

A Joint Standard of AASHTO, ITE, and NEMA

NTCIP 1202 v03

National Transportation Communications for ITS Protocol Object Definitions for Actuated Signal Controllers (ASC) Interface

Published in February 2019

Published by

American Association of State Highway and Transportation Officials (AASHTO)
444 North Capitol Street, N.W., Suite 249
Washington, D.C. 20001

Institute of Transportation Engineers (ITE)
1627 Eye Street, N.W., Suite 600
Washington, D.C. 20006

National Electrical Manufacturers Association (NEMA)
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209-3801

NOTICES

Copyright Notice

© 2019 by the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). All intellectual property rights, including, but not limited to, the rights of reproduction, translation, and display are reserved under the laws of the United States of America, the Universal Copyright Convention, the Berne Convention, and the International and Pan American Copyright Conventions. Except as licensed or permitted, you may not copy these materials without prior written permission from AASHTO, ITE, or NEMA. Use of these materials does not give you any rights of ownership or claim of copyright in or to these materials.

Visit www.ntcip.org for other copyright information, for instructions to request reprints of excerpts, and to request reproduction that is not granted below.

PDF File License Agreement

To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of an Adobe® Portable Document Format (PDF) electronic data file (the "PDF file"), AASHTO / ITE / NEMA authorizes each registered PDF file user to view, download, copy, or print the PDF file available from the authorized Web site, subject to the terms and conditions of this license agreement:

- a) you may download one copy of each PDF file for personal, noncommercial, and intraorganizational use only;
- b) ownership of the PDF file is not transferred to you; you are licensed to use the PDF file;
- c) you may make one more electronic copy of the PDF file, such as to a second hard drive or burn to a CD;
- d) you agree not to copy, distribute, or transfer the PDF file from that media to any other electronic media or device;
- e) you may print one paper copy of the PDF file;
- f) you may make one paper reproduction of the printed copy;
- g) any permitted copies of the PDF file must retain the copyright notice, and any other proprietary notices contained in the file;
- h) the PDF file license does not include (1) resale of the PDF file or copies, (2) republishing the content in compendiums or anthologies, (3) publishing excerpts in commercial publications or works for hire, (4) editing or modification of the PDF file except those portions as permitted, (5) posting on network servers or distribution by electronic mail or from electronic storage devices, and (6) translation to other languages or conversion to other electronic formats;
- i) other use of the PDF file and printed copy requires express, prior written consent.

Data Dictionary and MIB Distribution Permission

To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of a Data Dictionary ("DD") or Management Information Base ("MIB"), AASHTO / ITE / NEMA extend the following permission:

You may make or distribute unlimited copies, including derivative works, of the DD or MIB, including copies for commercial distribution, provided that:

- a) each copy you make or distribute includes the citation "Derived from NTCIP 0000 [insert the standard number]. Copyright by AASHTO / ITE / NEMA. Used by permission.";

- b) the copies or derivative works are not made part of the standard publications or works offered by other standard developing organizations or publishers or as works-for-hire not associated with commercial hardware or software products intended for field implementation;
- c) use of the DD or MIB is restricted in that the SYNTAX fields may only be modified to define: 1) a more restrictive subrange; or 2) a subset of the standard enumerated values; or 3) a set of retired and defined enumerated values for systems supporting multiversion interoperability;
- d) the description field may be modified but only to the extent that: 1) the more restrictive subrange is defined; and 2) only those bit values or enumerated values that are supported are listed.
[from 8002 A2 v04]

These materials are delivered “AS IS” without any warranties as to their use or performance.

AASHTO / ITE / NEMA and their suppliers do not warrant the performance or results you may obtain by using these materials. AASHTO / ITE / NEMA and their suppliers make no warranties, express or implied, as to noninfringement of third party rights, merchantability, or fitness for any particular purpose. In no event will AASHTO / ITE / NEMA or their suppliers be liable to you or any third party for any claim or for any consequential, incidental or special damages, including any lost profits or lost savings, arising from your reproduction or use of these materials, even if an AASHTO / ITE / NEMA representative has been advised of the possibility of such damages.

Some states or jurisdictions do not allow the exclusion or limitation of incidental, consequential, or special damages, or the exclusion of implied warranties, so the above limitations may not apply to a given user.

Use of these materials does not constitute an endorsement or affiliation by or between AASHTO, ITE, or NEMA and the user, the user’s company, or the products and services of the user’s company.

If the user is unwilling to accept the foregoing restrictions, he or she should immediately return these materials.

PRL and RTM Distribution Permission

To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of a Protocol Requirements List (“PRL”) or a Requirements Traceability Matrix (“RTM”), AASHTO / ITE / NEMA extend the following permission:

- a) you may make or distribute unlimited copies, including derivative works of the PRL (then known as a Profile Implementation Conformance Statement (“PICS”)) or the RTM, provided that each copy you make or distribute contains the citation “Based on NTCIP 0000 [insert the standard number] PRL or RTM. Used by permission. Original text © AASHTO / ITE / NEMA.”;
- b) you may only modify the PRL or the RTM by adding: 1) text in the Project Requirements column, which is the only column that may be modified to show a product’s implementation or the project-specific requirements; and/or 2) additional table columns or table rows that are clearly labeled as ADDITIONAL for project-unique or vendor-unique features; and
- c) if the PRL or RTM excerpt is made from an unapproved draft, add to the citation “PRL (or RTM) excerpted from a draft standard containing preliminary information that is subject to change.”

This limited permission does not include reuse in works offered by other standards developing organizations or publishers, and does not include reuse in works-for-hire, compendiums, or electronic storage devices that are not associated with procurement documents, or commercial hardware, or commercial software products intended for field installation.

A PRL is completed to indicate the features that are supported in an implementation. Visit www.ntcip.org for information on electronic copies of the MIBs, PRLs, and RTMs.

TRF Distribution Permission

A Testing Requirements Form (“TRF”) may be a Testing Requirements Traceability Table and/or Test Procedures. To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of a TRF, AASHTO / ITE / NEMA extend the following permission:

- a) you may make and/or distribute unlimited electronic or hard copies, including derivative works of the TRF, provided that each copy you make and/or distribute contains the citation “Based on NTCIP 0000 [insert the standard number] TRF. Used by permission. Original text © AASHTO / ITE / NEMA.”;
- b) you may not modify the logical flow of any test procedure, without clearly noting and marking any such modification; and
- c) if the TRF excerpt is made from an unapproved draft, add to the citation “TRF excerpted from a draft standard containing preliminary information that is subject to change.”

Content and Liability Disclaimer

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

AASHTO, ITE, and NEMA standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and seeks out the views of persons who have an interest in the topic covered by this publication. While AASHTO, ITE, and NEMA administer the process and establish rules to promote fairness in the development of consensus, they do not write the document and they do not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in their standards and guideline publications.

AASHTO, ITE, and NEMA disclaim liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. AASHTO, ITE, and NEMA disclaim and make no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. AASHTO, ITE, and NEMA do not undertake to guarantee the performance of any individual manufacturer or seller’s products or services by virtue of this standard or guide.

