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ACKNOWLEDGEMENTS

NTCIP 8004 v01 was prepared by the NTCIP Base Standards and Profiles 2 (BSP2) Working Group, which is a subdivision of the Joint Committee on the NTCIP. The 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 Joint Committee on the NTCIP consists of six representatives from each of the standards organizations, and provides guidance for NTCIP development.

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- Peek Traffic Systems, Inc.
- Robert De Roche Consulting, Inc.
- Siemens ITS
- Southwest Research Institute
- Texas Department of Transportation
- Trevilon
- URS

FOREWORD

NTCIP 8004 v01 defines a process and control standard for the rules and procedures for defining structure and identification of management information in transportation related communications. It defines requirements that are applicable to all NTCIP devices that exchange data in that environment. It also contains optional and conditional clauses that are applicable to specific environments for which they are intended.

NTCIP 8004 v01 uses only metric units, and NTCIP 8004 v01 includes five annexes; however, only Annex A is normative.

NTCIP 8004 v01 is designated, and should be cited as NTCIP 8004 v01. NTCIP 8004 v01 is an adopted and published NTCIP Policy, reflecting the resolution of comments received during the development and approval process, when drafts were designated using a major and minor version number (v01.01 through v01.37). To distinguish NTCIP 8004 v01 from previous drafts, NTCIP 8004 v01 also includes NTCIP 8004 v01.38 on each page header.

During early stages of development, portions of NTCIP 8004 v01 were part of NTCIP 1101:1997, which was also numbered and referenced (designated and cited) as NEMA TS 3.2-1996. However, in order to provide a more systematic approach to an organized numbering scheme, and to reflect the joint copyright held by AASHTO, ITE, and NEMA, NTCIP 8004 v01 is now the appropriate designation.

NTCIP 8004 v01 is an NTCIP Process, Control, and Information Management document. Process, Control, and Information Management documents define the practices and policies used by the NTCIP Joint Committee in developing and maintaining NTCIP standards and documents; these are authorized for publication by AASHTO, ITE, and NEMA following recommendation by the Joint Committee of the NTCIP. NTCIP Process, Control, and Information Management documents are not distributed for industry-wide ballot. An NTCIP Process, Control, and Information Management document equates to the following standard types:

- AASHTO – Recommended Practice
- ITE – Informational Report
- NEMA – Authorized Engineering Information

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Approvals

NTCIP 8004 v01 was separately balloted and approved by AASHTO, ITE, and NEMA after recommendation by the Joint Committee on the NTCIP. Each organization has approved this standard as the following standard type, as of the date:

AASHTO – Recommended Practice; November 2005
ITE – Informational Report; October 2005
NEMA – Authorized Engineering Information; December 2005

History

NTCIP 8004 v01 was originally part of NTCIP 1101, Simple Transportation Management Framework. A work item to separate 8004 v01 into a stand-alone document was approved by the Joint Committee on July 29, 1999.

NTCIP 8004 v01.32, February 2004 – Accepted as User Comment Draft by the Joint Committee on the NTCIP.

NTCIP 8004 v01.33, June 2004 – Made editorial changes to front matter and corrected miscellaneous typographical and grammatical errors.

NTCIP 8004 v01.36, March 2005 – Accepted as Recommended Standard by the Joint Committee on the NTCIP.

NTCIP 8004 v01, March 2005 – The Annex B DMS example was revised per instructions of the Joint Committee. In July 2005, Standards Bulletin B0106 distributed version v01.37 for balloting and approval. NTCIP 8004 v01 was Jointly Approved in 2005. May 2008 – 8004 v01.38 was edited and formatted for publication.

Compatibility of Versions

To distinguish NTCIP 8004 v01 (as published) from previous drafts, NTCIP 8004 v01 also includes NTCIP 8004 v01.38 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.

Anyone using NTCIP 8004 v01 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 8004 v01 should also consult NTCIP 8004 v01 for specific guidelines on compatibility.

NOTE—The above reference to NTCIP 8004 v01 is template information. The circular nature of the reference is recognized.

INTRODUCTION

NTCIP 8004 v01 is an NTCIP Process, Control, and Information Management document. Process, Control, and Information Management documents define the practices and policies used by the NTCIP Joint Committee in developing and maintaining NTCIP standards and document. NTCIP 8004 v01 is intended for use in association with certain Application Layer protocols in transportation-related communications such as SNMP, STMP, SFMP, FTP, and TFTP.

NTCIP 8004 v01 contains mandatory requirement statements that are applicable to all devices claiming conformance to this standard. It also contains options and conditional requirements, which may be applicable to a specific environment in which a device is used.

The following keywords apply to this document: AASHTO, Dynamic Objects, ITE, NEMA, NTCIP, SMI, SNMP, STMP, Process and Control Standard.

