

A Joint Standard of AASHTO, ITE, and NEMA

NTCIP 2301 version v02

National Transportation Communications for ITS Protocol Simple Transportation Management Framework (STMF) Application Profile (AP) (AP-STMF)

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- Siemens ITS
- Telvent Farradyne Inc.
- Transcore, Inc.
- Trevilon Corp.
- URS Corp.
- Washington State DOT

FOREWORD

NTCIP 2301 v02, an NTCIP standards publication, defines an application profile (AP) that is a combination of standards intended to meet specific requirements for information management and information transfers to and from transportation devices in a networked environment. As an NTCIP application profile, the scope covers the application, presentation, and session layers of the OSI Basic Reference Model. NTCIP 2301 v02 contains mandatory requirements that are applicable to all devices claiming conformance to NTCIP 2301 v02. NTCIP 2301 v02 also contains optional and conditional requirements, which may be applicable to a specific environment in which a device is used. NTCIP 2301 v02 uses only metric units.

Annex A includes mandatory requirements that are defined as normative.

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Section, Paragraph, or Clause:
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Approvals

NTCIP 2301 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 2301 v02 as the following standard type, as of the date:

AASHTO—Standard Specification, May 2010
ITE—Software Standard, June 2010
NEMA—Standard, November 2009

History

From 1998 to 1999, a predecessor of NTCIP 2301 v02 was referenced as TS 3.AP-STMF. However, as part of an organized numbering scheme for NTCIP standards publications, the designation NTCIP 2301 v02 was developed. The technical specifications of NTCIP 2301 v02 are identical to the former reference, except as noted in the development history:

TS 3.AP-STMF v98.01.07. August 1998—Accepted as a User Comment Draft by the Joint Committee on the NTCIP. October 1998—NTCIP Standards Bulletin B0025 referred version 98.01.08 for comment.

NTCIP 2301 v99.01.07. July 1999—Accepted v99.01.06 as a Recommended Standard by the Joint Committee on the NTCIP. January 2000—NTCIP Standards Bulletin B0044 referred v99.01.07, which included typographic corrections. Approved by AASHTO in May 2000, and approved by ITE and NEMA in May 2001.

NTCIP 2301:2001 v01.08. December 2001—Reformatted for printing: incremented version number and updated date; modified and reorganized front matter to conform to NTCIP 8002; and updated headers, footers, and page numbers. All references to TS 3 Standard designations were changed to equivalent NTCIP designations.

NTCIP 2301 v02.01. January 2002—Initial draft of NTCIP 2301 version 02 started.

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NTCIP 2301 v02.16. March 2008—Updated references, cross references, and created Proposed Recommended Standard. April 2008—Accepted as a Recommended Standard by the Joint Committee.

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NTCIP 2301 v02.17, June 2010—From August 2009 to June 2010, NTCIP v02.18 was considered for SDO balloting and approval.

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Compatibility of Versions

To distinguish NTCIP 2301 v02 (as published) from previous drafts, NTCIP 2301 v02 also includes NTCIP 2301 v02.19 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 2301 v02 is designated, and should be cited as, NTCIP 2301 v02. Anyone using NTCIP 2301 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.

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 2103 v02 should also consult NTCIP 8004 v02 for specific guidelines on compatibility.

INTRODUCTION

NTCIP is one part of the Intelligent Transportation Systems standardization activities covering base standards, profiles, and registration mechanisms.

Base Standards define procedures and rules for providing the fundamental operations associated with communications and information that is exchanged over fixed-point communications links.

Profiles define subsets or combinations of base standards used to provide specific functions or services. Profiles prescribe particular subsets or options available in base standards necessary for accomplishing a particular function or service. This provides a basis for the development of uniform, nationally recognized conformance.

Registration Mechanisms provide a means to specify and uniquely identify detailed parameters within the framework of base standards and/or profiles.

BSP2WG is concerned with the methodology of defining profiles, and their documentation in Standards Publications. NTCIP 2301 v02 defines an application profile that is a combination of base standards intended to meet the requirements for the management of information related to the communications layers. NTCIP 2301 v02 may also be applicable to end-application information management. The objective is to facilitate the specification of ITS systems characterized by a high degree of interoperability and interchangeability of its components.

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 ITS network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards. In August 1997, the Joint Committee on the NTCIP formed a new working group to develop a method for organizing class profiles. The Profiles WG (now incorporated with the Base Standards and Profile 2 Working Group) first met in September 1997.

After research into how national and international standards organizations combine protocols and standards to address all seven layers of the ISO-OSI Basic Reference Model, the committee adopted the approach defined in the *NTCIP Profile Framework*. Following that approach, a protocol stack is specified by application, transport, and subnetwork profiles. An application profile addresses the application, presentation, and session layers. A transport profile addresses the transport and network layers. A subnetwork profile addresses the data link and physical layers. NTCIP 2301 v02 is an application profile for use in center-to-roadside and center-to-center communications.

In December 2001, developing NTCIP 2301 v02 was started to include changes made in the underlying standards and, specifically, to incorporate SFMP.

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Section 1 GENERAL

1.1 SCOPE

NTCIP 2301 v02 (this application profile (AP)) is applicable to transportation devices and management systems that operate in Intelligent Transportation Systems (ITS). As an AP, NTCIP 2301 v02 specifies a set of protocols and standards applicable to the application, presentation, and session layers of the OSI Basic Reference Model. NTCIP 2301 v02 is intended to provide message authentication, information management, and data representation services for devices and management stations.

1.2 PROFILE-PROTOCOL-LAYER RELATIONSHIPS

NTCIP 2301 v02 specifies provisions for the Simple Transportation Management Framework Application Profile (AP-STMf). For information management, NTCIP 2301 v02 references the Simple Network Management Protocol (SNMPv1). The information related to communications network layers is referenced in the Structure and Identification of (Network) Management Information (SMI) and the Management Information Base for Network Management of TCP/IP-based Internets (MIB-II). Interfacing requirements are referenced to two standards for Requirements for Internet Hosts (InHost).

For information management of specific transportation-related information, NTCIP 2301 v02 also references provisions of NTCIP 1103 v02 for Simple Transportation Management Protocol (STMP) and Simple Fixed Message Protocol (SFMP). The organization and structure of transportation information is referenced to NTCIP 8004 v02 for SMI for the SMI MIB. The layers, comparable standards, and profile taxonomy that make up this profile are shown in Table 1.

Table 1 AP-STMf Relationships

OSI Model Layers	Comparable Standards	Profile
APPLICATION LAYER	IAB STD 3 (Internet Hosts) IAB STD 15 (SNMP)	AP-STMf
PRESENTATION LAYER	IAB STD 16 (SMI) IAB STD 17 (MIB-II)	
SESSION LAYER	NTCIP 1103 v02 (TMP) NTCIP 8004 v02 (SMI)	

1.3 REFERENCES

Normative references contain provisions that, through reference in this text, constitute provisions of NTCIP 2301 v02. Other references in NTCIP 2301 v02 might provide a complete understanding of the entire protocol and the relationships between all parts of the protocol. 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.

