary elements which are expected to be used by Control Center implementations of business objects. The objects are described in terms of the IEEE 1489. The objects are presented in the order of their appearance on the CC classification tree.

Look Up tables are presented first for several data elements that include formulas.

**Table 4.1      Look Up Table for CC-DeltaTime**

Bits 0-3\4-6	<b>000</b> [10 s]	<b>001</b> [20 s]	<b>010</b> [30 s]	<b>011</b> [30 s]	<b>100</b> [60 s]	<b>101</b> [2m & 15 m]
0000	0	2'40	8'30	16'30	25'	42'
0001	0'10	3'00	9'00	17'00	26'	44'
0010	0'20	3'20	9'30	17'30	27'	46'
0011	0'30	3'40	10'00	18'00	28'	48'
0100	0'40	4'00	10'30	18'30	29'	50'
0101	0'50	4'20	11'00	19'00	30'	52'
0110	1'00	4'40	11'30	19'30	31'	54'
0111	1'10	5'00	12'00	20'00	32'	56'
1000	1'20	5'20	12'30	20'30	33'	58'
1001	1'30	5'40	13'00	21'00	34'	60'
1010	1'40	6'00	13'30	21'30	35'	75'
1011	1'50	6'20	14'00	22'00	36'	90'
1100	2'00	6'40	14'30	22'30	37'	105'
1101	2'10	7'20	15'00	23'00	38'	120'
1110	2'20	7'40	15'30	23'30	39'	135'
1111	2'30	8'00	16'00	24'00	40'	d.b.

The single quote (') indicates minutes (e.g., 1'20 means 1 minute and 20 seconds, or 80 seconds).

d.b. = display blanks.

The shaded area of the table is for the entries incremented by 15 minutes.

**Table 4.2 Look Up Table for CC-OffRouteDistance**

<b>Bits 0-3\4-5</b>	<b>00 [10 m]</b>	<b>01 [50 m]</b>	<b>10 [100 m]</b>	<b>11 [1 km]</b>
0000	0	200	1,000	3
0001	10	250	1,100	4
0010	20	300	1,200	5
0011	30	350	1,300	6
0100	40	400	1,400	7
0101	50	450	1,500	8
0110	60	500	1,600	9
0111	70	550	1,700	10
1000	80	600	1,800	11
1001	90	650	1,900	12
1010	100	700	2,000	13
1011	110	750	2,100	14
1100	120	800	2,200	15
1101	130	850	2,300	16
1110	140	900	2,400	17
1111	150	950	2,500	18

**Table 4.3 Look Up Table for CC-ReturnToleranceEarly and CC-ReturnToleranceLate**

<b>Bits 0-3\4-5</b>	<b>00 [30 s]</b>	<b>01 [30 s]</b>	<b>10 [1 m]</b>	<b>11 [2 m]</b>
0000	0	8'00	16'	32'
0001	0'30	8'30	17'	34'
0010	1'00	9'00	18'	36'
0011	1'30	9'30	19'	38'
0100	2'00	10'00	20'	40'
0101	2'30	10'30	21'	42'
0110	3'00	11'00	22'	44'
0111	3'30	11'30	23'	46'
1000	4'00	12'00	24'	48'
1001	4'30	12'30	25'	50'
1010	5'00	13'00	26'	52'
1011	5'30	13'30	27'	54'
1100	6'00	14'00	28'	56'
1101	6'30	14'30	29'	58'
1110	7'00	15'00	30'	60'
1111	7'30	15'30	31'	d.b.

The single quote (') indicates minutes (e.g., 1'30 means 1 minute and 30 seconds).  
d.b. = display blanks.

**Descriptive Name:** CC\_AnnouncementMsgData\_txt / UCS  
**Descriptive Name Context:** ITS  
**Definition:** A textual description of the announcement or part of an announcement. An announcement may be displayed or annunciated.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 1  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-AnnouncementMsgData  
**Value Domain:** UCS  
**Data Type:** UTF8String  
**Representation Class Term:** text  
**Valid Value Range:** open  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**  
**Person Responsible:** peo  
**Date Revised:** 8/5/98

**Descriptive Name:** CC\_AnnouncementMsgID\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A number associated with an announcement message as assigned by the transit agency.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 2  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-AnnouncementMsgID  
**Value Domain:**  
**Data Type:** USHORT  
**Representation Class Term:** number  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_BlockIDShort\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A short version of Block ID (12 bits). If used, this data element should be correlated to SCH-BlockID or SCH-BlockDesignator by inserting it in the SchBlock message.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 3  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-BlockIDShort  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (0..4095)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 4095  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_DeltaTime\_tm / IEEE/ASTM SI : time

**Descriptive Name Context:** ITS

**Definition:** The deviation from the scheduled time at a trip time (from a given time point). A positive number (+) signifies late, and a negative number (-) implies the vehicle is early.

**Formula:** Deviation (D)\*Scale Factor (SF)+(T(c-1)+V(c-1)) [s]  
SF bits:  
000: D\*10 s  
001: D\*20 s + (150+10)  
010: D\*30 s + (460+20)  
011: D\*30 s + (930+30)  
100: D\*60 s+ (1410+30)  
101: D\*120 s + (2340+60)^  
110: reserved  
111: reserved

^ until D = 1010x, then value is incremented by 15 minutes.

where T(c-1) is the largest value of the previous column

**Source:** TCIP Working Group

**Class Name:** CC

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** NTCIP 1400 v01.04

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** This table is based on the coding deviation from schedule table described in VDV (German standard). See Table 4.1 Lookup Table for CC-DeltaTime.

**External Name:** ccdd 4

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** CC-DeltaTime

**Value Domain:** IEEE/ASTM SI : time

**Data Type:** INTEGER

**Representation Class Term:** time

**Valid Value Range:**

**Valid Value List:**

**Valid Value Rule:** special codes  
10111111 = display blank  
00111111 = zero without sign

**Internal Representation Layout:** bit 7 = sign bit  
bits 4-6 = scale factor  
bits 0-3 = deviation value

**Internal Layout Max Size:**

**Internal Layout Min Size:**

**Descriptive Name:** CC\_DetourID\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A number associated with a detour as assigned by a transit agency. The detour identifier may not necessarily be unique, but should be unique over the activation time and date.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 5  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-DetourID  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..255)  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**



**Descriptive Name:** CC\_DigitizedAnnouncement\_snd  
**Descriptive Name Context:** ITS  
**Definition:** Digital or analog signal representation of synthesized or recorded voice in a specified file format. This data element may also represent video or images. The first byte identifies the file format.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 6  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-DigitizedAnnouncement  
**Value Domain:**  
**Data Type:** MEMLONG  
**Representation Class Term:** sound, image  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:** 0 - code  
1-2047 - data  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_ExceptionFrequencyReport\_tm / IEEE/ASTM SI:time  
**Descriptive Name Context:** ITS  
**Definition:** The frequency between reports required when a transit vehicle in revenue service deviates from an adherence requirement.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 7  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-ExceptionFrequencyReport  
**Value Domain:** IEEE/ASTM SI : time [deka seconds]  
**Data Type:** INTEGER  
**Representation Class Term:** time  
**Valid Value Range:** (0..63)  
**Valid Value List:**  
**Valid Value Rule:** 1 bit = 10 seconds  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_MobileUnitID\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A unique number used to identify the mobile unit (e.g., mobile radio unit).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 8  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-MobileUnitID  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (0..4095)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 4095  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_MsgAddressGroup\_cd  
**Descriptive Name Context:** ITS  
**Definition:** Identifies the type of audience for the message(s).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 9  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-MsgAddressGroup  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..15)  
**Valid Value List:** vehicle fleet (0), -- broadcast, multicast  
route (1),  
organizational-unit (2), -- as indexed by CPT-OrganizationUnitID  
geographic-area (3), -- supported by point and radius  
vehicle-ID-list (4),  
block-list (5),  
run-list (6),  
pattern-list (7),  
manifest (8), -- not supported by outbound msg template  
beat (9), -- not supported by outbound msg template  
district (10), -- not supported by outbound msg template  
radio-zone (11),  
agencyID (12),  
-- 13-15 locally defined  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..15)  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_MsgResponse\_cd  
**Descriptive Name Context:** ITS  
**Definition:** Defines whether a response is required of the operator to an associated message.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 10  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-MsgResponse  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..1)  
**Valid Value List:** noResponse (0), -- No response (NR)  
responseRequired (1) -- Response required (RR)  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..1)  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_MsgResponseType\_cd  
**Descriptive Name Context:** ITS  
**Definition:** Determines the type of response required of an operator. This data element must be included in CcMsgRecord if message is destined for operator.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 11  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-MsgResponseType  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..3)  
**Valid Value List:** noResponse (0), -- No response required  
responseAck (1), -- Response/acknowledge  
responseYN (2), -- Response/[y,n]  
responseVar (3) -- Response/variable, such as a special function key  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_MsgSeqNo\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A unique number assigned to a message record (CcMsgRecord) for any given time period as specified by a transit agency.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 12  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-MsgSeqNo  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (0..15)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..15)  
**Internal Layout Max Size:** 15  
**Internal Layout Min Size:** 0

<b>Descriptive Name:</b>	CC_OffRouteDistance_qty / SI : length [m]
<b>Descriptive Name Context:</b>	ITS
<b>Definition:</b>	The orthogonal distance from the scheduled route of a transit vehicle in revenue service which will set a route adherence exception alarm. This data element is part of the ccActivateRouteAdherenceException which indicates the requirements for route adherence.
<b>Formula:</b>	Deviation (D)*Scaling Factor (SF) + (T(c-1)+V(c)) [meters] SF bits: 00: D*10 m 01: D*50 + 200 m 10: D*100 + 1,000 m 11: D*1000 + 3,000 m  where T(c-1) is the largest value of the previous column
<b>Source:</b>	TCIP Working Group
<b>Class Name:</b>	CC
<b>Classification Scheme Name:</b>	ITS Classification Scheme
<b>Classification Scheme Version:</b>	NTCIP 1400 v01.04
<b>Keyword:</b>	
<b>Related Data Concept:</b>	
<b>Relationship Type:</b>	
<b>Remarks:</b>	Direction is not assumed. See Table 4.2 Lookup Table for CC-OffRouteDistance
<b>External Name:</b>	ccdd 13
<b>External Name Usage:</b>	TCIP Tree Identifier
<b>ASN1 Name:</b>	CC-OffRouteDistance
<b>Value Domain:</b>	IEEE/ASTM SI : distance
<b>Data Type:</b>	INTEGER
<b>Representation Class Term:</b>	quantity [m]
<b>Valid Value Range:</b>	(0..31)
<b>Valid Value List:</b>	
<b>Valid Value Rule:</b>	
<b>Internal Representation Layout:</b>	bits 4-5 scaling factor bits 0-3 deviation value
<b>Internal Layout Max Size:</b>	31
<b>Internal Layout Min Size:</b>	0



**Descriptive Name:** CC\_OperatorAssignType\_cd  
**Descriptive Name Context:** ITS  
**Definition:** The type of operator assignment associated with a run. They include:  
Pick: operator picks a piece of work.  
Planned: short term assignment managed by operator base (garage)  
Actual: as operated

**Formula:**

**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:**

**External Name:** cccd 14  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-OperatorAssignmentType  
**Value Domain:**

**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** 0..255  
**Valid Value List:** pick (1),  
planned (2),  
actual (3),  
-- 4-155 reserved  
-- 156-255 local use

**Valid Value Rule:**

**Internal Representation Layout:**

**Internal Layout Max Size:** 255  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_PollingSlot\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** The reporting slot number in a cyclical polling process (on one channel) assigned to a mobile radio.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 15  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-PollingSlot  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (0..1023)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 1023  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_PTVehicleIDShort\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A short version of the CPT-PTVehicleID. This data element should be mapped to the CPT-PTVehicleID by its inclusion in the CptPTVehicle message (record).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 16  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-PTVehicleIDShort  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (1..4096)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 4096  
**Internal Layout Min Size:** 1

**Descriptive Name:** CC\_RadioMode\_cd  
**Descriptive Name Context:** ITS  
**Definition:** The type of communication mode supported by the radio channel.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 17  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-RadioMode  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..3)  
**Valid Value List:** voice (0),  
data (1),  
both (2),  
reserved (3)  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..3)  
**Internal Layout Max Size:** 3  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_RadioVoiceControl\_cd  
**Descriptive Name Context:** ITS  
**Definition:** Directs the voice traffic to the specified interface device.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 18  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-RadioVoiceControl  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..7)  
**Valid Value List:** handset (0),  
announcement (1),  
pa-covert (2),  
pa-interior (3),  
pa-exterior (4),  
pa-interior-exterior (5),  
telephone-interconnect (6),  
reserved (7)  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 7  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_ResponseRequestType\_cd

**Descriptive Name Context:** ITS

**Definition:** This defines the type of message sent by the transit vehicle to the control center. This data element is used in the CcPTVehicleMessageTemplate to distinguish between request for voice, silent alarm or data messages.

**Formula:**

**Source:** TCIP Working Group

**Class Name:** CC

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** NTCIP 1400 v01.04

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:**

**External Name:** ccdd 19

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** CC-ResponseRequestType

**Value Domain:**

**Data Type:** INTEGER

**Representation Class Term:** code

**Valid Value Range:**

**Valid Value List:** request-to-talk (0),  
priority-RTT (1),  
urgent (2),  
data (3),  
spare-1 (4),  
spare-2 (5),  
silent-alarm (6),  
remote-silent-alarm (7)

**Valid Value Rule:**

**Internal Representation Layout:** INTEGER (0..7)

**Internal Layout Max Size:** 7

**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_ReturnToleranceEarly\_tm / IEEE/ASTM SI : time

**Descriptive Name Context:** ITS

**Definition:** The deviation from scheduled time a transit vehicle must adhere to (once considered early) before it is considered on time (schedule) again.

