ITS Standards Advisories provide transportation agencies and ITS professionals with information and guidance on key activities related to ITS standards. Standards Advisories are distributed approximately 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. Each Standards Advisory highlights important, recent standards activities for a selected ITS application and provides links to more detailed information and resources. ITS Standards Advisories are posted on the ITS Standards Program web site at http://www.standards.its.dot.gov. Please e-mail the following address if you would like to be notified by e-mail when a new ITS Standards Advisory is posted on the web: flood@volpe.dot.gov.

If you are new to working with ITS standards, refer to the following introductory information.

- Frequently Asked Questions (FAQs) at the ITS Standards web site, http://www.standards.its.dot.gov/FAQ.htm
- The ITS Specialist at your FHWA Resource Center or Division Office

IEEE 1512: A Family of Standards

Incident Management (IM): What Is It?

Traffic and emergency services agencies need accurate, timely information on an incident to launch and manage an appropriate, coordinated assessment and response. The Federal Highway Administration (FHWA) *Traffic Incident Management Handbook* (http://www.itsdocs.fhwa.dot.gov/jpodocs/rept_mis/@9201!.pdf) defines an incident as "any non-recurring event that causes a reduction of roadway capacity or an abnormal increase in demand." Incidents include such familiar occurrences as vehicle crashes, breakdowns, work-zone lane closures, and, broadly speaking, any occurrences regionwide (such as natural disasters or extreme weather) that affect the movement of traffic.

The IEEE 1512® family of standards allows traffic management systems and public safety management systems to exchange incident-related information immediately for real-time command and control of resources. The IEEE 1512 family consists of a base (or common) standard, several existing or planned subject-area standards, and data dictionaries included within each volume. This is discussed further under "Meet the Family".

The messages and message sets given in the IEEE 1512 standards are expressed in Abstract Syntax Notation 1 (ASN.1), which is a standardized way of expressing data such that it facilitates the exchange of structured information. Each IEEE 1512 standard also includes or will include a translation of the ASN.1 into Extensible Markup Language (XML) data schema. XML is an extension of the methods of encoding data used to create the World Wide Web.

Meet the Family

Common IM

IEEE Std 1512®-2000, *Common Incident Management Message Sets for Use by Emergency Management Centers,* is the Base Standard for IM. The other IEEE 1512 subject-area standards must be used together with this standard, which contains the basic information – such as a description of the incident – to be exchanged by traffic and emergency management centers for any incident.

Traffic Incident Management

IEEE Std 1512.1®-2003, *Traffic Incident Management Message Sets for Use by Emergency Management Centers,* provides the framework for all of the information needed to respond to traffic-related incidents in real time. A message set is a series or set of individual messages for exchanging information about a particular topic. This standard establishes the template, or pattern, for constructing message sets. For example, the message sets defined in the standard address issues such as traffic flows, asset management for traffic control equipment, cleanup and repair, and identification of message recipients (such as the incident commander) by their incident-specific functions. In addition, this volume is applied when one traffic management center is required to control another center's devices. This standard must be used in conjunction with the Base Standard.

Public Safety

IEEE P1512.2®, *Public Safety Incident Management Message Sets for Use by Emergency Management Centers,* conveys message sets used for communications and coordination among public safety agencies, including traffic management

centers, emergency medical services, law enforcement, and fire and rescue, especially for inter-agency asset management. This standard must be applied in conjunction with the Base Standard.

Hazardous Materials

IEEE Std 1512.3®-2002, *Hazardous Material (HAZMAT) Incident Management Message Sets for Use by Emergency Management Centers,* concerns information needed by responders to hazmat spills on or near a roadway. The information governed by this standard enables hazmat responders to receive specific information on the spill and to work together to control and confine the hazmat.

In addition to hazardous materials incidents, this standard applies to any incident involving commercial vehicles, and to any incidents related to homeland security. This standard must be applied in conjunction with the Base Standard.