In publishing and making this document available, AASHTO, ITE, and NEMA are not undertaking to render professional or other services for or on behalf of any person or entity, nor are AASHTO, ITE, and NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

AASHTO, ITE, and NEMA have no power, nor do they undertake to police or enforce compliance with the contents of this document. AASHTO, ITE, and NEMA do not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health or safety-related information in this document shall not be attributable to AASHTO, ITE, or NEMA and is solely the responsibility of the certifier or maker of the statement.

Trademark Notice

NTCIP is a trademark of AASHTO / ITE / NEMA. All other marks mentioned in this standard are the trademarks of their respective owners.

<This page is intentionally left blank.>

Acknowledgements

NTCIP 1202 v03 was prepared by the NTCIP Actuated Signal Controller Working Group (ASC WG), which is a subdivision of the Joint Committee on the NTCIP. The NTCIP Joint Committee is organized under a Memorandum of Understanding among the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). The NTCIP Joint Committee consists of six representatives from each of the standards organizations, and provides guidance for NTCIP development.

When NTCIP 1202 v03 was prepared, the following individuals were voting (indicated by an asterisk) or alternate voting members of the NTCIP ASC WG:

- City of Anaheim, John Thai* (Co-Chair)
- Consensus Systems Technologies, Patrick Chan*, Manny Insignares
- Eberle Design, Inc., *Scott Evans*
- Econolite Control Products, Inc., Gary Duncan, Greg Mizell*, Dustin DeVoe
- Florida DOT, Matthew DeWitt*, Jeffrey Morgan, Derek Vollmer
- Intelight, Doug Tarico* (Co-Chair), Peter Ragsdale, Doug Crawford, Craig Gardner, Grant Gardner
- Peek Traffic Corporation, Mark Simpson*, Ray Deer
- Pillar Consulting, Ralph Boaz*
- Texas A&M University (TTI), Kevin Balke*, Hassan Charara, Srinivasa Sunkari
- TransCore, ITS, David Benevelli, Keith Patton, Robert Rausch*

Observing members include:

- Applied Information, Inc., Bryan Mulligan, Alan Clelland
- Kapsch, Joerg "Nu" Rosenbohm
- Kimley-Horn, Bob Barkley
- KLD, Wuping Xin
- McCain Inc., Donald Maas Jr.,
- North Carolina DOT, Greg Fuller
- Southwest Research Institute, Cameron Mott
- The University of Arizona, Larry Head
- Trafficware Engineered by Naztec, Clyde Neel
- Trevilon Corp., Kenneth Vaughn
- WSP, Christopher Toth, Thomas Timcho, Erica Toussant, Nora Wisor

Additional stakeholders who provided input or monitored development include:

- Arcadis U.S., Inc., David Ritchie
- Battelle, Jeffrey Arch, Greg Zink
- CA DOT (CalTrans), Herasmo Iniguez, Brian Simi, Ted Lombardi, Antonio Sarmiento, Stan Slavin
- Diablo Controls, Inc., Allen Jacobs
- Global Traffic Technologies, LLC, Christian Kulus
- Gridaptive, Jim Frazer
- SCSC, David Kelley
- Jacobs, Diederick VanDillen
- Mid-America Regional Council, Ray Webb
- Miovision, Jan Bergstrom, Dave Hillis
- Mixon Hill, Lee Mixon
- Minnesota DOT, Peter Skweres, Ray Starr
- New Jersey DOT, Jeevanjot Singh
- New York City DOT, Rami Khashashina, Mohammad Talas
- Oregon DOT, K. Groves, Roger Boettcher
- Overland Park, KS, Shawn Gotfredson
- Oz Engineering, Tom Guerra
- Parsons, Jon Wyatt
- PR Olson Associates, Paul Olson
- Reno A&E, Matt Zinn
- SAE International, Keith Wilson
- Sandag, Peter Thompson

- Siemens Industry, Inc., Glenn Massarano, Dave Miller, Daniel Nelson,
- Andrew Valdez
- Utah DOT, Shane Johnson

In addition to the many volunteer efforts, recognition is also given to those organizations that supported the effort by providing funding:

- U.S. Department of Transportation

Foreword

NTCIP 1202 v03, an NTCIP standards publication, identifies and defines how a management station may wish to interface with a field device to control and monitor traffic signal controllers and associated detectors in an NTCIP-conformant fashion. NTCIP 1202 v03 uses only metric units.

NTCIP 1202 v03 is titled Actuated Signal Controllers (ASC) Interface Protocol to express the multiple sections and annexes that are included in NTCIP 1202 v03. This NTCIP 1200-series standards publication has grown beyond the “object definitions” that were reflected in the title for its predecessors, NTCIP 1202 versions v01 and v02 (2005).

NTCIP 1202 v03 defines data elements for use with Actuated Signal Controller Units. The data is defined using the Simple Network Management Protocol (SNMP) object-type format as defined in RFC 1212 and the defined NTCIP format defined in NTCIP 8004. This data would typically be exchanged using one of the NTCIP 1103 recognized Application Layers (e.g., SNMP).

NTCIP 1202 v03 follows an established systems engineering approach to support procurement processes. The PRL is designed to allow an agency to indicate what user needs are applicable to a procurement, and to select which requirements are to be implemented in a project specific implementation. Proper completion of the PRL by the agency results in a specification that is more likely to satisfy the agency’s project needs and that is conformant to NTCIP 1202 v03. The RTM defines the interface specifications for those requirements selected, and can be used to develop the test plans and test procedures.

The following keywords apply to this document: AASHTO, ITE, NEMA, NTCIP, ASC, data, data dictionary, object, MIB, PRL and RTM.

NTCIP 1202 v03 includes a number of normative and four informative annexes.

NTCIP 1202 v03 is also an NTCIP Data Dictionary standard. Data Dictionary standards provide definitions of data concepts (messages, data frames, and data elements) for use within NTCIP systems; and are approved by AASHTO, ITE, and NEMA through a ballot process, after a recommendation by the NTCIP Joint Committee. For more information about NTCIP standards, or to acquire the related NTCIP 1202 v03 MIB, visit www.ntcip.org.

User Comment Instructions

The term “User Comment” includes any type of written inquiry, comment, question, or proposed revision, from an individual person or organization, about any NTCIP 1202 v03 content. A “Request for Interpretation” 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.

User Comments are generally referred to the committee responsible for developing and/or maintaining NTCIP 1202 v03. The committee chairperson, or their designee, may contact the submitter for clarification of the User Comment. When the committee chairperson or designee reports the committee’s consensus opinion related to the User Comment, that opinion is forwarded to the submitter. The committee chairperson may report that action on the User Comment may be deferred to a future committee meeting and/or a future revision of the standards publication. Previous User Comments and their disposition may be available for reference and information at www.ntcip.org.