**Formula:** Deviation (D)\*Scaling Factor (SF) + (T(c-1)+SF(c)) [tm units]  
00: D\*30 sec  
01: D\*30 + 8 min  
10: D\*1 + 16 min  
11: D\*2 + 32 min  
111111: display blanks

where T(c-1) is the largest value of the previous column

**Source:** TCIP Working Group

**Class Name:** CC

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** NTCIP 1400 v01.04

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** See Table 5.3 Lookup table for CC-ReturnToleranceEarly

**External Name:** ccdd 20

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** CC-ReturnToleranceEarly

**Value Domain:** IEEE/ASTM SI : time

**Data Type:** INTEGER

**Representation Class Term:** time

**Valid Value Range:** (0..63)

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:** bits:  
0-3 Deviation Value  
4-5 Scale factor

**Internal Layout Max Size:** 63

**Internal Layout Min Size:** 0

<b>Descriptive Name:</b>	CC_ReturnToleranceLate_tm / IEEE/ASTM SI : time
<b>Descriptive Name Context:</b>	ITS
<b>Definition:</b>	The deviation from scheduled time a transit vehicle must adhere to (once considered late) before it is considered on time (i.e., on schedule) again.
<b>Formula:</b>	Deviation (D)*Scaling Factor (SF) + (T(c-1)+SF(c)) [tm units] 00: D*30 sec 01: D*30 + 8 min 10: D*1 + 16 min 11: D*2 + 32 min 111111: display blanks  where T(c-1) is the largest value of the previous column
<b>Source:</b>	TCIP Working Group
<b>Class Name:</b>	CC
<b>Classification Scheme Name:</b>	ITS Classification Scheme
<b>Classification Scheme Version:</b>	NTCIP 1400 v01.04
<b>Keyword:</b>	
<b>Related Data Concept:</b>	
<b>Relationship Type:</b>	
<b>Remarks:</b>	See Table 4.3 Lookup table for CC-ReturnToleranceEarly and CC-ReturnToleranceLate
<b>External Name:</b>	ccdd 21
<b>External Name Usage:</b>	TCIP Tree Identifier
<b>ASN1 Name:</b>	CC-ReturnToleranceLate
<b>Value Domain:</b>	IEEE/ASTM SI : time [s]
<b>Data Type:</b>	INTEGER
<b>Representation Class Term:</b>	time
<b>Valid Value Range:</b>	(0..63)
<b>Valid Value List:</b>	
<b>Valid Value Rule:</b>	
<b>Internal Representation Layout:</b>	bits: 0-3 Deviation Value 4-5 Scale factor
<b>Internal Layout Max Size:</b>	63
<b>Internal Layout Min Size:</b>	0



**Descriptive Name:** CC\_RouteDirectionShort\_cd  
**Descriptive Name Context:** ITS  
**Definition:** This is a constrained version of SCH-RouteDirectionName.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 22  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-RouteDirectionShort  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..7)  
**Valid Value List:** north (0),  
south (1),  
east (2),  
west (3),  
inbound (4), -- matches (9) in SCH-RouteDirectionName  
outbound (5), --matches (10) in SCH-RouteDirectionName  
clockwise (6), --matches (13) in SCH-RouteDirectionName  
counter-clockwise (7) --matches (14) in SCH-RouteDirectionName  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..7)  
**Internal Layout Max Size:** 7  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_RouteIDShort\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A short version of the SCH-RouteID. This data element should be mapped to the SCH-RouteID by its inclusion in the SchRoute message (record).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** cddd 23  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-RouteIDShort  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (1..256)  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** CC\_RunIDShort\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A short version of Run ID. If used, this data element should be correlated to SCH-RunID or SCH-RunDesignator by inserting it in the SchRun message.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** codd 24  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-RunIDShort  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (1..4096)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 4096  
**Internal Layout Min Size:** 1

**Descriptive Name:** CC\_ScheduleToleranceEarly\_tm /IEEE/ASTM SI : time

**Descriptive Name Context:** ITS

**Definition:** The deviation from schedule before a transit vehicle in revenue service is considered early.

**Formula:** Deviation (D)\*Scaling Factor (SF) + (T(c-1)+SF(c)) [tm units]  
00: D\*30 sec  
01: D\*30 + 8 min  
10: D\*1 + 16 min  
11: D\*2 + 32 min  
111111: display blanks

where T(c-1) is the largest value of the previous column

**Source:** TCIP Working Group

**Class Name:** CC

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** NTCIP 1400 v01.04

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** See Table 4.3 Lookup table for CC-ReturnToleranceEarly and CC-ReturnToleranceLate

**External Name:** ccdd 25

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** CC-ScheduleToleranceEarly

**Value Domain:** IEEE/ASTM SI: time [s]

**Data Type:** INTEGER

**Representation Class Term:** time

**Valid Value Range:** (0..63)

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:** bits:  
0-3 Value  
4-5 Scale factor

**Internal Layout Max Size:** 63

**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_ScheduleToleranceLate\_tm /IEEE/ASTM SI : time

**Descriptive Name Context:** ITS

**Definition:** The deviation from scheduled time before a transit vehicle in revenue service is considered late.

**Formula:** Deviation (D)\*Scaling Factor (SF) + (T(c-1)+SF(c)) [tm units]  
00: D\*30 sec  
01: D\*30 + 8 min  
10: D\*1 + 16 min  
11: D\*2 + 32 min  
111111: display blanks

where T(c-1) is the largest value of the previous column

**Source:** TCIP Working Group

**Class Name:** CC

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** NTCIP 1400 v01.04

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** See Table 4.3 Lookup table for CC-ReturnToleranceEarly and CC-ReturnToleranceLate

**External Name:** ccdd 26

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** CC-ScheduleToleranceLate

**Value Domain:** IEEE/ASTM SI : time [s]

**Data Type:** INTEGER

**Representation Class Term:** time

**Valid Value Range:** (0..63)

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:** bits:  
0-3 Value  
4-5 Scale factor

**Internal Layout Max Size:** 63

**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_SecSinceTopHour\_tm / IEEE/ASTM SI : [s]  
**Descriptive Name Context:** ITS  
**Definition:** The time in seconds since the top of the hour. Assumption: if the number of seconds is greater than 3600 or greater than the current time since the top of the hour, then the time should be calculated from the last hour (not the current hour).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** codd 27  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-SecSinceTopHour  
**Value Domain:** IEEE/ASTM SI : time [s]  
**Data Type:** INTEGER  
**Representation Class Term:** time  
**Valid Value Range:** (0..4025)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 4025  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_ShiftNo\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A unique number associated with the work shifts of a transit agency's organizational unit.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** cddd 28  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-ShiftNo  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** number  
**Valid Value Range:** (0..255)  
**Valid Value List:** none (0),  
day\_or\_1st (1),  
evening\_or\_2nd (2),  
night\_or\_3rd (3),  
early\_or\_4th (4),  
extra (5),  
-- 5-155 reserved  
-- 156-255 local use  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 255  
**Internal Layout Min Size:** 0

**Descriptive Name:** CC\_WorkstationID\_nbr  
**Descriptive Name Context:** ITS  
**Definition:** A unique number assigned to each workstation in the control center local or wide area network.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** ccdd 29  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-WorkstationID  
**Value Domain:**  
**Data Type:** UBYTE  
**Representation Class Term:** number  
**Valid Value Range:** (0..255)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 255  
**Internal Layout Min Size:** 0



**Descriptive Name:** CC\_ZeroPeriod\_tm / IEEE/ASTM SI : time  
**Descriptive Name Context:** ITS  
**Definition:** The start time (zero hour) of a polling period. The data element is defined as the number of seconds since the top of the hour (see CC-SecSinceTopHour).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** CC  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** NTCIP 1400 v01.04  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:** This data element is similarly defined as CC-SecSinceTopHour  
**External Name:** cddd 30  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** CC-ZeroPeriod  
**Value Domain:** IEEE/ASTM SI : time [s]  
**Data Type:** USHORT  
**Representation Class Term:** time  
**Valid Value Range:** (0..65,535)  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 65535  
**Internal Layout Min Size:** 0

## 4.2 MESSAGE SET

<b>Message Identifier:</b>	TCIP
<b>Message Set Identifier:</b>	ST-TCIP-TCIP-CC
<b>Message Set Version:</b>	V 1.0
<b>Message Group Identifier:</b>	CC
<b>Message Name:</b>	CcActivateAnnouncementFreeform
<b>Message Description:</b>	A message that triggers/activates signs and/or annunciators with a string of announcements or announcement segments from concatenated messages. The announcement messages should be sent in the proper format (e.g., text, bitmap, synthesized voice) for activation. Only one type of format should be sent per message.
<b>Meta Data Source:</b>	Direct
<b>Priority:</b>	no priority
<b>Frequency:</b>	CcOutboundMessageTemplate
<b>Message Length:</b>	5
<b>Keywords:</b>	
<b>Time Stamp:</b>	
<b>Message Body:</b>	<pre>CcActivateAnnouncementFreeform ::= SEQUENCE {   components SEQUENCE OF OB-MID,   announcement CHOICE {     memo MEMLONG, -- can be text or formatted file     string UTF8String   }, -- end of choice   sign-message ObBusTextMessagetoDisplay OPTIONAL, -- if sign announcement   sign-type ObBusTextMessageDisplayType OPTIONAL -- if sign announcement }</pre>
<b>Object Identifier:</b>	cc 3

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcActivateAnnouncementFromLibrary  
**Message Description:** A message that triggers/activates a sign or annunciator with a string of announcements or announcement segments from a library of announcements. The device that receives this message should store or have access to the announcement library and extract the proper form for its use (i.e., text, bitmap, digitized voice).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 4  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcActivateAnnouncementFromLibrary ::= SEQUENCE {  
    components SEQUENCE OF OB-MID -- combined device address and device  
    configuration  
    sign-parameters ObBusTextMessageToDisplay OPTIONAL, -- if sign announcement  
    sign-type ObBusTextMessageDisplayType OPTIONAL -- if sign announcement  
}  
**Object Identifier:** cc 4

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcActivateRouteAdherence  
**Message Description:** A message that indicates the requirements for activating an exception to route adherence reporting. The series (sequence) of records signifies an escalation of the adherence violation. The first of the sequence is the first report. The second off route distance of the sequence is added onto the data element of the first report, and so on. For example, if the first record includes a CC-OffRouteDistance of 100 meters at 2 minute intervals, and the second record includes a CC-OffRouteDistance of 500 meters at 1 minute intervals, then when a transit vehicle is off route by 175 meters, it reports at 2 minute intervals; when the vehicle is 502 meters off route, it reports in every minute.

**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 1  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcActivateRouteAdherence ::= SEQUENCE OF CcRouteAdherenceEntry  
**Object Identifier:** cc 5

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcActivateScheduleAdherence  
**Message Description:** A message that indicates the requirements for activating an exception to schedule adherence reporting. Specifically, the message is sent to the schedule adherence module to indicate a relaxing or tightening of the schedule adherence parameters. For example, tolerance-early and tolerance-late are used to define the range of early (-) and late (+) constraints on triggering a schedule adherence violation. Return-tolerance-early and late indicate the amount of adherence required to trigger adherence once a violation has already been triggered.

**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 6  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcActivateScheduleAdherence ::= SEQUENCE OF {  
    tolerance-early CC-ScheduleToleranceEarly  
    return-tolerance-early CC-ReturnToleranceEarly OPTIONAL,  
    tolerance-late CC-ScheduleToleranceLate  
    return-tolerance-late CC-ReturnToleranceLate OPTIONAL,  
    report-frequency CC-ExceptionFrequencyReport OPTIONAL,  
    response CC-MsgResponse  
    -- indicates whether initiation of this message triggers a status/acknowledge response  
}

**Object Identifier:** cc 6

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcAnnunciatorLibrary  
**Message Description:** A collection of messages to be announced on a PTV or a stop point.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate or ccDataLoadTemplate  
**Message Length:** 4  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcAnnunciatorLibrary ::= SEQUENCE {  
    activation-date CPT-ActivationDate, -- last date file was compiled/updated  
    version-number CPT-VersionNo OPTIONAL,  
    organizational-unit CPT-OrganizationalUnitID OPTIONAL,  
    annunciator-library SEQUENCE OF CcAnnunciatorMessageEntry  
}  
**Object Identifier:** cc 7

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcAnnunciatorMessageEntry  
**Message Description:** A message to be announced on a PTV or at a stop point.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 4  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcAnnunciatorMessageEntry ::= SEQUENCE {  
    message-id CC-AnnouncementMsgID,  
    configuration-date CPT-ActivationDate OPTIONAL,  
    text-announcement CC-AnnouncementMsgData OPTIONAL,  
    digitized-announcement CC-DigitizedAnnouncement OPTIONAL  
}  
**Object Identifier:** cc 8

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcChangeRadioMode  
**Message Description:** A command to the mobile radio unit to switch the channel from one mode to another mode. This may involve a channel change. This message may be used when the VLU emulates trunking over a conventional radio system. For example, the message should not be sent until the controller (VLU) queries the radio for the best available channel, and reserves the channel for messaging.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 3  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcChangeRadioMode ::= SEQUENCE {  
    radio-mode CC-RadioMode,  
    radio-control CC-RadioVoiceControl OPTIONAL, -- use when radio mode is voice  
    channelID CPT-ChannelID OPTIONAL  
}  
**Object Identifier:** cc 9



**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcChangeReportingRate  
**Message Description:** Defines the reporting rate and protocols for status reporting.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 3  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcChangeReportingRate ::= SEQUENCE {  
    reporting-period CC-ExceptionFrequencyReport,  
    polling-slot CC-PollingSlot OPTIONAL, -- used for change in polling protocols  
    zero-period CC-ZeroPeriod OPTIONAL -- used for change in polling protocol  
}  
**Object Identifier:** cc 10

**Message Identifier:** TCIP

**Message Set Identifier:** ST-TCIP-TCIP-CC

**Message Set Version:** V 1.0

**Message Group Identifier:** CC

**Message Name:** CcDataLoadTemplate

**Message Description:** This template holds the objects for transferring bulk messages from the control center (fixed end) to the PTV (mobile end). The types of messages include: default configurations, schedules, trips, stop point locations/names, fare tables, bad card list, sw updates, sign/annunciator libraries, etc. Technologies frequently used include: DSRC, wireless ethernet, magnetic media (e.g., flash card, floppy) and radio (for small amounts of data). Frequently used to transfer information to PTV as it leaves the Vehicle Base or sits overnight, or retrieves information from the PTV as it arrives at the Vehicle Base after completing its revenue service.