For the Record

The benefits of using the IEEE 1512 family of standards include:

- Inter-agency and cross-jurisdictional coordination
- More rapid dispatch
- Less reliance on voice communication
- Reconciliation of differences in response procedures among public safety agencies
- Real-time access to images
- Less data re-keying.

IM Data: Related Standards

The IM standards contain those data concepts specifically relevant to incident management. For all other data concepts, the IEEE 1512 family of standards refers to, or plans to refer to, the following standards developed by other standards development organizations (SDOs).

SDO	Standard
American Public Transportation Association (APTA)	Transit Communications Interface Profiles (TCIP)
American Association of	Data Element

SDO	Standard
Motor Vehicle Administrators (AAMVA)	Dictionary For Traffic Records Systems (ANSI D20-2003)
Institute of Transportation Engineers (ITE)	Traffic Management Data Dictionary (TMDD)*
National Association of State EMS Directors	National Emergency Medical Services Information System (NEMSIS)
National Electrical Manufacturers Association (NEMA), American Association of State Highway and Transportation Officials (AASHTO), ITE	National Transportation Communications for ITS Protocol (NTCIP)
National Fire Protection Agency (NFPA)	Hazard Identification System (NFPA 704)
Organization for the Advancement of Structured Information Standards (OASIS)	Common Alerting Protocol (CAP)
Society of Automotive Engineers (SAE)	ATIS Data Dictionary (SAE J2354)
United States Fire Administration (USFA), National Fire Information Council (NFIC)	National Fire Incident Reporting System (NFIRS)
US Department of Justice (DOJ) Office of Justice Programs	Global Justice XML Data Model (GJXDM)
US DOT, Governors Highway Safety Association (GHSA)	Model Minimum Uniform Crash Criteria (MMUCC)

* Note: The TMDD (ITE-AASHTO TM 1.03) is to be replaced by the standard *Traffic Management Center-to-Center Communications* Volume II, Annex 3. The new standard is expected to be published by mid-2004.

IM Standards: What's Next?

Standards Development Status

Version 1 of IEEE 1512, the Base Standard, was published in July 2000. The Incident Management Working Group (IMWG) has slated the standard for revision. Version 2 is expected to be ready for publication in Winter 2005. The new version will include a complete XML version of the message sets.

IEEE 1512.1 (Traffic Incident Management) was published in March 2003. The IMWG will begin preparing a supplement to the standard that will account for new data flows that have been added to the ITS National Architecture.

IEEE 1512.2 (Public Safety) is being drafted. As of the publication date of this Advisory, the standard has completed formal ballot. Publication is expected in Fall 2004.

IEEE 1512.3 (Hazardous Materials) was published in October 2002. The IMWG will begin preparing a supplement to the standard that will account for new data flows that have been added to the ITS National Architecture.

The project authorization request (PAR) IEEE P1512a™, *Standard for Emergency Management Data Dictionary*, was withdrawn in March 2003. However, as noted above, the relevant data concepts are defined in each individual subject area standard and are included in the ITS Data Registry. The new XML schemas are being produced using the existing data dictionaries and are being cross-validated with other related data dictionaries.

Changes to Come

The family of IEEE 1512 standards is expected to grow over time. Currently, the working group is planning a new standard that is expected to be designated IEEE Std 1512.4™. The standard will describe in-vehicle message sets related to traffic incident management. These apply to communications between traffic management or emergency management centers and mobile units, such as police cars or ambulances. The IEEE has approved the project authorization request and work has begun on the standard. Another new subject area standard that the IMWG is discussing includes the integration and monitoring of health and safety devices, such as radiation monitors, that are worn by public safety personnel or that are carried in their vehicles.

Testing

The purpose of testing the IM standard is to evaluate the completeness, suitability, and effectiveness of its features. The New York State DOT's Integrated Incident Management System (IIMS) has been funded as a field operational test of the IEEE 1512 family of standards. For information on IIMS, see http://www.dot.state.ny.us/reg/r11/iims/.