A User Comment should be submitted to this address:

NTCIP Coordinator
National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209-3801
e-mail: ntcip@nema.org

A User Comment should be submitted in the following form:

Standard Publication number and version:
Page:
Section, Paragraph, or Clause:
Comment:
Editorial or Substantive?:
Suggested Alternative Language:

Please include your name, organization, and address in your correspondence.

Approvals

NTCIP 1202 v03 was separately balloted and approved by AASHTO, ITE, and NEMA after recommendation by the Joint Committee on the NTCIP. Each organization has approved NTCIP 1202 v03 as the following standard type, as of the date:

AASHTO—Standard Specification; December, 2018
ITE—Software Standard; January, 2019
NEMA—Standard; December, 2018

History

In 1992, the NEMA 3TS Transportation Management Systems and Associated Control Devices Section began the effort to develop 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 ITS network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards. In late 1998, the Actuated Signal Controller Working Group was tasked with the effort to update the Actuated Traffic Signal Controller Object Definitions document. The first meeting of this working group was held in October 1999. From 1996 to 1999, this document was referenced as NEMA TS 3.5-1996. However, to provide an organized numbering scheme for the NTCIP documents, this document is now referenced as NTCIP 1202. As included in the following development history, NTCIP 1202 has experienced revisions over time:

NEMA TS 3.5-1996. 1996 – Approved by NEMA. 1996 – Accepted as a Recommended Standard by the Joint Committee on the NTCIP. 1997 – Approved by AASHTO and ITE.
v01.07a printed with NEMA cover.

NTCIP 1202 v01. v01.07b printed with joint cover. v01.07c printed to PDF in November 2002.
v01.07d printed to PDF for no-cost distribution January 2005.

NTCIP 1202 Amendment 1. November 1999 – Accepted as a User Comment Draft Amendment by the Joint Committee on the NTCIP. April 2000 – NTCIP Standards Bulletin B0049 sent NTCIP

1202 Amendment 1 v01.06b for user comment. NTCIP 1202 Amendment 1, a User Comment Draft, was incorporated into 1202v02, and was not advanced further.

NTCIP 1202 v02.10. June 2001 – Accepted as a User Comment Draft by the Joint Committee on the NTCIP. February 2002 – NTCIP Standards Bulletin B0068 referred v02.13 for user review and comment.

NTCIP 1202 v02.16. October 2002 – Accepted as a Recommended Standard by the Joint Committee on the NTCIP. April 2004 – NTCIP Standards Bulletin B0091 referred v02.18 for balloting. Approved by AASHTO in November 2004, approved by ITE in March 2005, and approved by NEMA in November 2004.

NTCIP 1202:2005 v02.19. November 2005 – Edited document for publication. By the terms of MOU on CTPA article 1.2, the ownership of version 02 was assigned to AASHTO, ITE, and NEMA because the preexisting work was revised by more than 50%.

NTCIP 1202 v03 was developed to reflect lessons learned, to update the document to the new documentation formats, and to add new features such as support for a connected vehicle interface. NTCIP 1202 v03 also follows an established systems engineering approach. Several new sections were added to relate user needs identified in a concept of operations, functional requirements, interface specifications and a requirements traceability matrix to the existing sections.

Compatibility of Versions

To distinguish NTCIP 1202 v03 (as published) from previous drafts, NTCIP 1202 v03 also includes NTCIP 1202 v03.27 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.

The MIB associated with NTCIP 1202 v03 (as published) is 1202v0327.MIB. In addition, the 1217v0127.MIB is available through SAE.

NTCIP 1202 v03 is designated, and should be cited as, NTCIP 1202 v03. Anyone using NTCIP 1202 v03 should seek information about the version number that is of interest to them in any given circumstance. The PRL, RTM and the MIB should all reference the version number of the standards publication that was the source of the excerpted material.

Compliant systems based on later, or higher, version numbers MAY NOT be compatible with compliant systems based on earlier, or lower, version numbers. Anyone using NTCIP 1202 v03 should also consult NTCIP 8004 v02 for specific guidelines on compatibility.

CONTENTS

Note: The following Contents listing includes seven heading levels (for annexes) to permit TPG evaluation.

	Page
Section 1 General [Informative]	1
1.1 Scope	1
1.2 References.....	2
1.2.1 Normative References	2
1.2.2 Other References.....	3
1.2.3 Contact Information	3
1.3 General Statements	4
1.4 Terms	4
1.5 Abbreviations	13
Section 2 Concept of Operations [Normative]	14
2.1 Tutorial [Informative]	14
2.2 Current Situation and Problem Statement [Informative]	15
2.3 Reference Physical Architecture [Informative].....	16
2.3.1 ASC Characteristics – Cabinet Specifications	18
2.3.2 ASC Characteristics – Controller Types.....	20
2.3.3 ASC Characteristics – Connected Vehicle Interface.....	20
2.4 Architectural Needs.....	22
2.4.1 Provide Live Data	23
2.4.2 Provide Dynamic Object Data	23
2.4.3 Provide Block Data.....	23
2.4.4 Provide for Log Data Local Storage and Retrieval.....	23
2.4.5 Provide for Database Management	23
2.4.6 Condition-based Exception Reporting.....	24
2.5 Features.....	24
2.5.1 Manage the ASC Configuration	24
2.5.2 Manage Signal Operations.....	25
2.5.3 Manage Detectors	31
2.5.4 Manage Connected Vehicles Interface	31
2.5.5 Backward Compatibility Features.....	35
2.6 Security	35
2.6.1 Manage Authentication	36
2.6.2 Manage Accessibility.....	36
2.6.3 Manage Users.....	36
2.6.4 Log User Access	36
2.7 Operational Policies and Constraints.....	36
2.8 Relationship to the ITS National Architecture [Informative].....	36
Section 3 Functional Requirements [Normative]	39
3.1 Tutorial [Informative]	39
3.2 Scope Of The Interface [Informative].....	40
3.3 Protocol Requirements List (PRL)	40
3.3.1 Notation [Informative]	40
3.3.2 Instructions for Completing the PRL [Informative]	42
3.3.3 Protocol Requirements List (PRL) Table	43

