

1512.2™

IEEE Standard for Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers

IEEE Standards Coordinating Committee 32

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IEEE Standards Coordinating Committee 32 on
Intelligent Transportation Systems



3 Park Avenue, New York, NY 10016-5997, USA

29 November 2004

Print: SH95277

PDF: 5995-1



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IEEE Standard for Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers

Sponsor

Standards Coordinating Committee 32 (SCC 32)

on

IEEE Intelligent Transportation Systems

Approved 23 September 2004

IEEE-SA Standards Board

Abstract: This standard addresses the exchange of vital data about public safety issues involved in transportation-related events, through common incident management message sets. Message sets specified are consistent with the National Intelligent Transportation Systems Architecture and are described using Abstract Syntax Notation One (ASN.1 or ASN) syntax. This standard comprises one companion standard of the family of incident management standards centered around a base standard, IEEE Std 1512®-2000. Other members of that family include two other companion standards, IEEE Std 1512.1-2003 and IEEE Std 1512.3-2002, specifying incident management message sets for transportation management-related data exchange and hazardous material- and cargo-related data exchange. Collectively, that family of standards shall be referred to as the IEEE 1512® Family of Standards. The goal of that family of standards is to support efficient communication for the real-time, interagency management of transportation-related events. Those events include incidents, emergencies, accidents, planned roadway closures, special events, and disasters caused by humans or natural events. Those events include any such event that impacts transportation systems, or that causes a report to be received by an emergency management system, whether or not the event actually affects a transportation system, and whether or not a response is required.

Keywords: 911, ASN.1, ATMS, CAD, center-to-center, commercial vehicles, dangerous goods, data exchange, EMC, emergency response, emergency services, EMS, fire, hazardous materials, hazmat, incident command, incident management, incident management system, incident response, incidents, intelligent transportation systems (ITS), law enforcement, message sets, police, public safety, TMC, traffic incident management, traffic incidents, traffic management, transportation management system

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Print: ISBN 0-7381-4490-8 SH95277
PDF: ISBN 0-7381-4491-6 SS95277

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Introduction

(This introduction is not part of IEEE Std 1512.2-2004, IEEE Standard For Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers.)

The Incident Management Working Group was formed from a cross section of intelligent transportation system (ITS) and incident management practitioners in 1997 to address the problems and concerns of dispatching traffic management centers interacting with each other in the resolution of (primarily) roadway services disruptions (and certain other events on the highway)—generically referred to as *incidents*. Advancing the greater coordination of these centers and their cross-servicing over various jurisdictional boundaries is the primary objective of this Working Group.

This standard, IEEE Std 1512.2-2004, is one of several related standards in this area and deals primarily with the communication of vital data of a public safety nature involved in transportation-related events. It is a *companion standard* to a *base standard*, IEEE Std 1512-2000.^a Other categories of communication, having to do with transportation management, hazardous material, and other cargo are addressed in other companion standards generated by the Working Group. The base standard, this standard, and other companion standards together comprise what shall be known as the *IEEE 1512 Family of Standards*.

The base standard includes more general introductory material for the family of standards, including the other companion standards and the relationship between the family of standards and other ITS standards and the National ITS Architecture. That material will not be repeated here. Rather, the remainder of this Introduction will present a statement of the problem this companion standard is to address and its goal.

Problem statement

In the course of a transportation-related event where multiple public safety agencies are involved, there is a critical need to coordinate the management of the event among those agencies. Involved public safety agencies may include law enforcement, fire and rescue, emergency medical services (EMS), hazardous material management, traffic management, towing and recovery, and others. Each agency has a separate set of tasks, resources, and communication gear; yet the agencies need to coordinate their separate actions.

The challenge to be met by the IEEE 1512 Family of Standards is to specify message sets to support communication to coordinate those separate actions. That coordination extends to five categories of information, as follows:

- 1) *Situation awareness*: A common-format rendition of the situation, i.e., the spatial layout, general aspects such as smoke and fire, what each agency is doing, and the tracking of several variables in a summary way: injured, response personnel, response equipment, witnesses, perpetrators, involved vehicles, and cargo.
- 2) *Each agency's plan of action*: A flexible format for agencies to disseminate their plans, so that each agency can take all other agencies' plans into account in its own planning and management. That exchange can support the specification of a single incident-wide action plan, or simply each agency specifying its own plan, to be followed separately but accounting for the plans of the other agencies.
- 3) *Asset management*: An effective way for the agencies to share information about availability of assets for interagency management, and then to facilitate the interagency use of those assets, i.e., where Agency A requests that an asset of Agency B be dispatched to the incident. This extends to informing other agencies of the need for services such as law enforcement, evacuation, medical treatment, rescue, fire suppression, and hazardous material management.
- 4) *Warning information*: Emergency evacuation, responder distress, cautions for responders, and "be on lookout for" information.

^aInformation on references can be found in Clause 2.