U.S. DOT Calls IEEE 1512 "Available for Use"

The U.S. DOT encourages state and local agencies to use the published IEEE 1512 family of standards. The Base Standard was published four years ago and is being used or will be used in large IM deployments across the country.

- Agencies already deploying XML-based systems using the currently available Version 2 draft have been informed by the IMWG that the draft is stable and that any changes to the Base Standard resulting from new versions of IEEE 1512.1 or 1512.3 should not affect these deployments.

- Agencies expecting to develop XML-based implementations may follow current deployers and use the Version 2 draft, or may wait until the

end of 2004 when Version 2 of the Base Standard will be published.

- Agencies expecting to develop ASN.1 implementations can use Version 1; however, naming conventions used in Version 1 are being adjusted to translate the short acronym-like data structure names into a longer, more descriptive form as the XML-based version is being developed. Similarly, to the cases above, these deployers may choose to use the draft of Version 2, or, if project schedules permit delay, wait for the publication of Version 2.

- IEEE 1512 Standards are available for sale at http://shop.ieee.org/ieeestore/.

Implementing IM

Deployment

Deployment Activity

The need to integrate communications among transportation and public safety agencies in multiple jurisdictions has led to increased activity among the states in building IEEE 1512-based traffic incident management systems. Early deployers include:

- **New York IIMS** is a joint effort of the New York State and New York City Departments of Transportation and the New York City Police Department. It provides incident-related information to city agencies responsible for sanitation, environmental protection, public works, fire, and emergency medical services. IIMS transmits text, location information, and images to

and from operations centers and mobile responders. For further information, contact Edward Mark at (718) 482-4559 or emark@gw.dot.state.ny.us, or see http://www.dot.state.ny.us/reg/r11/iims/index.html.

- **The Capital Wireless Integrated Network (CapWIN)** is a multi-state, multi-discipline, mobile data network linking federal, state, and local public safety and transportation agencies in Maryland, Virginia, and Washington, DC. The system provides messaging, text, and image data to first responders. Information is available at http://www.capwin.org/. Contacts are Tom Jacobs at (301) 614-3703 or tjacobs@capwin.org, or Tom Merkle at (301) 614-3720 or tmerkle@capwin.org.

- **The CAD (Computer-Aided Dispatch)/ITS Integration Program** has initiated field operational tests in Utah and Washington State of initiatives that link public safety agencies' CAD systems with traffic management systems. Information is available at http://www.itspublicsafety.net/.

Deployment Note

The IEEE 1512 family of standards governs the data concepts and message sets needed for incident management. However, a communications link consists of additional layers or levels that define characteristics of the physical and data links between computers. Further information on the high-level communications protocols needed to implement an IM system will be available in a forthcoming advisory on Center-to-Center (C2C) Communications for Traffic Management.

Tools

In addition to the IEEE 1512 family of standards, there are several other ITS standards (see page 6) that are needed to implement IM. We refer to all collectively as standards applicable to IM deployment. Many tools and resources are available to assist those considering standards-based IM deployments.

- An IEEE Std 1512-2000 fact sheet is at http://www.standards.its.dot.gov/Documents/FSP1512_r2.PDF.

- A *Guide to the 1512 Standards* has been completed and published. This guide summarizes both functional benefits and technical descriptions of the standards. The document is available for download for no charge at http://grouper.ieee.org/groups/scc32/imwg/index.html.

Working with Vendors

By definition, creating an incident management system crossing jurisdictional and departmental lines requires the technical leadership of a system integrator, preferably with experience in both the transportation and public safety systems environments. The system integrator must have the skill set to incorporate into the system implementation the IEEE 1512 family of standards and the other underlying ITS standards supporting the communications architecture. Consult the section below for guidance in selecting a system integrator.

Standards Resources

Technical Assistance

Technical assistance for IM (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 standards. The site contains a wealth of information on ITS standards, including the IM standards. Visit http://www.standards.its.dot.gov.

- **ITS Specialists** are available at each of the four FHWA Resource Centers to provide guidance on issues related to ITS standards. Visit http://www.fhwa.dot.gov/resourcecenter/teamoper.cfm for contact information.