**Meta Data Source:** Direct

**Priority:** no priority

**Frequency:** Daily (once or twice)

**Message Length:** 11

**Keywords:**

**Time Stamp:**

**Message Body:** CcDataLoadTemplate ::= SEQUENCE {  
    address-group CC-MsgAddressGroup OPTIONAL,  
    broadcast NULL OPTIONAL,  
    routes SEQUENCE OF CC-RouteIDShort OPTIONAL,  
    organizational-units SEQUENCE OF CPT-OrganizationalUnitID OPTIONAL,  
    geographic-areas SEQUENCE OF SpPolygonclass OPTIONAL,  
    vehicle-list SEQUENCE OF CC-PTVehicleIDShort OPTIONAL,  
    block-list SEQUENCE OF CC-BlockIDShort OPTIONAL,  
    run-list SEQUENCE OF CC-RunIDShort OPTIONAL,  
    pattern-list SEQUENCE OF SCH-PatternID OPTIONAL,  
    radio-zones SEQUENCE OF CPT-RadioZoneID OPTIONAL,  
    agencies SEQUENCE OF CPT-AgencyID OPTIONAL,  
    msg-list SEQUENCE OF CcMsgRecord  
}

**Object Identifier:** cctemplate 1

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcLogOffDispatch  
**Message Description:** Parameters which indicate and validate that a dispatcher or supervisor logged off a workstation.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:**  
**Message Length:** 6  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcLogOffDispatch ::= SEQUENCE {  
    employee CPT-EmployeeID,  
    job-category CPT-EmployeeJobCategory OPTIONAL,  
    workstation-id CC-WorkstationID OPTIONAL,  
    agencyID CPT-AgencyID OPTIONAL,  
    deactivation-time CPT-DeactivationTime,  
    deactivation-date CPT-DeactivationDate  
}  
**Object Identifier:** cc 11

<b>Message Identifier:</b>	TCIP
<b>Message Set Identifier:</b>	ST-TCIP-TCIP-CC
<b>Message Set Version:</b>	V 1.0
<b>Message Group Identifier:</b>	CC
<b>Message Name:</b>	CcLogOffOperator
<b>Message Description:</b>	Parameters which indicate and validate that an operator or supervisor logged off a vehicle log-on device (e.g., MDT, Farebox, VCH). CPT-VehicleID, and CPT-BlockID or CPT-RunID are sent as part of the template message.
<b>Meta Data Source:</b>	Direct
<b>Priority:</b>	no priority
<b>Frequency:</b>	CcPTVMessageTemplate
<b>Message Length:</b>	4
<b>Keywords:</b>	
<b>Time Stamp:</b>	
<b>Message Body:</b>	CcLogOffOperator ::= SEQUENCE { employee CPT-EmployeeID, job-category CPT-EmployeeJobCategory OPTIONAL, agencyID CPT-AgencyID OPTIONAL, logOffDateTime CPT-DateTime }
<b>Object Identifier:</b>	cc 12

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcLogOnDispatch  
**Message Description:** Parameters which identify and validate that a dispatcher or supervisor logged on to a workstation.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:**  
**Message Length:** 9  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcLogOnDispatch ::= SEQUENCE {  
    employee CPT-EmployeeID,  
    job-category CPT-EmployeeJobCategory OPTIONAL,  
    operational-status SCH-ServiceType OPTIONAL,  
    -- only revenue, training and maintenance categories apply to this message  
    agencyID CPT-AgencyID OPTIONAL,  
    task-job-category CPT-EmployeeJobCategory OPTIONAL,  
    -- describes the category used when logging on to the workstation  
    workstation-id CC-WorkstationID,  
    activation-time CPT-ActivationTime,  
    activation-date CPT-ActivationDate,  
    shift-number CC-ShiftNo OPTIONAL  
}  
**Object Identifier:** cc 13

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcLogOnOperator  
**Message Description:** Parameters which indicate and validate that an operator or supervisor logged onto a vehicle log-on device (e.g., MDT, Farebox, VCH).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPTVMessageTemplate  
**Message Length:** 11  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcLogOnOperator ::= SEQUENCE {  
    employee CPT-EmployeeID,  
    job-category CPT-EmployeeJobCategory OPTIONAL,  
    operational-status SCH-ServiceType OPTIONAL,  
    organization-ID CPT-OrganizationalUnitID OPTIONAL,  
    agencyID CPT-AgencyID OPTIONAL,  
    vehicle-base CPT-VehicleBase OPTIONAL,  
    block-id CC-BlockIDShort OPTIONAL,  
    run-id CC-RunIDShort OPTIONAL,  
    route-id CC-RouteIDShort OPTIONAL,  
    activationDateTime CPT-DateTime  
} ( WITH COMPONENTS {..., block-id PRESENT}  
    WITH COMPONENTS {..., run-id PRESENT}  
    WITH COMPONENTS {..., route-id PRESENT} )  
**Object Identifier:** cc 14

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcMsgRecord  
**Message Description:** A record with a message and its context (type). This is an outbound message (fixed to mobile end).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** As needed  
**Message Length:** 4  
**Keywords:**  
**Time Stamp:**  
**Message Body:**

```
CcMsgRecord ::= SEQUENCE {  
  message-sequence-no CC-MsgSeqNo OPTIONAL,  
  response-type       CC-MsgResponseType OPTIONAL,  
  --include if message is routed to driver  
  onboard-destinations SEQUENCE OB-MID OPTIONAL,  
  msg SEQUENCE OF {  
    SEQUENCE {  
      msg-id TCIP-CLASS.&id {{CcMsgSet}},  
      value TCIP-CLASS.&Type {{CcMsgSet} {@.msg-id}}  
    }  
  }  
}
```

  
**Object Identifier:** cctemplate 2

**Message Identifier:** TCIP

**Message Set Identifier:** ST-TCIP-TCIP-CC

**Message Set Version:** V 1.0

**Message Group Identifier:** CC

**Message Name:** CcOperatorAssignment

**Message Description:** A run assigned to a particular operator. The type of operator assignment is defined by CC-OperatorAssignType. Special data elements are associated with the different assignments types.

**Meta Data Source:** Direct

**Priority:** no priority

**Frequency:**

**Message Length:** 8

**Keywords:**

**Time Stamp:**

**Message Body:** CcOperatorAssignment ::= SEQUENCE {  
    employee-id CPT-EmployeeID,  
    run-id SCH-RunID,  
    activation-date CPT-ActivationDate, --date on which Operator Assignment was made,  
    e.g., pick date  
    assignment-type CC-OperatorAssignType,  
    block-id SCH-BlockID OPTIONAL,  
    time-table-version SCH-TimeTableVersion OPTIONAL,  
    day-type SCH-DayType OPTIONAL,  
    operator-base CPT-OperatorBase OPTIONAL  
    -- one of the following variations of this message must be implemented  
    -- for actual assignments  
} (WITH COMPONENTS { ..., block-id PRESENT } |  
    -- for pick assignments  
    (WITH COMPONENTS { ..., time-table-version PRESENT, day-type PRESENT,  
    operator-base PRESENT } |  
    -- for planned assignments  
    (WITH COMPONENTS { ..., operator-base PRESENT } )

**Object Identifier:** cc 15



**Message Identifier:** TCIP

**Message Set Identifier:** ST-TCIP-TCIP-CC

**Message Set Version:** V 1.0

**Message Group Identifier:** CC

**Message Name:** CcOutboundMessageTemplate

**Message Description:** This template holds the objects for messages from the control center (fixed end) to the PTV (mobile end). The messages include parameter reporting request (based on frequency), threshold monitor request (based on high/low limits), activate PA, operator detour (route adherence changes), high rate polling start/end, text messages (to driver), activate display, service change (schedule adherence change/deviation), data load deletions (delete selections from data load sets including block, run, trip, run, fare tables, bad card list, libraries for modification of main schedule in the control center, operator base or on PTV) and any messages associated with polling protocols. This message can be used in an architecture based on exception or poll reporting or as an interrupt to a polling process. The priority of the message is determined by the priority of the highest priority of the message records.

**Meta Data Source:** Direct

**Priority:** no priority

**Frequency:** As needed

**Message Length:** 13

**Keywords:**

**Time Stamp:**

**Message Body:**

```
CcOutboundMessageTemplate ::= SEQUENCE {
  address-group  CC-MsgAddressGroup,
  broadcast      NULL OPTIONAL, -- broadcast if included, address-group = 0
  route-list     SEQUENCE OF CC-RoutelDShort OPTIONAL,
  -- address-group = 1
  ptv-list      SEQUENCE OF CC-PTVehicleIDShort OPTIONAL,
  -- address-group = 4
  organization-list SEQUENCE OF CPT-OrganizationalUnitID OPTIONAL,
  -- address-group = 2
  block-list     SEQUENCE OF CC-BlockIDShort OPTIONAL,
  -- address-group = 5
  run-list      SEQUENCE OF CC-RunIDShort OPTIONAL, -- address-group = 6
  area-list     SEQUENCE OF SpPolygonclass OPTIONAL,
  -- address-group = 3
  pattern-list   SEQUENCE OF SCH-PatternID OPTIONAL,
  -- address-group = 7
  radio-zone-list SEQUENCE OF CPT-RadioZoneID OPTIONAL,
  -- address-group = 11
  agency-list   SEQUENCE OF CPT-AgencyID OPTIONAL,
  -- address-group = 12
  other-list    SEQUENCE OF OCTET STRING OPTIONAL,
  -- address-group = 13-15 (user defined)
  msg-list      SEQUENCE OF CcMsgRecord
}
( WITH COMPONENTS { ..., broadcast PRESENT} |
  WITH COMPONENTS { ..., route-list PRESENT} |
  WITH COMPONENTS { ..., organization-list PRESENT} |
  WITH COMPONENTS { ..., area-list PRESENT} |
  WITH COMPONENTS { ..., ptv-list PRESENT} |
  WITH COMPONENTS { ..., block-list PRESENT} |
  WITH COMPONENTS { ..., run-list PRESENT} |
  WITH COMPONENTS { ..., pattern-list PRESENT} |
  WITH COMPONENTS { ..., radio-zone-list PRESENT} |
  WITH COMPONENTS { ..., agency-list PRESENT} |
```

WITH COMPONENTS {..., other-list PRESENT } )

**Object Identifier:**

cctemplate 3

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcParameterDumpRequest  
**Message Description:** A request initiated by the fixed end for recorded trip performance data.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 4  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcParameterDumpRequest ::= SEQUENCE {  
    recorder-locations SEQUENCE OF OB-MID,  
    begin-date-time DATETIME, -- from time/date  
    end-date-time DATETIME, --to time/date  
    parameter-requests SEQUENCE OF OB-PID  
}  
**Object Identifier:** cc 16

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcParameterRateConfiguration  
**Message Description:** The rate at which a logical device should report a specific parameter's value. The device may be a trip recorder, logic unit, or the source device.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 2  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcParameterRateConfiguration ::= SEQUENCE {  
    parameters SEQUENCE OF OB-PID,  
    rate OB-Rate  
}  
**Object Identifier:** cc 17

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcParameterReportRequest  
**Message Description:** A request by the CC to the OB to reconfigure the reporting capabilities to report a specific parameter(s) at a specified rate (for over the air/real-time reporting).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 2  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcParameterReportRequest ::= SEQUENCE {  
    logical-device-address OB-MID,  
    parameter-rate-request SEQUENCE OF CcParameterRateConfiguration  
}  
**Object Identifier:** cc 18

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcParameterThreshold  
**Message Description:** The definition of the threshold in which a parameter value is constrained before it triggers an exception.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 5  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcParameterThreshold ::= SEQUENCE {  
    parameter OB-PID,  
    hi-value INTEGER OPTIONAL, -- open type, depends on PID  
    lo-value INTEGER OPTIONAL, -- open type, depends on PID  
    footnote FOOTNOTE OPTIONAL, -- may be based on manufacturer codes  
    source-device OB-MID OPTIONAL  
}  
**Object Identifier:** cc 19

**Message Identifier:** TCIP

**Message Set Identifier:** ST-TCIP-TCIP-CC

**Message Set Version:** V 1.0

**Message Group Identifier:** CC

**Message Name:** CcPatternDeltaTime

**Message Description:** The offset (early or late) from an expected trip time. This offset may be due to an expected delay or to a delay at a specified location (e.g., lane closed). May be used in a detour situation to adjust trip times.

**Meta Data Source:** Direct

**Priority:** no priority

**Frequency:** CcOutboundMessageTemplate

**Message Length:** 8

**Keywords:**

**Time Stamp:**

**Message Body:**

```
CcPatternDeltaTime ::= SEQUENCE {
  delta-time  CC-DeltaTime,
  -- include point class or time point
  location    SpGeopoint          OPTIONAL,
  timepoint-id SCH-TimePointID    OPTIONAL,
  pattern-id  SCH-PatternID,
  trips-affected SEQUENCE OF SCH-TripID OPTIONAL,
  -- if not included, then affects only trip at activation time
  activation-time  CPT-ActivationTime,
  deactivation-time CPT-DeactivationTime OPTIONAL,
  footnote         CPT-Footernote  OPTIONAL -- message to driver
}
```

**Object Identifier:** cc 20

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcPatternException  
**Message Description:** A deviation or detour from a scheduled trip. This message instructs the operator and other business areas (operational centers) that a specific detour shall be operated. It also provides the schedule and route adherence with a new pattern, and may provide information for the fare collection component.  
  
