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National Transportation Communications for ITS Protocol Object Definitions for Signal Control and Prioritization (SCP)

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FOREWORD

NTCIP 1211 v02, this standard, defines the management information base for Signal Control and Prioritization (SCP) Systems. It defines individual parameters that represent the configuration, status, and control information that is unique to an SCP. NTCIP 1211 v02 defines a set of objects for use in controlling traffic signal systems in priority applications.

NTCIP 1211 v02 provides definitions of the management information related to Signal Control and Prioritization (SCP). SCP management information includes individual parameters that represent the configuration, status, and control information of such a device. It also includes data frames and message sets of these parameters and others from different standards to address the operational information exchanges between the devices in a baseline system configuration.

NTCIP 1211 v02 defines requirements that are applicable to an NTCIP environment that involves the control of traffic signal controllers. While the term Signal Control and Prioritization implies a logical implementation, the data concepts may be applicable to a physical device. By definition, SCP operates in the context of a "system" that includes a priority requester, such as a transit vehicle, traffic signal controllers, and the management centers that configure and monitor the traffic signal controllers. It, therefore, imposes functional and communications requirements on all of these "system" components. The following keywords apply to NTCIP 1211 v02: NTCIP, traffic signal control, transit, emergency responder, priority control, prioritization, signal priority.

It also defines specific groupings of these parameters and others to address the operational configuration, monitoring, and control of the device/entity in a baseline system configuration. NTCIP 1211 v02 is an NTCIP Device Data Dictionary Standard. NTCIP Device Data Dictionaries Standards formally express management information in terms of objects (data elements, data frames, and messages) for use within NTCIP systems.

NTCIP 1211 v02 uses only metric units. For more information about NTCIP standards, visit the NTCIP Web site at <http://www.ntcip.org>.

There are normative and informative annexes in NTCIP 1211 v02:

- a) Annex A is normative and contains a Requirements Traceability Matrix (RTM) that traces requirements to the dialogs and data objects used to fulfill it.
- b) Annex B is informative and contains the object tree showing the major nodes of the SCP object structure within the Global object tree.
- c) Annex C is normative and (in a future version) is intended to contain the test procedures associated with the user needs, functional requirements, dialogs, and objects defined in NTCIP 1211 v02.
- d) Annex D is informative and contains each of the major revisions and changes provided for between NTCIP 1211 v02, and its predecessor, NTCIP 1211 v01.
- e) Annex E is informative and documents user requests that were not included in NTCIP 1211 v02.
- f) Annex F is informative and provides a tutorial on SCP and provides examples on how a typical SCP system may work.
- g) Annex G is normative and contains the definitions for the Generic SNMP interface including the definitions to perform GET, SET, GET NEXT commands. These definitions may be moved to a different NTCIP standard at a future date, because this content is applicable to all device-specific NTCIP standards.
- h) Annex H is normative and serves as a placeholder for systems engineering descriptions that may be moved to a different NTCIP standard at a future date, because this content is applicable to all device-specific NTCIP standards.

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The term “User Comment” includes any type of written inquiry, comment, question, or proposed revision, from an individual person or organization, about any part of NTCIP 1211 v02 content. A “Request for Interpretation” of NTCIP 1211 v02 is also classified as a User Comment. User Comments are solicited at any time. In preparation of this NTCIP standards publication, input of users and other interested parties was sought and evaluated.

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Approvals

NTCIP 1211 v02 was separately balloted and approved by AASHTO, ITE, and NEMA after recommendation by the Joint Committee on the NTCIP. Each organization has approved NTCIP 1211 v02 as the following standard type, as of the date:

AASHTO – Standard Specification; August 2014
ITE – Software Standard; September 2014
NEMA – Standard; September 2014

History

In 1992, the NEMA 3-TS Transportation Management Systems and Associated Control Devices Section began development of the NTCIP. The Transportation Section’s purpose was in response to user needs to include standardized systems communication in NEMA TS 2, *Traffic Controller Assemblies*. 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. The Joint Committee on the NTCIP formed a working group to develop a common set of management information related to controlling the roadside devices that act in supervisory capacity. The SCP WG's first meeting was in November 1999.