- **The ITS Field Support Team** is a technical assistance program to provide hands-on help to ITS standards deployers. (See http://www.standards.its.dot.gov/documents/FSTflyer.pdf for more details.) 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.

- **The ITE Traffic Incident Management (TIM) Committee** is an ad hoc group of transportation and public safety professionals interested in fostering the development of local incident management programs. The committee's web site is http://www.trafficincident.org/.

- **The ITE TIM Committee Discussion Group** is an unmoderated email list that allows interested transportation professionals to interact and trade information related to traffic incident management. Subscribe to the discussion group

and learn how it works by visiting http://www.trafficincident.org/forum/index.html.

- **The ITS Standards Contacts Database** contains contact information for state-level deployers who have used, are using, or are planning to use IM standards. Individuals in the database are available for informal discussions about using IM standards. Find the database on the ITS Standards web site at http://www.standards.its.dot.gov/contacts.asp.

- **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 the IEEE 1512 family of standards on request through the IEEE and the ITE. Contact James Cheeks at jcheeks@ite.org or (202) 289-0222 x131. More detail is available through www.ite.org or www.pcb.its.dot.gov.

Standards on Sale

The IEEE 1512 family of standards may be purchased from the IEEE. For further information, consult http://standards.ieee.org/transtech/#main.

Getting Involved

IM Working Group

The IMWG is an IEEE Vehicular Technology Society subgroup. Its web site is http://grouper.ieee.org/groups/scc32/imwg/index.html. Contact the IMWG chair, Ann Lorscheider, at (704) 342-6814 or alorscheider@dot.state.nc.us for further information on, or to participate in, the standards development process. Contact IEEE Program Manager Anita Ricketts at (732) 562 3847 or a.ricketts@ieee.org.

2004 ITS Standards Registrants' Lists

The ITE maintains Registrants' Lists of interested parties for many ITS standards projects. Members of each list receive periodic updates and calls for comments on draft standards. Comments from list members will assist the SDOs in producing standards that meet the requirements of all interested parties. Each list will be updated annually. Go to http://www.ite.org/standards/itsstandardslist_form.pdf to download the form. Send it to ITE by mail or fax.

Standards Applicable to IM Deployments

Standards Development Organization (SDO):
Institute of Electrical and Electronics Engineers (IEEE)

The following section lists standards that can be used in an IM deployment. Note: The "Type" column indicates whether the standard contains a data dictionary, defines message sets, or is a concept-of-operations document. (In other advisories, this column indicates which level, as defined by the NTCIP model of communications links, applies. In this case, all IM standards below are at the Information Level.) "SDO Status" denotes the standard's current development status as determined by the working group or committee that oversees the development of the standard. "Comment" refers to any additional information related to the status of the standard. For information on the standards development process and its terminology, see http://standards.ieee.org/resources/glance.html.

Additional standards related to IM are in the following forthcoming advisories: Advanced Traveler Information System (ATIS), Center-to-Center Communications for Traffic Management, and Transit Communications Interface Profiles (TCIP). See www.standards.its.dot.gov for these advisories as they are published.

Standard	Document Title	Description	Type	SDO Status
IEEE Std 1512-2000	Common Incident Management Message Sets for Use by Emergency Management Centers	Base standard for a family of related standards that address the intercommunication needs of emergency management centers and other types of centers engaged in transportation incident management.	Message Set/Data Dictionary	Published 7-00
IEEE Std 1512.1-2003	Traffic Incident Management Message Sets for Use by Emergency Management Centers	Supplemental standard providing a framework for exchange of data in message sets for use by centers involved in transportation-related incident management.	Message Set/Data Dictionary	Published 3-03
IEEE Std 1512.2-2002	Public Safety Incident Management Message Sets for Use by Emergency Management Centers	Supplemental standard supporting communication of public safety-related data among centers involved in transportation-related incident management.	Message Set/Data Dictionary	In Ballot
IEEE Std 1512.3-2002	Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers	Supplemental standard supporting communication concerning hazardous materials, including vehicle cargo, vehicle contents, and building contents.	Message Set/Data Dictionary	Published 10-02
ITE-AASHTO TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	Provides a functional level data dictionary consisting of and defining a set of data elements necessary to support data flows within and among traffic management systems.	Data Dictionary	Approved; Version 2 In Ballot

