



Dynamic Message Signs (DMS)

January 2003 Advisory No. 1

ITS Standards Advisory

ITS Standards Advisories provide the transportation community with information and guidance on key activities related to ITS standards. Standards Advisories are distributed monthly by the U.S. Department of Transportation's **ITS Standards Program**, with each Advisory focusing on a single ITS application and its corresponding standards. Standards Advisories highlight important, recent standards activities for the selected ITS application and provide links to more detailed information and resources. ITS Standards Advisories are posted on the ITS Standards Program web site at www.its-standards.net. Please email the following address if you would like to be notified by email when a new ITS Standards Advisory is posted on the web: flood@volpe.dot.gov.

If you are new to working with ITS standards, the following resources are available to provide introductory information-

- Frequently-Asked-Questions (FAQs) at the ITS Standards web site, www.its-standards.net/FAQ.htm
- Chapters 1, 2 and 3 of [The NTCIP Guide](#), a comprehensive reference for NTCIP
- The ITS Specialist at your [FHWA Resource Center](#) or [Division Office](#).

The DMS Standard: What's New?

Standards Development

The DMS NTCIP working group is drafting Version 2 of NTCIP 1203, *Object Definitions for Dynamic Message Signs*. Version 2 represents a major upgrade in the functionality of the DMS standard. Version 2 is scheduled to be distributed for user comment during the spring of 2003. DMS working group members will assess user comments and determine if any further work is required on the standard.

NTCIP 1203 allows integration of DMS devices and products from multiple manufacturers into a single system using standard communications and data. Version 2 adds features such as graphics and device status reports. This version also restructures the standard to make it easier for end users to specify product attributes and/or capabilities. Added detail in Version 2 enables all parties, including users, designers, vendors and integrators to build systems that meet requirements identified through the systems engineering process. Rigorously identifying requirements will enable the public agency to construct robust compliance tests for vendor systems to meet.

A major benefit of Version 2 for end users concerns customization. Version 2 adds features and functions, such as color, that could be obtained previously only by deviating from the standard through customization.

For the record

The history of NTCIP 1203:

- Version 1: Published October 1997
- Amendment 1: Approved October 2002
- Version 2: In working group draft

Amendment 1 resolves inconsistencies in Version 1, but is not a major upgrade. You may download the DMS standard or contact the chair of the DMS Standard Working Group through the NTCIP web site <http://www.ntcip.org/library/groupstatus/default.asp?groupid=5>.

Testing

The purpose of testing DMS Version 2 is to ensure that bugs or known issues from previous versions are assessed and determined to be resolved. Testing also evaluates the completeness of the standard's new functions and features.

The Virginia DOT (VDOT) is deploying Version 2. Early adoption of Version 2 benefits the transportation community by creating a knowledge-base of how the standard operates in a real-world transportation environment. Deployment plans include a testing component, which is currently being developed by Battelle and VDOT. Test results will be documented and made available to the community.

For the record

Battelle, with the Illinois State Toll Highway Authority, tested DMS Version 1. Overall, the tests showed that the standard enabled the implementation of functional and interoperable subsystems. Test results demonstrated the value of the DMS standard by showing that the standards offer greater levels of multi-vendor device interoperability than would be available through use of proprietary systems. The following two web sites contain information about DMS testing and the ITS Standards Testing Program.

- <http://www.its-standards.net/testDMS.htm>
- http://www.nawgits.com/icdn/dmstest_results.html

Rolling Out DMS

Deployment

Deployment Activity

The number of public agencies referencing the DMS standard in their procurements is growing. As of the date of this Advisory, the overwhelming majority of state agencies writing DMS specifications are using NTCIP 1203 and other NTCIP standards that support DMS.

Tools

In addition to NTCIP 1203, the DMS standard, several other standards, applicable to any device that can use the same communications links as DMS, are needed to implement DMS. In the DMS context, together these are termed DMS standards. The Standards Program offers many tools and resources to educate those considering standards-based DMS deployments on the suite of DMS standards.

- **The DMS Standards Application Package** is a folder of documents providing an overview of ITS standards and specific information on DMS standards and DMS deployments. Send your request to flood@volpe.dot.gov.
- **The NTCIP SpecWizard** software helps deployers formulate NTCIP-compatible specifications for DMS procurements. This tool helps end users remove many of the ambiguities that often creep into specifications. The SpecWizard is slated to be available from <http://www-mctrans.ce.ufl.edu> in March 2003.
- **DMS Sample Specifications** are contained in the *Specification Guide for Procurement of NTCIP-compliant Dynamic Message Signs (DMS)* published

by the ITS JPO. This document is a tool for authors of DMS procurement specifications. The document contains sample wording for procurement specifications and methods for adapting the standard to include specific project requirements. Download this document from: <http://www.its-standards.net/Documents/genDMSSpec.pdf>.