The destination of this message is contained in the Message Template. This message may go to OB (mobile units), PI, IM and SCH.  
  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 12  
**Keywords:** Patch  
**Time Stamp:**  
**Message Body:**  
CcPatternException ::= SEQUENCE {  
    agency                CPT-AgencyID,  
    activationDateTime  CPT-DateTime,  
    deactivationDateTime CPT-DateTime OPTIONAL,  
    detour-id            CC-DetourID,  
    detour-type          IM-DetourType  OPTIONAL,  
    patch                SchPattern,  
    pattern-time-offset  CcPatternDeltaTime,  
    driverMsg            SEQUENCE OF CC-AnnouncementMsgID  OPTIONAL,  
    -- if message goes to driver  
    announcement      CC-AnnouncementMsgData  OPTIONAL,  
    -- if message goes to OB  
    missedStopPointList SEQUENCE OF CPT-StopPointID,  
    addedStopPointList  SEQUENCE OF CPT-StopPointID,  
    -- from existing inventory of stop points  
    newStopPointList   SEQUENCE OF SpPointclass  
    -- newly created stop points or not maintained by agency  
}

**Object Identifier:** cc 21



**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcPTVDeregistration  
**Message Description:** A message sent automatically by a public transit vehicle to power down; (deregisters from polling protocol). Since PTV frequently remains active for some time after last logoff (and after engine is shut off), this message may need to be generated spontaneously, based on a timer function, a given amount of time after vehicle is powered off.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPTVMessageTemplate  
**Message Length:** 2  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcPTVDeregistration ::= SEQUENCE {  
    ptv-id CC-PTVehicleIDShort,  
    agency CPT-AgencyID OPTIONAL  
}  
**Object Identifier:** cc 22

<b>Message Identifier:</b>	TCIP
<b>Message Set Identifier:</b>	ST-TCIP-TCIP-CC
<b>Message Set Version:</b>	V 1.0
<b>Message Group Identifier:</b>	CC
<b>Message Name:</b>	CcPTVMessageTemplate
<b>Message Description:</b>	This template holds the objects for the PTV to report or respond to the control center (fixed end). This may be a response to a data load, outbound message template. The template contains general information on the source of the messages and may contain other information related to the messages (priority, time message generated, etc.).
<b>Meta Data Source:</b>	Direct
<b>Priority:</b>	High when CC-ResponseRequestType=[2,3]
<b>Frequency:</b>	As needed; polling arch assumes every poll.
<b>Message Length:</b>	11
<b>Keywords:</b>	
<b>Time Stamp:</b>	
<b>Message Body:</b>	<pre>CcPTVMessageTemplate ::= SEQUENCE {   ptv-id CC-PTVehicleIDShort OPTIONAL,   mobile-unit-id CC-MobileUnitID OPTIONAL,   -- either vehicle or radio id must be used   alarm-summary OB-AlarmSummary OPTIONAL,   door-summary OB-DoorStatusSummary OPTIONAL,   route-id CC-RouteIDShort,   route-direction CC-RouteDirectionShort,   time-tag CC-SecSinceTopHour OPTIONAL, --mandatory for high priority level   avl-location SpPointclass OPTIONAL,   priority-level CPT-PriorityLevel OPTIONAL,   response-request-type CC-ResponseRequestType OPTIONAL,   msg SEQUENCE OF {     SEQUENCE {       msg-id TCIP-CLASS.&amp;id ({CcMsgSet}),       value TCIP-CLASS.&amp;Type ({CcMsgSet} {@.msg-id})     }   } OPTIONAL --message is open for any TCIP msg type } (WITH COMPONENTS {..., ptv-id PRESENT}     WITH COMPONENTS {..., mobile-unit-id PRESENT} )</pre>
<b>Object Identifier:</b>	cctemplate 4

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcPTVRegistration  
**Message Description:** The registration of a PTV with a central system upon power up.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPTVMessageTemplate  
**Message Length:** 3  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcPTVRegistration ::= SEQUENCE {  
    ptv-id CPT-PTVehicleIDShort,  
    vin CPT-VIN OPTIONAL,  
    configurationList SEQUENCE OF ObComponent OPTIONAL  
}  
**Object Identifier:** cc 23

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcRouteAdherenceEntry  
**Message Description:** This is an entry to the CcActivateRouteAdherence. It records the frequency that a transit vehicle must report when it is off route (report-frequency). The off-route-distance is the (total) distance by which the vehicle is off route. The return-off-route-distance is the (total) distance the vehicle must return before it is considered within the route adherence entries parameters (also called historesis).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcActivateRouteAdherence  
**Message Length:** 3  
**Keywords:**  
**Time Stamp:**  
**Message Body:**

```
CcRouteAdherenceEntry ::= SEQUENCE {  
    off-route-distance          CC-OffRouteDistance,  
    return-off-route-distance   CC-OffRouteDistance OPTIONAL,  
    report-frequency           CC-ExceptionFrequencyReport OPTIONAL  
}
```

**Object Identifier:** cc 24

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-CC  
**Message Set Version:** V 1.0  
**Message Group Identifier:** CC  
**Message Name:** CcThresholdMonitorRequest  
**Message Description:** A message from the CC to the OB to reset the threshold(s) on specified parameters for over the air/real-time exception reporting.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcOutboundMessageTemplate  
**Message Length:** 2  
**Keywords:**  
**Time Stamp:**  
**Message Body:** CcThresholdMonitorRequest ::= SEQUENCE {  
    device OB-MID,  
    parameter-threshold-requests SEQUENCE OF CcParameterThreshold  
}  
**Object Identifier:** cc 25



## Section 5 CONFORMANCE

The control center business area supports the first two levels of conformance -- Conformance Level 1 and Conformance Level 2 -- as defined in NTCIP 1400, version 01.04. Conformance Levels are defined as a collection of CC-related objects that are required to support a function of a component in the control center area. Level 1 conformance only includes data elements contained within this document and other documents that support this business area. Level 2 conformance includes all the requirements contained in Section 5.2, below.

### 5.1 LEVEL 1 CONFORMANCE

Level 1 conformance for control center bus applications is listed as follows:

Data Element Name	Reference*
CC Data Elements	NTCIP 1407 Section 4.1
CPT Data Elements	NTCIP 1401 Section 4.1

\* *NTCIP 1407 refers to this document; see Section 4.1 for complete listing. NTCIP 1401 Section 4.1 refers to the Standard on Common Public Transportation Objects. The CC Conformance group consists of the global set of data elements related to CC as outlined in the CC message set.*

### 5.2 LEVEL 2 CONFORMANCE

Level 2 conformance for control center bus applications includes all Level 1 conformance requirements and those requirements listed below:

Message Name	Reference*
SP Messages	NTCIP 1407 Section 4.2
CPT Messages	NTCIP 1401 Section 4.2
SCH – TimePointID	NTCIP 1404 Section 4.2
SCH – PatternID	NTCIP 1404 Section 4.2
SCH – TripID	NTCIP 1404 Section 4.2

\* *NTCIP 1407 refers to this document; see Section 4.2 for complete listing. NTCIP 1401 refers to the Standard on Common Public Transportation Objects. NTCIP 1404 Section 4.2 refers to the Standard on Scheduling and Runcutting Objects.*

*The CC conformance group consists of the CC and CPT message sets.*





**Annex A**  
**DATA ELEMENT/MESSAGE USE**  
**CROSS REFERENCE TABLE**

Data Element/Message	Message(s)
<b>CC-AnnouncementMsgData</b>	CcPatternException CcAnnunciatorMessageEntry
<b>CC-AnnouncementMsgID</b>	CcAnnunciatorMessageEntry CcPatternException
<b>CcAnnunciatorMessageEntry</b>	CcAnnunciatorLibrary
<b>CC-BlockIDShort</b>	CcDataLoadTemplate CcLogOnOperator CcOutboundMessageTemplate SchBlock
<b>CC-DeltaTime</b>	CcPatternDeltaTime
<b>CC-DetourID</b>	CcPatternException
<b>CC-DigitizedAnnouncement</b>	CcAnnunciatorMessageEntry
<b>CC-ExceptionFrequencyReport</b>	CcActivateScheduleAdherence CcChangeReportingRate CcRouteAdherenceEntry
<b>CC-MobileUnitID</b>	CcPTVMessageTemplate
<b>CC-MsgAddressGroup</b>	CcDataLoadTemplate CcOutboundMessageTemplate

<b>Data Element / Message</b>	<b>Message(s)</b>
<b>CcMsgRecord</b>	CcDataLoadTemplate CcOutboundMessageTemplate
<b>CC-MsgResponse</b>	CcActivateScheduleAdherence
<b>CC-MsgResponseType</b>	CcMsgRecord
<b>CC-MsgSeqNo</b>	CcMsgRecord
<b>CC-OffRouteDistance</b>	CcRouteAdherenceEntry
<b>CC-OperatorAssignType</b>	CcOperatorAssignment
<b>CcParameterRateConfiguration</b>	CcParameterReportRequest
<b>CcParameterThreshold</b>	CcThresholdMonitorRequest
<b>CcPatternDeltaTime</b>	CcPatternException
<b>CC-PollingSlot</b>	CcChangeReportingRate
<b>CC-PTVehicleIDShort</b>	CcOutboundMessageTemplate CcPTVDeregistration CcPTVMessageTemplate CcDataLoadTemplate CptPTVehicle
<b>CC-RadioMode</b>	CcChangeRadioMode

Data Element / Message	Message(s)
<b>CC-RadioVoiceControl</b>	CcChangeRadioMode
<b>CC-ResponseRequestType</b>	CcPTVMessageTemplate
<b>CC-ReturnToleranceEarly</b>	CcActivateScheduleAdherence
<b>CC-ReturnToleranceLate</b>	CcActivateScheduleAdherence
<b>CcRouteAdherenceEntry</b>	CcActivateRouteAdherence
<b>CC-RouteDirectionShort</b>	CcPTVMessageTemplate
<b>CC-RouteIDShort</b>	CcDataLoadTemplate CcLogOnOperator CcOutboundMessageTemplate CcPTVMessageTemplate SchRoute
<b>CC-RunIDShort</b>	CcDataLoadTemplate CcLogOnOperator CcOutboundMessageTemplate SchRun
<b>CC-ScheduleToleranceEarly</b>	CcActivateScheduleAdherence
<b>CC-ScheduleToleranceLate</b>	CcActivateScheduleAdherence

---

<b>Data Element / Message</b>	<b>Message(s)</b>
<b>CC-SecSinceTopHour</b>	CcPTVMessageTemplate
<b>CC-ShiftNo</b>	CcLogOnDispatch
<b>CC-WorkstationID</b>	CcLogOnDispatch
<b>CC-ZeroPeriod</b>	CcChangeReportingRate

---

## Annex B

### GUIDANCE ON DIALOG SETS USING CC TEMPLATE OBJECTS





The Control Center Message Templates are structures in which certain information is communicated from the fixed to mobile end or vice versa. There are three templates and a template message structure object. Two templates (e.g., *CcDataLoadTemplate* and *CcOutboundMessageTemplate*) are used for fixed to mobile end communications and the third (*CcPTVMessageTemplate*) is used for mobile to fixed end communications. Messages (TCIP Objects) that are recommended for use with each template are listed in the white boxes in Table B.1. The gray boxes identify the templates under the column associated with its origin (e.g., fixed or mobile end). Additionally, the dynamic object structure defined in the TCIP Framework document NTCIP 1400 v01.04 may be used to construct *ad hoc* messages that may be used once, during a specified time period or for a specified registration/log-on period.

The *CcDataLoadTemplate* was constructed to download large data loads onto the vehicle such as schedules, fare tables, fare zones, libraries, configuration information and more. The means of communication may include short-range high-speed wireless cellular packet, wireless ethernet, wireless modem, infrared probe, or magnetic or flash memory cards. Typically, the *CcDataLoadTemplate* will be executed once a day. Acknowledgement or verification of load may or may not be required. Since performance configuration information may be included, the *CcDataLoadTemplate* may evoke certain real-time performance responses by the PTV. Table B.2 shows how the three template message objects may be used.

**Table B.1 Message Templates and Supported TCIP Objects**

<b>Mobile End (OnBoard)</b>	<b>Fixed End (Control Center)</b>
CcPTVMessageTemplate	CcOutboundMessageTemplate
CcLogOffOperator	CcActivateAnnouncementFreeform
CcLogOnOperator	CcActivateAnnounceFromLibrary
CcPTVDeregistration	CcActivateRouteAdherence
CcPTVRegistration	CcActivateScheduleAdherence
ObComponent	CcAnnunciatorLibrary
ObDoorRecord	CcChangeRadioMode
ObParameterDumpResponse	CcChangeReportingRate
ObStopPointRecord	CcParameterDumpRequest
Any TCIP objects including J1587 objects	CcParameterRateConfiguration
	CcParameterReportRequest
	CcParameterThreshold
	CcPatternDeltaTime
	CcPatternException
	CcThresholdMonitorRequest
	CcMsgRecord
	CcDataLoadTemplate
	CcAnnunciatorLibrary
	CcMsgRecord
CcMsgRecord	
	Any TCIP object

**Table B.2 Example of Message Dialog**

Mobile End	Communications Channel	Fixed End
[process information]		Initial Load (tuesday-oct-6-1998) (sent @2:30, oct 6)
Real-time performance Reporting (ptv-report-oct6) (sent @5:30, oct. 6 and at 2 minute intervals)		[process information]
New reporting message (new-ptv-report-oct6noon) (sent @12:02, oct 6 and at 6 minute intervals)	 	Update Real-time reporting (new-oct-6noon) (sent @12:00, oct 6) [process information]

Where,

```

tuesday-oct-6-1998      CcDataLoadTemplate ::= {
  address-group         0,
  broadcast              NULL,
  msg-list              SEQUENCE OF oct6-msg-record }

oct6-msg-record         CcMsgRecord ::= {
  msg {
    {id ccParameterRateConfiguration-id, value CcParameterRateConfiguration :
      {parameters {379, 789, 791},
       rate 120}
    }
  }
}

ptv-report-oct6        CcPTVMessageTemplate ::= {
  ptv-id                245,
  route-id              39, -- route 39
  route-direction       4, -- inbound
  messageResponses {
    {id ob-J1589-TransitDoorStatus-id, value OB-J1589-TransitDoorStatus :
00},
    {id ob-RouteAdherenceStatus-id, value OB-RouteAdherenceStatus : 2},
    {id ob-ScheduleAdherenceOffset-id, value OB-ScheduleAdherenceOffset :
360}
  }
}

new-oct-6noon          CcOutboundMessageTemplate ::= {
  address-group         0,
  broadcast              NULL,
  msg-list              SEQUENCE OF new-oct6noon-msg-record }

new-oct6noon-msg-record CcMsgRecord ::= {
  msg {

```

```
    {id ccParameterRateConfiguration-id, value CcParameterRateConfiguration :
      {parameters {379, 789, 791, 793},
       rate 360}
    }
  }
}

new-ptv-report-oct6noon CcPTVMessageTemplate ::= {
  ptv-id 245,
  route-id 39, -- route 39
  route-direction 4, -- inbound
  messageResponses {
    {id ob-J1589-TransitDoorStatus-id, value OB-J1589-TransitDoorStatus : 00},
    {id ob-RouteAdherenceStatus-id, value OB-RouteAdherenceStatus : 2},
    {id ob-ScheduleAdherenceOffset-id, value OB-ScheduleAdherenceOffset :
    360},
    {id ob-StopPointStop-id, value OB-StopPointStop : 1324333333}
  }
}
```



