

# NTCIP 1102:2004

National Transportation  
Communications for ITS Protocol

Octet Encoding Rules (OER)  
Base Protocol

Joint Standard of AASHTO, ITE, and NEMA

version 01.15



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

# NTCIP 1102:2004 v01.15

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## National Transportation Communications for ITS Protocol Octet Encoding Rules (OER) Base Protocol

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## FOREWORD

This document defines a base standard for encoding rules that are to be used in conjunction with Application Layer protocols defined in separate standards. There is one informative annex to this document.

This document is an NTCIP Protocol Base Standard standards publication. Protocol Base Standards define the basic details of data handling. A Joint NTCIP Protocol Base Standard standards publication is equivalent to these document types at the standards organizations:

AASHTO – Standard Specification  
ITE – Software Standard  
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## Approvals

This standards publication 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 – Standard Specification; March 2002  
ITE – Software Standard; December 2002  
NEMA – Standard; November 2004

## History

A subset of the encoding rules defined in this NTCIP 1102 standard was specified in the standard NEMA TS 3.2-1996, *NTCIP Simple Transportation Management Framework (STMF)*, which was also numbered NTCIP 1101. However, in order to address extended ASN.1 functionalities needed for center-to-center communications, the necessity to develop a stand-alone document became apparent. That need resulted in this standard, NTCIP 1102, which serves as the replacement for both Section 5.1.2.2 of NEMA TS 3.2-1996, and NEMA TS 3.2 Amendment 1 of 1998. The content of this standard is fully consistent with NEMA TS 3.2-1996 as amended by TS 3.2 Recommended Amendment 1 of 1998. However, NTCIP 1102 defines many additional features not contained in NEMA TS 3.2-1996 (NTCIP 1101).

The technical specification of NTCIP 1102 is identical to the former version, except as noted in the development history below:

NTCIP 1102 v01.06. July 1999 – Accepted as a User Comment Draft by the Joint Committee on the NTCIP. January 2000 – NTCIP Standards Bulletin B0040 distributed for user comment.

NTCIP 1102 v01.11. September 2000 – Accepted as a Recommended Standard. June 2001 – NTCIP Standards Bulletin B0062 referred v01.12 for balloting. Approved by AASHTO in March 2002, approved by ITE in December 2002, and approved by NEMA in November 2004.

NTCIP 1102 v01.13. June 2002 – The BSP WG incorporated revisions to dispose of a user comment received during the ballot period. Revisions were made to: clause 1.3.2 Other References (to add URLs); clause 2.3.8.2 Content, b. Root Components (to improve DEFAULT value clarity); figure 2-23 Encoding Example 2 (to correct the example of the Root Object 3's Content Octets); and clause 2.3.9.2 SEQUENCE OF Content (to revise the *quantity* field specification).

NTCIP 1102:2004 v01.15. October 2005 – Prepared document for publication with revision of the front matter and editing for format and clarity.

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## INTRODUCTION

The context of the 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 or profiles.

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. In 1998, the Joint AASHTO / ITE / NEMA Committee on the NTCIP chartered a working group to formalize the Octet Encoding Rules, as well as several other Base Standards. The first meeting of the working group was in January 1999.

It was decided early in the process not to invent new base protocols, but rather to research existing standards and to decide whether these would fulfill the requirements for the specific transportation environments for which they would be used. The NTCIP would only develop new standards when this research proved unfruitful.

The NTCIP Joint Committee's Base Standards and Protocol (BSP) Working Group was concerned with the identification of applicable standards to address a transportation need, the definition of base standards and protocols in case existing standards do not address the identified need, and their documentation in standards publications.

Due to overlap in WG membership and to achieve meeting efficiency, the BSP WG was merged with the Profiles WG. The merged Base Standards and Profiles WG is abbreviated BSP2 WG.

The NTCIP 1102 is a Presentation Layer base standard, in the 7-layer OSI Reference Model, for use in association with certain Application Layer protocols in center-to-roadside and center-to-center communications, such as the Simple Transportation Management Protocol (STMP) and DATEX-ASN. These encoding rules provide more compact transfer syntax than do the Basic Encoding Rules. These rules, however, still maintain the fully octet-aligned fields to enable efficient processing by modern computer systems.

There are several different sets of encoding rules, such as Basic Encoding Rules (BER) and Packed Encoding Rules (PER), that have been investigated but determined not to address the specific needs of certain Application Layer protocols (STMF and DATEX-ASN) used within the transportation community.

The objective is to facilitate the specification of ITS systems characterized by a high degree of interoperability and interchangeability of components.

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## Section 1 GENERAL

### 1.1 SCOPE

This base protocol provides a set of encoding rules that can be applied to values of data structures defined using the ASN.1 notation (ASN.1 Types). The result of applying the rules is an unambiguous transfer syntax that may be used to transmit the data across an interface. The receiving station decodes the transfer syntax using these same rules.

At the time of publication, the Octet Encoding Rules (OER) have been developed for use with the Simple Transportation Management Protocol (STMP) and DATEX-ASN.

These encoding rules are intended for use at the time that a data exchange is required and are designed to provide a simple set of encoding rules for agencies that can be used on links with limited bandwidth.

### 1.2 PROTOCOL AND LAYER RELATIONSHIP

This base protocol specifies the Octet Encoding Rules, and it provides the rules to encode (prepare) data for transmission over various transfer services. Within the scheme of the ISO OSI 7-Layer Reference Model, OER is a Presentation Layer protocol, which may be used in conjunction with various Application Layer protocols. However, it has been developed specifically to fulfill the needs of the STMP and DATEX-ASN. Figure 1-1 shows the place of OER.

NTCIP Profiles	ISO Layers	Base Standard
APPLICATION PROFILE	APPLICATION LAYER	(not addressed by this standard)
	PRESENTATION LAYER	OER (this standard)
	SESSION LAYER	(not addressed by this standard)

**Figure 1-1  
OER - Base Protocol Relationship**

### 1.3 REFERENCES

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