- **The DMS Standards Application Area Workshop** features two days of in-depth training on specification writing, contract development, and other essential elements of ITS procurements. For more information about the workshops and schedule, contact Barry Zimmer at 202-366-4082 or Barry.Zimmer@fhwa.dot.gov.

Working with Vendors

Spurred by the number of states writing specifications referencing the DMS standard, NTCIP 1203, many vendors provide standards-based message signs. Procuring the DMS devices from vendors raises the complicated issues of how to certify a particular device's conformance with the standard and how to test for a vendor's compliance with an agency's contractual requirements. While DMS vendors may assert conformance, there is no "official" conformance test for devices employing DMS Version 1. The NTCIP working group is wrestling with the issue of conformance testing in general for the family of NTCIP standards. DMS Version 2 will more easily permit the design of both conformance and compliance test procedures, since the standard incorporates systems engineering process principles.

U.S. DOT Urges Use of DMS Standards

The U.S. DOT strongly encourages state and local agencies to use DMS standards. DMS standards are mature, they have undergone significant testing, and they offer immediate benefits for agencies by 1) providing interoperability between DMS and other NTCIP-compatible field devices running on common communications channels, and 2) enabling simplified administration of DMS subsystems, leading to easier overall administration.

Here are specific recommendations for the following groups.

- **Current users of standards-based DMS:** Review the features and functions of DMS Version 2 to determine if upgrading from Version 1 would enhance your agency's DMS operations. Check <http://www.its-standards.net/status.htm> or call the

ITS Specialist at your [FHWA Resource Center](#) or [Division Office](#) for up-to-date information.

- **Those considering using standards-based DMS:** DMS standards offer an ideal opportunity to introduce standards-based ITS into your agency's operations. Speak with the ITS Specialist at your [FHWA Resource Center](#) or [Division Office](#), or use the [Standards Contacts Database](#) to contact peers who have already deployed the standard.
- **Those with legacy DMS systems considering migrating to standards-based DMS:** Migrating from proprietary to standards-based DMS can be complicated, but will provide both immediate and long-term benefits. There are many resources available to help you assess your current system and develop a migration path. The [ITS Field Support Team](#) offers systems assessment, integration, and procurement advice.

Standards Resources

Technical Assistance

Technical assistance for DMS (as well as other applications) is available in a number of formats.

- **The ITS JPO Standards Program Web Site** is the first stop for information on the DMS standard. The site contains a wealth of information on ITS standards, including the current status of the DMS standard. Visit <http://www.its-standards.net/>.
- **The ITS Specialist** at each of the four FHWA Resource Centers is available to provide guidance on issues related to ITS standards. Visit www.fhwa.dot.gov/field.html for contact information.
- **The ITS Field Support Team** is a major new technical assistance program sponsored by the Standards Program. Visit <http://www.its-standards.net/Documents/FSTflyer.pdf> for more detail on this program. The ITS Field Support Team offers intensive consultation and support on a broad range of standards-related issues, including:
 - Assessment of current system
 - Development of project specifications
 - Review of existing contracts and specifications
 - Identification of appropriate contracting and procurement mechanisms
 - Development of test plans
 - Evaluation of systems for contract compliance and conformance to specifications.
- **The Contacts Database** contains contact information for state-level deployers who have used, are using, or are planning to use DMS standards. Individuals in the database are available for informal discussions about using DMS standards. Find the database on the ITS Standards web site at <http://www.its-standards.net/deploy.htm>.
- **The Standards Forum** is a *moderated*, on-line community of individuals interested in learning about ITS standards and sharing their experiences with colleagues. The only requirement to join the Forum is a desire to learn about ITS standards. Questions

posted to the Forum are answered quickly. Visit the forum at www.nawgits.com/stdsforum/.

Training

Training is available for DMS standards, and other standards, through the Institute of Transportation Engineers (ITE) and the Transit Standards Consortium. Training is held at locations throughout the country. The following web sites provide more detail.

- www.ite.org
- www.tsconsortium.org
- www.pcb.its.dot.gov

Standards on Sale

Standards may be purchased from <http://global.ihs.com/>. American Association of State Highway and Transportation Officials (AASHTO), ITE, and National Electrical Manufacturers Association (NEMA) members may obtain a password from those organizations to purchase NTCIP standards for 50% off retail.

Getting Involved

DMS Working Group

Contact the chair of the DMS working group, Chris Bates, for information on participating in the standards development process. His email is cbates@trevilon.com.