## Annex C ASN.1 SCRIPT Informative Annex

This annex is a script in ASN.1 format for compiling the required CC business objects.

```
TCIP-CCDD
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN

    BYTE ::= INTEGER (-128..127)

    UBYTE ::= INTEGER (0..255)

    USHORT ::= INTEGER (0..65535)

    LONG ::= INTEGER (-2147483648..2147483647)

    ULONG ::= INTEGER (0..4294967295)

    TIME ::= ULONG

    DATE ::= ULONG

    DATETIME ::= ULONG

    FOOTNOTE ::= UTF8String (SIZE (1..256))

    MEMMLONG ::= OCTET STRING (SIZE (1..2000000))

    NAME ::= UTF8String (SIZE (1..30))

    NAME8 ::= UTF8String (SIZE (1..8))

    IDENS ::= INTEGER (0..65535)

    IDENL ::= INTEGER (0..4294967295)

    enterprises OBJECT IDENTIFIER ::= {iso(1) identified-organization(3)
dod(6)
internet(1) private(4) enterprises(1)}

    nema OBJECT IDENTIFIER ::= {enterprises 1206}

    transportation OBJECT IDENTIFIER ::= {nema 4}

    SP-Altitude ::= INTEGER (-32768..32767)

    SP-AngularDirection ::= USHORT

    SP-CityName ::= NAME

    SP-CommunityName ::= NAME

    SP-CompassDirection ::= INTEGER {
north(1),
south(2),
east(3),
west(4),
southwest(5),
southeast(6),
```

```
northwest(7),
northeast(8)
} (0..255)

SP-Country ::= USHORT

SP-County ::= USHORT

SP-Datum ::= NAME8

SP-GeoLabel ::= NAME

SP-LandmarkDesc ::= FOOTNOTE

SP-LandmarkName ::= NAME

SP-Latitude ::= LONG

SP-Level ::= BYTE

SP-LinkID ::= ULONG

SP-Longitude ::= LONG

SP-MilePostID ::= ULONG

SP-NodeID ::= ULONG

SP-Offset ::= LONG

SP-PostalCode ::= NAME8

SP-Province ::= INTEGER (0..255)

SP-RelativeDistance ::= INTEGER (0..255)

SP-RoadName ::= NAME

SP-RoadNumber ::= IA5String (SIZE (1..20))

SP-RoadPrefix ::= IA5String (SIZE (1..4))

SP-RoadSuffix ::= IA5String (SIZE (1..4))

SP-RoadType ::= IA5String (SIZE (1..4))

SP-Side ::= INTEGER {
right(1),
left(2)
} (0..255)

SP-SPEasting ::= LONG

SP-SPNorthing ::= LONG

SP-SPZone ::= IDENS

SP-State ::= INTEGER {
alabama(1),
alaska(2),
american-samoa(3),
arizona(4),
arkansas(5),
california(6),
panama-canal-zone(7),
colorado(8),
```

```
connecticut(9),  
delaware(10),  
district-of-columbia(11),  
florida(12),  
georgia(13),  
guam(14),  
hawaii(15),  
idaho(16),  
illinois(17),  
indiana(18),  
iowa(19),  
kansas(20),  
kentucky(21),  
louisiana(22),  
maine(23),  
maryland(24),  
massachusetts(25),  
michigan(26),  
minnesota(27),  
mississippi(28),  
missouri(29),  
montana(30),  
nebraska(31),  
nevada(32),  
new-hampshire(33),  
new-jersey(34),  
new-mexico(35),  
new-york(36),  
north-caroline(37),  
north-dakota(38),  
ohio(39),  
oklahoma(40),  
oregon(41),  
pennsylvania(42),  
puerto-rico(43),  
rhode-island(44),  
south-carolina(45),  
south-dakota(46),  
tennessee(47),  
texas(48),  
utah(49),  
vermont(50),  
virgin-island(51),  
virginia(52),  
washington(53),  
west-virginia(54),  
wisconsin(55),  
wyoming(56)  
} (0..255)
```

```
SpAddresspoint ::= SEQUENCE {  
directional [0] SP-RoadType OPTIONAL,  
number [1] SP-RoadNumber,  
prefix [2] SP-RoadPrefix OPTIONAL,  
name [3] SP-RoadName,  
suffix [4] SP-RoadSuffix,  
city [5] SP-CityName OPTIONAL,  
community [6] SP-CommunityName OPTIONAL,  
county [7] SP-County OPTIONAL,  
province [8] SP-Province OPTIONAL,  
state [9] SP-State OPTIONAL,  
postalCode [10] SP-PostalCode,  
country [11] SP-Country OPTIONAL  
}
```

```
SpAddressRangeline ::= SEQUENCE {
```

```
address [0] SpAddresspoint,  
number [1] SP-RoadNumber,  
side [2] SP-Side OPTIONAL  
}  
  
SpCentroidpolygon ::= SpPointclass  
  
SpGeoline ::= SEQUENCE OF SpGeopoint  
  
SpGeoLpoint ::= SEQUENCE {  
geoPoint [0] SpGeopoint,  
label [1] SP-GeoLabel  
}  
  
SpGeoOffsetpoint ::= SEQUENCE {  
geoPoint [0] SpGeopoint,  
offset [1] SP-Offset,  
angle [2] SP-AngularDirection  
}  
  
SpGeopoint ::= SEQUENCE {  
latitude [0] SP-Latitude,  
longitude [1] SP-Longitude,  
altitude [2] SP-Altitude OPTIONAL,  
datum [3] SP-Datum OPTIONAL  
}  
  
SpIntOffsetpoint ::= SEQUENCE {  
intersection [0] SpIntpoint,  
offset [1] SP-Offset,  
direction [2] SP-CompassDirection,  
side [3] SP-Side OPTIONAL  
}  
  
SpIntpoint ::= SEQUENCE OF SP-RoadName  
  
SpL-AddressRangepolygon ::= SEQUENCE OF SpAddressRangeline  
  
SpL-Linkpolygon ::= SEQUENCE OF SpLinkline  
  
SpLandmarkpoint ::= SEQUENCE {  
name [0] SP-LandmarkName,  
level [1] SP-Level OPTIONAL,  
descriptions [2] SP-LandmarkDesc OPTIONAL,  
address [3] SpAddresspoint OPTIONAL,  
geoPoint [4] SpGeopoint OPTIONAL  
}  
  
SpLinkline ::= SEQUENCE {  
linkID [0] SP-LinkID,  
geoLine [1] SpGeoline  
}  
  
SpMilepostpoint ::= SEQUENCE {  
milepost [0] SP-MilePostID,  
roadName [1] SP-RoadName,  
offset [2] SP-Offset OPTIONAL,  
direction [3] SP-CompassDirection OPTIONAL  
}  
  
SpNodeOffsetpoint ::= SEQUENCE {  
nodeID [0] SP-NodeID,  
offset [1] SP-Offset,  
direction [2] SP-CompassDirection,  
side [3] SP-Side OPTIONAL  
}
```

```

    SpNodePercentOffsetpoint ::= SEQUENCE {
firstNode      [0] SpNodepoint,
secondNode     [1] SpNodepoint,
relativeDistance [2] SP-RelativeDistance,
side          [3] SP-Side OPTIONAL
    }

    SpNodepoint ::= SEQUENCE {
nodeID [0] SP-NodeID,
label  [1] SP-GeoLabel OPTIONAL
    }

    SpP-Geopolygon ::= SEQUENCE OF SpGeopoint

    SpP-Intpolygon ::= SEQUENCE OF SpIntpoint

    SpP-Nodepolygon ::= SEQUENCE OF SpNodepoint

    SpP-SPpolygon ::= SEQUENCE OF SpSPpoint

    SpPointclass ::= CHOICE {
address      [0] SpAddresspoint,
geoPoint    [1] SpGeopoint,
geoLabelPt  [2] SpGeoLpoint,
geoOffset   [3] SpGeoOffsetpoint,
intersection [4] SpIntpoint,
intOffset   [5] SpIntOffsetpoint,
landmark    [6] SpLandmarkpoint,
milepost    [7] SpMilepostpoint,
node        [8] SpNodepoint,
nodeOffset  [9] SpNodeOffsetpoint,
nodePercentOffset [10] SpNodePercentOffsetpoint,
statePlanePt [11] SpSPpoint,
roadLabel   [12] SpRoadLabelpoint
    }

    SpPolygonclass ::= SEQUENCE {
label      [0] SP-GeoLabel OPTIONAL,
polygon [1] EXPLICIT CHOICE {
    centroid      [0] EXPLICIT SpCentroidpolygon,
    geoPoint-Poly [1] SpP-Geopolygon,
    intersection-Poly [2] SpP-Intpolygon,
    node-Poly     [3] SpP-Nodepolygon,
    stPlanePt-Poly [4] SpP-SPpolygon,
    addressRange-Poly [5] SpL-AddressRangepolygon,
    link-Poly     [6] SpL-Linkpolygon
}
}

    SpRoadLabelpoint ::= SEQUENCE {
geoPoint [0] SpGeopoint,
roadName [1] SP-RoadName
    }

    SpSPpoint ::= SEQUENCE {
easting      [0] SP-SPEasting,
northing     [1] SP-SPNorthing,
statePlaneZone [2] SP-SPZone OPTIONAL,
altitude     [3] SP-Altitude OPTIONAL,
datum       [4] SP-Datum OPTIONAL
    }

    tcip OBJECT IDENTIFIER ::= {transportation 3}

    cc OBJECT IDENTIFIER ::= {tcip 5}