1.3.1 Normative References

- RFC 1122:1989 *Requirements For Internet Hosts—Communication Layers* (IAB STD 3)
- RFC 1123:1989 *Requirements For Internet Hosts—Application and Support* (IAB STD 3)

RFC 1155:1990	<i>Structure and Identification of Management Information for TCP/IP-based Internets (IAB STD 16)</i>
RFC 1157:1990	<i>Simple Network Management Protocol (IAB STD 15)</i>
RFC 1212:1991	<i>Concise MIB Definitions (IAB STD 16)</i>
RFC 1213:1991	<i>Management Information Base for Network Management of TCP/IP-based Internets: MIB-II (IAB STD 17)</i>
AASHTO / ITE / NEMA NTCIP 1103 v02	<i>Transportation Management Protocols (TMP)</i> published July 2010
AASHTO / ITE / NEMA NTCIP 2201:2003	<i>Transportation Transport Profile</i> published September 2005
AASHTO / ITE / NEMA NTCIP 8004 v02	<i>Structure and Identification of Management Information (SMI)</i> published June 2010

1.3.2 Other References

ISO/IEC 10731:1994	<i>Information technology—Open Systems Interconnection—Basic Reference Model—Conventions for the definition of OSI services</i>
AASHTO / ITE / NEMA NTCIP 1102:2004	<i>Octet Encoding Rules (OER) Base Protocol</i>
AASHTO / ITE / NEMA NTCIP 1104 v01	<i>Center-to-Center Naming Convention Specification</i> published May 2008
AASHTO / ITE / NEMA NTCIP 2202:2001	<i>Internet (TCP/IP and UDP/IP) Transport Profile</i>

1.3.3 Contact Information

1.3.3.1 NTCIP Standards

For revision information on NTCIP 2301 v02, contact:

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For draft revisions to NTCIP 2301 v02, and recommended revisions of the NTCIP Joint Committee, visit www.ntcip.org.

1.3.3.2 ISO/IEC Standards

Members of ISO maintain registers of currently valid ISO/IEC International Standards. For the USA, the member of ISO is the American National Standards Institute (ANSI), which may be contacted as follows:

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New York, NY 10036
(212) 642-4900
<http://global.ihb.com>

1.3.3.3 IAB Documents

For Internet Architecture Board (IAB) documents, contact:

Internet Architecture Board (IAB)
www.rfc-editor.org
www.rfc-editor.org/repositories.html

1.4 DEFINITIONS AND ACRONYMS

For purposes of NTCIP 2301 v02, the following definitions, and their acronyms, apply:

Application Layer	That portion of the OSI Basic Reference Model (Layer 7) that provides access to the communications services.
data	Information before it is interpreted.
Data Link Layer	That portion of the OSI Basic Reference Model (Layer 2) responsible for flow control, framing, synchronization, and error control over a communications link.
datagram	A self-contained unit of data transmitted independently of other datagrams.
host	(Internet usage) The physical and/or logical part of the end-system's application. A computer attached to one or more networks that supports users and runs application programs.
Intelligent Transportation Systems (ITS)	A major national initiative to apply information, communication, and control technologies in order to improve the efficiency of surface transportation.
internet	Any collection of connected networks where information can be passed from one network to another.
Internet	A large collection of connected networks, primarily in the United States, running the Internet suite of protocols. Sometimes referred to as the <i>DARPA Internet</i> , <i>NSF/DARPA Internet</i> , <i>Internet</i> , or the <i>Federal Research Internet</i> .
Internet protocol (IP)	The network protocol offering a connectionless mode network service in the Internet suite of protocols.
Internet Protocol (IP) Suite	A collection of computer-communication protocols originally developed under DARPA sponsorship.
internetwork	The ability of devices to communicate across multiple networks.
network	A collection of subnetworks connected by intermediate systems and populated by end systems.

Network Layer	That portion of an OSI Basic Reference Model (Layer 3) responsible for data transfer across the network, independent of both the media comprising the underlying subnetworks and the topology of those subnetworks.
network management	The technology used to manage a network, usually referring to the management of devices that contain information about setup, control, and status of the layers in a communications stack. The term refers to all devices, both intermediate and end systems, that are present on the network or internetwork.
Open Systems Interconnection (OSI)	An international effort to facilitate communications among computers of different manufacture and technology.
OSI Basic Reference Model	A widely accepted structuring technique that provides an abstract representation of the communication process that is divided into seven basic, functional layers.
Physical Layer	That portion of an OSI Basic Reference Model (Layer 1) responsible for the electrical and mechanical interface between communicating systems.
Presentation Layer	That portion of an OSI Basic Reference Model (Layer 6) responsible for converting and organizing data from one format to another.
Session Layer	That portion of an OSI Basic Reference Model (Layer 5) that manages a series of data exchanges between end-system applications.
subnetwork	A physical network within a network. All devices on a subnetwork share a common physical medium.
taxonomy	A classification scheme for referencing profiles or sets of profiles unambiguously.
TCP/IP Reference Model	An alternate to the OSI Basic Reference Model that organizes the communications process into 4 layers, consisting of host-to-network, internet, transport, and application layers.
Transport Layer	That portion of an OSI Basic Reference Model (Layer 4) that attempts to guarantee reliable data transfer between two end-systems, using flow control and error recovery, and may provide multiplexing.

1.5 OTHER ABBREVIATIONS AND ACRONYMS

Other abbreviations or acronyms used in NTCIP 2301 v02 are defined as follows:

AP	Application Profile
OER	Octet Encoding Rules
PICS	Protocol Implementation Conformance Statement
PRL	Profile Requirements List
RFC	(Internet) Request for Comments
SFMP	Simple Fixed Message Protocol
SMI	Structure and Identification of Management Information
SNMP	Simple Network Management Protocol
STD	(Internet) Standard
STMF	Simple Transportation Management Framework
STMP	Simple Transportation Management Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

Section 2 FUNCTIONAL REQUIREMENTS

2.1 GENERAL REQUIREMENTS

Implementations claiming conformance to SNMP shall support the following elements as stated.

- a) All of the constraints defined in Section 2.2 through Section 2.2.2.2.
- b) All mandatory requirements specified in Annexes A.3.2, A.5, A.8, and A.9.
- c) All requirements of the standards normatively referenced by NTCIP 2301 v02. See Section 1.3.1.

Implementations claiming conformance to STMP shall support the following elements as stated.

- a) All SNMP requirements as stated previously.
- b) All of the constraints defined in Section 2.3 through Section 2.3.2.1.
- c) All mandatory requirements specified in Annex A.3.3 and Annex A.6 of this profile.
- d) All requirements of the standards normatively referenced by NTCIP 2301 v02. See Section 1.3.1.

Implementations claiming conformance to SFMP shall support the following elements as stated.

- a) All of the constraints defined in Section 2.4 through Section 2.4.2.1.
- b) All mandatory requirements specified in Annex A.3.4, A.7, A.8, and A.9.
- c) All requirements of the standards normatively referenced by NTCIP 2301 v02. See Section 1.3.1.

2.2 SNMP REQUIREMENTS

SNMP shall be in accordance with SNMPv1 as defined in RFC 1157. SNMP shall also meet the requirements defined in NTCIP 1103 v02 Section 3.2.

NOTE—See NTCIP 1103 v02 Section 3.2.2 for special handling of Set Operations on a Read-Only Variable.

Annex A.5 provides an SNMP Profile Requirements List (PRL) that enumerates the key architectural, procedural, message fields, PDU fields, type encoding, and other requirements of SNMP referenced to RFC 1155, RFC 1157, and RFC 1212. Annex A.5 also references NTCIP 1103 v02.

NOTE—A predecessor of NTCIP 2301 v02 stated “NTCIP 1103 imposes restrictions on the use of SNMP traps. An agent shall not issue any trap other than the trapEvent. Support for generating the eventTrap is optional for an agent. It is optional for a management station to support either type. See NTCIP 1103 Subclause 3.2.4.” The use of SNMP traps is expected to be defined in a future version of NTCIP 2301 v02.

When an end application, such as an Actuated Signal Controller, calls for OER Encoding, that encoding shall meet the OER encoding requirements for STMP in Annex A.6.2. OER is defined in NTCIP 1102:2004.