In 1992, the NEMA 3-TS Transportation Management Systems and Associated Control Devices Section began development of the NTCIP. The Transportation Section's purpose was in response to user needs to include standardized systems communication in the NEMA TS 2 standard, *Traffic Controller Assemblies*. Under the guidance of the Federal Highway Administration's NTCIP Steering Group, the NEMA effort was expanded to include the development of communications standards for all transportation field devices that could be used in an Intelligent Transportation Systems (ITS) network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards. After the NTCIP Class B Profile was published, the Joint Committee determined that the communications profiles should be modular to meet the varied needs of different communication environments. The Joint Committee on the NTCIP formed both the Base Standards and Protocols Working Group (BSP WG) and the Profiles WG. After reorganization, the two merged to form the Base Standards and Profiles 2 (BSP2) WG. The first BSP2 WG meeting was in January 1999.

The BSP2 WG submitted a work plan and initiated development of NTCIP 8004 v01 in January 2000.

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Section 1 GENERAL

1.1 SCOPE

NTCIP 8004 v01 is applicable to the NTCIP 1200 series and other NTCIP standards that deal with device data dictionaries. NTCIP 8004 v01 defines the structure and identification of information used in transportation related devices.

1.2 REFERENCES

For revision information on this NTCIP standard, contact:

NTCIP Coordinator
National Electrical Manufacturers Association
1300 North 17th Street, Suite 1752
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For draft revisions to this NTCIP standard, and recommended revisions of the NTCIP Joint Committee, visit www.ntcip.org.

1.2.1 Normative References

The following standards (normative references) contain provisions that, through reference in this text, constitute provisions of this NTCIP standard. Other documents and standards (other references) which are referenced in NTCIP 8004 v01 might provide a complete understanding of the entire protocol and the relations 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.

IAB STD 15	(RFC 1157) <i>Simple Network Management Protocol</i> , J. Case, M. Fedor, M. Schoffstall, J. Davin, May 1990
IAB STD 16	(RFC 1155) <i>Structure and Identification of Management Information for TCP/IP based Internets</i> , M. Rose, K. McCloghrie, May 1990, (RFC 1212) <i>Concise MIB Definitions</i> , M. Rose and K. McCloghrie, March 1991
ISO/IEC 8824-1:1998	Information technology -- Abstract Syntax Notation One (ASN.1): Specification of basic notation
ISO/IEC 8824-2:1998	Information technology -- Abstract Syntax Notation One (ASN.1): Information object specification
ISO/IEC 8824-3:1998	Information technology -- Abstract Syntax Notation One (ASN.1): Constraint specification
ISO/IEC 8824-4:1998	Information technology -- Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specification

ISO 14817:2002 (E)	Transport information and control systems — Requirements for TICS central data registry and TICS data dictionaries
NTCIP 1102 v01.11	Octet Encoding Rules (OER) Base Protocol

1.2.2 Informative References

IEEE Std. 610.12-1990:	IEEE Standard Glossary of Software Engineering Terminology
NTCIP 2202:2001	Transport Profile for Internet (TCP/IP and UDP/IP)
NTCIP 2301:2001	Application Profile for Simple Transportation Management Framework
NTCIP 7001	Assigned Numbers - Part 1
NTCIP 8003:2001	Framework and Classification of Profiles
NTCIP 8005 v01.12	Creating Management Information Base Files and a Functional Area Data Dictionary
NTCIP 9001 v02.06	The NTCIP Guide
RFC 854	<i>Telnet Protocol specification</i> , J. Postel, J. Reynolds, May 1983

1.2.3 Contact Information

1.2.3.1 ISO/IEC Standards

Members of the 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:

ANSI
11 West 42nd Street, 13th Floor
New York, New York 10036
(212) 642-4900
<http://global.ihs.com>

1.2.3.2 RFC Documents

Obtain Request for Comment (RFC) electronic documents from several repositories on the World Wide Web, or by “anonymous” File Transfer Protocol (FTP) with several hosts. Browse or FTP to:

<http://www.ietf.org/rfc.html>
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<http://www.rfc-editor.org/repositories.html>
for FTP sites, read <ftp://ftp.isi.edu/in-notes/rfc-retrieval.txt>

1.2.3.3 NTCIP Documents

NTCIP documents may be obtained by contacting NEMA at the following address:

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1.3 DEFINITIONS

For the purposes of NTCIP 8004 v01, the following terms and definitions apply. For terms not defined in Section 1.3, English words are used in accordance with their definitions in the latest edition of *Webster's New Collegiate Dictionary*. Electrical and electronic terms not defined in Section 1.3 or in *Webster's New Collegiate Dictionary* are used in accordance with their definitions in IEEE Std 100-19962.