3.4	Architectural Requirements	98
3.4.1	Support Basic Communications Requirements	98
3.4.2	Support Logged Data Requirements	98
3.4.3	Support Exception Reporting Requirements.....	98
3.4.4	Manage Access Requirements	98
3.5	Data Exchange and Operational Environment Requirements.....	99
3.5.1	ASC Configuration Management Requirements.....	99
3.5.2	Manage Signal Operations Management Requirements.....	105
3.5.3	Detector Management Requirements	166
3.5.4	Connected Vehicles Interface Management	177
3.5.5	Backward Compatibility Requirements	208
3.6	Supplemental Non-communications Requirements	208
3.6.1	Response Time for Requests.....	209
3.6.2	Condition-based Maximum Transmission Start Time	209
3.6.3	Signal Phase and Timing Data Performance Requirements	209
Section 4 Dialogs [Normative]		211
4.1	Tutorial [Informative]	212
4.2	Specified Dialogs	213
4.2.1	Get Block Data	213
4.2.2	Set Complex Configuration Parameters (called 'P2' Objects in NTCIP 1202 v02)	213
4.2.3	Set Block Data.....	216
4.2.4	Setup, Programming, and Processing of I/O Mapping.....	217
4.2.5	Making an I/O Map Active	218
4.2.6	Configure Speed Limits for a Node Point.....	218
4.2.7	Enable Collection of Connected Data	218
4.2.8	Retrieve Connected Device Detector Zone - Geographic.....	219
4.2.9	Configure Enabled Lanes.....	219
4.2.10	Provide Detection Reports to an ASC.....	220
4.2.11	Activating a MAP Plan.....	220
4.2.12	Confirm MAP Compatibility	220
4.3	State-Transition Diagrams	221
4.3.1	Data Parameter Types	221
4.3.2	Consistency Checks.....	222
4.3.3	Non-Sequential Time Change.....	227
Section 5 Management Information Base (MIB) [Normative]		228
5.0	MIB Comment Header	228
5.1	MIB Header.....	228
5.2	Phase Parameters	229
5.2.1	Maximum Phases.....	229
5.2.2	Phase Table	229
5.2.3	Maximum Phase Groups.....	242
5.2.4	Phase Status Group Table.....	242
5.2.5	Phase Control Table	247
5.3	Detector Parameters.....	251
5.3.1	Maximum Vehicle Detectors	251
5.3.2	Vehicle Detector Parameter Table	251
5.3.3	Maximum Vehicle Detector Status Groups	259
5.3.4	Vehicle Detector Status Group Table	259
5.3.5	Volume / Occupancy Report	261
5.3.6	Maximum Pedestrian Detectors	265
5.3.7	Pedestrian Detector Parameter Table.....	265
5.3.8	Maximum Pedestrian Detector Groups.....	268

5.3.9	Pedestrian Detector Status Group Table	269
5.3.10	Pedestrian Detector Report.....	270
5.3.11	Maximum Vehicle Detector Control Groups.....	274
5.3.12	Pedestrian Detector Control Group Table.....	275
5.4	Unit Parameters	276
5.4.1	Startup Flash Parameter	277
5.4.2	Automatic Ped Clear Parameter	277
5.4.3	Backup Time Parameter	277
5.4.4	Unit Red Revert Parameter.....	278
5.4.5	Unit Control Status	278
5.4.6	Unit Flash Status.....	279
5.4.7	Unit Alarm Status 2	279
5.4.8	Unit Alarm Status 1	280
5.4.9	Short Alarm Status	281
5.4.10	Unit Control	281
5.4.11	Maximum Alarm Groups	282
5.4.12	Alarm Group Table.....	282
5.4.13	Maximum Special Function Outputs	283
5.4.14	Special Function Output Table.....	283
5.4.15	Remote Manual Control Timer.....	285
5.4.16	Remote Manual Control Advance Command	285
5.4.17	ASC Elevation - Antenna Offset.....	286
5.4.18	Startup Flash Mode.....	286
5.4.19	Backup Timer Parameter - User Defined.....	286
5.4.20	Maximum Number of User Definable OIDs for Backup Timer	287
5.4.21	Backup Time - User Defined Functions Table	287
5.4.22	ASC Clock.....	288
5.4.23	Communications.....	293
5.4.24	Maximum Number of OIDs for Global Set ID Parameter.....	301
5.4.25	Global Set ID Parameter Definition Table.....	301
5.4.26	Unit Alarm Status 3	302
5.4.27	Unit Alarm Status 4	303
5.5	Coordination Parameters.....	303
5.5.1	Coord Operational Mode Parameter	303
5.5.2	Coord Correction Mode Parameters	304
5.5.3	Coord Maximum Mode Parameter	304
5.5.4	Coord Force Mode Parameter	305
5.5.5	Maximum Patterns Parameter	305
5.5.6	Pattern Table Type.....	305
5.5.7	Pattern Table.....	306
5.5.8	Maximum Splits.....	309
5.5.9	Split Table	310
5.5.10	Coordination Pattern Status	313
5.5.11	Local Free Status	313
5.5.12	Coordination Cycle Status.....	314
5.5.13	Coordination Sync Status.....	314
5.5.14	System Pattern Control	314
5.5.15	System Sync Control.....	315
5.5.16	Unit Coordination Sync Point	315
5.6	Time Base Parameters	316
5.6.1	Time Base Pattern Sync Parameter.....	316
5.6.2	Maximum Time Base Actions.....	316
5.6.3	Time Base Asc Action Table	316
5.6.4	Time Base Asc Action Status.....	318
5.6.5	Action Plan Command	318

5.7	Preempt Parameters.....	319
5.7.1	Maximum Preempts	319
5.7.2	Preempt Table.....	319
5.7.3	Preempt Control Table	329
5.7.4	Preempt Status.....	330
5.7.5	Maximum Preempt Groups	330
5.7.6	Preempt Status Table	331
5.7.7	Preempt Queue Delay Table.....	332
5.7.8	Maximum Preemption Gates.....	332
5.7.9	Preempt Gate Table.....	333
5.8	Ring Parameters.....	334
5.8.1	Maximum Rings.....	334
5.8.2	Maximum Sequences.....	334
5.8.3	Sequence Table	334
5.8.4	Maximum Ring Control Groups.....	336
5.8.5	Ring Control Group Table	336
5.8.6	Ring Status Table.....	341
5.9	Channel Parameters.....	342
5.9.1	Maximum Channels.....	342
5.9.2	Channel Table.....	342
5.9.3	Maximum Channel Status Groups	346
5.9.4	Channel Status Group Table.....	346
5.10	Overlap Parameters.....	348
5.10.1	Maximum Overlaps	348
5.10.2	Overlap Table.....	349
5.10.3	Maximum Overlap Status Groups.....	355
5.10.4	Overlap Status Group Table	355
5.11	TS2 Port 1 Parameters	357
5.11.1	Maximum Port 1 Addresses	357
5.11.2	Port 1 Table.....	357
5.12	ASC Block Objects.....	359
5.12.1	ASC Block Get Control.....	359
5.12.2	ASC Block Data.....	360
5.12.3	ASC Block Error Status	361
5.13	Cabinet Parameters	362
5.13.1	Maximum Cabinet Environmental Monitoring Devices	362
5.13.2	Cabinet Environmental Devices Table	362
5.13.3	Maximum Number of Cabinet Temperature Sensors	364
5.13.4	Cabinet Temperature Sensor Status Table	365
5.13.5	Maximum Number of Humidity Sensors	367
5.13.6	Cabinet Humidity Sensor Status Table	367
5.13.7	Power Source.....	369
5.13.8	Line Volts.....	369
5.13.9	ATC Cabinet LED Displays	370
5.14	I/O Mapping	370
5.14.1	I/O Mapping Control	370
5.14.2	I/O Maps Maximum Inputs	371
5.14.3	I/O Maps Maximum Outputs	371
5.14.4	I/O Input Map Table	372
5.14.5	I/O Input Map Status table	376
5.14.6	I/O Output Map Table.....	377
5.14.7	I/O Output Map Status Table	382
5.14.8	I/O Map Description Table	383
5.14.9	I/O Map Input Functions.....	384