ITE-AASHTO TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	Provides a national standard for an agreed-upon set of messages for traffic management systems.	Message Set	Approved; Version 2 In Ballot
SAE J2353 199910	Data Dictionary for Advanced Traveler Information Systems (ATIS)	Defines the data elements for ATIS messages.	Data Dictionary	Published 10-99
SAE J2354	Message Sets for Advanced Traveler Information System (ATIS)	Defines messages needed regardless of transmission medium by information service providers for ATIS.	Message Set	Published Version 2 2-04
SAE J2540 200207	Messages for Handling Strings and Look-Up Tables in ATIS Standards	Defines methods and messages to translate sequences of text and other types of data to and from indexes and reference tables.	Message Set	Published 7-02
SAE J2540-2 200202	ITIS Phrase Lists (International Traveler Information Systems)	Defines messages that meet the requirements for ITIS phrases.	Message Set	Published 2-02; Amendment 1, Version 1 Approved
N/A	Global Justice XML Data Model (GJXDM)	XML Schema rendering of the Global Justice XML Data Dictionary (GJXDD).	Data Dictionary/ XML Schema	Published 1-04

Acronyms and Abbreviations

AAMVA	American Association of Motor Vehicle Administrators		MMUCC	Model Minimum Uniform Crash Criteria
AASHTO	American Association of State Highway and Transportation Officials		MS/ETMCC	Message Sets for External TMC Communications
ANSI	American National Standards Institute		NEMA	National Electrical Manufacturers Association
APTA	American Public Transportation Association		NEMSIS	National Emergency Medical Services Information System
ASN.1	Abstract Syntax Notation 1		NFIC	National Fire Information Council
ATIS	Advanced Traveler Information System		NFIRS	National Fire Incident Reporting System
C2C	Center to Center		NFPA	National Fire Protection Agency
CAD	Computer-Aided Dispatch		NTCIP	National Transportation Communications for ITS Protocol
CAP	Common Alerting Protocol			
CapWIN	Capital Wireless Integrated Network		OASIS	Organization for the Advancement of Structured Information Standards
DOJ	U. S. Department of Justice			
FHWA	Federal Highway Administration		PAR	Project Authorization Request
GHSA	Governors Highway Safety Association		SAE	Society of Automotive Engineers
GJXDD	Global Justice XML Data Dictionary		SCC	Standards Coordinating Committee
GJXDM	Global Justice XML Data Model		SDO	Standards Development Organization
HAZMAT	Hazardous Materials		TBD	To be determined
IEEE	Institute of Electrical and Electronics Engineers		TCIP	Transit Communications Interface Profiles
			TIM	Traffic Incident Management
IIMS	Integrated Incident Management System		TMC	Traffic (Transportation) Management Center
IM	Incident Management			
IMWG	Incident Management Working Group		TMDD	Traffic Management Data Dictionary
ITE	Institute of Transportation Engineers		U.S. DOT	United States Department of Transportation
ITIS	International Traveler Information System			
ITS	Intelligent Transportation Systems		USFA	United States Fire Administration
JPO	Joint Program Office		XML	Extensible Markup Language

The ITS Standards Advisory Series

Number	Name	Date	Web Address
1	DMS	January 2003	http://www.standards.its.dot.gov/Documents/dms_advisory.pdf
2	ESS	March 2003	http://www.standards.its.dot.gov/Documents/ess_advisory.pdf
3	DSRC	April 2003	http://www.standards.its.dot.gov/Documents/dsrc_advisory.pdf
4	ADUS	October 2003	http://www.standards.its.dot.gov/Documents/ADUS_Advisory.pdf