agent	The entity that receives commands and transmits responses to the received commands.
block object	A grouping of individual objects primarily for the purpose of referring to the group with a single name and identifier. It is the NTCIP representation of an ISO 14817 data frame.
compatible	The ability of two or more systems or components to exchange information. [Per IEEE Std. 610.12-1990.]
data	Information before it is interpreted.
data element	Some single unit of information of interest (such as a fact, proposition, observation, etc.) about some (entity) class of interest (e.g., a person, place, process, property, concept, association, state, event). A data element is considered to be indivisible in a particular context. [Per ISO 14817.] NOTE—A data element is represented by an object class, a property of the represented object class and a value domain.
data frame	NOTE—For NTCIP 8004 v01 purposes, the SNMP Object Type Macro is used to define the entity type, property, and an explicit value domain term. A grouping of data elements primarily for the purpose of referring to the group with a single name, and thereby efficiently reusing groups of data elements that commonly appear together (as an ASN.1 SEQUENCE, SEQUENCE OF, SET, SET OF or CHOICE) in a message specification. [Per ISO 14817.] NOTE—This data concept type may be used to specify groups of data elements for other purposes as well. NOTE—In the context of SNMP, a data frame consists of only the information (variable bindings) to be exchanged. It does not include the application layer header.
datagram	A self-contained unit of data transmitted independently of other datagrams.
file	A grouping of individual or block database objects into a single sequence of bytes that can be referred to by file operations. NOTE—A file exists nominally in a directory, and can have an associated path.
Intelligent Transportation Systems	The application of advanced information processing and communications, sensing, and control technologies to surface transportation with the objective of promoting more efficient use of the existing highway and transportation network, increasing safety and mobility, and decreasing the environmental impacts.

International Organization for Standardization (ISO)	An international standards organization. NOTE—ANSI is the primary interface to ISO within the United States. NOTE—Often thought to be International Standards Organization because of the usage ISO for short.
Internet	A large collection of connected networks, primarily in the United States, running the Internet suite of protocols. NOTE—Sometimes referred to as the <i>DARPA Internet</i>, <i>NSF/DARPA Internet</i>, or the <i>Federal Research Internet</i>.
Internet Protocol	The network protocol offering a connection-less mode network service in the Internet suite of protocols.
Interoperable	The ability of two or more systems or components to exchange information and use the information that has been exchanged [Per IEEE Std. 610.12-1990.]
IP address	A 32-bit quantity used to represent a point of attachment in an internet.
management information base manager	A structured collection or database of related managed objects defined using Abstract Syntax Notation One (ASN.1).
message	The entity that sends commands to entities and processes their responses. A message is a grouping of data elements and/or data frames, as well as associated message metadata that is used to convey a complete unit of information. [Per ISO 14817] NOTE—For purposes of NTCIP 8004 v01, a message is an abstract description; it is not a specific instance. NOTE—In the context of SNMP, a message consists of the application layer header and the information (variable binding) to be exchanged.
National Transportation Communications for ITS Protocol (NTCIP) network	A family of protocols that provide common control and data collection services as well as accommodating various system topologies and data routing duties. NOTE—NTCIP is designed to support not only currently deployed systems, but also new systems and technologies as they become available. A collection of subnetworks connected by intermediate systems and populated by end systems.
network layer	That portion of an OSI system responsible for data transfer across the network, independent of both the media comprising the underlying subnetworks and the topology of those subnetworks.
object	An instance of object type is a data structure that can be used to describe the attribute or properties of a single data element or a group of data elements, such as a data frame.
OBJECT IDENTIFIER	A unique name (identifier) that is associated with each type of object in a Management Information Base that is a defined ASN.1 type.
object type	A data structure used to describe the attribute or properties of a data element or group of data elements.
OBJECT-TYPE	A macro used to define the meta attributes of an object in an SNMP Management Information Bases.
protocol	A specific set of rules, procedures, and conventions defining the format and timing of data transmissions between devices that are accepted and used to understand each other.

Simple Network Management Protocol	A communications protocol developed by the Internet Engineering Task Force (IETF), used for configuration and monitoring of network devices.
Simple Transportation Management Framework	The organization of the information within devices and the methods of retrieving or modifying any information within the device. NOTE—STMF also explains how to generate and utilize computer readable information organization descriptions.
subnet/ subnetwork	A physical network within a network on which all devices share the same physical media.
trap	An event within an SNMP agent that generates a message for a management station

1.4 ABBREVIATIONS AND ACRONYMS

The acronyms used in NTCIP 1104 8004 v01 are defined as follows:

ANSI	American National Standards Institute
ASCII	American National Standard Code for Information Interchange.
ASN.1	Abstract Syntax Notation One
IAB STD	Internet Activities Board Standard
IANA	Internet Assigned Numbers Authority
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IP	Internet Protocol
MIB	Management Information Base
NTCIP	National Transportation Communications for Intelligent Transportation Systems (ITS) Protocol
NVT	Network Virtual Terminal
OER	Octet Encoding Rules
OSI	Open Systems Interconnection
PICS	Protocol (or Profile) Implementation Conformance Specification
RFC	Request for Comments
SMI	Structure and Identification of Management Information
SNMP	Simple Network Management Protocol
STMF	Simple Transportation Management Framework.
STMP	Simple Transportation Management Protocol
TCP	Transport Control Protocol
TMIB	Transportation Management Information Base
UML	Unified Modeling Language

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