5.14.10	I/O Map Output Functions	386
5.14.11	I/O Map FIO Pins.....	389
5.14.12	I/O Map TS1 Pins	391
5.14.13	I/O Map TS2 BIU Pins.....	395
5.14.14	I/O Map ATS Cabinet SIU Pins	397
5.14.15	I/O Map Auxiliary Device Pins.....	399
5.15	SIU Port 1 Parameters.....	400
5.15.1	Maximum SIU Port 1 Addresses	400
5.15.2	SIU Port 1 Table.....	400
5.16	RSU Interface	401
5.16.1	RSU Interface Port	402
5.16.2	Maximum Number of RSU Ports.....	402
5.16.3	Logical RSU Ports Table.....	402
5.17	ASC SPaT.....	404
5.17.1	SPaT Data Timestamp.....	405
5.17.2	SPaT Enabled Lanes Command.....	405
5.17.3	SPaT Enabled Lanes Concurrency Table.....	405
5.17.4	SPaT Message Options	406
5.17.5	SPaT RSU Ports Table.....	407
5.17.6	Current Tick Counter	408
5.17.7	Current Tick Counter - Milliseconds	408
5.18	RSU - ASC Support	409
5.18.1	RSU Signal Phase and Timing Functions.....	409
5.18.2	Connected Detection Zone	413
Section 6 Block Object Definitions		428
6.1	Block Data Type and ID.....	428
6.2	Phase Block Data	430
6.2.1	Phase Block Example	431
6.3	Vehicle Detector Block Data	431
6.3.1	Vehicle Detector Block Example.....	432
6.4	Pedestrian Detector Block Data.....	432
6.4.1	Pedestrian Detector Block Example.....	433
6.5	Pattern Block Data	433
6.5.1	Pattern Block Example.....	434
6.6	Split Block Data.....	434
6.6.1	Split Block Example.....	435
6.7	Time Base Block Data	435
6.7.1	Time Base Block Example	436
6.8	Preempt Block Data	436
6.8.1	Preempt Block Example.....	437
6.9	Sequence Block Data	437
6.9.1	Sequence Block Example	438
6.10	Channel Block Data	438
6.10.1	Channel Block Example	439
6.11	Overlap Block Data	439
6.11.1	Overlap Block Example.....	440
6.12	Port 1 Block Data	440
6.12.1	Port 1 Block Example.....	441
6.13	Schedule Block Data.....	441
6.13.1	Schedule Block Example	441
6.14	Day Plan Block Data.....	442

6.14.1	Day Plan Block Example.....	442
6.15	Event Log Config Block Data.....	443
6.15.1	Event Log Config Block Example.....	444
6.16	Event Class Block Data.....	444
6.16.1	Event Class Block Example.....	445
6.17	Dynamic Object Config Block Data.....	445
6.17.1	Dynamic Object Config Block Example.....	446
6.18	Dynamic Object Owner Block Data.....	446
6.18.1	Dynamic Object Owner Block Example.....	447
6.19	Dynamic Object Status Block Data.....	447
6.19.1	Dynamic Object Status Block Example.....	447
6.20	Miscellaneous ASC Block Data.....	448
6.20.1	Miscellaneous ASC Block Example.....	448
6.21	Phase 2 Block Data.....	449
6.22	Vehicle Detector 2 Block Data.....	449
6.23	Vehicle VOL/OCC Report V3 Block Data.....	450
6.24	Pedestrian Detector 2 Block Data.....	450
6.25	Pedestrian Detector Report Block Data.....	451
6.26	Pedestrian Button Config Block Data.....	451
6.27	Pattern 2 Block Data.....	451
6.28	Split 2 Block Data.....	452
6.29	Preempt 2 Block Data.....	452
6.30	Preempt Queue Delay Block Data.....	453
6.31	Channel 2 Block Data.....	453
6.32	Overlap 2 Block Data.....	454
6.33	Communications Port Definition Block Data.....	454
6.34	Ethernet Comm Port Definition Block Data.....	455
6.35	SIU Port 1 Block Data.....	455
6.36	Miscellaneous 2 ASC Block Data.....	456
6.37	User-Defined Backup Timer Definition Block Data.....	456
6.38	ASC Location Block Data.....	456
6.39	Global Set ID Definition Block Data.....	457
6.40	ASC Environmental Monitoring Block Data.....	457
6.41	ASC Cabinet Temperature Sensor Block Data.....	458
6.42	ASC Cabinet Humidity Sensor Block Data.....	458
6.43	ASC I/O Input Mapping Block Data.....	459
6.44	ASC I/O Input Status Block Data.....	459
6.45	ASC I/O Output Mapping Block Data.....	460
6.46	ASC I/O Output Status Block Data.....	461
6.47	ASC I/O Mapping Description Block Data.....	461
6.48	CV Configuration ASC Block Data.....	462
6.49	CV Logical RSU Ports Configuration Block Data.....	462
6.50	CV SPaT Enabled Lanes Concurrency Configuration Block Data.....	462
6.51	CV SPaT RSU Ports Configuration Block Data.....	463
6.52	CV Detector Configuration Block Data.....	463
6.53	CV Detection Zone Configuration.....	464

6.54	CV Detection Report Block Data	464
Section 7 SAE/NTCIP Object Definitions		465
7.1	MIB Header	465
7.2	Signal Phase and Timing	466
7.2.1	Intersection Status	466
7.2.2	Maximum SPaT Speed Advisories	466
7.2.3	SPaT Speed Advisories Table	467
7.2.4	Maximum SPaT Movement Maneuvers	468
7.2.5	SPaT Movement Maneuvers Table	469
7.2.6	SPaT Enabled Lanes Status	474
7.2.7	SPaT Signal Status Table	474
7.2.8	SPaT Signal Status Block	478
7.2.9	SPaT Movement Maneuver Status Block	479
7.3	MAP Data	480
7.3.1	MAP Message Count	480
7.3.2	MAP Message Time	480
7.3.3	Maximum Number of Lanes	480
7.3.4	Intersection Lane Table	481
7.3.5	Maximum Number of Intersections	485
7.3.6	MAP Intersection Table	485
7.3.7	Maximum Number of Node Points	488
7.3.8	Node Point Table	488
7.3.9	Maximum Computed Lane	492
7.3.10	Intersection Computed Lane Table	492
7.3.11	Maximum Lane Connections	494
7.3.12	Lane Connection Table	494
7.3.13	Maximum Number of Speed Limits	496
7.3.14	Intersection Speed Limit Table	497
7.3.15	Maximum User Types	498
7.3.16	Intersection User Types Table	498
7.3.17	Maximum MAP Plans	499
7.3.18	MAP Plan Table	499
Annex A Requirements Traceability Matrix (RTM) [Normative]		503
A.1	Notation [Informative]	503
A.1.1	Functional Requirement Columns	503
A.1.2	Dialog Column	503
A.1.3	Object Columns	504
A.1.4	Additional Specifications	504
A.2	Instructions For Completing The RTM [Informative]	504
A.3	Requirements Traceability Matrix (RTM) Table	504
Annex B Object Tree [Informative]		700
Annex C Test Procedures [Normative]		702
Annex D Documentation of Revisions [Informative]		703
D.1	NTCIP 1202 v02 to NTCIP 1202 v03	703
D.1.1	Added Systems Engineering Process	703
D.1.2	General MIB Changes	703
D.1.3	New User Needs	703
D.1.3.1	Added Support for Connected Vehicle Environment	704
D.1.3.2	Added Support to Manage the Cabinet Environment	704
D.1.3.3	Added Support to Manage the Power Sources	704
D.1.3.4	Added Support to Retrieve Operational Performance Data	704