- 5) *Messaging overhead*: Message priority, drill/not-a-drill, acknowledgement, ability to address by function as opposed to by agency name, and determining whether or not a center is functioning.

Goal of this companion standard

The goal of this companion standard is to specify message sets to support the exchange of the five types of information previously listed. More precisely, it is to specify the message sets that support that exchange, in combination with the message sets specified in the rest of the IEEE 1512 Family of Standards. As of this writing, that family of standards includes:

- Base standard: IEEE Std 1512-2000
- Companion standard: IEEE Std 1512.1TM-2003
- Companion standard: IEEE Std 1512.3TM-2002

As part of its support of that exchange, this companion standard will support existing conventions and nomenclature for established practices in public safety incident management, in particular the National Incident Management System (NIMS)^b and existing formats for incident action plans. At the same time, the message sets will not require that the local implementation use NIMS or any particular format for an incident action plan. While in some local implementations any multi-agency incident is coordinated with a single plan, in other local implementations conventions are oriented around each agency having its own plan without any single, explicitly integrated plan. Both of those cases are supported by this standard. References to incident command systems (ICS) and unified command systems (UCS) in this standard shall be taken to also refer to the NIMS.

Companion standards

This standard, IEEE Std 1512.2-2004, provides information on additional messages, data frames, and data elements beyond those appearing in the base standard, IEEE Std 1512-2000, and the companion standards listed earlier. In order to make full use of this information, the base standard, companion standards, and other references to ITS and industry standards may also need to be employed. That is particularly true in the area of message set reuse, where the contents of various elements have been taken from well-established practices, both within and outside that of the ITS and the public safety industries.

The standard and use with data registries

This standard was developed in conjunction with entries designed to be made into a data registry. The following information may be useful to persons wishing to track the data structures described in this standard with those entries or in other similar registries.

In each of the data structures found in Clause 5, Clause 6, and Clause 7, the following metadata fields are used and are equivalent to the named fields in a data registry. The mapping between these fields is as follows. The specific clause numbering and name of an entry is also the *descriptive name* of that entry in the registry (the part that follows after the “:” is the name used). The one or more paragraphs that then follow, headed “Use,” form the *description* entry. The final one or more paragraphs, headed “Remarks,” form the *remarks* entry. The section headed “Used by” contains linkages to other data structures that in turn refer to this one. In a data registry, the fields *related data concept* and *relationship type* may be used to convey this information, along with other relationships. The section headed “ASN.1 Representation” contains all the ASN.1 defining code. In a data registry, this information is broken up among the fields: *ASN.1 name*, *data type*, *valid value rule*, and *body*. The *ASN.1 name* contains the formal ASN.1 Type Definition name of the object. The *data type* contains the base type from which it is defined. The *valid value rule*, or the *body*, then

^b U.S. Department of Homeland Security, www.dhs.gov, March 1, 2004. As of this writing, the exact URL is: www.dhs.gov/interweb/assetlibrary/NIMS-90-web.pdf.

contains the various constraints, declared constants, enumerations values, and comments of the rest of the definition. In the case of data element entries, this information is found in the *valid value rule*, while in the case of data frames and messages, this information is placed into the *body* field.

Other fields used in a data registry (such as *units* or *formula*) are, typically, not provided with content from this standard, or are self-evident and constant in nature. The *source* field is an example of this, and its value for all entries from this standard is IEEE 1512.2-2004.

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Acknowledgements

The Working Group wishes to acknowledge the assistance of SubCarrier Systems Corp (SCSC) and their ITSware tool suite in the preparation of the standard. This document was prepared using the ITSware *Mini-Edit* automated tools to create and manage the text and the ASN.1 and XML productions found in the standard, and to ensure synchronization between these entries and those of the data registry and other standards.

The Working Group wishes to acknowledge the assistance of Bancroft Scott and Paul Thorpe of Open Systems Solutions, Inc. (OSS) in providing the use of their ASN.1 tool suite compiler. The ASN.1 syntax appearing in this standard was validated using that tool suite compiler.



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The IEEE 1512 Family of Standards is dedicated to the memory of those who lost their lives responding to the tragic events of September 11, 2001. The Working Group honors the men and women who continue to maintain vigilance in protecting freedom and security. It is our hope and expectation that these standards will enhance multi-jurisdictional communications.

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IEEE Standard for Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers

1. Overview

This standard specifies a framework for exchange of data in message sets for use by centers involved in transportation-related incident management, in particular, for exchanges of data for coordination among public safety agencies, and between those agencies and traffic management centers (TMCs).

This standard supplements IEEE Std 1512[®]-2000,¹ henceforth called the *base standard*, as well as two other *companion standards*, in the *IEEE 1512[®] Family of Standards*, IEEE Std 1512.1[™]-2003 and IEEE Std 1512.3[™]-2002. The overview, scope, and purpose of IEEE Std 1512-2000 will not be repeated in this standard.