2.2.1 SNMP Interface Conformance

2.2.1.1 UDP Conformance

Support for User Datagram Protocol (UDP) is not mandated by NTCIP 2301 v02. If UDP is supported, the interface requirements as specified in NTCIP 2202:2001, RFC 1157 Section 4, and RFC 1122 Section 4.1.4 shall be applicable. As stated in RFC 1157 Section 4, SNMP interfaces with UDP via port numbers.

2.2.1.2 TCP Conformance

Support for the Transmission Control Protocol (TCP) is not required.

2.2.1.3 T2 Conformance

Support for Transportation Transport Protocol (T2) is not mandated by NTCIP 2301 v02. If supported, SNMP messages shall be encapsulated and parsed by one of the methods as prescribed in NTCIP 2201:2003. Standard SNMP traps are prohibited when using this interface.

2.2.2 SNMP SMI Requirements

NTCIP 8004 v02 defines the SMI that applies to data elements used within the context of SNMP.

2.2.2.1 RFC Data Elements

The base data elements that originate in RFCs follow the base object specification as described in NTCIP 8004 v02 and meet the requirements as defined in NTCIP 8004 v02 Section 2.3.1. NTCIP 8004 v02 Section 2.3.1 through Section 2.3.1.9 references RFC 1155 and RFC 1212.

An implementation shall support the System Conformance Group as defined in Annex A.8.2. These data elements are derived from RFC 1213 Section 3.4. It is recommended that the value entered for sysName in the System Conformance Group conform to NTCIP 1104 v01 Section 2.3.8 for device name.

An implementation may optionally support the SNMP Statistics Conformance Groups defined in Annex A.5.3. These data elements are derived from RFC 1213 Section 3.13.

2.2.2.2 NTCIP Data Elements

The data elements defined within NTCIP 1200-series standards follow the requirements of the simple object specification or block object specification as described in NTCIP 8004 v02. These data elements meet the requirements of NTCIP 8004 v02 Section 2.3.2 or NTCIP 8004 v02 Section 2.3.3, respectively.

An implementation shall support the Security Conformance Group as defined in Annex A.8.3. These data elements are derived from NTCIP 1103 v02 Annex A.8.

An implementation shall support the snmpMaxPacketSize data element as defined in Annex A.5.4. That data element is cross-referenced to NTCIP 1103 v02 Annex A.1.

An implementation may optionally support the Logical Names Conformance Group as defined in Annex A.8.4. These data elements are derived from NTCIP 1103 v02 Annex A.6.

2.3 STMP REQUIREMENTS

STMP shall be in accordance with NTCIP 1103 v02 Section 5.

Annex A.6 is a Profile Requirements List (PRL) that enumerates the key architectural, procedural, message fields, PDU fields, and other requirements of STMP referenced to NTCIP 1103 v02.

2.3.1 STMP Interface Conformance

2.3.1.1 UDP Conformance

Support for User Datagram Protocol (UDP) is not mandated by NTCIP 2301 v02. If UDP is supported, STMP shall interface with UDP via port numbers. Port number 501 shall be used by STMP GetRequest, GetNext Request, SetRequest-NoReply, and GetResponse, SetResponse, and Error PDUs.

2.3.1.2 TCP Conformance

Support for Transmission Control Protocol (TCP) is not required.

2.3.1.3 T2 Conformance

Support for Transportation Transport Protocol (T2) is not mandated by NTCIP 2301 v02. STMP messages shall be encapsulated by either Method 1 or Method 2 as defined in NTCIP 2201:2003 Section 2.2.3. STMP messages shall be parsed by either Method 3 or Method 4 as defined in NTCIP 2201:2003 Section 2.2.4.

2.3.2 STMP SMI Requirements

NTCIP 8004 v02 Section 2.3.4 defines the SMI that applies to data elements used within the context of STMP.

2.3.2.1 NTCIP Data Elements

An implementation shall support the Dynamic Object Conformance Group as defined in Annex A.6.3. These data elements are cross-referenced to NTCIP 1103 v02 Annex A.3 and Annex A.5. An implementation may optionally support the STMP Statistics Conformance Group defined in Annex A.6.4. These data elements are cross-referenced to NTCIP 1103 v02 Annex A.4.

The snmpMaxPacketSize data element (see Annex A.5.4) shall also apply to STMP packets.

2.4 SFMP REQUIREMENTS

SFMP shall be in accordance with NTCIP 1103 v02 Section 4.

Annex A.7 is a PRL that enumerates the key architectural, procedural, message fields, PDU fields, and other requirements of SFMP referenced to NTCIP 1103 v02.

2.4.1 SFMP Interface Conformance

2.4.1.1 T2 Conformance

SFMP requires support of NTCIP 2201:2003. The encapsulation and parsing method is described in NTCIP 2201:2003 Section 2.2.2 and Section 2.2.3.

2.4.2 SFMP SMI Requirements

NTCIP 8004 v02 defines SMI that applies to data elements used within the context of SNMP. That same structure and identification applies to the data elements used with the context of SFMP.

2.4.2.1 NTCIP Data Elements

The data elements defined within NTCIP 1200-series standards follow the requirements of the simple object specification or block object specification as described in NTCIP 8004 v02. These data elements meet the requirements of NTCIP 8004 v02 Section 2.3.2 or NTCIP 8004 v02 Section 2.3.3, respectively.

An implementation shall support the Security Conformance Group as defined in Annex A.8.3. These data elements are derived from NTCIP 1103 v02 Annex A.8.

An implementation shall support the snmpMaxPacketSize data element as defined in Annex A.5.4. This data element shall apply to the SFMP agent. That data element is cross-referenced to NTCIP 1103 v02 Annex A.1.2.

An implementation may optionally support SFMP Statistics Conformance defined in Annex A.7.5. These data elements are derived from NTCIP 1103 v02 Annex A.2.

An implementation may optionally support the Logical Names Conformance Group as defined in Annex A.8.4. These data elements are derived from NTCIP 1103 v02 Annex A.6.

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Annex A AP-STMF PROFILE REQUIREMENTS LIST (PRL) [Normative]

A.1 INTRODUCTION

Annex A provides the PRL for implementations of AP-STMF.

To claim conformance with NTCIP 2301 v02, an implementation shall satisfy the mandatory conformance requirements of NTCIP 2301 v02.

The PRL is a template (or proforma). An implementation's completed PRL is called a Profile Implementation Conformance Specification (PICS). For an implementation, an implementer or supplier generates a PICS by indicating the appropriate level of support provided by an implementation. The PICS states which capabilities and options of the protocol have been implemented. The following can use the PICS:

- a) The protocol implementer, as a checklist to reduce the risk of failure to conform to NTCIP 2301 v02 through oversight.
- b) The supplier and user, as a detailed indication of the capabilities of the implementation.
- c) The user, as a basis for initially checking the possibility of interworking with another implementation.

NOTE—While interworking can never be guaranteed, failure to do so can often be predicted from incompatible PICSs.

- d) A user, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.1.1 Notation

The following notations and symbols are used to indicate status and conditional status in the PRL and PICS within all NTCIP standards. Not all of these notations and symbols may be used within NTCIP 2301 v02.

A.1.1.1 Status Symbols

Table 2 identifies the symbols used to indicate base standard and profile status.