D.1.3.5	Added Support to Manage I/O Mapping	704
D.1.3.6	Added Support for Accessible Pedestrian Signals (APS)	704
D.1.3.7	Added Support to Activate an Action Plan	704
D.1.3.8	Added Support to Manually Advance the Controller Remotely	704
D.1.3.9	Added Support for Condition Based Exception Reporting	704
D.1.4	New Requirements.....	705
D.1.4.1	Manage ASC Location.....	705
D.1.4.2	Manage Communications Ports	705
D.1.4.3	Manage ASC Clock	705
D.1.4.4	Manage User-Defined Backup Time	705
D.1.4.5	Support for Advanced Warning Signal Indications	705
D.1.4.6	Support for Phase Maximum 3.....	705
D.1.4.7	Support for Bicycle Phases	705
D.1.4.8	Support for Transit Phases.....	705
D.1.4.9	Manage Alternate Times for Transitions	705
D.1.4.10	Manage Coordination Point.....	705
D.1.4.11	Support for Additional Overlaps.....	706
D.1.4.12	Manage Preempt Exit Strategy.....	706
D.1.4.13	Manage Additional Alarms.....	706
D.1.4.14	Support for Paired Detectors	706
D.1.4.15	Improved Support for Vehicle Detectors	706
D.1.4.16	Improved Support for Pedestrian Detectors	706
D.1.4.17	Block Objects for New NTCIP 1202 v03 Objects	706
D.1.5	Changes to Existing Objects	706
D.1.5.1	Additional Coordination Correction Mode.....	706
Annex E User Requests [Informative].....		707
E.1	Features Not Supported by This Version.....	707
E.1.1	Interval Based Controllers	707
E.1.2	Non-Persistent Timing Patterns	707
E.1.3	Traffic Adaptive Algorithm	707
E.1.4	Peer-to-Peer	707
E.1.5	Signal Control Priority	707
E.1.6	Additional Support for ADA	708
E.1.7	Programmable Logic Gates and Functions.....	708
E.1.8	Advanced Preempt Inputs	708
E.1.9	Conflict Monitoring Unit and Channel Support.....	708
E.1.10	Traffic Signal Controller Broadcast Message (TSCBM).....	708
E.1.11	startTime	709
Annex F Generic Concepts and Definitions		710
F.1	Meaning of 'Other' as a Value	710
F.2	Manufacturer-Specific Consistency Checks	710
F.3	Connected Vehicle Implementation [Informative]	710
F.3.1	Overview	711
F.3.2	Architectural Considerations	712
F.3.2.1	NTCIP 1103 v03-Based Traps	712
F.3.2.2	Security	713
F.3.2.3	Conformance	713
F.3.3	Detailed Discussion.....	714
F.3.3.1	SPAT and MAP Relationship.....	714
F.3.3.2	SPAT Data.....	715
F.3.3.2.1	SPAT Objects	716
F.3.3.2.1.1	signalStatusTable.....	717
F.3.3.2.1.2	advisorySpeedTable	719
F.3.3.2.1.3	mapUserTable.....	719

	F.3.3.2.1.4	movementManeuverTable	719
	F.3.3.2.1.5	spatEnabledLanesConcurrencyTable	720
	F.3.3.2.1.6	spatPortTable	720
	F.3.3.2.1.7	signalStatusBlock	720
	F.3.3.2.1.8	movementManeuverStatusBlock	720
	F.3.3.3	Implementation	720
F.3.4		MAP Data	722
	F.3.4.1	mapIntersectionTable	723
	F.3.4.2	mapLaneTable	723
	F.3.4.3	mapNodePointTable	724
	F.3.4.4	mapLaneConnectTable	725
	F.3.4.5	mapComputedLaneTable	726
	F.3.4.6	mapSpeedLimitTable	726
	F.3.4.7	mapPlanTable	726
	F.3.4.8	Implementation	727
	F.3.4.9	Example	728
F.3.5		BSMs and PSMs	731
	F.3.5.1	Connected Device Detectors	731
	F.3.5.2	Connected Device Data	733
	F.3.5.2.1	Actuations	733
	F.3.5.2.2	Processed Data	734
Annex G SNMP Interface [Normative]			735
G.1		Generic SNMP Get Interface	735
G.2		Generic SNMP Get-Next Interface	735
G.3		Generic SNMP Set Interface	736
G.4		Variable Binding List Structure	737
G.5		Additional Requirements	737
	G.5.1	Grouping of Objects in a Request	737
	G.5.2	Support of Get	737
	G.5.3	Support of Get-Next	737
	G.5.4	Support of Set	737
	G.5.5	Performance	738
	G.5.6	Properly Defined Objects	738
Annex H NTCIP 1201 v03- and NTCIP 1103 v03-Derived Functional Requirements and Dialogs [Normative]			739
H.1		Generic Functional Requirements	739
	H.1.1	Generic Configuration Requirements	739
		H.1.1.1 Determine Device Component Information	739
		H.1.1.2 Determine Device Configuration Identifier Requirements	739
		H.1.1.2.1 Determine Unique Deployment Configuration Identifier	739
		H.1.1.2.2 Determine Configuration Identifier Parameter Content	740
		H.1.1.3 Determine Supported Standards	740
		H.1.1.4 Manage Unique System Name	740
		H.1.1.5 Manage Time	740
		H.1.1.5.1 Configure Time	740
		H.1.1.5.2 Configure Time Zone	740
		H.1.1.5.3 Configure Daylight Saving Mode	740
		H.1.1.5.4 Determine Time Setting	740
		H.1.1.5.5 Determine Time Zone Setting	740
		H.1.1.5.6 Determine Daylight Saving Mode Setting	740
		H.1.1.5.7 Monitor Current Time	740
	H.1.1.6	Managing Auxiliary Ports Requirements	741
		H.1.1.6.1 Determine External Port Information	741