In the course of managing many transportation-related events, there is a need for coordinating the actions of several different public safety and traffic management agencies. While each agency may be in full control of its own part of the management of the incident, it must coordinate with the other agencies in the following five different ways:

- 1) Exchange information about the situation, “situation awareness,” so that all agencies know what every agency sees.
- 2) Exchange each other’s plans, so every agency knows every other agency’s plans. This could be done by generating one overall plan based on each agency’s plan, or by simply exchanging all plans so each agency’s plan can be generated and adjusted taking into account all other agencies’ plans. Either way, plans must be exchanged among agencies.
- 3) Exchange information about available assets, and then coordinate use of those assets. This involves sharing updates on each agency’s assets availability and location, then exchanging information necessary of interagency requests for assets.
- 4) Exchange warning information. This includes emergency evacuation, responder distress, cautions for responders and “be on lookout for” information.

¹Information on references can be found in Clause 2.

- 5) Manage the exchange of all of the information in items 1) through 4). This includes message priority, drill/not-a-drill, acknowledgement, routing messages to centers based on their roles in the incident as opposed to by agency name, and determining whether or not a center is functioning.

Managing the operational complexities of collecting or generating that data, collating and analyzing it, then disseminating the results as necessary, is a task for the local implementation. The task for this standard is to provide the framework for communication among the public safety and traffic management agencies to provide a flexible basis for the five types of information exchange listed here.

1.1 Scope

This standard, IEEE Std 1512.2-2004, is a companion standard for IEEE Std 1512-2000, referred to here as the base standard. This standard specifies messages, data frames, and data elements for communicating information specific to public safety in support of real-time, interagency, transportation-related incident management. It addresses the unique disciplines associated with communications dealing with the control and confinement of hazardous material during and following an incident.

The base standard specifies messages, data frames, and data elements for the basic underlying communication involved in real-time interagency transportation-related incident management. Refer to the base standard for specification of the scope of the combination of the base standard and companion standards such as this one. Together, the base standard and companion standards shall be referred to as the IEEE 1512 Family of Standards.

Clause 5 and Clause 6 of this standard present the specified messages, data frames, and data elements in ASN.1 format and in XML formats. Collected XML schema entries are presented in Annex B.

1.2 Purpose

This standard provides a framework for the exchange of information concerning coordination among public safety agencies, and between those agencies and traffic management agencies, as part of the management of transportation-related events. That information includes the five types of information listed in Clause 1.

This standard is part of the IEEE 1512 Family of Standards. The purpose of that family of standards as a whole is presented in the base standard and will not be repeated here.

2. References

The following documents shall be used, when applicable, in the process of populating and developing the message sets of this standard. The specific revision and issued date stated shall be used for each document. When the following documents are superseded by an approved revision, the revised version shall be reviewed for applicability.

The references cited below shall be included in the references of the other companion standards unless specifically excepted.

Global Justice XML Data Dictionary, pre-release 3.0.0.0.²

²This publication is commonly referred to as "JXDD" and was developed by the Office of Justice Programs (OJP) of the Dept. of Justice. The authoritative source is <http://www.it.ojp.gov/jxdd>. This effort represents a number of other standards practices, such as the FBI NCIC-2000 and the ANSI D20 standards in XML forms.

IEEE Std 1488™-2000, IEEE Standard for Message Set Template for Intelligent Transportation Systems.^{3,4}

IEEE Std 1489™-1999, IEEE Standard for Data Dictionaries for Intelligent Transportation Systems—Part 1: Functional Area Data Dictionaries.

IEEE Std 1512-2000, IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers.

IEEE Std 1512.1-2003, IEEE Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers.

IEEE Std 1512.3-2002, IEEE Standard for Traffic Incident Management Message Sets for Use by Emergency Management Centers.

ISO/IEC 8824-1:1998, Information technology—Abstract Syntax Notation One (ASN.1): Specification of basic notation.⁵

ISO/IEC 8824-2:1998, Information technology—Abstract Syntax Notation One (ASN.1): Information object specification.

ISO/IEC 8824-3:1998, Information technology—Abstract Syntax Notation One (ASN.1): Constraint specification.

ISO/IEC 8824-4:1998, Information technology—Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.

ITE TCIP-IM, Transit Communications Interface Profiles—Standard on Incident Management Objects, NTCIP 1402v01.02, December 2000.⁶

ITE TMDD, Standard for Functional Level Traffic Management Data Dictionary (TMDD), Standard No. TM1.01.4.

Model Minimum Uniform Crash Criteria Guideline (MMUCC), National Highway Traffic Safety Administration, Federal Highway Administration, second edition, 2003.⁷

SAE J2354-2004, Message Sets for Advanced Traveler Information System (ATIS).⁸

SAE J2540-2002, Messages for Handling Strings and Look-Up Tables in ATIS Standards.

SAE J2540-1-2002, RDS Phrase Lists.

SAE J2540-2-2003, ITIS Phrase Lists (International Traveler Information Systems).