Table 2 Base Standard and Profile Status Symbols

m	mandatory
m.<n>	support of every item of the group labeled by the same numeral <n> required, but only one is active at time
o	optional
o.<n>	optional, but support of at least one of the group of options labeled by the same numeral <n> is required
c	conditional
n/a	Not applicable (i.e., logically impossible in the scope of the profile)
x	excluded or prohibited

The o.<n> notation is used to show a set of selectable options (i.e., one or more of the set shall be implemented) with the same identifier <n>. Two character combinations are used for dynamic conformance requirements. In this case, the first character refers to the static (implementation) status,

and the second refers to the dynamic (use); thus "mo" means "mandatory to be implemented, optional to be used." Base standard requirements are shown using the equivalent notations in upper case (e.g., M, O, X).

The classification of the requirements and options in RFCs does not correspond to the convention described in Table 2, and shall be mapped into the profile as indicated in Table 3.

Table 3 RFC Mapping to Profile

RFC	Profile
MUST	Mandatory*
SHOULD	Mandatory*
MAY	Optional
SHOULD NOT	Prohibited
MUST NOT	Prohibited
* In adapting communications industry standards to the transportation industry, there may be exceptions where specific mandatory requirements are not applicable to the new environment. Where these exceptions are made, a justification shall be provided.	

A.1.1.2 Conditional Status Notation

The predicate notations that may be used are indicated in Table 4.

Table 4 Predicate Notations

<predicate>:	This notation introduces a single item that is conditional on the <predicate>.
<predicate>::	This notation introduces a table or a group of tables, all of which are conditional on the <predicate>.

The <predicate>: notation means that the status following it applies only when the PRL or PICS states that the feature or features identified by the predicate are supported. In the simplest case, <predicate> is the identifying tag of a single PICS item. The <predicate>:: notation may precede a table or group of tables in a section or subsection. When the group predicate is true, then the associated clause shall be completed. The symbol <predicate> also may be a Boolean expression composed of several indices. "AND", "OR", and "NOT" shall be used to indicate the Boolean logical operations.

A.1.1.3 Support Column Symbols

The PRL includes a support column. An implementer claims support of an item by circling the appropriate answer (Yes, No, or N/A) in the support column. See Table 5.

Table 5 Support Column Responses

Yes	Supported by the implementation
No	Not supported by the implementation
N/A	Not applicable

A.1.1.4 Instructions for Completing the PRL

An implementer shows the extent of conformance to a profile or other NTCIP standard by completing the PRL. The implementer indicates whether mandatory requirements are conformed to, and whether optional functions are supported. The resulting completed PRL is called a PICS. The initial section of the PRL is implementation identification. The second grouping of sections summarizes higher level conformance to a set of global conformance statements. The third section is a set of basic requirements

that provide an indication of options at the protocol level. These three sections are followed by a PRL for each protocol: SNMP, STMP, and SFMP.

When the PRL lists requirements, the "Support" or "Supported Values" column shall be completed. In this column, each response shall be selected either from the indicated set of responses, or it shall comprise one or more parameter values as requested. If a conditional requirement is inapplicable, use the Not Applicable (NA) choice. If a mandatory requirement is not satisfied, exception information shall be supplied by entering a reference Xi, where i is a unique identifier, to an accompanying rationale for the non-conformance. When the profile requirement is expressed as a two-character combination (as defined in Annex A.1.1.1), the response shall address each element of the requirement; e.g., for the requirement "mo," the possible conforming responses are "yy" or "yn."

A.2 STANDARDS REFERENCED

NTCIP 2301 v02 specifies the provision of host-to-host information management services in a transportation roadside-to-central management station environment. Those standards referenced in Annex A are listed in Section 1.3.1.

A.3 PROFILE REQUIREMENTS LIST (PRL)

A.3.1 Implementation Identification

Ref	Question	Response
1	Supplier	
2	Contact point for queries about the profile	
3	Implementation name(s) and version(s)	
4	Date of statement	
5	Other information: machine name, operating systems, system name	

A.3.2 SNMP Global Statement of Conformance

SNMP Conformance		
Ref	Standard	Response
1	RFC 1157 SNMP implemented?	
2	RFC 1155 SMI implemented?	
3	RFC 1213, MIB-II System and SNMP Groups, implemented?	
4	NTCIP 8004 v02 (SMI) NEMA SMI implemented?	
5	NTCIP 1103 v02 (TMP) Objects for SNMP implemented?	
6	NTCIP 1103 v02 (TMP) NTCIP Security Group implemented?	
7	NTCIP 1103 v02 (TMP) Logical Names Group implemented?	

A.3.3 STMP Global Statement of Conformance

STMF Conformance		
Ref	Standard	Response
1	NTCIP 1103 v02 (TMP) STMP implemented?	
2	NTCIP 1103 v02 (TMP) Objects for STMP implemented?	
3	NTCIP 2301 v02 (STMF) SNMP Conformance?	

A.3.4 SFMP Global Statement of Conformance

SFMP Conformance		
Ref	Standard	Response
1	NTCIP 1103 v02 (TMP) SFMP implemented?	
2	RFC 1155 SMI implemented?	
3	NTCIP 1103 v02 (TMP) SNMP Configuration Group?	
4	NTCIP 1103 v02 (TMP) Objects for SFMP implemented?	
5	NTCIP 1103 v02 (TMP) NTCIP Security Group implemented?	
6	NTCIP 1103 v02 (TMP) Logical Names Group implemented?	

A.4 BASIC REQUIREMENTS

The following table lists the basic requirements for an AP-STMF implementation, and asks if the listed protocols or standards have been implemented.

Index	Protocol/Element	NTCIP 2301 v02 Sec.	Profile Status	Support
snmp	RFC 1157 SNMP implemented?	2.2	o	Yes / No
stmp	NTCIP 1103 v02 (TMP) STMP (Section 5) implemented?	2.3	o	Yes / No
sfmp	NTCIP 1103 v02 (TMP) SFMP (Section 4) implemented?	2.4	o	Yes / No
smi	RFC1155 SMI implemented?	2.2.2, 2.3.2, 2.4.2	m	Yes
nema-smi	NTCIP 1103 v02 (TMP) NEMA SMI implemented?	2.2.2.2	m	Yes
mib2-sys	RFC 1213 MIB-II system group implemented?	2.2.2.2	m	Yes
mib2-snmp	RFC 1213 MIB-II snmp group implemented?	2.2.2.2	snmp:m	Yes / No
snmp-objs	NTCIP 1103 v02 (TMP) Objects for SNMP (Annex A.1) implemented?	2.2.2.2	snmp:m	Yes / No
sfmp-objs	NTCIP 1103 v02 (TMP) Objects for SFMP (Annex A.2) implemented?	2.4.2.1	sfmp:m	Yes / No
stmp-objs	NTCIP 1103 v02 (TMP) Objects for STMP (Annex A.3) implemented?	2.3.2.1	stmp:m	Yes / No
logic-names	NTCIP 1103 v02 (TMP) Logical Names (Annex A.6) implemented?	2.2.2.2, 2.4.2.1	m	Yes
sec-objs	NTCIP 1103 v02 (TMP) Security Objects (Annex A.9) implemented?	2.2.2.2, , 2.4.2.1	m	Yes

A.5 SNMP PRL

A.5.1 SNMP Protocol Summary

Protocol Version	
Addenda implemented?	
Amendments implemented?	
Have any exceptions been required?	Yes _____ No _____
NOTE—A YES answer means that the implementation does not conform to the SNMP Protocol. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.	