H.1.1.6.2	Configure Port Information.....	741
H.1.1.6.3	Required Number of Auxiliary Ports	741
H.1.1.7	Manage Generic Scheduler Requirements	741
H.1.1.7.1	Configure Timebased Scheduler Month-Day-Date.....	741
H.1.1.7.2	Configure Timebased Scheduler Day Plans and Timebased Actions	741
H.1.1.8	Manage Security Definitions Requirements	741
H.1.1.8.1	Configure Security Definitions	741
H.1.1.9	Manage Dynamic Objects Requirements	742
H.1.1.9.1	Configure Dynamic Object Requirements	742
H.1.1.9.1.1	Configure Dynamic Object Persistence Time	742
H.1.1.9.1.2	Configure Dynamic Object Configuration ID	742
H.1.1.10	Manage Exception Reporting Requirements.....	742
H.1.1.10.1	Enable/Disable Exception Reporting	742
H.1.1.10.2	Configure Exception Reporting Condition Requirements	742
H.1.1.10.2.1	Configure a Monitored (Watch) Object	742
H.1.1.10.2.2	Configure a Monitored Group of Objects (Watch Block)	743
H.1.1.10.3	Configure Exception Reporting Data Transmission Requirements	743
H.1.1.10.3.1	Configure a Report Object	743
H.1.1.10.3.2	Configure a Report Group of Objects (Block)	743
H.1.1.10.4	Configure Exception Reporting Destination.....	743
H.1.1.10.5	Configure Exception Reporting Community.....	743
H.1.1.10.6	Configure Exception Reporting Operational Mode Requirements	743
H.1.1.10.6.1	Configure Exception Reporting Acknowledgement	743
H.1.1.10.6.2	Configure Exception Reporting Aggregation	744
H.1.1.10.6.3	Configure Exception Reporting Queue	744
H.1.1.10.6.4	Configure Exception Reporting (Forced)	744
H.1.1.10.6.5	Configure Exception Reporting Communications	744
H.1.1.10.6.6	Configure Exception Reporting - Maximum Rate	744
H.1.1.10.7	Determine Watch Block Capabilities.....	744
H.1.1.10.8	Determine Report Block Capabilities	744
H.1.1.10.9	Determine Exception Reporting Trap Channel Capabilities	745
H.1.1.10.10	Determine Exception Reporting Aggregation Capabilities.....	745
H.1.1.10.11	Determine Event Reporting Latency	745
H.1.1.10.12	Monitor Communications Link State	745
H.1.1.10.13	Monitor Exception Based Reporting Status Requirements	745
H.1.1.10.13.1	Monitor Exception Based Communications Link Error	745
H.1.1.10.13.2	Monitor Exception Based Maximum Rate Exceeded.....	745
H.1.1.10.13.3	Monitor Exception Based Queue Full Error	746
H.1.1.10.14	Monitor Exception Based Transmissions.....	746
H.1.1.10.15	Monitor Number of Lost Queued Exception Based Reports....	746
H.1.1.10.16	Monitor Number of Exception Based Events	746
H.1.1.10.17	Monitor Exception Based Data	746
H.1.1.10.18	Clear Event Class	746
H.1.1.10.19	Clear Event Configuration.....	746
H.1.1.10.20	Clear Event Log Table	746
H.1.1.10.21	Clear Report Objects	746
H.1.1.10.22	Clear Report Blocks	746
H.1.1.10.23	Clear Watch Objects	746
H.1.1.10.24	Clear Watch Blocks.....	747
H.1.1.10.25	Clear Exception Based Reporting Tables	747
H.1.1.10.26	Reset a Communications Link	747
H.1.2	Generic Status Monitoring Requirements	747
H.1.2.1	Monitor Status of External Device	747

H.1.2.2	Retrieve Database Management Requirements	747
H.1.2.2.1	Monitor Database Operation.....	747
H.1.2.2.2	Monitor Database Operation Status	747
H.1.2.2.3	Monitor Database Operation Error Status	747
H.1.2.3	Retrieve Generic Scheduler Settings Requirements.....	748
H.1.2.3.1	Monitor Timebased Scheduler Month-Day-Date	748
H.1.2.3.2	Monitor Timebased Scheduler Day Plans and Timebased Actions	748
H.1.2.3.3	Monitor Active Timebased Schedule	748
H.1.2.3.4	Monitor Active Timebased Schedule Day Plan and Timebased Actions	748
H.1.2.4	Retrieve Security Definitions Requirements.....	748
H.1.2.4.1	Determine Security Definitions	748
H.1.2.5	Retrieve Dynamic Objects Requirements	748
H.1.2.5.1	Determine Dynamic Objects Requirements.....	748
H.1.2.5.1.1	Determine Dynamic Object Persistence Time	749
H.1.2.5.1.2	Determine Dynamic Object Configuration ID	749
H.1.2.5.2	Monitor STMP-related Communications Requirements	749
H.1.2.5.2.1	Monitor STMP Data Exchange Requirements.....	749
H.1.2.5.2.1.1	Monitor Incoming and Outgoing STMP Packet Exchanges 749	
H.1.2.5.2.1.2	Monitor Incoming and Outgoing STMP Packet Types ..	749
H.1.2.5.2.2	Monitor STMP Data Exchange Error Requirements.....	749
H.1.2.5.2.2.1	Monitor Incoming and Outgoing STMP Error Exchanges - Too Big Error	749
H.1.2.5.2.2.2	Monitor Incoming and Outgoing STMP Error Exchanges - No Such Name	749
H.1.2.5.2.2.3	Monitor Incoming and Outgoing STMP Error Exchanges - Bad Value	749
H.1.2.5.2.2.4	Monitor Incoming and Outgoing STMP Error Exchanges - Read-Only	750
H.1.2.5.2.2.5	Monitor Incoming and Outgoing STMP Error Exchanges - General Error.....	750
H.1.3	Generic Data Retrieval Requirements	750
H.1.3.1	Support Logged Data	750
H.1.3.1.1	Retrieve Current Configuration of Logging Service	750
H.1.3.1.2	Configure Event Logging Service	750
H.1.3.1.3	Retrieve Event Logged Data.....	750
H.1.3.1.4	Configure Clearing of Event Class Log.....	750
H.1.3.1.5	Determine Capabilities of Event Logging Service	750
H.1.3.1.6	Determine Number of Logged Events per Event Class	750
H.1.3.1.7	Support a Number of Events to Store in Log.....	750
H.1.3.1.8	Configure Clearing of Global Log	751
H.1.3.1.9	Determine Total Number of Logged Events	751
H.1.3.1.10	Determine Number of Events within a Class	751
H.1.3.1.11	Determine Event Logging Resolution	751
H.1.3.1.12	Clear Event Configuration.....	751
H.1.3.1.13	Clear Event Classes	751
H.1.3.1.14	Clear Event Class Log	751
H.1.3.1.15	Retrieve Non-Sequential Clock Changes	751
H.1.3.2	Supplemental Requirements for Event Monitoring.....	751
H.1.3.2.1	Record and Timestamp Events	751
H.1.3.2.2	Support a Number of Event Classes	751
H.1.3.2.3	Support a Number of Events to Log	752
H.1.3.2.4	Support Monitoring of Event Type Requirements.....	752
H.1.3.2.4.1	Support On-Change Events.....	752

