NTCIP 2102:2003

National Transportation Communications for ITS Protocol

Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile

Joint Standard of AASHTO, ITE, and NEMA

version 01.09

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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 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.

This publication provides the definition of an NTCIP Subnetwork Profile. It defines requirements for the data link and physical layers of a communications stack based upon the OSI Basic Reference Model. It also contains optional and conditional clauses that are applicable to specific environments for which they are intended.

This document is an NTCIP Subnetwork Profile document. Subnetwork Profile documents define the requirements of the data link and physical layers of a communications stack based upon the OSI Basic Reference Model.

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

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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; March 2003
ITE – Software Standard; December 2002
NEMA – Standard; October 2002

History

This standard was originally part of NTCIP 2001, *Class B Profile*. In July 1999, the Joint Committee on the NTCIP approved a work item to separate the text into a stand-alone subnetwork profile. NTCIP 2102 was previously referenced as TS 3.SP-PMPP/FSK.

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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 subnetwork profile that is a combination of standards intended to meet specific requirements for data transfers to and from roadside devices in either a networked or direct-connect environment. The purpose of this standard is to provide the information necessary to establish a connection using the Point-to-MultiPoint Protocol (PMPP) via a 1200 bps frequency shift keying (FSK) modem interface. Its scope covers the Data Link and Physical Layers of the OSI Basic Reference Model. It is used to manage connected devices that coexist on a common channel. It supports a variety of upper layer protocols over a common physical implementation. It 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.

Annex A is normative and contains a Profile Requirements List in the form of PICS proforma.

The following keywords apply to this document: AASHTO, ITE, NEMA, NTCIP, Profile, Subnetwork, PMPP, Bell 202, and FSK.

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 layers of the OSI Basic Reference Model, the committee adopted the approach defined in the *NTCIP Profile Framework.* Following that approach, a complete protocol stack was 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 - Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile* is a subnetwork profile for use in center-to-field communications.

The Profiles Working Group is concerned with the methodology of defining profiles, and the definition and documentation of profiles in Standards Publications. This document is intended to provide a complete subnetwork profile (SP) that specifies the communications over an asynchronous, half-duplex or full-duplex dedicated digital circuit. This SP specifies the requirements for an unbalanced connectionless operation. This subnetwork profile can be used with different transport profiles addressing the network and transport layer requirements. The objective is to facilitate the specification of ITS systems characterized by a high degree of interoperability and interchangeability of its components.

CONTENTS

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Section 1
GENERAL

1.1 SCOPE

This standard is applicable to transportation related devices that must operate in a typical primary/secondary configuration where one device is the designated primary while one or more other devices are connected to one channel acting as secondaries. As a subnetwork profile, it specifies a set of protocols and standards applicable to the data link and physical layers of the OSI Basic Reference Model. The SP-PMPP/FSK is intended to provide an interoperability standard for the Physical and Data Link Layer aspects of communications in transportation related devices. The primary purpose of this standard is to provide a simple data exchange tool that uses a connectionless delivery mechanism.

This subnetwork profile lists the requirements for an implementation using an unbalanced mode of operation for the data link layer that have been derived from the High-Level Data Link Control (HDLC) standard. This subnetwork profile defines not only the definition of the physical and the data link layer protocols but also the interface definition between the data link layer and higher layer protocols.

1.2 PROFILE-PROTOCOL-LAYER RELATIONSHIPS

A profile defines a combination of base standards and/or other profiles that collectively perform the intended function. The definition of Subnetwork Profiles and their functions and responsibilities are defined within NTCIP 8003. This profile references computer communications and transportation protocol standards for the Data Link and Physical Layers of the OSI Basic Reference Model.

The OSI Basic Reference Model defines seven layers, each performing a particular role in the transmission of data over a medium. This subnetwork profile defines the first two layers. The layers, base standards, and profile taxonomy that make up this profile are shown in Figure 1-1.

ISO Layers	Base Standards	Profile
DATA LINK LAYER	ISO/IEC 3309 ISO/IEC 4335 ISO/IEC 7809	SP-PMPP/FSK Subnetwork Profile
PHYSICAL LAYER	Based upon Bell 202T	

Figure 1-1
SP-PMPP/FSK - Subnetwork Profile Relationship

The first layer, the Physical Layer, deals with how the bits of information are transmitted over a communications channel. It deals with the mechanical and electrical interfaces, and the physical transmission medium.

The second layer, the Data Link Layer, has the task of transforming the information that came in over the wire into data that appears to be free of transmission errors. It should incorporate mechanisms to ensure the integrity of the data and provide a method of ensuring that, if need be, no data is lost. An unbalanced configuration provides for only one primary station and one or more secondary stations to operate as point- to-point or point-to-multipoint, half duplex or full duplex, and stop/start (asynchronous) transmission.