A.5.2 SNMP Protocol

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
Manager Capabilities						
nMan	Device capable of acting as SNMP Management Station	RFC 1157 Sec. 4 and RFC 1123 Secs. 6.3.1 and 6.3.3	O	2.2	o	Yes / No
nmget	Generate SNMP GetRequest	RFC 1157 Sec. 4.1.2	M		nMan:m	Yes
nmgetn	Generate SNMP GetNextRequest	RFC 1157 Sec. 4.1.3	M		nMan:m	Yes
nmset	Generate SNMP SetRequest	RFC 1157 Sec. 4.1.5	M		nMan:m	Yes
nmgetr	Receive SNMP GetResponse	RFC 1157 Sec. 4.1.4	M		nMan:m	Yes
nmtrap	Receive SNMP Trap	RFC 1157 Sec. 4.1.6	M		o	Yes / No
nmtrap1	Receive SNMP TrapEvent	NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No
Agent Capabilities						
nAgent	Implementation capable of acting as SNMP Managed Agent	RFC 1157 Sec. 4 and RFC 1123 Secs. 6.3.1 and 6.3.3	O	2.2	o	Yes / No
naget	Generate SNMP GetResponse	RFC 1157 Sec. 4.1.4	M		nAgent:m	Yes
natrap	Generate Standard SNMP Trap	RFC 1157 Sec. 4.1.6	M		UDP:O T2:X	No
naget	Receive SNMP GetRequest	RFC 1157 Sec. 4.1.2	M		nAgent:m	Yes
nagetn	Receive SNMP GetNextRequest	RFC 1157, Sec. 4.1.3	M		nAgent:m	Yes
naset	Receive SNMP SetRequest	RFC 1157 Sec. 4.1.5	M		nAgent:m	Yes

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
nview	Modify "views" per community name	RFC 1157 Sec. 3.2.5	M	2.2	nAgent: m	Yes
SNMP Message Header						
nVer	Version	RFC 1157 Sec. 5	M	2.2	m	Yes
nComm	CommunityName		M		m	Yes
SNMP Get, Get Response, Set, and GetNext PDU format						
nRId	request-id	RFC 1157 Secs. 4.1 and 5	M	2.2	m	Yes
nErrStat	error-status		M		m	Yes
nErrSNE	noError		M		m	Yes
nErrSTB	tooBig		M		m	Yes
nErrSNSN	noSuchName		M		m	Yes
nErrSBV	badValue		M		m	Yes
nErrSRO	readOnly	NTCIP 1103 v02 Sec. 3.2.2	M		m	Yes
nErrSGE	genErr	RFC 1157 Secs. 4.1 and 5	M		m	Yes
nErrIndex	error-index	RFC 1157 Sec. 5	M		m	Yes
nVarBind	variable-bindings		M	m	Yes	
nVarBind N	name		M	m	Yes	
nVarBindv	value		M	m	Yes	
SNMP Response Time						
nRT	Response time <= 100 ms +1 ms / byte	NTCIP 1103 v02 Sec. 3.2.4	M	2.2	m	Yes
SNMP Trap PDU Format						
nTEnt	enterprise	RFC 1157 Secs. 4.1.6 and 5	M	2.2	m	
nTAddr	agent-addr		M		m	
nTGen	generic-trap		M		o	Yes / No
nTCS	coldStart	RFC 1157 Secs. 4.1.6.1 and 5 NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No
nTWS	warmStart	RFC 1157 Secs 4.1.6.2 and 5 NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No
nTLD	linkDown	RFC 1157 Secs. 4.1.6.3 and 5 NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No
nTLU	linkup	RFC 1157 Secs 4.1.6.4 and 5 NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No
nTAF	authenticationFailure	RFC 1157 Secs. 4.1.6.5 and 5 NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
nTE	egpNeighborLoss	RFC 1157 Secs. 4.1.6.6 and 5 NTCIP 1103 v02 Sec. 3.2.5	M		o	Yes / No
nTEntSpc	enterpriseSpecific	RFC 1157 Secs. 4.1.6.7 and 5	M		o	Yes / No
nTEntST	specific-trap	RFC 1157 Sec. 5	M		m	Yes
nTTS	time-stamp	RFC 1157 Secs. 4.1.5 and 5	M		m	Yes
nTVarBind	variable-bindings	RFC 1157 Sec. 5	M		m	Yes
nTVarBind N	name	RFC 1157 Sec. 5	M		m	Yes
nTVarBind V	value	RFC 1157 Sec. 5	M		m	Yes
SNMP Padding						
nPad	no extra data	NTCIP 1103 v02 Sec. 3.2.3	M		m	Yes
BER Encoding of ASN.1 Primitive Types						
berI	integer	RFC 1155 Sec. 3.0	M	2.2	m	Yes
berIS1	integer (0..255)		M		m	Yes
berIS2	integer (0..4265535)		M		m	Yes
berIS4	integer (0..4294967295)		M		m	Yes
berOct	octet string		M		m	Yes
berOID	object identifier		M		m	Yes
berNull	null		M		m	Yes
BER Encoding of ASN.1 Constructor Types						
berSseq	sequence	RFC 1155 Sec. 3.0	M	2.2	m	Yes
BER Encoding of SNMP Defined Types						
berNetAddr	networkaddress	RFC 1155 Secs. 3.0 and 3.2.3.1	M	2.2	m	Yes
berIpAddr	ipaddress		M		m	Yes
berC	counter		M		m	Yes
berCS1	counter (0..255)		M		m	Yes
berCS2	counter (0..65535)		M		m	Yes
berG	gauge		M		m	Yes
berGS1	gauge (0..255)		M		m	Yes
berGS2	gauge (0..65535)		M		m	Yes
berT	timeticks		M		m	Yes
berO	opaque (arbitrary)		M		m	Yes

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
OER Encoding of ASN.1 Primitive Types within NTCIP Block Objects						
OerI	integer	RFC 1155 Sec. 3.0	M	2.2	o	Yes
nOerIS1	integer (0..255)		M		o	Yes
nOerIS2	integer (0..4265535)		M		o	Yes
nOerIS4	integer (0..4294967295)		M		o	Yes
nOerOct	octet string		M		o	Yes
nOerOID	object identifier		M		o	Yes
nOerNullI	null		M		o	Yes
OER Encoding of ASN.1 Constructor Types within NTCIP Block Objects						
nOerSeq	sequence	RFC 1155 Sec. 3.0	M	2.2	m	Yes
OER Encoding of SNMP Defined Types within NTCIP Block Objects						
nOerNetAddr	networkaddress	RFC 1155 Secs. 3.0 and 3.2.3.1	M	2.2	m	Yes
nOerIpAddress	ipaddress		M		m	Yes
nOerC	counter		M		m	Yes
nOerCS1	counter (0..255)		M		m	Yes
nOerCS2	counter (0..65535)		M		m	Yes
nOerG	gauge		M		m	Yes
nOerGS1	gauge (0..255)		M		m	Yes
nOerGS2	gauge (0..65535)		M		m	Yes
nOerT	timeticks		M		m	Yes

A.5.3 SNMP Statistics Conformance Group

SNMP Statistics Conformance Group						
RFC 1213	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
Snmp	SNMP Statistics	--	M	Yes	---	
snmp.1	snmplnPkts	S	snmp : M	Yes	Counter	
snmp.2	snmpOutPkts	S	snmp : M	Yes	Counter	
snmp.3	snmplnBadVersions	S	snmp : M	Yes	Counter	
snmp.4	snmplnBadCommunityNames	S	snmp : M	Yes	Counter	
snmp.5	snmplnBadCommunityUses	S	snmp : M	Yes	Counter	
snmp.6	snmplnASNParseErrs	S	snmp : M	Yes	Counter	
snmp.8	snmplnTooBig	S	snmp : M	Yes	Counter	
snmp.9	snmplnNoSuchNames	S	snmp : M	Yes	Counter	
snmp.10	snmplnBadValues	S	snmp : M	Yes	Counter	
snmp.11	snmplnReadOnly	S	snmp : M	Yes	Counter	
snmp.12	snmplnGenErrs	S	snmp : M	Yes	Counter	
snmp.13	snmplnTotalReqVars	S	snmp : O	Yes / No	Counter	
snmp.14	snmplnTotalSetVars	S	snmp : O	Yes / No	Counter	
snmp.15	snmplnGetRequests	S	snmp : M	Yes	Counter	

