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National Transportation Communications for ITS Protocol Trivial File Transfer Protocol Application Profile

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FOREWORD

This document uses only metric units.

This publication defines an application class profile that is a combination of standards intended to meet specific requirements for a simple block or file transfer mechanism to and from roadside devices in a networked environment. Its scope covers the application, presentation and session 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.

The text includes mandatory requirements in Annex A that are defined as normative.

For more information about NTCIP standards, visit the NTCIP Web Site at <http://www.ntcip.org>. For a hardcopy summary of NTCIP information, contact the NTCIP Coordinator at the address below.

In preparation of this NTCIP document, input of users and other interested parties was sought and evaluated. Inquires, comments, and proposed or recommended revisions should be submitted to:

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Approvals

This document 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; May 2000
ITE – Software Standard; May 2001
NEMA – Standard; January 2001

History

From 1998 to 1999, this document was referenced as TS 3.TFTP. However, to provide an organized numbering scheme for the NTCIP documents, this document is now referenced as NTCIP 2302. The technical specifications of NTCIP 2302 are identical to the former reference, except as noted in the development history below:

TS 3.TFTP v98.01.04. March 1998 – Accepted as a User Comment Draft by the Joint Committee on the NTCIP. July 1998 – NTCIP Standards Bulletin B0014 referred document for comment.

NTCIP 2302 v99.01.05. July 1999 – Accepted v99.01.04 as a Recommended Standard by the Joint Committee on the NTCIP. January 2000 – NTCIP Standards Bulletin B0045 referred v99.01.05 with typographic corrections for approval. Approved by AASHTO in May 2000, approved by ITE in May 2001, and approved by NEMA in January 2001.

NTCIP 2302:2001 v01.06. 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 Standard designations.

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 and/or profiles.

The Profiles Working Group is concerned with the methodology of defining profiles, and their documentation in Standards Publications. This standard defines an application profile for block or file transfers to and from roadside devices. 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 first met in September 1997.

After research into how national and international standards organizations combine protocols and standards to address all seven layer of the ISO-OSI Reference Model, the committee adopted the approach defined in the *NTCIP Profile Framework*. Following that approach, a protocol stack is specified by application, transport, 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 Trivial File Transfer Protocol – Application Profile* (AP-TFTP) is an application profile for use in center-to-roadside and center-to-center communications.

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Section 1 GENERAL

1.1 SCOPE

This standard is applicable to traffic control and transportation related devices that must operate in an Intelligent Transportation System. As an NTCIP application profile, it specifies a set of protocols and standards applicable to the application, presentation, and session layers of the ISO - OSI Reference Model. This standard is intended to provide a simple block or file transfer service between roadside devices and management stations over a connectionless transport service.

1.2 PROFILE-PROTOCOL-LAYER RELATIONSHIPS

This application profile specifies the provisions for the Trivial File Transfer Protocol. This profile provides connectionless file transfer services. The layers, base standards, and profile taxonomy that make up this profile are shown in Figure 1-1.

ISO Layers	Base Standard	Profile
APPLICATION LAYER	IAB STD 33 (TFTP) IAB STD 3 (Internet Hosts)	TFTP – Application Profile
PRESENTATION LAYER		
SESSION LAYER		

**Figure 1-1
TFTP - Application Profile Relationship**

1.3 REFERENCES

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For draft revisions of this document, which are under discussion by the relevant NTCIP Working Group, and recommended revisions of the NTCIP Joint Committee, visit the World Wide Web at <http://www.ntcip.org>.

The following standards (normative references) contain provisions, which through reference in this text, constitute provisions of this Standard. Other documents and standards (other references) are referenced in these documents, which might provide a complete understanding of the structure and use of profiles. At the time of publication, the editions indicated were valid. All standards are subject to revision, and