



U.S. Department of
Transportation



Intelligent Transportation Systems Standards Fact Sheet

NTCIP 2202

April 2002

National Transportation Communications for ITS Protocol (NTCIP) – Internet (TCP/IP and UDP/IP) Transport Profile

Overview

The National Transportation Communications for Intelligent Transportation System (ITS) Protocol (NTCIP) is a family of standards that provides both the rules for communicating (called protocols) and the vocabulary (called objects) necessary to allow electronic traffic control equipment from different manufacturers to operate with each other as a system. The NTCIP is the first set of standards for the transportation industry that allows traffic control systems to be built using a “mix and match” approach with equipment from different manufacturers. Therefore, NTCIP standards reduce the need for reliance on specific equipment vendors and customized one-of-a-kind software. To assure both manufacturer and user community support, NTCIP is a joint product of the National Electronics Manufacturers Association (NEMA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers (ITE).

Prior to the establishment of the NTCIP, traffic management centers used a number of proprietary protocols to exchange information with field devices such as traffic signal controllers and dynamic message signs. The goal of all NTCIP standards is to identify a common set of non-proprietary communications protocols that address requirements for center-to-center and center-to-field communications and promote interoperability.

What is this standard for?

This standard, **NTCIP 2202 – Internet (TCP/IP and UDP/IP) Transport Profile**, defines a combination of base standards and protocols used to provide specific functions and services for layers 3 (network or routing of packets) and 4 (transport or message handling) of the Open Systems Interconnection (OSI) Reference Model (ISO/IEC 7498-1). The seven-layered model describes the basic functions and services of communication protocols.

This standard specifies the requirements for an implementation based upon the functions defined in Internet TCP/IP and UDP/IP standards. Request for comment (RFC) 793-transmission control protocol (TCP) provides the definition of layer 4 services when using a connection-oriented approach. RFC 769-user datagram protocol (UDP) provides the definition of layer 4 services when using a connectionless-oriented approach. Both layer 4 protocols use RFC 791-internet protocol (IP) as the definition of layer 3 services and functions for connectionless end-to-end delivery in a networked environment.

Who uses it?

This standard should be used by equipment manufacturers, systems integrators, and transportation agency personnel. Manufacturers and integrators should understand the specific implementation and operational requirements that it defines. Specification writers and acceptance testers can also find this standard useful, since it defines a profile implementation conformance specification (PICS). Manufacturers, integrators, and users can use this standard as:

The NTCIP family of standards is a joint project of the following standards development organizations:

American Association of State Highway and Transportation Officials (AASHTO)

Institute of Transportation Engineers (ITE)

National Electrical Manufacturers Association (NEMA)

(Contact information is shown at the end of this fact sheet)

To obtain a copy of this standard, please contact:

Global Engineering Documents

Web site: <http://global.ihs.com>

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- a. A checklist to reduce the risk of failure to conform to the standard through oversight;
- b. A detailed indication of the capabilities of the implementation;
- c. A basis for initially checking the possibility of inter-operating with another implementation; and
- d. The basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

How is it used?

At the transport layer, TCP is used to specify the format of data and acknowledgements that two devices exchange to achieve a reliable transfer of information. UDP specifies the format of data exchange needed to achieve such a transfer, but does not provide end-to-end acknowledgements of each piece (packet) of information. Both transport layers define a common mechanism for multiplexing information to and from multiple applications layers. At the network layer, IP is used to specify the format of data and procedures to provide a connectionless, node-to-node information packet delivery service and routing. This transport profile is intended to be compliant with the computer industry's "sockets interface" standard.

Scope

This standard is applicable to transportation-related field devices and management systems that need to operate in a networked environment. As a transport profile, it specifies a combination of standards and protocols applicable to the transport and network layers (layers 4 and 3) of the OSI Reference Model. It applies to systems that need to route information through a series of intervening devices. In a transportation application, the standard might be used in a closed-loop system to route information from a transportation management center (TMC), through a signal system master, to a traffic signal controller.

Related documents

To accommodate the broad scope of this standardization effort, the NTCIP has been divided into numerous individual standards. A detailed list of related documents is available on the [NTCIP 9001 – NTCIP Guide](#) fact sheet. (The NTCIP Guide is also available on-line at www.ntcip.org).

IAB STD 3 – RFC 1122: 1989, Internet Architecture Board (IAB) Requirements For Internet Hosts - Communication Layers, RFC 1123: 1989, Requirements for Internet Hosts - Application and Support

IAB STD 5 – RFC 791: 1981, IAB Internet Protocol, RFC 950: 1985, Internet standard subnetting procedure, RFC 919: 1984, Broadcasting Internet datagrams, RFC 922: 1984, Broadcasting Internet datagrams in the presence of subnets, RFC 792: 1981, Internet Control Message Protocol, RFC 1112: 1989, Host extensions for IP multicasting

IAB STD 6 – RFC 768: 1980, IAB User Datagram Protocol

IAB STD 7 – RFC 793: 1981, IAB Transmission Control Protocol

IAB STD 17 – RFC 1213: 1991, IAB Management Information Base

ISO/IEC 7498-1:1994 – Information technology - Open Systems Interconnection, Basic Reference Model: The Basic Model

ISO/IEC TR 10000-1:1995 – Information Technology - Framework and Taxonomy of International Standardized Profiles, Part 1: General Principles and Documentation Framework

[NTCIP 8003 – Profile Framework](#)

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