SNMP Statistics Conformance Group						
RFC 1213	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
snmp.16	snmpInGetNexts	S	snmp : M	Yes	Counter	
snmp.17	snmpInSetRequests	S	snmp : M	Yes	Counter	
snmp.18	snmpInGetResponses	S	snmp : M	Yes	Counter	
snmp.19	snmpInTraps	S	snmp : M	Yes / No	Counter	
snmp.20	snmpOutTooBig	S	snmp : M	Yes	Counter	
snmp.21	snmpOutNoSuchNames	S	snmp : M	Yes	Counter	
snmp.22	snmpOutBadValues	S	snmp : M	Yes	Counter	
snmp.24	snmpOutGenErrs	S	snmp : M	Yes	Counter	
snmp.25	snmpOutGetRequests	S	snmp : M	Yes	Counter	
snmp.26	snmpOutGetNexts	S	snmp : M	Yes	Counter	
snmp.27	snmpOutSetRequests	S	snmp : M	Yes	Counter	
snmp.28	snmpOutGetResponses	S	snmp : M	Yes	Counter	
snmp.29	snmpOutTraps	S	snmp : O	Yes / No	Counter	
snmp.30	snmpEnableAuthenTraps	P	snmp : O	Yes / No	INT	

A.5.4 SNMP Configuration Conformance Group

SNMP Configuration Conformance Group						
NTCIP 1103 v02	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
nMaxPS	snmpMaxPacketSize	S	snmp : M stmp : M stmp : M sfmp : M	Yes	484-65535	

A.6 STMP PRL

A.6.1 STMP Protocol Summary

Protocol Version	
Addenda implemented?	
Amendments implemented?	
Have any exceptions been required?	Yes _____ No _____
NOTE—A YES answer means that the implementation does not conform to the STMP Protocol. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.	

A.6.2 STMP Protocol

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
Manager Capabilities						
tMan	Implementation capable of acting as STMP Management Station	NTCIP 1103 v02 Sec. 5.2	O	2.3	o	Yes / No
tMGet	Generate STMP GetRequest		M		tMan:m	Yes
tMGetN	Generate STMP GetNextRequest		M		tMan:m	Yes
tMSet	Generate STMP SetRequest		M		tMan:m	Yes
tMSetNR	Generate STMP SetRequest-NoReply		M		tMan:m	Yes
tMGetR	Receive STMP GetResponse		M		tMan:m	Yes
tMSetR	Receive STMP SetResponse		M		tMan:m	Yes
tMErr	Receive STMP Error		M		tMan:m	Yes
Agent Capabilities						
tAgent	Implementation capable of acting as STMP Managed Agent	NTCIP 1103 v02 Sec. 5.2	O	2.3	o	Yes / No
tAGet	Receive STMP GetRequest		M		tAgent:m	Yes
tAGetN	Receive STMP GetNextRequest		M		tAgent:m	Yes
tASet	Receive STMP SetRequest		M		tAgent:m	Yes
tASetNR	Receive STMP SetRequest-NoReply		M		tAgent:m	Yes
tAGetR	Generate STMP GetResponse		M		tAgent:m	Yes
tASetR	Generate STMP SetResponse		M		tAgent:m	Yes
tAErr	Generate STMP Error		M		tAgent:m	Yes
STMP Message Header						
tMT	Message Type	NTCIP 1103 v02 Sec. 5.2.3.1	M	2.3	m	Yes
tOID	Object ID		M		m	Yes

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
STMP SetRequest, SetRequest-NoReply, and GetResponse PDU Format						
tVarBind	variable-bindings	NTCIP 1103 v02 Sec. 5.2.3.2	M	2.3	m	Yes
STMP Response Time						
tRT	Response time =< 100 ms + 1 ms / byte	NTCIP 1103 v02 Sec. 5.2.2.2	M	2.3	m	Yes
STMP Error Response PDU Format						
tErrStat	Error-Status	NTCIP 1103 v02 Sec. 5.2.3.2	M	2.3	m	Yes
tErrSTB	tooBig	NTCIP 1103 v02 Sec. 5.2.2.1	M		m	Yes
tErrSNSN	noSuchName		M		m	Yes
tErrSBV	badValue		M		m	Yes
tErrSRO	readOnly		M		m	Yes
tErrSGE	genErr		M		m	Yes
tErrIndex	Error-Index	NTCIP 1103 v02 Sec. 5.2.3.2	M		m	Yes
STMP OER Encoding of ASN.1 Primitive Types						
tOerI	integer	NTCIP 1102:2004 Secs. 2.3 and 2.4 NTCIP 1103 v02 Sec. 5.2.4.3	M	2.3	m	Yes
tOerOct	octet string		M		m	Yes
tOerOID	object identifier		M		m	Yes
tOerNull	null		M		m	Yes
STMP OER Encoding of ASN.1 Constructor Types						
tOerSeq	sequence	NTCIP 1102:2004 Sec. 2.3 NTCIP 1103 v02 5.2.4.3	M	2.3	m	Yes
STMP OER Encoding of SNMP Defined Types						
tOerNetAddr	networkaddress	NTCIP 1102:2004 Secs. 2.3 and 2.4 NTCIP 1103 v02 Sec. 5.2.4.3	M	2.3	m	Yes
tOerIpAddr	ipaddress		M		m	Yes

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Sec.	Status	
tOerC	counter		M		m	Yes
tOerG	gauge		M		m	Yes
tOerT	timeticks		M		m	Yes
tOerO	opaque		M		m	Yes

A.6.3 STMP Dynamic Object Conformance Group

Dynamic Object Conformance Group						
NTCIP 1103 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
	Dynamic Object Definitions	--	O	Yes / No	--	--
A.3.4	dynObjDef	--	M	Yes	--	--
	dynObjEntry	--	M	Yes	--	--
A.3.4.1.1	dynObjNumber	S	M	Yes	1-13	
A.3.4.1.2	dynObjIndex	S	M	Yes	1-255	
A.3.4.1.3	dynObjVariable	P	M	Yes	OID	
	Dynamic Object Configuration					
A.3.6	dynObjConfigTable	--	M	Yes	--	--
	dynObjConfigEntry	--	M	Yes	--	--
A.3.6.1.1	dynObjConfigOwner	P	M	Yes	string	
A.3.6.1.2	dynObjConfigStatus		M	Yes	1-3	
	valid (1)	C	--	Yes	--	--
	underCreation (2)	C	--	Yes	--	--
	invalid (3)	C-S	--	Yes	--	--
A.5.1	STMP Configuration	--	--	--	--	--
A.5.1.1.1	dynamicObjectPersistence	P	M	Yes	0-65535	
A.5.1.1.2	dynamicObjectTableConfigID	S	M	Yes	0-65535	