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⁶Joint AASHTO/ITE/NEMA standards are available from the American Association of State Highway and Transportation Officials (AASHTO), 444 North Capitol St. NW, Suite 249, Washington, DC 20001, USA. Also available from the Institute of Transportation Engineers (ITE), 1099 14th Street NW, Suite 300 West, Washington, DC 20005-3438, USA, or the National Electrical Manufacturers Association (NEMA), 1300 N. 17th Street, Suite 1847, Rosslyn, Virginia 22209-3801, USA.

⁷This publication is available from: <http://www.nhtsa.dot.gov/people/performance/trafrecords/pages/mmucc/mmucc.htm>.

⁸SAE publications are available from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096, USA (<http://www.sae.org/>).

SAE J2630-2003, Converting ATIS Message Standards From ASN.1 to XML.

The National EMS Information Standards (NEMSIS), version two. Published under the sponsorship of NHTSA.⁹

Other documents defined in IEEE Std 1512-2000 remain as cited and are included herein by reference.

3. Definitions, acronyms, and abbreviations

For the purposes of this standard, the following definitions, abbreviations, and acronyms apply. If not defined in this clause, English words are used in accordance with their definitions in the latest edition of *Merriam-Webster's New Collegiate Dictionary*. IEEE 100, *The Authoritative Dictionary of IEEE Standards Terms*, Seventh Edition, should be referenced for terms not defined in this clause.

The terms, abbreviations, and acronyms cited below shall be a part of the terms of the other companion standards of this standard unless specifically cited otherwise.

3.1 Definitions

3.1.1 agency data: In the context of this standard, IEEE Std 1512.2-2004, any data that are created by the center or its assets or come under the control of the center as per local data agreements and operating practices.

3.1.2 asset: A piece of equipment used for incident management. Examples include vehicles, traffic control equipment, and closed-circuit television cameras. It is a narrower term than resource in that it does not include teams of response personnel.

3.1.3 assisting agencies: In the scope of this standard, IEEE Std 1512.2-2004, this term refers to another agency (either public or private) that is called in at the request of an incident commander to perform some task. Used within the scope of this standard, this term applies to other agencies that are presumed to *not* have access to IEEE 1512 message set information and who, therefore, may require additional assistance to understand the pertinent details of the current event.

3.1.4 branches: A term used in the Model Procedures Guide (National Fire Service Incident Management Systems Model Procedures and Guides)¹⁰ used by the fire incident command system (ICS) to indicate additional portions of the command structure. The reasons for this can be varied (span of control, complexity, geographic range, etc.). In the scope of this standard, IEEE Std 1512.2-2004, creating branches in an active incident can result in new or moved staging areas and zones, and affect traffic flows in and around an event.

3.1.5 command post: The location where the primary command functions are executed. It is the designated area at the incident scene that functions as the centralized point for multi-agency coordination, on-scene communication, command and control of resources, and information gathering. The command post may be co-located with the incident base or other incident facilities.

3.1.6 disaster medical assistance teams (DMATs): The National Disaster Medical System (NDMS), through the U.S. Public Health Service (PHS), fosters the development of DMATs. A DMAT is a group of professional and paraprofessional medical personnel (supported by a cadre of logistical and administrative staff) designed to provide emergency medical care during a disaster or other event. DMAT teams are

⁹This publication is available from: <http://www.nemsis.org/>.

¹⁰This publication is available from <http://www.fpst.okstate.edu> or <http://www.ifsta.org>.

organized along ICS/UCS lines and are self-contained with limited field supplies for the most part. In addition to the standard DMATs, there are specialized DMATs that deal with specific medical conditions such as crush injury, burn, and mental health emergencies. Other specialty teams include disaster mortuary operational response teams (DMORTs) that provide mortuary services; veterinary medical assistance teams (VMATs) that provide veterinary services; and national medical response teams (NMRTs) that are equipped and trained to provide medical care for victims of weapons of mass destruction.

3.1.7 dispatch: The operation of asking an agency to perform a specified role concerning a specified incident. In some cases, but not all, the operation includes receiving acknowledgment that the specified role will be performed.

3.1.8 diversion route: A route identified to the driving public with signs, traffic routing devices, and flagger and/or media announcements as a mandatory alternative to a congested or closed route. It is distinguished from an alternative route, which is optional.

3.1.9 emergency medical service (EMS): A system represented by one or more agencies that provide mobile emergency medical care for incidents, including both ambulances and the system of hospitals and treatment centers to which an ambulance would transport an injured person.

3.1.10 Fire Ground Command (FGC): FGC is a method of firefighting incident management developed by the Phoenix, Arizona, Fire Department in the 1970s. This was later merged with FIREScope under the auspices of the National Fire Service Incident Management Systems Consortium, to produce the National Fire Service Incident Management System Model Procedures and Guides published by Fire Protection Publications of Oklahoma State University.