	H.1.3.2.4.2	Support Greater Than Events	752
	H.1.3.2.4.3	Support Less Than Events.....	752
	H.1.3.2.4.4	Support Hysteresis Events.....	752
	H.1.3.2.4.5	Support Periodic Events	752
	H.1.3.2.4.6	Support Bit Flag Events	752
	H.1.3.2.4.7	Support Event Monitoring on Any Data	752
H.1.4	Generic Control Requirements.....		752
	H.1.4.1	Control External Device.....	752
	H.1.4.2	Control Database Operation Requirements	753
	H.1.4.2.1	Control Database Access	753
	H.1.4.2.2	Perform Database Consistency Check.....	753
	H.1.4.2.3	Enforce Consistency Check Parameters.....	753
H.1.5	Generic Performance Requirements.....		753
	H.1.5.1	Atomic Operations	753
H.2	Derived GLOBAL Dialogs		753
	H.2.1	Manage Communications Environment.....	753
	H.2.1.1	Retrieve Current Configuration of Event Reporting and Logging Service.....	753
	H.2.1.2	Configuring Reporting/Logging Service.....	754
	H.2.1.3	Retrieving Logged Data.....	754
	H.2.2	Determining Device Component Information	755
	H.2.3	Global Time Data	755
	H.2.3.1	Graphical Depiction of Global Time Data	755
	H.2.4	Configure Events.....	756
	H.2.5	Generic Retrieve Table Dialog	756
	H.2.6	Generic Retrieve Table Row Dialog.....	757
	H.2.7	Generic Configure Table Row.....	757
H.3	External Data Elements		757
Annex I Communications Ports Protocols [Normative].....			758
I.1	SNMP Group.....		758
I.2	System Group		759
I.3	RS232 Group		759
I.4	HDLC Group		760
I.5	Interfaces Group		761
I.6	IP Group.....		762
I.7	ICMP Group		763
I.8	A.33 TCP Group		763
I.9	A.34 UDP Group.....		764
I.10	A.35 Ethernet Group.....		764

FIGURES

	Page
Figure 1 Reference Physical Architecture - ASC System.....	17
Figure 2 Controller Assembly.....	19
Figure 3 ASC - Connected Vehicle System Context Diagram.....	21
Figure 4 Physical Architecture 1	22
Figure 5 Physical Architecture 2	22
Figure 6 Example Node Point Attribute.....	190
Figure 7 Get Block Data.....	213
Figure 8 Set Complex Configuration Parameters	215
Figure 9 Set Block Objects.....	217
Figure 10 Object Tree for NTCIP 1202 v03 (continued in Figure 11).....	700

Figure 11 Object Tree for NTCIP 1202 v03 (Continued)	701
Figure 12 NTCIP 1202 v03 Tables to Support SPAT and MAP	715
Figure 13 Example signalStatusTable	718
Figure 14 Example Signalized Intersection.....	728
Figure 15 Connected Data Detectors Mapping.....	732
Figure 16 SNMP Get Interface.....	735
Figure 17 SNMP GetNext Interface	736
Figure 18 SNMP Set Interface	736
Figure 19 SNMP Interface - View of Participating Classes.....	737
Figure 20 Global Time Data	756

TABLES

	Page
Table 1 Conformance Symbols.....	40
Table 2 Conditional Status Notation	41
Table 3 Predicate Mapping to NTCIP 1202 v03 Section	41
Table 4 Support Column Entries	42
Table 5 Protocol Requirements List (PRL)	45
Table 6 Field I/O Devices Supported	138
Table 7 Requirements Traceability Matrix (RTM)	504
Table 8 Example J2735 Permitted Movement Value.....	728
Table 9 Example Signal Indications.....	729
Table 10 Example DE_MovementPhaseState Values	729
Table 11 Example signalStatusTable	730
Table 12 Example movementManeuverTable	730

Section 1 General [Informative]

1.1 Scope

NTCIP 1202 v03 specifies the logical interface between an Actuated Signal Controller (ASC) and the host systems that control them. NTCIP 1202 v03 describes the supported ASC functionality in terms of user needs and requirements; however, the nature of the interface is determined in part by the operational nature of the devices being controlled, and therefore NTCIP 1202 v03 touches on such operational issues on occasion.

Prior to the development of NTCIP 1202, there were no standards defining how ASCs communicate with host systems. As a result, each manufacturer has developed its own protocol to meet its own particular needs. This approach has resulted in systems that are not interchangeable or interoperable. If an agency wishes to use either a central management system or additional ASC from a different vendor, the agency encounters significant systems integration challenges, requiring additional resources to address. These additional resource requirements inhibit information sharing within and between various potential users of the data and prevent vendor independence. Without manufacturer independence, resource requirements further increase because of a lack of a competitive market.

These problems have not been limited to traffic signal controllers. Many other devices also need to exchange information. In surface transportation, examples include dynamic message signs, bus priority sensors, weather, and environmental monitoring, etc.

To address these problems, NTCIP is developing a family of open standards for communications between field devices and central management systems. NTCIP 1202 v03 is part of that larger family and is designed to define an interoperable and interchangeable interface between a transportation management system and an ASC, while still allowing for extensions beyond NTCIP 1202 v03 to allow for new functions as needed. This approach is expected to support the deployment of ASC from one or more vendors in a consistent and resource-efficient way.

NTCIP 1202 v03 standardizes the communications interface by identifying the various operational needs of the users (Section 2) and subsequently identifying the necessary requirements (Section 3) that support each need. NTCIP 1202 v03 then defines the NTCIP standardized communications interface used to fulfill these requirements by identifying the dialogs (Section 4) and related data concepts (Section 5) that support each requirement. Traceability among the various sections is defined by the Protocol Requirements List (Section 3.3) and the Requirements Traceability Matrix (Annex A). Conformance requirements for NTCIP 1202 v03 are provided in Section 3.3. NTCIP 1202 v03 only addresses a subset of the requirements needed for procurement. It does not address requirements related to the performance of the traffic detectors (e.g., accuracy, the supported detection range, the time it takes to detect conditions, etc.), hardware components, mounting details, etc.

Previous versions of NTCIP 1202 addressed only Actuated Traffic Signal Controllers (ASC) that employ vehicle or pedestrian detectors to activate a particular phase – the scope did not include pre-timed, or fixed-time signal controllers that cycle through phases regardless of the number of vehicles or pedestrians present. ASCs included both fully actuated traffic signals, where all phases are actuated, and phases are skipped if no vehicles or pedestrians are detected, as well as semi-actuated traffic signals, where at least one phase is guaranteed to be served regardless of whether pedestrians or vehicles are detected. For the NTCIP 1202 v03 purposes, controllers that allow different phases to be active (or skipped) at any point in time phase are known as phase-based controllers.