The NTCIP 1211 v02 Project was initiated June 2008.

NTCIP 1211 v02.09 May 2014: Issued User Comment Draft with responses due May 12, 2014.

NTCIP 1211 v02.11 June 2014: NTCIP SCP WG accepts draft NTCIP 1211 v02.21, and forwards to NTCIP Joint Committee for consideration in June 2014.

NTCIP 1211 v02.23 June 2014: NTCIP Joint Committee accepts and issues to AASHTO, ITE and NEMA for Ballotting.

NTCIP 1211 v02.24 September 2014: Prepared standard for publication.

Compatibility of Versions

To distinguish NTCIP 1211 v02 (as published) from previous drafts, NTCIP 1211 v02 also includes NTCIP 1211 v02.24 on each page header. All NTCIP Standards Publications have a major and minor version number for configuration management. The version number syntax is "v00.00a," with the major version number before the period, and the minor version number and edition letter (if any) after the period.

NTCIP 1211 v02 is designated, and should be cited as, NTCIP 1211 v02. Anyone using NTCIP 1211 v02 should seek information about the version number that is of interest to them in any given circumstance. The MIB, the PRL, and the PICS should all reference the version number of the standards publication that was the source of the excerpted material.

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Section 1 General [Informative]

1.1 Scope

The scope of NTCIP 1211 v02 is the definition of management information and the operations related to Signal Control and Prioritization (SCP). It covers the management of preferential treatment (priority) of different classes of vehicles (such as transit, emergency service, other priority vehicles, which might include commercial fleet vehicles, etc.) and the implementation of special coordination operation within a Traffic Signal Controller. To affect a priority request, its scope includes the content of messages to be exchanged between a prioritizing entity and a controller, the sequence in which messages are exchanged, and associated functions within a controller related to SCP. The scope includes the configuration and monitoring of a prioritizing entity and those aspects of coordination that relate to SCP. The process of generating priority requests is not defined by NTCIP 1211 v02.

NTCIP 1211 v02 deals, primarily, with granting priority while still maintaining coordination with adjacent intersections. The functionality expressed here is intended to work in conjunction with the coordination object definitions and functions as defined in NTCIP 1202. The coordination objects and functions can also be invoked when an intersection is operating in a non-coordinated mode.

Granting absolute priority irrespective of coordination is considered pre-emption and is covered in NTCIP 1202:2005. The process of generating a priority request is also not covered here. For transit vehicles, this process is defined in the American Public Transportation Association's (APTA) Transit Communications Interface Profiles (TCIP) standard.

The remainder of NTCIP 1211 v02 provides the following main sections, each building on the previous section(s):

- a) Concept of Operations – This section provides a description of user needs (needs for features and needs related to the operational environment) applicable to SCP.
- b) Functional Requirements – This section defines the functional requirements that address the user needs identified in the Concept of Operations. It includes a Protocol Requirements List (PRL) Table that defines conformance requirements thereby allowing users to select the desired options for a particular project.
- c) Dialogs – This section describes how functional requirements that require more complex implementations are fulfilled. The dialogs define the standardized procedure for a management station to manage a device and define the responses expected by the device.
- d) Management Information Base (MIB) – This section defines the data exchanged during communications (an update of NTCIP 1211 v01 Sections 3 and 4)
- e) Requirements Traceability Matrix – This annex provides a table that associates each requirement to a dialog, an interface, and its associated list of objects.
- f) Test Procedures – This annex is a placeholder for future test procedures, which ensure that a requirement is met and is validated.

The first two of these sections are presented at a high level and are of interest to most readers of NTCIP 1211 v02; the later sections entail more detailed design issues that are of interest to implementers, integrators, and testers.

Additional annexes provide information on certain topics such as changes between NTCIP 1211 v01 and NTCIP 1211 v02, and the Generic SNMP Interface description.