3.1.11 FIREScope Incident Command System: The FIREScope Incident Command System is a method of firefighting incident management developed by the state of California in the 1970s. This was later merged with the FGC approach under the auspices of the National Fire Service Incident Management Systems Consortium, to produce the National Fire Service Incident Management Systems Model Procedures & Guides published by Fire Protection Publications of Oklahoma State University.

3.1.12 Global: The Global Justice Information Sharing Initiative (Global), through its Global Advisory Committee (GAC), advises the nation's highest-ranking law enforcement officer, the U.S. Attorney General. Global aids its member organizations and the people they serve through a series of important initiatives, including the *Global Justice XML Data Dictionary*. Global is a "group of groups," representing more than thirty independent organizations spanning the spectrum of law enforcement, judicial, correctional, and related bodies. The Global Infrastructure/Standards Working Group (GISWG) encourages the coordination of information sharing standards within the justice community. This effort includes publishing, cataloging, and sharing these standards (including IEEE Std 1512-2000) to promote collaborative efforts and offering blueprints to those beginning the information exchange planning process. Successful data exchange is greatly facilitated by the development and adoption of standards that enable transparent integration of disparate systems.

3.1.13 incident command post (ICP): A (temporary) command site established at or near the scene of the incident where the ranking on-scene authority operates from and establishes local control of assets and resources assigned to the incident. In some jurisdictions, the ICP can function as a dispatch center for a period of time, and issue and receive messages as a peer with other centers. In other (and most) environments, the ICP receives messages through an intelligent transportation system (ITS) agency dispatch center and is, therefore, not directly visible to the messages of this standard, IEEE Std 1512.2-2004. Visible or not, the ICP forms a primary collection and dissemination point for information regarding the incident itself. Therefore, reuse of common message formats is desirable.

3.1.14 incident response: In the context of this standard, IEEE Std 1512.2-2004, the response from public safety agencies to an incident as distinguished from the response from traffic agencies. It can include a response to an incident that occurs at a planned road closure or special event.

3.1.15 management support team (MST): An MST provides field command and control in a disaster for deployed Federal medical assets. The MST can provide and coordinate communications, transportation, a medical cache, and other logistical support to DMATs and specialty teams. This terminology is used by the medical response community, particularly those using the NDMS.

3.1.16 National Disaster Medical System (NDMS): The NDMS is a Federally coordinated system that augments the nation's emergency medical response capability. The overall purpose of the NDMS is to establish a single integrated national medical response capability for assisting state and local authorities in dealing with the medical and health effects of major peacetime disasters. It also is used to provide support to the military and the Department of Veterans' Affairs medical systems in caring for casualties evacuated back to the U.S. from overseas conflicts.

3.1.17 National Fire Academy (NFA): The NFA is a training and education academy, created by Congress, to "advance the professional development of fire service personnel and other persons engaged in fire prevention and control activities."

3.1.18 National Fire Incident Reporting System (NFIRS): NFIRS is an information system developed and supported by the U.S. Fire Administration (USFA). It is the primary means by which the National Fire Data Center (NFDC) collects information on the incidents of fires in the U.S. The single, largest annual collection of fire data in the world, NFIRS receives incident-based fire data voluntarily from local fire departments through participating state fire marshals who collect, analyze, and forward the information to the NFDC.

3.1.19 National Law Enforcement Telecommunication System (NLETS): NLETS is a distributed database and access systems to assist state and Federal governmental agencies, and other organizations with similar missions, who enforce or aid in enforcing local, state, or Federal laws or ordinances. Technically speaking, NLETS is a computerized, high-speed message switching system created for and dedicated to the criminal justice community. Its sole purpose is to provide for the interstate and/or interagency exchange of criminal justice and criminal justice-related information. The system can receive, store, and forward message traffic from and to all its user agencies. Administrative message traffic on the system includes all types of free-form criminal justice-related data from one point to one or more points. In addition, NLETS supports inquiry into state motor vehicle, driver's license, criminal history, and other state databases.

3.1.20 point of entry (POE): In the NLETS systems, this term is used to define (typically at a state level) where the NLETS "line" actually terminates. In states with computer-to-computer deployments, the POE will be the state computer system that interfaces with the NLETS computer. The POE should not be confused with the control terminal agency. There is no analogous concept in IEEE Std 1512-2000, except in those cases where a physically private LAN connection would be employed to connect centers. More typical in IEEE 1512 deployments would be a multiple set of connection points used for multiple applications (TCIP/IP), and where IEEE 1512 message traffic content was sufficiently secured by other methods.