```

```
TCIP-CLASS ::= CLASS {
  &Type
  ,
  &description UTF8String OPTIONAL,
  &id          OBJECT IDENTIFIER UNIQUE
} WITH SYNTAX {
  &Type
  IDENTIFIED BY &id
  [ WITH DESCRIPTION &description ]
}

CPT-ActivationDate ::= DATE

CPT-ActivationTime ::= TIME

CPT-AgencyID ::= IDENS

CPT-ChannelID ::= INTEGER (0..255)

CPT-DateTime ::= DATETIME

CPT-DeactivationDate ::= DATE

CPT-DeactivationTime ::= TIME

CPT-EmployeeID ::= ULONG

CPT-EmployeeJobCategory ::= INTEGER {
  fullTimeOperator(1),
  partTimeOperator(2),
  conductor(3),
  engineer(4),
  maintenance(5),
  supervisor(6),
  revenueCollector(7),
  dispatcher(8),
  null(65526),
  intentionallyLeftBlank(65527),
  deletedByDevice(65528),
  dataUnavailable(65529),
  illegalCalculation(65530),
  valueOutOfRange(65531),
  deviceMalfunction(65532),
  dataExpired(65533),
  dataSupressedForSecurityOrPrivacy(65534),
  unspecified(65535)
} (0..65535)

CPT-Footer ::= FOOTNOTE

CPT-Manufacturer ::= NAME

CPT-Mode ::= IA5String (SIZE (1..2))

CPT-OperatorBaseID ::= IDENS

CPT-OrganizationalUnitID ::= IDENS

CPT-PriorityLevel ::= INTEGER (0..255)

CPT-RadioZoneID ::= IDENS

CPT-StopPointID ::= IDENS

CPT-TransitFacilityID ::= IDENS
```

```
CPT-VersionNo ::= UTF8String (SIZE (1..8))

CPT-VIN ::= OCTET STRING (SIZE (1..17))

SCH-ActivationID ::= IDENS

SCH-BlockID ::= IDENL

SCH-DayType ::= INTEGER {
sunday(1),
monday(2),
tuesday(3),
wednesday(4),
thursday(5),
friday(6),
saturday(7),
holiday(8),
weekday(9),
weekend(10),
weekdaySchoolClosed(11),
null(246),
intentionallyLeftBlank(247),
deletedByDevice(248),
dataUnavailable(249),
illegalCalculation(250),
valueOutOfRange(251),
deviceMalfunction(252),
dataExpired(253),
dataSupressedForSecurityOrPrivacy(254),
unspecified(255)
} (0..255)

SCH-NoteID ::= IDENS

SCH-PatternDesignator ::= NAME8

SCH-PatternID ::= IDENS

SCH-PatternName ::= NAME

SCH-RouteDirectionName ::= INTEGER {
north(1),
south(2),
east(3),
west(4),
sw(5),
se(6),
nw(7),
ne(8),
in(9),
out(10),
circ(11),
dest(12),
clockwise(13),
counterClock(14),
name(15),
null(246),
intentionallyLeftBlank(247),
deletedByDevice(248),
dataUnavailable(249),
illegalCalculation(250),
valueOutOfRange(251),
deviceMalfunction(252),
dataExpired(253),
dataSupressedForSecurityOrPrivacy(254),
unspecified(255)
```

```
    } (0..255)

    SCH-RouteID ::= IDENS

    SCH-RunID ::= IDENS

    SCH-ServiceType ::= INTEGER {
regular(1),
express(2),
circular(3),
radial(4),
feeder(5),
jitney(6),
limited(7),
nonRevenue(8),
unknown(9),
charter(10),
school(11),
special(12),
operatorTraining(13),
maintenance(14),
noService(15),
standBy(16),
extra(17),
null(246),
intentionallyLeftBlank(247),
deletedByDevice(248),
dataUnavailable(249),
illegalCalculation(250),
valueOutOfRange(251),
deviceMalfunction(252),
dataExpired(253),
dataSupressedForSecurityOrPrivacy(254),
unspecified(255)
    } (0..255)

    SCH-TimePointID ::= IDENS

    SCH-TimeTableVersionID ::= IDENS

    SCH-TripID ::= IDENS

    SchPattern ::= SEQUENCE {
pattern-designator [0] SCH-PatternDesignator,
pattern-id [1] SCH-PatternID,
pattern-name [2] SCH-PatternName OPTIONAL,
note-id [3] SCH-NoteID OPTIONAL,
route-direction [4] SCH-RouteDirectionName OPTIONAL,
route-id [5] SCH-RouteID,
time-points [6] SEQUENCE OF SCH-TimePointID,
stop-points [7] SEQUENCE OF CPT-StopPointID,
triggers [8] SEQUENCE OF SCH-ActivationID OPTIONAL,
mode [9] CPT-Mode OPTIONAL,
timetable-version [10] SCH-TimeTableVersionID OPTIONAL
    }

    IM-DetourType ::= INTEGER {
ad-hoc(1),
canned(2),
short-term(3),
long-term(4),
null(246),
intentionallyLeftBlank(247),
deletedByDevice(248),
dataUnavailable(249),
illegalCalculation(250),
```



```
valueOutOfRange(251),
deviceMalfunction(252),
dataExpired(253),
dataSupressedForSecurityOrPrivacy(254),
unspecified(255)
} (0..255)

OB-AlarmSummary ::= BOOLEAN

OB-DataLoadRelease ::= DATETIME

OB-DoorStatusSummary ::= BOOLEAN

OB-MID ::= INTEGER

OB-MIDDescription ::= FOOTNOTE

OB-PID ::= INTEGER

OB-Rate ::= USHORT

ObComponent ::= SEQUENCE {
componentID [0] OB-MID OPTIONAL,
component-parameters [1]
    ObBusComponentIdentificationParameters OPTIONAL,
sw-dataload-parameters [2] SEQUENCE OF ObSWComponent OPTIONAL,
dateInstalled [3] CPT-DateTime OPTIONAL,
description [4] OB-MIDDescription OPTIONAL
}

ObSWComponent ::= SEQUENCE {
component [0] OB-MID,
identification [1] OB-J1587-SoftwareIdentification,
manufacturer [2] CPT-Manufacturer OPTIONAL,
revision [3] CPT-VersionNo OPTIONAL,
data-loads [4] SEQUENCE OF SEQUENCE {
    data-load-id [0] INTEGER (0..255) OPTIONAL,
    data-load-name [1] IA5String (SIZE (0..17)) OPTIONAL,
    date-time [2] OB-DataLoadRelease OPTIONAL,
    revision-no [3] CPT-VersionNo
}
}

OB-J1587-SoftwareIdentification ::= IA5String

ObBusTextMessageDisplayType ::= IA5String

ObBusTextMessagettoDisplay ::= IA5String

ObBusComponentIdentificationParameters ::= IA5String

ccdd OBJECT IDENTIFIER ::= {cc 1}

cctemplate OBJECT IDENTIFIER ::= {cc 2}

cc-AnnouncementMsgData-id OBJECT IDENTIFIER ::= {ccdd 1}

cc-AnnouncementMsgData TCIP-CLASS ::= {
CC-AnnouncementMsgData IDENTIFIED BY cc-AnnouncementMsgData-id WITH
DESCRIPTION "A textual description of the announcement or part of an
announcement.
An announcement may be displayed or annunciated."
}

CC-AnnouncementMsgData ::= UTF8String
```

```
cc-AnnouncementMsgID-id OBJECT IDENTIFIER ::= {ccdd 2}

cc-AnnouncementMsgID TCIP-CLASS ::= {
  CC-AnnouncementMsgID IDENTIFIED BY cc-AnnouncementMsgID-id WITH
  DESCRIPTION "A number associated with a ccAnnouncementMessage as
  assigned by the
  transit agency."
}

CC-AnnouncementMsgID ::= USHORT

cc-BlockIDShort-id OBJECT IDENTIFIER ::= {ccdd 3}

cc-BlockIDShort TCIP-CLASS ::= {
  CC-BlockIDShort IDENTIFIED BY cc-BlockIDShort-id WITH DESCRIPTION "A short
  version of Block ID (12 bits). If used, this data element
  should be correlated to SCH-BlockID or SCH-BlockDesignator by inserting
  it in the
  SchBlock message."
}

CC-BlockIDShort ::= INTEGER

cc-DeltaTime-id OBJECT IDENTIFIER ::= {ccdd 4}

cc-DeltaTime TCIP-CLASS ::= {
  CC-DeltaTime IDENTIFIED BY cc-DeltaTime-id WITH DESCRIPTION
  "The deviation from the scheduled time at a trip time (from a
  given time point). A positive number (+) signifies late, and a
  negative number (-)
  implies the vehicles is early."
}

CC-DeltaTime ::= INTEGER

cc-DetourID-id OBJECT IDENTIFIER ::= {ccdd 5}

cc-DetourID TCIP-CLASS ::= {
  CC-DetourID IDENTIFIED BY cc-DetourID-id WITH DESCRIPTION "A number
  associated with a detour as assigned by a transit agency.
  The detour identifier may not necessarily be unique, but should be
  unique over the
  activation time and date."
}

CC-DetourID ::= INTEGER (0..255)

cc-DigitizedAnnouncement-id OBJECT IDENTIFIER ::= {ccdd 6}

cc-DigitizedAnnouncement TCIP-CLASS ::= {
  CC-DigitizedAnnouncement IDENTIFIED BY cc-DigitizedAnnouncement-id WITH
  DESCRIPTION "Digital or analog signal representation of synthesized or
  recorded
  voice in a specified file format. This data element may also represent
  video or images.
  The first byte identifies the file format."
}

CC-DigitizedAnnouncement ::= MEMLONG

cc-ExceptionFrequencyReport-id OBJECT IDENTIFIER ::= {ccdd 7}

cc-ExceptionFrequencyReport TCIP-CLASS ::= {
  CC-ExceptionFrequencyReport IDENTIFIED BY
  cc-ExceptionFrequencyReport-id WITH DESCRIPTION "The frequency between
  reports required when a transit vehicle in
```

```
    revenue service deviates from an adherence requirement."
}

CC-ExceptionFrequencyReport ::= INTEGER

cc-MobileUnitID-id OBJECT IDENTIFIER ::= {ccdd 8}

cc-MobileUnitID TCIP-CLASS ::= {
CC-MobileUnitID IDENTIFIED BY cc-MobileUnitID-id WITH DESCRIPTION "A unique
number used to identify the mobile unit (e.g., mobile
radio unit)."}

CC-MobileUnitID ::= INTEGER

cc-MsgAddressGroup-id OBJECT IDENTIFIER ::= {ccdd 9}

cc-MsgAddressGroup TCIP-CLASS ::= {
CC-MsgAddressGroup IDENTIFIED BY cc-MsgAddressGroup-id WITH DESCRIPTION
"Identifies the type of audience for the message(s)."}

}

CC-MsgAddressGroup ::= INTEGER {
vehicle-list(4),
block-list(5),
run-list(6),
pattern-list(7),
manifest(8),
beat(9),
district(10),
radio-zone(11),
agencyID(12)
} (0..15)

cc-MsgResponse-id OBJECT IDENTIFIER ::= {ccdd 10}

cc-MsgResponse TCIP-CLASS ::= {
CC-MsgResponse IDENTIFIED BY cc-MsgResponse-id WITH DESCRIPTION
"Defines whether a response is required of the operator to an
associated message."
}

CC-MsgResponse ::= INTEGER {
noResponse(0),
responseRequired(1)
} (0..1)

cc-MsgResponseType-id OBJECT IDENTIFIER ::= {ccdd 11}

cc-MsgResponseType TCIP-CLASS ::= {
CC-MsgResponseType IDENTIFIED BY cc-MsgResponseType-id WITH DESCRIPTION
"Determines the type of response required of an operator. This
data element must be included in CcMsgRecord if message is destined for
operator."
}

}

CC-MsgResponseType ::= INTEGER {
noResponse(0),
responseAck(1),
responseYN(2),
responseVar(3)
} (0..3)

cc-MsgSeqNo-id OBJECT IDENTIFIER ::= {ccdd 12}
```

```
    cc-MsgSeqNo TCIP-CLASS ::= {
    CC-MsgSeqNo IDENTIFIED BY cc-MsgSeqNo-id WITH DESCRIPTION "A unique number
assigned to a message record (CcMsgRecord) for
    any given time period as specified by a transit agency."
    }

    CC-MsgSeqNo ::= INTEGER (0..15)

    cc-OffRouteDistance-id OBJECT IDENTIFIER ::= {ccdd 13}

    cc-OffRouteDistance TCIP-CLASS ::= {
    CC-OffRouteDistance IDENTIFIED BY cc-OffRouteDistance-id WITH
    DESCRIPTION
    "The orthogonal distance from the scheduled route of a transit
vehicle in revenue service which will set a route adherence exception
alarm. This
    data element is part of the ccActivateRouteAdherenceException which
indicates the
    requirements for route adherence."
    }

    CC-OffRouteDistance ::= INTEGER

    cc-OperatorAssignmentType-id OBJECT IDENTIFIER ::= {ccdd 14}

    cc-OperatorAssignmentType TCIP-CLASS ::= {
    CC-OperatorAssignmentType IDENTIFIED BY cc-OperatorAssignmentType-id
    WITH DESCRIPTION "The type of operator assignment associated with a
run. They include:
    Pick: operator picks a piece of work.
    Planned: short term assignment managed by operator base (garage)
    Actual: as operated."
    }

    CC-OperatorAssignmentType ::= INTEGER {
    pick(1),
    planned(2),
    actual(3)
    } (0..255)

    cc-PollingSlot-id OBJECT IDENTIFIER ::= {ccdd 15}

    cc-PollingSlot TCIP-CLASS ::= {
    CC-PollingSlot IDENTIFIED BY cc-PollingSlot-id WITH DESCRIPTION "The
reporting slot number in a cyclical polling process (on one
    channel) assigned to a mobile unit."
    }

    CC-PollingSlot ::= INTEGER

    cc-PTVehicleIDShort-id OBJECT IDENTIFIER ::= {ccdd 16}

    cc-PTVehicleIDShort TCIP-CLASS ::= {
    CC-PTVehicleIDShort IDENTIFIED BY cc-PTVehicleIDShort-id WITH
    DESCRIPTION "A short version of the CPT-PTVehicleID. This data element
should
    be mapped to the CPT-PTVehicleID by its inclusion in the CptPTVehicle
message
    (record)."
```

```
CC-RadioMode IDENTIFIED BY cc-RadioMode-id WITH DESCRIPTION
  "The type of communication mode supported by the radio channel."
}

CC-RadioMode ::= INTEGER {
voice(0),
data(1),
both(2),
reserved(3)
} (0..3)

cc-RadioVoiceControl-id OBJECT IDENTIFIER ::= {ccdd 18}

cc-RadioVoiceControl TCIP-CLASS ::= {
CC-RadioVoiceControl IDENTIFIED BY cc-RadioVoiceControl-id WITH
DESCRIPTION
  "Directs the voice traffic to the specified interface device."
}

CC-RadioVoiceControl ::= INTEGER {
handset(0),
announcement(1),
pa-covert(2),
pa-interior(3),
pa-exterior(4),
pa-interior-exterior(5),
telephone-interconnect(6),
reserved(7)
} (0..7)

cc-ResponseRequestType-id OBJECT IDENTIFIER ::= {ccdd 19}

cc-ResponseRequestType TCIP-CLASS ::= {
CC-ResponseRequestType IDENTIFIED BY cc-ResponseRequestType-id WITH
DESCRIPTION "This defines the type of message sent by the transit
vehicle to
the control center. This data element is used in the
CcPTVehicleMessageTemplate to
distinguish between request for voice, silent alarm or data messages."
}

CC-ResponseRequestType ::= INTEGER {
request-to-talk(0),
priority-RTT(1),
urgent(2),
data(3),
spare-1(4),
spare-2(5),
silent-alarm(6),
remote-silent-alarm(7)
} (0..7)

cc-ReturnToleranceEarly-id OBJECT IDENTIFIER ::= {ccdd 20}

cc-ReturnToleranceEarly TCIP-CLASS ::= {
CC-ReturnToleranceEarly IDENTIFIED BY cc-ReturnToleranceEarly-id WITH
DESCRIPTION "The deviation from scheduled time a transit vehicle must
adhere
to (once considered early) before it is considered on time (schedule)
again."
}

CC-ReturnToleranceEarly ::= INTEGER
```

```
cc-ReturnToleranceLate-id OBJECT IDENTIFIER ::= {ccdd 21}

cc-ReturnToleranceLate TCIP-CLASS ::= {
  CC-ReturnToleranceLate IDENTIFIED BY cc-ReturnToleranceLate-id WITH
  DESCRIPTION "The deviation from scheduled time a transit vehicle must
adhere
to (once considered late) before it is considered on time (i.e., on
schedule)
again."
}

CC-ReturnToleranceLate ::= INTEGER

cc-RouteDirectionShort-id OBJECT IDENTIFIER ::= {ccdd 22}

cc-RouteDirectionShort TCIP-CLASS ::= {
  CC-RouteDirectionShort IDENTIFIED BY cc-RouteDirectionShort-id WITH
  DESCRIPTION
  "This is a constrained version of SCH-RouteDirectionName."
}

CC-RouteDirectionShort ::= INTEGER {
north(0),
sourth(1),
east(2),
west(3),
inbound(4),
outbound(5),
clockwise(6),
counter-clockwise(7)
} (0..7)

cc-RouteIDShort-id OBJECT IDENTIFIER ::= {ccdd 23}

cc-RouteIDShort TCIP-CLASS ::= {
  CC-RouteIDShort IDENTIFIED BY cc-RouteIDShort-id WITH DESCRIPTION
  "A short version of the SCH-RouteID. This data element should
be mapped to the SCH-RouteID by its inclusion in the SchRoute message
(record)."
```

```
  }

  CC-RouteIDShort ::= INTEGER (1..256)

cc-RunIDShort-id OBJECT IDENTIFIER ::= {ccdd 24}

cc-RunIDShort TCIP-CLASS ::= {
  CC-RunIDShort IDENTIFIED BY cc-RunIDShort-id WITH DESCRIPTION
  "A short version of Run ID. If used, this data element should
be correlated to SCH-RunID or SCH-RunDesignator by inserting it in the
SchRun message."
```

```
  }

  CC-RunIDShort ::= INTEGER

cc-ScheduleToleranceEarly-id OBJECT IDENTIFIER ::= {ccdd 25}

cc-ScheduleToleranceEarly TCIP-CLASS ::= {
  CC-ScheduleToleranceEarly IDENTIFIED BY cc-ScheduleToleranceEarly-id
  WITH DESCRIPTION "The deviation from schedule before a transit vehicle
in revenue
service is considered early."
}

  CC-ScheduleToleranceEarly ::= INTEGER
```

```
cc-ScheduleToleranceLate-id OBJECT IDENTIFIER ::= {ccdd 26}

cc-ScheduleToleranceLate TCIP-CLASS ::= {
CC-ScheduleToleranceLate IDENTIFIED BY cc-ScheduleToleranceLate-id WITH
DESCRIPTION
"The deviation from scheduled time before a transit vehicle in
revenue service is considered late."
}

CC-ScheduleToleranceLate ::= INTEGER

cc-SecSinceTopHour-id OBJECT IDENTIFIER ::= {ccdd 27}

cc-SecSinceTopHour TCIP-CLASS ::= {
CC-SecSinceTopHour IDENTIFIED BY cc-SecSinceTopHour-id WITH DESCRIPTION
"The time in seconds since the top of the hour. Assumption: if
the number of seconds is greater than 3600 or greater than the current
time since
the top of the hour, then the time should be calculated from the last
hour (not
the current hour)."
```

```
ccActivateAnnouncementFreeform TCIP-CLASS ::= {
CcActivateAnnouncementFreeform IDENTIFIED BY
  ccActivateAnnouncementFreeform-id WITH DESCRIPTION
  "A message that triggers/activates signs and/or annunciators
  with a string of announcements or announcement segments from
  concatenated messages. The announcement messages should be
  sent in the proper format (e.g., text, bitmap, synthesized
  voice) for activation. Only one type of format should be sent
  per message."
}

CcActivateAnnouncementFreeform ::= SEQUENCE {
components          [0] SEQUENCE OF OB-MID,
announcement [1] EXPLICIT CHOICE {
  memo    [0] MEMMLONG,
  string [1] UTF8String
},
sign-message          [2] ObBusTextMessageToDisplay OPTIONAL,
sign-type            [3] ObBusTextMessageDisplayType OPTIONAL
}

ccActivateAnnouncementFromLibrary-id OBJECT IDENTIFIER ::= {cc 4}

ccActivateAnnouncementFromLibrary TCIP-CLASS ::= {
CcActivateAnnouncementFromLibrary IDENTIFIED BY
  ccActivateAnnouncementFromLibrary-id WITH DESCRIPTION "A message that
triggers/activates a sign or annunciator with a
  string of announcements or announcement segments from a library
  of announcements. The device that receives this message
  should store or have access to the announcement library and
  extract the proper form for its use (i.e., text, bitmap,
  digitized voice)."
}

CcActivateAnnouncementFromLibrary ::= SEQUENCE {
components          [0] SEQUENCE OF OB-MID,
sign-parameters [1] ObBusTextMessageToDisplay OPTIONAL,
sign-type        [2] ObBusTextMessageDisplayType OPTIONAL
}

ccActivateRouteAdherence-id OBJECT IDENTIFIER ::= {cc 5}

ccActivateRouteAdherence TCIP-CLASS ::= {
CcActivateRouteAdherence IDENTIFIED BY ccActivateRouteAdherence-id WITH
DESCRIPTION
  "A message that indicates the requirements for activating an
  exception to route adherence reporting. The series (sequence)
  of records signifies an escalation of the adherence violation.
  The first of the sequence is the first report. The second off
  route distance of the sequence is added onto the data element
  of the first report, and so on. For example, if the first
  record includes a CC-OffRouteDistance of 100 meters at 2 minute
  intervals, and the second record includes a
  CC-OffRouteDistance of 500 meters at 1 minute intervals, then
  when a transit vehicle is off route by 175 meters, it reports
  at 2 minute intervals; when the vehicle is 502 meters off
  route, it reports in every minute."
}

CcActivateRouteAdherence ::= SEQUENCE OF CcRouteAdherenceEntry

ccActivateScheduleAdherence-id OBJECT IDENTIFIER ::= {cc 6}

ccActivateScheduleAdherence TCIP-CLASS ::= {
CcActivateScheduleAdherence IDENTIFIED BY
```



```

ccActivateScheduleAdherence-id WITH DESCRIPTION
"A message that indicates the requirements for activating an
exception to schedule adherence reporting. Specifically, the
message is sent to the schedule adherence module to indicate a
relaxing or tightening of the schedule adherence parameters.
For example, tolerance-early and tolerance-late are used to
define the range of early (-) and late (+) constraints on
triggering a schedule adherence violation.
Return-tolerance-early and late indicate the amount of
adherence required to trigger adherence once a violation is
triggered."
}

CcActivateScheduleAdherence ::= SEQUENCE OF SEQUENCE {
tolerance-early      [0] CC-ScheduleToleranceEarly,
return-tolerance-early [1] CC-ReturnToleranceEarly OPTIONAL,
tolerance-late       [2] CC-ScheduleToleranceLate,
return-tolerance-late [3] CC-ReturnToleranceLate OPTIONAL,
report-frequency     [4] CC-ExceptionFrequencyReport OPTIONAL,
response             [5] CC-MsgResponse
}

ccAnnunciatorLibrary-id OBJECT IDENTIFIER ::= {cc 7}

ccAnnunciatorLibrary TCIP-CLASS ::= {
CcAnnunciatorLibrary IDENTIFIED BY ccAnnunciatorLibrary-id WITH
DESCRIPTION
"A collection of messages to be announced on a PTV or a stop
point."
}

CcAnnunciatorLibrary ::= SEQUENCE {
activation-date      [0] CPT-ActivationDate,
version-number       [1] CPT-VersionNo OPTIONAL,
organizational-unit [2] CPT-OrganizationalUnitID OPTIONAL,
annunciator-library [3] SEQUENCE OF CcAnnunciatorMessageEntry
}

ccAnnunciatorMessageEntry-id OBJECT IDENTIFIER ::= {cc 8}

ccAnnunciatorMessageEntry TCIP-CLASS ::= {
CcAnnunciatorMessageEntry IDENTIFIED BY ccAnnunciatorMessageEntry-id
WITH DESCRIPTION
"A messages to be announced on a PTV or at a stop point."
}

CcAnnunciatorMessageEntry ::= SEQUENCE {
message-id           [0] CC-AnnouncementMsgID,
configuration-date  [1] CPT-ActivationDate OPTIONAL,
text-announcement   [2] CC-AnnouncementMsgData OPTIONAL,
digitized-announcement [3] CC-DigitizedAnnouncement OPTIONAL
}

ccChangeRadioMode-id OBJECT IDENTIFIER ::= {cc 9}

ccChangeRadioMode TCIP-CLASS ::= {
CcChangeRadioMode IDENTIFIED BY ccChangeRadioMode-id WITH DESCRIPTION
"A command to the mobile radio unit to switch the channel from
one mode to another mode. This may involve a channel change.
This message may be used when the VLU emulates trunking over
a conventional radio system. For example, the message should
not be sent until the controller (VLU) queries the radio for
the best available channel, and reserves the channel for
messaging."
}