A.6.4 STMP Statistics Conformance Group

STMP Statistics Conformance Group						
NTCIP 1103 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
A.4.1	STMP Statistics	--	O	Yes / No	---	---
A.4.1.1.1	stmpInPkts	S	A.4.1 : M	Yes	counter	
A.4.1.1.2	stmpOutPkts	S	A.4.1 : M	Yes	counter	
A.4.1.1.3	reserved	--	--	--	---	---
A.4.1.1.4	reserved	--	--	--	---	---
A.4.1.1.5	reserved	--	--	--	---	---
A.4.1.1.6	stmpInParseErrs	S	A.4.1 : M	Yes	counter	
A.4.1.1.7	reserved	--	--	--	---	---
A.4.1.1.8	stmpInTooBigs	S	A.4.1 : M	Yes	counter	
A.4.1.1.9	stmpInNoSuchNames	S	A.4.1 : M	Yes	counter	
A.4.1.1.10	stmpInBadValues	S	A.4.1 : M	Yes	counter	
A.4.1.1.11	stmpInReadOnlys	S	A.4.1 : M	Yes	counter	
A.4.1.1.12	stmpInGenErrs	S	A.4.1 : M	Yes	counter	
A.4.1.1.13	reserved	--	--	--	---	---
A.4.1.1.14	reserved	--	--	--	---	---
A.4.1.1.15	stmpInGetRequests	S	A.4.1 : M	Yes	counter	
A.4.1.1.16	stmpInGetNexts	S	A.4.1 : M	Yes	counter	
A.4.1.1.17	stmpInSetRequests	S	A.4.1 : M	Yes	counter	
A.4.1.1.18	stmpInGetResponses	S	A.4.1 : M	Yes	counter	

STMP Statistics Conformance Group						
NTCIP 1103 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
A.4.1.1.19	reserved	--	--	--	---	---
A.4.1.1.20	stmpOutTooBigs	S	A.4.1 : M	Yes	counter	
A.4.1.1.21	stmpOutNoSuchNames	S	A.4.1 : M	Yes	counter	
A.4.1.1.22	stmpOutBadValues	S	A.4.1 : M	Yes	counter	
A.4.1.1.23	stmpOutReadOnly	S	A.4.1 : M	Yes	counter	
A.4.1.1.24	stmpOutGenError	S	A.4.1 : M	Yes	counter	
A.4.1.1.25	stmpOutGetRequests	S	A.4.1 : M	Yes	counter	
A.4.1.1.26	stmpOutGetNexts	S	A.4.1 : M	Yes	counter	
A.4.1.1.27	stmpOutSetRequests	S	A.4.1 : M	Yes	counter	
A.4.1.1.28	stmpOutGetResponses	S	A.4.1 : M	Yes	counter	
A.4.1.1.29	reserved	--	--	--	---	---
A.4.1.1.30	reserved	--	--	--	---	---
A.4.1.1.31	stmpInSetRequestsNoReply	S	A.4.1 : M	Yes	counter	
A.4.1.1.32	stmpInSetResponses	S	A.4.1 : M	Yes	counter	
A.4.1.1.33	stmpInErrorResponses	S	A.4.1 : M	Yes	counter	
A.4.1.1.34	stmpOutSetRequestsNoReply	S	A.4.1 : M	Yes	counter	
A.4.1.1.35	stmpOutSetResponses	S	A.4.1 : M	Yes	counter	
A.4.1.1.36	stmpOutErrorResponses	S	A.4.1 : M	Yes	counter	

A.7 SFMP PRL

A.7.1 SFMP Protocol Summary

Protocol Version	
Addenda implemented?	
Amendments implemented?	
Have any exceptions been required? NOTE—A YES answer means that the implementation does not conform to the SFMP Protocol. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.	Yes _____ No _____

A.7.2 Agent/Manager Capabilities

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Section	Status	
sf-man	Implementation capable of acting as SFMP Management Station	NTCIP 1103 v02 Sec. 4.2	O	2.4	o.3	Yes / No
sfm-grt	Generate SFMP GetRequest		M		sf-man:m	Yes
sfm-srt	Generate SFMP SetRequest		M		sf-man:m	Yes
sfm-srtn	Generate SFMP SetRequest-NoReply		M		sf-man:m	Yes
sfm-gre	Receive SFMP GetResponse		M		sf-man:m	Yes
sfm-sre	Receive SFMP SetResponse		M		sf-man:m	Yes
sf-err	Receive SFMP ErrorResponse		M		sf-man:m	Yes
sf-agnt	Implementation capable of acting as SFMP Managed Agent		NTCIP 1103 v02 Sec. 4.2		O	2.4
sfa-grt	Receive SFMP GetRequest	M		sf-agnt:m	Yes	
sfa-srt	Receive SFMP SetRequest	M		sf-agnt:m	Yes	
sfa-srtn	Receive SFMP SetRequest-NoReply	M		sf-agnt:m	Yes	
sfa-gre	Generate SFMP GetResponse	M		sf-agnt:m	Yes	
sfa-sre	Generate SFMP SetResponse	M		sf-agnt:m	Yes	
sfa-err	Generate SFMP ErrorResponse	M		sf-agnt:m	Yes	

A.7.3 SFMP Protocol Data Unit

Item	Protocol Feature	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Section	Status	
fpdu1	message	NTCIP 1103 v02 Sec. 4.2.3	M	2.4	m	Yes
fpdu1.1	version	NTCIP 1103 v02 Sec. 4.2.4.1	M		m	Yes
fpdu1.2	community-name	NTCIP 1103 v02 Sec. 4.2.4.2	M		m	Yes
fpdu1.3	request-number	NTCIP 1103 v02 Sec. 4.2.4.3	M		m	Yes
Error Data						
fpdu 1.4.1.1	error-index	NTCIP 1103 v02 Sec. 4.2.4.7	M	2.4	m	Yes
fpdu 1.4.1.2	error-status	NTCIP 1103 v02 Sec. 4.2.4.6	M		m	Yes
fpdu 1.4.1.2.1	NoError		M		m	Yes
fpdu 1.4.1.2.2	tooBig		M		m	Yes
fpdu 1.4.1.2.3	noSuchName		M		m	Yes
fpdu 1.4.1.2.4	badValue		M		m	Yes
fpdu 1.4.1.2.5	readOnly		M		m	Yes
fpdu 1.4.1.2.6	genErr	M	m		Yes	
fpdu 1.5	message-oid	NTCIP 1103 v02 Sec. 4.2.4.4	M		m	Yes
fpdu1.6	data	NTCIP 1103 v02 Sec. 4.2.4.5	M		m	Yes
SFMP Response Time						
fRT	Response time <= 100 ms + 1 ms / byte	NTCIP 1103 v02 Sec. 4.2.2.2	M		m	Yes

A.7.4 OER Encoding of SFMP Message

Item	Elements	Base Standard		NTCIP 2301 v02		Support
		Reference	Status	Section	Status	
Encoding of ASN.1 Primitive Types						
f-oir-int	integer	NTCIP 1102:2004 Secs. 2.3 and 2.4 NTCIP 1103 v02 Sec. 4.3	M	2.4	m	Yes
f-oir-oct	octet string		M		m	Yes
f-oir-oid	object identifier		M		m	Yes
f-oir-null	null		M		m	Yes
Encoding of ASN.1 Constructor Types						
f-oir-seq	sequence	NTCIP 1102:2004 Secs. 2.3 and 2.4 NTCIP 1103 v02 Sec. 4.3.1	M	2.4	m	Yes
Encoding of SNMP Defined Types						
f-oir-neta	networkaddress	NTCIP 1102:2004 Secs. 2.3 and 2.4 NTCIP 1103 v02 Sec. 4.3	M	2.4	m	Yes
f-oir-ipa	ipaddress		M		m	Yes
f-oir-count	counter		M		m	Yes
f-oir-gauge	gauge		M		m	Yes
f-oir-tts	timeticks		M		m	Yes
f-oir-opaq	opaque (arbitrary)		M		m	Yes