3.2 Abbreviations and acronyms

AASHTO American Association of State Highway and Transportation Officials

AID automatic incident detection

ALERT™ Advanced Law Enforcement Response Technology

ASN.1	Abstract Syntax Notation One
ATIS	Advanced Traveler Information Systems
AVL	automatic vehicle location
BNICE	biological, nuclear, incendiary, chemical, explosives; also defined by medical users as bombs, nuclear, irritants, chemical, etiological
BOLO	be on the look out (for...)
CAD	computer-aided dispatch
CCP	change center properties
CCTV	closed-circuit television
CFR	Code of Federal Regulations
CMS	changeable message sign
DMAT	disaster medical assistance team
DMORT	disaster mortuary operational response team
DMS	dynamic message sign
DOT	Department of Transportation
DSRC	dedicated short-range communications
DTD	document type definition
E911	enhanced 911
EMS	emergency medical service
EOC	emergency operations center
ERG	<i>2004 Emergency Response Guidebook</i>
FBI	Federal Bureau of Investigation
FOSC	Federal on-scene coordinator
GAC	global advisory committee
GJIN	Global Justice Information Network
GPS	global positioning system
HAR	highway advisory radio
HazMat	hazardous material (slang)

HM	hazardous material or “hazmat” (slang)
HMIS	Hazardous Material Identification System
IAP	incident action plan
ICAO	International Civil Aviation Organization
ICP	incident command post or intelligent clearance practices
ICS	incident command system or incident command structure
ID	identification
IEEE	Institute of Electrical and Electronics Engineers
IEMS	integrated emergency management system
IIR	Institute for Intergovernmental Research
IM	incident management
IMDG	international maritime dangerous goods (Code)
IMS	incident management system
ISO	International Standards Organization
ISP	information service provider
ITE	Institute of Transportation Engineers
ITIS	International Traveler Information System
ITS	intelligent transportation system
JUST	Department of Justice, also known as DOJ
LAN	local area network
LE	law enforcement
LOS	level of service
LRMS	location reference message set
MST	management support team
MUTCD	Manual on Uniform Traffic Control Devices
NA	North America
NCIC	National Crime Information Center

NCMEC	National Center for Missing and Exploited Children
NDMS	National Disaster Medical System
NFA	National Fire Academy
NFIRS	National Fire Incident Reporting System
NFPA	National Fire Protection Association
NIMS	National Incident Management System
NLETS	National Law Enforcement Telecommunication System
NRS	national response system
NTCIP	National Transportation Communications for ITS Protocol
OSHA	Occupational Safety and Health Administration
PIO	public information officer
PPE	personal protective equipment
PSAP	public safety answering point
RF	radio frequency
RMS	records management systems
SAE	Society of Automotive Engineers
SCBA	self-contained breathing apparatus
SDO	standards development organization
TCIP	transit communications interface profiles
TCP/IP	transmission control protocol/Internet protocol
TMC	traffic management center
TMDD	transportation management data dictionary
TOC	traffic operations center
UCS	unified command system or structure
UN	United Nations
VDS	vehicle detection system (or station)
VIN	vehicle identification number

VMS	variable message sign
WZ	work zone
XML	eXtensible markup language

4. Structure of the standard

4.1 Overview

4.1.1 Scope of requirements

The scope of these requirements, and so of this standard, IEEE Std 1512.2-2004, shall extend to the exchange of information supporting real-time, interagency, transportation-related incident management, between transportation agencies, public safety, and public works agencies or centers involved in incident management communications. This standard is intended for interagency aspects of that exchange, though that does not prevent its use in information exchange within any one agency.

These requirements are written using two terms: *agency* refers to an organizational entity such as a TMC or a police department; *center* refers to any node on the communication network involved in incident management. So in this context, an agency may be considered a center, or there may be multiple centers within a given agency. Technically, the term *center* could always be used, but *agency* is used when it is clearer to refer to the organizational entity involved.

The term *transportation-related incident*, for purposes of defining the scope of these requirements, includes, and only includes, the following two types of events:

- a) A non-recurring event, such as a motor vehicle accident, other unplanned road closure, planned road closure, or planned special event (such as a parade, sporting event, or demonstration) that affects transportation services (and so, for example, could be a structural fire, because the incident response affects the traffic grid)
- b) Any transportation-related event reported to a PSAP (Public Safety Access Point, where 911 and other incident-reporting calls are received), whether or not a response is required, and whether or not the event actually affects transportation services

For convenience, the term *transportation-related incident* will be shortened to the word *incident* in this standard.

The requirements specified here flow down systematically from the four basic operations listed in 4.2. As such, they are requirements to be met by the IEEE 1512 Family of Standards as a group of standards. Thus, some of the requirements specified herein may actually be addressed within IEEE Std 1512-2000, IEEE Std 1512.1-2003, or in IEEE Std 1512.3-2002. In these instances, these references are clearly identified in 4.2. The remaining requirements are to be met by this standard, IEEE Std 1512.2-2004.

4.1.2 Conformance with this standard

Conformance shall be as specified in the base standard and its successors.

4.2 Four basic incident management communication operations

These requirements can be framed in terms of the following four basic incident management communication functions listed. For each basic function, data types supporting that function are listed, sorted by standard of

the IEEE 1512 Family of Standards in which each data type is specified. The data types listed here, as specified in this standard, constitute the basis for the requirements that follow in the remainder of Clause 4.