```

```
CcChangeRadioMode ::= SEQUENCE {
radio-mode      [0] CC-RadioMode,
radio-control   [1] CC-RadioVoiceControl OPTIONAL,
channelID      [2] CPT-ChannelID OPTIONAL
}

ccChangeReportingRate-id OBJECT IDENTIFIER ::= {cc 10}

ccChangeReportingRate TCIP-CLASS ::= {
CcChangeReportingRate IDENTIFIED BY ccChangeReportingRate-id WITH
DESCRIPTION
  "Defines the reporting rate and protocols for status reporting."
}

CcChangeReportingRate ::= SEQUENCE {
reporting-period [0] CC-ExceptionFrequencyReport,
polling-slot     [1] CC-PollingSlot OPTIONAL,
zero-period      [2] CC-ZeroPeriod OPTIONAL
}

ccDataLoadTemplate-id OBJECT IDENTIFIER ::= {cctemplate 1}

ccDataLoadTemplate TCIP-CLASS ::= {
CcDataLoadTemplate IDENTIFIED BY ccDataLoadTemplate-id WITH DESCRIPTION
"This template holds the objects for transferring bulk messages from the
control center (fixed end) to the PTV (mobile end).
The types of messages include: default configurations,
schedules, trips, stop point locations/names, fare tables, bad
card list, sw updates, sign/annunciator libraries, etc.
Technologies frequently used include: DSRC, wireless ethernet,
magnetic media (e.g., flash card, floppy) and radio (for small
amounts of data). Frequently used to transfer information to
PTV as it leaves the Vehicle Base or sits overnight, or
retrieves information from the PTV as it arrives at the Vehicle
Base after completing its revenue service."
}

CcDataLoadTemplate ::= SEQUENCE {
address-group    [0] CC-MsgAddressGroup OPTIONAL,
broadcast        [1] NULL OPTIONAL,
routes           [2] SEQUENCE OF CC-RouteIDShort OPTIONAL,
organizational-units [3] SEQUENCE OF
  CPT-OrganizationalUnitID OPTIONAL,
geographic-areas [4] SEQUENCE OF SpPolygonclass OPTIONAL,
vehicle-list     [5] SEQUENCE OF CC-PTVehicleIDShort OPTIONAL,
block-list       [6] SEQUENCE OF CC-BlockIDShort OPTIONAL,
run-list         [7] SEQUENCE OF CC-RunIDShort OPTIONAL,
pattern-list     [8] SEQUENCE OF SCH-PatternID OPTIONAL,
radio-zones      [9] SEQUENCE OF CPT-RadioZoneID OPTIONAL,
agencies         [10] SEQUENCE OF CPT-AgencyID OPTIONAL,
msg-list         [11] SEQUENCE OF CcMsgRecord
}

ccLogOffDispatch-id OBJECT IDENTIFIER ::= {cc 11}

ccLogOffDispatch TCIP-CLASS ::= {
CcLogOffDispatch IDENTIFIED BY ccLogOffDispatch-id WITH DESCRIPTION
  "Parameters which indicate and validate that a dispatcher or
supervisor logged off a workstation."
}

CcLogOffDispatch ::= SEQUENCE {
employee         [0] CPT-EmployeeID,
job-category     [1] CPT-EmployeeJobCategory OPTIONAL,
workstation-id   [2] CC-WorkstationID OPTIONAL,
agencyID        [3] CPT-AgencyID OPTIONAL,
}
```

```
deactivation-time [4] CPT-DeactivationTime,  
deactivation-date [5] CPT-DeactivationDate  
}  
  
ccLogOffOperator-id OBJECT IDENTIFIER ::= {cc 12}  
  
ccLogOffOperator TCIP-CLASS ::= {  
CcLogOffOperator IDENTIFIED BY ccLogOffOperator-id WITH DESCRIPTION  
  "Parameters which indicate and validate that an operator or  
  supervisor logged off a vehicle log-on device (e.g., MDT,  
  Farebox, VCH). CPT-VehicleID, and CPT-BlockID or CPT-RunID are  
  sent as part of the template message."  
}  
  
CcLogOffOperator ::= SEQUENCE {  
employee [0] CPT-EmployeeID,  
job-category [1] CPT-EmployeeJobCategory OPTIONAL,  
agencyID [2] CPT-AgencyID OPTIONAL,  
logOffDateTime [3] CPT-DateTime  
}  
  
ccLogOnDispatch-id OBJECT IDENTIFIER ::= {cc 13}  
  
ccLogOnDispatch TCIP-CLASS ::= {  
CcLogOnDispatch IDENTIFIED BY ccLogOnDispatch-id WITH DESCRIPTION  
  "Parameters which identify and validate that a dispatcher or  
  supervisor logged on to a workstation."  
}  
  
CcLogOnDispatch ::= SEQUENCE {  
employee [0] CPT-EmployeeID,  
job-category [1] CPT-EmployeeJobCategory OPTIONAL,  
operational-status [2] SCH-ServiceType OPTIONAL,  
agencyID [3] CPT-AgencyID OPTIONAL,  
task-job-category [4] CPT-EmployeeJobCategory OPTIONAL,  
workstation-id [5] CC-WorkstationID,  
activation-time [6] CPT-ActivationTime,  
activation-date [7] CPT-ActivationDate,  
shift-number [8] CC-ShiftNo OPTIONAL  
}  
  
ccLogOnOperator-id OBJECT IDENTIFIER ::= {cc 14}  
  
ccLogOnOperator TCIP-CLASS ::= {  
CcLogOnOperator IDENTIFIED BY ccLogOnOperator-id WITH DESCRIPTION  
  "Parameters which indicate and validate that an operator or  
  supervisor logged onto a vehicle log-on device (e.g., MDT,  
  Farebox, VCH)."  
}  
  
CcLogOnOperator ::= SEQUENCE {  
employee [0] CPT-EmployeeID,  
job-category [1] CPT-EmployeeJobCategory OPTIONAL,  
operational-status [2] SCH-ServiceType OPTIONAL,  
organization-ID [3] CPT-OrganizationalUnitID OPTIONAL,  
agencyID [4] CPT-AgencyID OPTIONAL,  
vehicle-base [5] CPT-TransitFacilityID OPTIONAL,  
block-id [6] CC-BlockIDShort OPTIONAL,  
run-id [7] CC-RunIDShort OPTIONAL,  
route-id [8] CC-RouteIDShort OPTIONAL,  
activationDateTime [9] CPT-DateTime  
} (WITH COMPONENTS { ... ,  
block-id PRESENT  
} | WITH COMPONENTS { ... ,  
run-id PRESENT  
} | WITH COMPONENTS { ... ,
```

```
route-id    PRESENT
  })

ccMsgRecord-id OBJECT IDENTIFIER ::= {cctemplate 2}

ccMsgRecord TCIP-CLASS ::= {
CcMsgRecord IDENTIFIED BY ccMsgRecord-id WITH DESCRIPTION
  "A record with a message and its context (type).  This is an
  outbound message (fixed to mobile end)."}

CcMsgRecord ::= SEQUENCE {
message-sequence-no [0] CC-MsgSeqNo OPTIONAL,
response-type       [1] CC-MsgResponseType OPTIONAL,
onboard-destinations [2] SEQUENCE OF OB-MID OPTIONAL,
msg                 [3] SEQUENCE OF SEQUENCE {
  msg-id            [0] TCIP-CLASS.&id  ({CcMsgSet}),
  value [1] EXPLICIT TCIP-CLASS.&Type  ({CcMsgSet}@.msg-id)}
}

ccOperatorAssignment-id OBJECT IDENTIFIER ::= {cc 15}

ccOperatorAssignment TCIP-CLASS ::= {
CcOperatorAssignment IDENTIFIED BY ccOperatorAssignment-id WITH
DESCRIPTION "A run assigned to a particular operator.  The type of
operator
assignment is defined by CC-OperatorAssignType.  Special data
elements are associated with the different assignments types."
}

CcOperatorAssignment ::= SEQUENCE {
employee-id        [0] CPT-EmployeeID,
run-id             [1] SCH-RunID,
activation-date    [2] CPT-ActivationDate,
assignment-type    [3] CC-OperatorAssignmentType,
block-id           [4] SCH-BlockID OPTIONAL,
timetable-version [5] SCH-TimeTableVersionID OPTIONAL,
day-type           [6] SCH-DayType OPTIONAL,
operator-base      [7] CPT-OperatorBaseID OPTIONAL
} (WITH COMPONENTS { ... ,
block-id    PRESENT
} | WITH COMPONENTS { ... ,
timetable-version    PRESENT,
day-type             PRESENT,
operator-base        PRESENT
} | WITH COMPONENTS { ... ,
operator-base    PRESENT
})

ccOutboundMessageTemplate-id OBJECT IDENTIFIER ::= {cctemplate 3}

ccOutboundMessageTemplate TCIP-CLASS ::= {
CcOutboundMessageTemplate IDENTIFIED BY ccOutboundMessageTemplate-id
WITH DESCRIPTION
  "This template holds the objects for messages from the control
  center (fixed end) to the PTV (mobile end).  The messages
  include parameter reporting request (based on frequency),
  threshold monitor request (based on high/low limits), activate
  PA, operator detour (route adherence changes), high rate
  polling start/end, text messages (to driver), activate display,
  service change (schedule adherence change/deviation), data
  load deletions (delete selections from data load sets including
  block, run, trip, run, fare tables, bad card list, libraries
  for modification of main schedule in the control center,
  operator base or on PTV) and any messages associated with
```

```
polling protocols. This message can be used in an architecture
based on exception or poll reporting or as an interrupt to a
polling process. The priority of the message is determined by
the priority of the highest priority of the message records."
}

CcOutboundMessageTemplate ::= SEQUENCE {
address-group      [0] CC-MsgAddressGroup,
broadcast          [1] NULL OPTIONAL,
route-list        [2] SEQUENCE OF CC-RouteIDShort OPTIONAL,
ptv-list          [3] SEQUENCE OF CC-PTVehicleIDShort OPTIONAL,
organization-list [4] SEQUENCE OF CPT-OrganizationalUnitID OPTIONAL,
block-list        [5] SEQUENCE OF CC-BlockIDShort OPTIONAL,
run-list          [6] SEQUENCE OF CC-RunIDShort OPTIONAL,
area-list         [7] SEQUENCE OF SpPolygonclass OPTIONAL,
pattern-list      [8] SEQUENCE OF SCH-PatternID OPTIONAL,
radio-zone-list   [9] SEQUENCE OF CPT-RadioZoneID OPTIONAL,
agency-list       [10] SEQUENCE OF CPT-AgencyID OPTIONAL,
other-list        [11] SEQUENCE OF OCTET STRING OPTIONAL,
msg-list          [12] SEQUENCE OF CcMsgRecord
} (WITH COMPONENTS { ... ,
broadcast PRESENT
} | WITH COMPONENTS { ... ,
route-list PRESENT
} | WITH COMPONENTS { ... ,
organization-list PRESENT
} | WITH COMPONENTS { ... ,
area-list PRESENT
} | WITH COMPONENTS { ... ,
ptv-list PRESENT
} | WITH COMPONENTS { ... ,
block-list PRESENT
} | WITH COMPONENTS { ... ,
run-list PRESENT
} | WITH COMPONENTS { ... ,
pattern-list PRESENT
} | WITH COMPONENTS { ... ,
radio-zone-list PRESENT
} | WITH COMPONENTS { ... ,
agency-list PRESENT
} | WITH COMPONENTS { ... ,
other-list PRESENT
}))

ccParameterDumpRequest-id OBJECT IDENTIFIER ::= {cc 16}

ccParameterDumpRequest TCIP-CLASS ::= {
CcParameterDumpRequest IDENTIFIED BY ccParameterDumpRequest-id WITH
DESCRIPTION "A request initiated by the fixed end for recorded trip
performance data."
}

CcParameterDumpRequest ::= SEQUENCE {
recorder-locations [0] SEQUENCE OF OB-MID,
begin-date-time    [1] DATETIME,
end-date-time      [2] DATETIME,
parameter-requests [3] SEQUENCE OF OB-PID
}

ccParameterRateConfiguration-id OBJECT IDENTIFIER ::= {cc 17}

ccParameterRateConfiguration TCIP-CLASS ::= {
CcParameterRateConfiguration IDENTIFIED BY
ccParameterRateConfiguration-id WITH DESCRIPTION
"The rate at which a logical device should report a specific
parameter's value. The device may be a trip recorder, logic
```

```
    unit, or the source device."
  }

  CcParameterRateConfiguration ::= SEQUENCE {
parameters [0] SEQUENCE OF OB-PID,
rate       [1] OB-Rate
  }

  ccParameterReportRequest-id OBJECT IDENTIFIER ::= {cc 18}

  ccParameterReportRequest TCIP-CLASS ::= {
CcParameterReportRequest IDENTIFIED BY ccParameterReportRequest-id WITH
  DESCRIPTION
    "A request by the CC to the OB to reconfigure the reporting
    capabilities to report a specific parameter(s) at a specified
    rate (for over the air/real-time reporting)."}
  }

  CcParameterReportRequest ::= SEQUENCE {
logical-device-address [0] OB-MID,
parameter-rate-request [1] SEQUENCE OF CcParameterRateConfiguration
  }

  ccParameterThreshold-id OBJECT IDENTIFIER ::= {cc 19}

  ccParameterThreshold TCIP-CLASS ::= {
CcParameterThreshold IDENTIFIED BY ccParameterThreshold-id WITH
  DESCRIPTION
    "The definition of the threshold in which a parameter value is
    constrained before it triggers an exception."
  }

  CcParameterThreshold ::= SEQUENCE {
parameter      [0] OB-PID,
hi-value       [1] INTEGER OPTIONAL,
lo-value       [2] INTEGER OPTIONAL,
footnote       [3] FOOTNOTE OPTIONAL,
source-device  [4] OB-MID OPTIONAL
  }

  ccPatternDeltaTime-id OBJECT IDENTIFIER ::= {cc 20}

  ccPatternDeltaTime TCIP-CLASS ::= {
CcPatternDeltaTime IDENTIFIED BY ccPatternDeltaTime-id WITH DESCRIPTION
    "The offset (early or late) from an expected trip time. This
    offset may be due to an expected delay or to a delay at a
    specified location (e.g., lane closed). May be used in a
    detour situation to adjust trip times."
  }

  CcPatternDeltaTime ::= SEQUENCE {
delta-time     [0] CC-DeltaTime,
location       [1] SpGeopoint OPTIONAL,
timepoint-id   [2] SCH-TimePointID OPTIONAL,
pattern-id     [3] SCH-PatternID,
trips-affected [4] SEQUENCE OF SCH-TripID OPTIONAL,
activation-time [5] CPT-ActivationTime,
deactivation-time [6] CPT-DeactivationTime OPTIONAL,
footnote       [7] CPT-Footnote OPTIONAL
  }

  ccPatternException-id OBJECT IDENTIFIER ::= {cc 21}

  ccPatternException TCIP-CLASS ::= {
CcPatternException IDENTIFIED BY ccPatternException-id WITH DESCRIPTION
    "A deviation or detour from a scheduled trip. This message
```

```

instructs the operator and other business areas (operational
centers) that a specific detour shall be operated. It also
provides the schedule and route adherence with a new pattern,
and may provide information for the fare collection component.
The destination of this message is contained in the Message
Template. This message may go to OB (mobile units), PI, IM and
SCH. "
}

CcPatternException ::= SEQUENCE {
agency [0] CPT-AgencyID,
activationDateTime [1] CPT-DateTime,
deactivationDateTime [2] CPT-DateTime OPTIONAL,
detour-id [3] CC-DetourID,
detour-type [4] IM-DetourType OPTIONAL,
patch [5] SchPattern,
pattern-time-offset [6] CcPatternDeltaTime,
driverMsg [7] SEQUENCE OF CC-AnnouncementMsgID OPTIONAL,
announcement [8] CC-AnnouncementMsgData OPTIONAL,
missedStopPointList [9] SEQUENCE OF CPT-StopPointID,
addedStopPointList [10] SEQUENCE OF CPT-StopPointID,
newStopPointList [11] SEQUENCE OF SpPointclass
}

ccPTVDeregistration-id OBJECT IDENTIFIER ::= {cc 22}

ccPTVDeregistration TCIP-CLASS ::= {
CcPTVDeregistration IDENTIFIED BY ccPTVDeregistration-id WITH
DESCRIPTION
"A message sent automatically by a public transit vehicle to
power down; (deregisters from polling protocol). Since PTV
frequently remains active for some time after last logoff (and
after engine is shut off, this message may need to be generated
spontaneously, based on a timer function, a given amount of
time after vehicle is powered off."
}

CcPTVDeregistration ::= SEQUENCE {
ptv-id [0] CC-PTVehicleIDShort,
agency [1] CPT-AgencyID OPTIONAL
}

ccPTVMessageTemplate-id OBJECT IDENTIFIER ::= {cctemplate 4}

ccPTVMessageTemplate TCIP-CLASS ::= {
CcPTVMessageTemplate IDENTIFIED BY ccPTVMessageTemplate-id WITH
DESCRIPTION
"This template holds the objects for the PTV to report or
respond to the control center (fixed end). This may be a
response to a data load, outbound message template. The
template contains general information on the source of the
messages and may contain other information related to the
messages (priority, time message generated, etc.)."
}

CcPTVMessageTemplate ::= SEQUENCE {
ptv-id [0] CC-PTVehicleIDShort OPTIONAL,
mobile-unit-id [1] CC-MobileUnitID OPTIONAL,
alarm-summary [2] OB-AlarmSummary OPTIONAL,
door-summary [3] OB-DoorStatusSummary OPTIONAL,
route-id [4] CC-RouteIDShort,
route-direction [5] CC-RouteDirectionShort,
time-tag [6] CC-SecSinceTopHour OPTIONAL,
avl-location [7] EXPLICIT SpPointclass OPTIONAL,
priority-level [8] CPT-PriorityLevel OPTIONAL,
response-request-type [9] CC-ResponseRequestType OPTIONAL,

