

# **NTCIP 2201:2003**

**National Transportation  
Communications for ITS Protocol**

**Transportation Transport Profile**

Joint Standard of AASHTO, ITE, and NEMA

version 01.15



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

# **NTCIP 2201:2003** v01.15

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## **National Transportation Communications for ITS Protocol Transportation Transport Profile**

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- Skyline Products
- Southwest Research Institute
- Trevilon
- VHB
- Virginia Department of Transportation



## FOREWORD

This document uses only metric units.

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 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.

This publication provides the definition of an NTCIP Transport Profile. It defines requirements for the transport and network layers of a communications stack based upon the ISO-OSI Reference Model. It also contains optional and conditional clauses that are applicable to specific environments for which they are intended.

For more information about NTCIP standards, visit the NTCIP Web site at <http://www.ntcip.org>.

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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:

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## **History**

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## **Compatibility of Versions**

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

## INTRODUCTION

This publication defines a transport profile that is a combination of standards intended to meet specific requirements for transport services in transportation devices and management centers in a non-networked environment. Its scope covers the transport and network layers of the OSI Reference Model. It contains mandatory requirement statements that are applicable to all devices claiming conformance to this standard. It also contains optional and conditional requirements that may be applicable to a specific environment in which a device is used.

Annex A is normative and contains a Profile Requirements List in the form of PICS proforma. Annex B is informative and contains a set of service primitives that can be used to characterize the services provided by the Transportation Transport (T2) Profile.

The following keywords apply to this document: AASHTO, ITE, NEMA, NTCIP, Profile, Transport, NULL, and T2.

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 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 research into how national and international standards organizations combine protocols and standards to address all seven layers of the ISO-OSI Reference Model, the committee adopted the approach defined in the *NTCIP Profile Framework*. Following that approach, a complete protocol stack can be 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. The *NTCIP - Transportation Transport Profile* (TP - T2) is a transport profile for use in center-to-field and field-to-field communications.

Within the Joint AASHTO/ITE/NEMA Committee on the NTCIP, the Profiles Working Group is concerned with the methodology of defining profiles, and their documentation in Standards Publications. This standard defines a transport profile and the requirements for linking an application profile to a subnetwork profile. In the case of non-networked communications, there is little functionality associated with the network and transport layers. In this case, the purpose of transport service is to transform the information at the application - transport interface to a form compatible with the transport - subnetwork interface. In addition to this, the transport service provides a multiplexing function to route incoming frames to multiple applications layers. The objective is to facilitate the specification of ITS characterized by a high degree of interoperability and interchangeability of its components.

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## Section 1 GENERAL

### 1.1 SCOPE

This standard is applicable to transportation devices and management systems that must operate in Intelligent Transportation Systems. It specifies a set of procedures applicable to the transport and network layers of the ISO - OSI Reference Model. The set of procedures provides a linking mechanism between the application and subnetwork profiles in non-networked environments. In this environment, no transport and network layer services are needed other than interfacing the profiles and upper layer protocol multiplexing. It is intended to provide a standard interface technique to ensure interoperability, especially in cases where multiple communications stacks co-exist.

### 1.2 PROFILE-PROTOCOL-LAYER RELATIONSHIP

This transport profile specifies the provision for non-networked, connectionless transport and network services between an end system connected to a subnetwork and another compatible end system on the same subnetwork. The end systems must use mutually agreed upon access methods at the application, transport, and subnetwork levels in order to communicate. An end system is compatible only if the suboptions (e.g., TCP) are compatible. A complete transport profile requires knowledge of the subnetwork type, access method, circuit type, and service type. The layers, base standards and profile taxonomy that make up this profile are shown in Figure 1-1.

| ISO Layers      | Base Standards                 | Profile  |
|-----------------|--------------------------------|--|
| TRANSPORT LAYER | Part of<br>IAB STD 6 (UDP)     | NTCIP 2201<br>Transportation<br>Transport (T2) Profile |
| NETWORK LAYER   | Part of<br>IAB STD 17 (MIB-II) |  |

**Figure 1-1  
Transportation - Transport Profile Relationship**

As implied by the figure, only parts of existing base standards are referenced. In the OSI Reference Model, the transport layer is responsible for reliable data transfer between two end-systems, using flow control and error recovery, and may provide multiplexing. The network layer is responsible for data transfers across the network, independent of both the media comprising the underlying subnetworks and the topology of those subnetworks. The intended environment of this profile is where flow control and error recovery are the responsibility of the subnetwork and where information exchanges occur in a non-network system, where there is only a single subnetwork. The only remaining function that is applicable to the T2 Profile is application multiplexing. The relationship of the T2 Profile to the other layers of the OSI Model is that it serves as a link in transforming the interface information at the Application - Transport boundary to the interface information at the Transport-Subnetwork boundary.