- 1) *Warning information:*
Specified in 4.4: Advise emergency evacuation, request immediate assistance, publish cautions for responders, publish and respond to “watch for” information.
- 2) *Situation awareness:* Collating and disseminating situation status, including:
Specified in other IEEE 1512 standards: Geographic layout, response vehicle locations, asset status, severity, traffic impacts, evacuation plans, care facilities used.
Specified in 4.5: Inform of need for specific response services, track involved persons (including witnesses), response personnel and vehicles.
- 3) *Plan dissemination:*
Specified in other IEEE 1512 standards: Incident-wide response plan, as an ID number, response plan type, text, responding organization and assets, staging areas, evacuation areas, zone information, traffic management plans, and routes: ingress, egress, alternative, diversion, and evacuation.
Specified in 4.6: Incident management command structure.
- 4) *Interagency asset management:*
Specified in other IEEE 1512 standards: Interagency polling for assets, requesting specific assets, granting those requests, arranging asset transfer (physical and/or management of), requesting and receiving asset status information, interagency updating of asset inventory location and status, asset linking (e.g., which equipment is linked to which vehicle).

4.3 More specific requirements

In 4.4, 4.5, and 4.6, the four general requirements in 4.2 that are supported in this standard are expanded into more specific requirements. The specific requirements are presented in the form of explanatory text and tables. Generally, after Table 1, the requirements and tables are arranged so that each table corresponds to a message, and each row in a table corresponds to a data element or data frame within that message.

Many data items in the tables that follow match data elements from Model Minimum Uniform Crash Criteria (MMUCC). Those are marked by reference to MMUCC, followed by the data element designation in that document. Other data items specified here can be used to carry the information of MMUCC data elements, but are not verbatim matches, and are not explicitly marked. The IEEE 1512 Family of Standards supports the transmission of all MMUCC data elements designated as “collected at the scene,” except those data elements that are out of scope in that they do not support real-time, interagency incident management command and control.

To aid in navigation, the following subclauses are summarized in Table 1. Note that the structure of Table 1 replicates three of the four basic incident management communication functions specified in 4.2 that are addressed in this standard.

Table 1—Subclauses and tables specifying requirements

Subclause	Table	Acronym ^a	Requirement
4.4			Warning information
4.1.1	2	ISE	Advise all personnel to immediately evacuate; immediate site evacuation.
4.4.2	3	RIA	Request immediate emergency assistance.
4.4.3	4	CFR	Publish cautions for responders.

Table 1—Subclauses and tables specifying requirements (continued)

Subclause	Table	Acronym ^a	Requirement
4.4.4			“Watch for” cycle
4.4.4.1	5	WCH	Publish watch for message.
4.4.4.2	6	RWF	Respond to a “watch for” message.
4.5			Situation awareness
4.5.1			Inform of need for...
4.5.1.1	7	INL	Law enforcement
4.5.1.2	8	INM	Emergency medical services
4.5.1.3	9	INR	Rescue
4.5.1.4	10	INF	Fire suppression
4.5.1.5	11	INO	Other response
4.5.2			Track persons and vehicles
4.5.2.1	12	TIP	Track involved persons
4.5.2.2	13	TSC	Track response personnel in special circumstances
4.5.2.3	14	TRP	Track response personnel on-site
4.5.2.4	15	TWT	Track witnesses
4.5.2.5	16	TIV	Track involved vehicles
4.6	17		Incident management plan information, management command structure

^aAcronyms are for ease of textual and oral reference only. They do not have to be carried in any message.

4.4 Warning Information

4.4.1 Advise all personnel to immediately evacuate: immediate site evacuation

There are critical times in some incidents where a newly discovered hazard makes it necessary for all response personnel, in fact all people on-site, to evacuate to a safe distance. In cases where multiple agencies are on-site yet are not within shouting distance of each other, an interagency communications network can perform a valuable service by rapidly disseminating that information across agencies. While, as shown in Table 2, there are several data items that can support this requirement, local implementation may designate default values, such that a single button-push can send a message to all personnel to, for example, pull back at least 100 m from the incident and await further guidance. The data items in Table 2 may be implemented with user interfaces that facilitate rapid data entry and rapid understanding of the message.

The information shared when advising all personnel to immediately evacuate shall include the following:

Message name, acronym: Immediate site evacuation, ISE

Table 2—Information for advising all personnel to immediately evacuate

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Evacuation area	Area to be evacuated.
Pull-back distance	Distance to pull back to.
Pull-back direction	Direction in which to exit.
Reassembly area	Area at which to reassemble.
Reason	Reason for evacuation. Examples: sniper fire, explosion hazard, toxic fumes.
Guidance	Guidance to evacuees. Examples: watch out for thrown bricks, run across wind, stay low.