A.7.5 SFMP Statistics Conformance Group

SFMP Statistics Conformance Group						
NTCIP 1103 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
A.2	SFMP Statistics	--	O	Yes / No	---	---
A.2.1	sfmpInPkts	S	A.2 : M	Yes	counter	
A.2.2	sfmpOutPkts	S	A.2 : M	Yes	counter	
A.2.3	sfmpInBadVersions	S	A.2 : M	Yes	counter	
A.2.4	sfmpInBadCommunityNames	S	A.2 : M	Yes	counter	
A.2.5	sfmpInBadCommunityUses	S	A.2 : M	Yes	counter	
A.2.6	sfmpInParseErrs	S	A.2 : M	Yes	counter	
A.2.7	Reserved	--	--	--	---	---
A.2.8	sfmpInTooBiggs	S	A.2 : M	Yes	counter	
A.2.9	sfmpInNoSuchNames	S	A.2 : M	Yes	counter	
A.2.10	sfmpInBadValues	S	A.2 : M	Yes	counter	
A.2.11	sfmpInReadOnlys	S	A.2 : M	Yes	counter	
A.2.12	sfmpInGenErrs	S	A.2 : M	Yes	counter	
A.2.13	Reserved	--	--	--	---	---
A.2.14	Reserved	--	--	--	---	---
A.2.15	sfmpInGetRequests	S	A.2 : M	Yes	counter	
A.2.16	Reserved	--	--	--	---	---
A.2.17	sfmpInSetRequests	S	A.2 : M	Yes	counter	
A.2.18	sfmpInGetResponses	S	A.2 : M	Yes	counter	
A.2.19	Reserved	--	--	--	---	---
A.2.20	sfmpOutTooBiggs	S	A.2 : M	Yes	counter	
A.2.21	sfmpOutNoSuchNames	S	A.2 : M	Yes	counter	
A.2.22	sfmpOutBadValues	S	A.2 : M	Yes	counter	
A.2.23	sfmpOutReadOnly	S	A.2 : M	Yes	counter	
A.2.24	sfmpOutGenErrs	S	A.2 : M	Yes	counter	
A.2.25	sfmpOutGetRequests	S	A.2 : M	Yes	counter	
A.2.26	Reserved	--	--	--	---	---
A.2.27	sfmpOutSetRequests	S	A.2 : M	Yes	counter	
A.2.28	sfmpOutGetResponses	S	A.2 : M	Yes	counter	
A.2.29	Reserved	--	--	--	---	---
A.2.30	Reserved	--	--	--	---	---
A.2.31	sfmpInSetRequestsNoReply	S	A.2 : M	Yes	counter	
A.2.32	sfmpInSetResponses	S	A.2 : M	Yes	counter	
A.2.33	sfmpInErrorResponses	S	A.2 : M	Yes	counter	
A.2.34	sfmpOutSetRequestsNoReply	S	A.2 : M	Yes	counter	
A.2.35	sfmpOutSetResponses	S	A.2 : M	Yes	counter	
A.2.36	sfmpOutErrorResponses	S	A.2 : M	Yes	counter	

A.8 GENERAL CONFORMANCE GROUPS PRL

A.8.1 General Conformance Groups Protocol Summary

Protocol Version	
Addenda implemented?	
Amendments implemented?	
Have any exceptions been required?	Yes _____ No _____
NOTE—A YES answer means that the implementation does not conform to NTCIP 2301 v02. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.	

A.8.2 System Conformance Group

System Conformance Group						
RFC 1213	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
System	System	--	SNMP : M	Yes	---	
system 1	sysDescr	S	system : M	Yes	string	
system 2	sysObjectID	S	system : M	Yes	OID	
system 3	sysUpTime	S	system : M	Yes	TimeTicks	
system 4	sysContact	P	system : M	Yes	string	
system 5	sysName	P	system : M	Yes	string	
	NOTE—The value of sysName should follow NTCIP 1104 v01 naming conventions for devices.					
system 6	sysLocation	P	system : M	Yes	string	
system 7	sysServices	S	system : M	Yes	0..127	

A.8.3 Security Conformance Group

Security Conformance Group						
NTCIP 1103 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
A.8	Security	--	SNMP:M SFMP:M	Yes	----	---
A.8.1	communityNameAdmin	C	A.8 : M	Yes	string	
A.8.2	communityNamesMax	C	A.8 : M	Yes	1..255	
A.8.3	communityNameTable	--	A.8 : M	Yes	---	
	communityNameTableEntry	--	A.8 : M	Yes	---	
A.8.3.1.1	communityNameIndex	S	A.8 : M	Yes	1..255	
A.8.3.1.2	communityNameUser	P	A.8 : M	Yes	string	
A.8.3.1.3	communityNameAccessMask	P	A.8 : M	Yes	gauge	

A.8.4 Logical Names Conformance Group

Logical Name Conformance Group						
NTCIP 1103 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
A.6	Logical Names	--	O	Yes / No	----	---
A.6.1	logicalNameTranslationTableMaxEntries	C	A.6 : M	Yes	INT	
A.6.2	logicalNameTranslationTable	--	A.6 : M	Yes	---	
A.6.2	logicalNameTranslationEntry	--	A.6 : M	Yes	---	
A.6.2.1.1	logicalNameTranslationIndex	S	A.6 : M	Yes	INT	
A.6.2.1.2	logicalNameTranslationLogicalName	P	A.6 : M	Yes	string	
A.6.2.1.3	logicalNameTranslationNetworkAddress	P	A.6 : M	Yes	ipAddress	
A.6.2.1.4	logicalNameTranslationStatus	P	A.6 : M	Yes	INT	

A.9 NTCIP SMI PRL

A.9.1 SMI Protocol Summary

Protocol Version	
Addenda implemented?	
Amendments implemented?	
Have any exceptions been required? NOTE—A YES answer means that the implementation does not conform to the NTCIP 2301 v02 Profile. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming.	Yes _____ No _____

A.9.2 NEMA Tree Structure

Item	Path	Base Standard		NTCIP 2301 v02		Support		
		Reference	Status	Section	Status			
smi1	nema	NTCIP 8004 v02 Annex A	M	2.2.2, 2.3.2, 2.4.2	m	Yes		
smi1.1	nemaMgmt		M		o	Yes		
smi1.2	nemaExperimental		M		o	Yes		
smi1.3	nemaPrivate		M		o	Yes		
smi1.4	transportation		M		m	Yes		
smi1.4.1	protocols		M		o	Yes / No		
smi1.4.2	devices		M		m	Yes		
smi1.4.3	tcip		M		o	Yes / No		
smi1.4.1.1	layers		M		o	Yes / No		
smi1.4.1.1.1	application		M		o	Yes / No		
smi1.4.1.2	profiles		M		o	Yes / No		
smi1.4.1.3	dynObjMgmt		NTCIP 8004 v02 Annex A.2		M	2.2.2, 2.3.2, 2.4.2	STMP:m	Yes

A.9.3 Textual Conventions

Textual Conventions Group						
NTCIP 8004 v02 Section	Object Name	Object Type	Object Status	Object Support	Allowed Values	Supported Values
A.3	Textual Conventions GROUP	--	O	Yes / No	----	---
	Byte	--	O	Yes / No	-128..127	
	UByte	--	O	Yes / No	0..255	
	Short	--	O	Yes / No	-32768..32767	
	UShort	--	O	Yes / No	0..65535	
	Long	--	O	Yes / No	-2147483648..2147483647	
	BITMAP8	--	O	Yes / No	string (1)	
	BITMAP16	--	O	Yes / No	string (2)	
	BITMAP32	--	O	Yes / No	string (4)	
	OwnerString	--	O	Yes / No	string (0..127)	
	RowStatusStatic	--	O	Yes / No	1..6	

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