```

```
msg [10] SEQUENCE OF SEQUENCE {
  msg-id [0] TCIP-CLASS.&id ({CcMsgSet}),
  value [1] EXPLICIT TCIP-CLASS.&Type ({CcMsgSet}{@.msg-id})
} OPTIONAL
} (WITH COMPONENTS { ... ,
ptv-id PRESENT
} | WITH COMPONENTS { ... ,
mobile-unit-id PRESENT
})

ccPTVRegistration-id OBJECT IDENTIFIER ::= {cc 23}

ccPTVRegistration TCIP-CLASS ::= {
CcPTVRegistration IDENTIFIED BY ccPTVRegistration-id WITH DESCRIPTION
  "The registration of a PTV with a central system upon power up."
}

CcPTVRegistration ::= SEQUENCE {
ptv-id [0] CC-PTVehicleIDShort,
vin [1] CPT-VIN OPTIONAL,
configurationList [2] SEQUENCE OF ObComponent OPTIONAL
}

ccRouteAdherenceEntry-id OBJECT IDENTIFIER ::= {cc 24}

ccRouteAdherenceEntry TCIP-CLASS ::= {
CcRouteAdherenceEntry IDENTIFIED BY ccRouteAdherenceEntry-id WITH
DESCRIPTION
  "This is an entry to the CcActivateRouteAdherence. It records
the frequency that a transit vehicle must report when it is off
route (report-frequency). The off-route-distance is the
(total) distance by which the vehicle is off route. The
return-off-route-distance is the (total) distance the vehicle
must return before it is considered within the route adherence
entries parameters (also called hysteresis)."
}

CcRouteAdherenceEntry ::= SEQUENCE {
off-route-distance [0] CC-OffRouteDistance,
return-off-route-distance [1] CC-OffRouteDistance OPTIONAL,
report-frequency [2] CC-ExceptionFrequencyReport OPTIONAL
}

ccThresholdMonitorRequest-id OBJECT IDENTIFIER ::= {cc 25}

ccThresholdMonitorRequest TCIP-CLASS ::= {
CcThresholdMonitorRequest IDENTIFIED BY ccThresholdMonitorRequest-id
WITH DESCRIPTION
  "A message from the CC to the OB to reset the threshold(s) on
specified parameters for over the air/real-time exception
reporting."
}

CcThresholdMonitorRequest ::= SEQUENCE {
device [0] OB-MID,
parameter-threshold-requests [1] SEQUENCE OF CcParameterThreshold
}

CcMsgSet TCIP-CLASS ::= {
cc-AnnouncementMsgData | cc-AnnouncementMsgID | cc-BlockIDShort |
cc-DeltaTime | cc-DetourID | cc-DigitizedAnnouncement |
cc-ExceptionFrequencyReport | cc-MobileUnitID | cc-MsgResponse |
cc-MsgSeqNo | cc-MsgAddressGroup | cc-MsgResponseType |
cc-OffRouteDistance | cc-OperatorAssignmentType | cc-PollingSlot |
cc-PTVehicleIDShort | cc-RadioMode | cc-RadioVoiceControl |
cc-ResponseRequestType | cc-ReturnToleranceEarly |
```



```
cc-ReturnToleranceLate | cc-RouteDirectionShort | cc-RouteIDShort |  
cc-RunIDShort | cc-ScheduleToleranceEarly |  
cc-ScheduleToleranceLate | cc-SecSinceTopHour | cc-ShiftNo |  
cc-WorkstationID | cc-ZeroPeriod | ccActivateAnnouncementFreeform |  
ccActivateAnnouncementFromLibrary | ccActivateRouteAdherence |  
ccActivateScheduleAdherence | ccAnnunciatorLibrary |  
ccAnnunciatorMessageEntry | ccChangeRadioMode |  
ccChangeReportingRate | ccDataLoadTemplate | ccLogOffDispatch |  
ccLogOffOperator | ccLogOnDispatch | ccLogOnOperator |  
ccMsgRecord | ccOperatorAssignment | ccOutboundMessageTemplate |  
ccParameterDumpRequest | ccParameterRateConfiguration |  
ccParameterReportRequest | ccParameterThreshold |  
ccPatternDeltaTime | ccPatternException | ccPTVDeregistration |  
ccPTVMessageTemplate | ccPTVRegistration | ccRouteAdherenceEntry |  
ccThresholdMonitorRequest  
}
```

END