2003 ITS Standards Registrants' List

The *ITE Procedures for Developing Equipment Standards, Software and Protocol Standards, and Recommended Practices* allows for Registrants' Lists of interested parties to be maintained for each ITE standards project. Members of each Registrants' List will receive periodic updates and calls for comments on draft standards. Comments from the members of the Registrants' List will assist the Standards Developing Organizations and committees in producing standards that meet the requirements of all interested parties. Each Registrants' List will be updated annually. Complete the [form](#) and send it to ITE by mail or fax.

Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
DMS	Dynamic Message Signs
FHWA	Federal Highway Administration
FSK	Frequency Shift Keying
FTP	File Transfer Protocol
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
JPO	Joint Program Office
LAN	Local Area Network
MIB	Management Information Base
NEMA	National Electrical Manufacturers Association

NTCIP	National Transportation Communications for ITS Protocol
OER	Octet Encoding Rules
PMPP	Point-to-Multipoint Protocol
SDO	Standards Developing Organization
SMI	Structure of Management Information
SNMP	Simple Network Management Protocol
STMF	Simple Transportation Management Framework
STMP	Simple Transportation Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
U.S. DOT	United States Department of Transportation
UDP/IP	User Datagram Protocol/Internet Protocol
VDOT	Virginia Department of Transportation

Standards Applicable to DMS Deployments

Standards Developing Organization (SDO): AASHTO

Standard	Document Title	Description	Type	Development Status	Date
NTCIP 1203	Object Definitions for Dynamic Message Signs	Defines DMS data for all types of signs that can change state.	Data Dictionary	Published; Amendment 1 recommended; Version 2 in working group draft	10-97
NTCIP 1201	Global Object Definitions	Defines data, such as time, to be used in multiple device types including DMS.	Data Dictionary	Published; Amendment 1 recommended; Version 2 in ballot	04-97
NTCIP 1101	Simple Transportation Management Framework	Rules and protocols for organizing, describing and exchanging transportation management information between applications and equipment for interoperability.	NTCIP Base Standard	Published; Will be replaced by NTCIP 1102, NTCIP 1103, and NTCIP 8004	04-97
NTCIP 1102	Base Standard: Octet Encoding Rules (OER)	Encoding/decoding rules to prepare data for transmission or to decode data before sending it to an application.	NTCIP Base Standard	Approved; Recommended Standard	08-02
NTCIP 1103	Simple Transportation Management Protocol (STMP)	Rules for exchanging data with little overhead for interoperability of transportation devices operating over limited bandwidth links.	NTCIP Base Standard	In user comment draft; Recommended Standard expected in Winter 2002-3	07-02
NTCIP 8004	Structure and Identification of Management Information (SMI)	Defines how the NTCIP effort defines and registers and registers its data, including how the SNMP MIB information is mapped into the ITS Data	NTCIP Base Standard	In working group draft	11-01
NTCIP 2301	Application Profile for Simple Transportation Management Framework (STMF)	Application, presentation, and session layer protocols to provide simple information management services.	Communications Protocol Profile – Application Layer	Published	03-02
NTCIP 2201	Transportation Transport Profile	Defines a transport profile to transmit data when devices are directly connected to the central controller or computer and do not require network	Communications Protocol Profile – Transport Layer	Entered Balloting Stage	08-02
NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile	Transport and network layer protocols to provide connectionless and connection-oriented transport services.	Communications Protocol Profile – Transport Layer	Published	03-02
NTCIP 2101	Subnet Profile for Point to Multipoint Protocol using RS 232	Data link and physical layer protocols applicable to roadside devices.	Communications Protocol Profile – Subnetwork Layer	Published	03-02
NTCIP 2102	Subnet Profile for PMPP Over FSK modems	Defines how to communicate over twisted wire using FSK modems.	Communications Protocol Profile – Subnetwork Layer	Entered Balloting Stage	08-02
NTCIP 2103	Subnet Profile for Point to Point Protocol using RS 232	Rules for point-to-point protocol use over RS-232 related circuits for interoperability of devices linked by dial-up circuits.	Communications Protocol Profile – Subnetwork Layer	Entered Balloting Stage	08-02
NTCIP 2104	Subnetwork Profile for Ethernet	Provides interoperability for devices that communicate over local area network (LAN) interfaces.	Communications Protocol Profile – Subnetwork Layer	Entered Balloting Stage	08-02

Note: The “Type” column indicates whether the standard defines data or communications (and for communications which layer of the link from physical to message definition). “Status” denotes the standard’s current development status as determined by the working group that oversees the development of the standard. “Date” refers to the date of the last published standard or the date a draft entered the indicated status. For further information on each of the DMS standards see <http://www.its-standards.net/Afactsheets.asp>. For further information on the standards development process see <http://standards.ieee.org/resources/glance.html>.