4.4.2 Request immediate emergency assistance

There are critical times in some incidents where an individual, whether a responder or not, requires immediate emergency assistance. As with the requirement in 4.4.1, in cases where multiple agencies are on-site yet are not within shouting distance of each other, an interagency communications network can perform a valuable service by rapidly disseminating that information across agencies. While, as shown in Table 3, there are several data items that can support this requirement, local implementation may designate default values, such that a single button-push can send a message to all personnel that imparts the most critical information. The Details data item in Table 3 may not be compatible with simple and rapid dissemination of the critical information, but perhaps local implementations can develop enumerated lists, annunciators and displays to address that issue. Specifying that data item leaves room for creative development by local implementations.

Note that this circumstance could give rise to special applications of the acknowledgement functionality specified in the base standard. For example, this message could call for human-intervention acknowledgement and “requested action has been initiated,” which is in this case is a “help is on the way” message. Also, depending on the technology, that acknowledgement message could be routed to the person in distress.

The information shared when requesting immediate emergency assistance shall include the following:

Message name, acronym: Request immediate emergency assistance, RIA

Table 3—Information for requesting immediate emergency assistance

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Location	Location of person in distress, if known, the confidence of that location, and (optionally) area designation with associated confidence, e.g., 90% confidence area, if the technology provides that information.
Responder	Flag designating whether the person in distress is a responder or a civilian.
Affiliation	(If a responder) emergency response agency with which the person is affiliated.
Technology	The technology of the distress signal: an enumerated list, with optional local codes.
Details	Free text details as known. Examples: type of distress; collapse danger; no oral confirmation; specify Rapid Intervention Team.

4.4.3 Publish cautions for responders

There are incidents where it can be quite helpful to publish cautions for responders. That is, one agency can identify a need to caution responders from other agencies, in which case an IEEE 1512 interagency message can publish that caution. Some local implementations may choose not to use the premise history data items due to privacy considerations.

The information shared when publishing cautions for responders shall include the following:

Message name, acronym: Cautions for responders, CFR

Table 4—Information for publishing cautions for responders

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Wait for LE	Flag designating: “Wait for law enforcement.”
Why wait	Free text description of why the “Wait for law enforcement” flag is set.
Crime scene	Flag designating: “Declared a crime scene.”
Why crime scene	Free text description of why the crime scene flag is set.
Specific caution	Enumerated list of cautions for responders, with values including but not limited to: sniper fire, gun-wielding, gun shots, hostile patient, uncontained hazardous material (dry, liquid, vapor), chem/bio threat, bomb threat. Local implementation can add local codes to supplement, not replace, enumerated values listed in any of the 1512 family of standard.
Other caution	Free text for cautions not included in enumerated list.

4.4.4 “Watch for” cycle

4.4.4.1 Publish “watch for” message

In some incidents, there is a need for one agency to ask other agencies to “watch for” particular individuals, vehicles, or objects. These requirements are specified to cover any of a number of situations, including where some person, vehicle, or object is missing, with a possibility that it has been misplaced, or taken advertently or inadvertently, or simply that the person, vehicle, or object represents a hazard. Examples could include an employee who has not reported in, a missing vehicle, or a missing variable message sign. In Table 5, data items are specified for persons, vehicles, and objects. A single message could include all three types of things to watch for, though it will probably be more common that only a single type of thing would be described in a single message, or perhaps both a person and a vehicle.

The information shared in a watch for message shall include the following:

Message name, acronym: Watch for, WCH

Table 5—Information for watch for message

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Person to watch for	Description of the person to watch for: Three (indented) data items:
NCIC personal attributes	NCIC-based descriptive attributes. See NCIC 2000 Code Manual ^a for details: name (NAM), gender (SEX), skin tone (SKN), race (RAC), age (AGE), height (HGT), weight (WGT), hair color (HAI), eye color (EYE).
Non-NCIC personal attributes	List of person ID attributes not covered in NCIC personal attributes: role in incident, address, home phone, work phone.
Description	Free text extension as necessary to describe the person.
Vehicle to watch for	Description of the vehicle: Use the data items specified for tracking involved vehicles (see 4.5.2.5), except for location, as known.
Object to watch for	Free text: Description of object to watch for.
Danger	Free text: Specifics of any danger involved.
Reason	Free text: Reason for this message.
Instructs	Free text: Instructions for what to do if the person, vehicle, or object is spotted. Includes who to notify.
Past sightings	A list of past sightings. For each sighting, six (indented) data items:
Location	Free text description of location.
Direction	(If the watched-for item is a vehicle, or a person, or object sighted in a vehicle.) Enumerated list: N, NE, E, SE, S, SW, W, NW.
Speed	(If the watched-for item is a vehicle, or a person, or object sighted in a vehicle.) In miles per hour.
Associated vehicle	Description of any vehicle associated with the sighting. Use only when the watched-for item is a person or object. Use the data items specified for tracking involved vehicles (see 4.5.2.5), except for location, as known.

Table 5—Information for watch for message (continued)

Data items	Description
Associated person	Description of any person associated with the sighting. Use only when the watched-for item is a vehicle or object. Use the three person-data data items used above for person to watch for.
Multiple associated persons	The message shall be able to carry descriptions of multiple “associated persons” as previously specified. Each person shall be described using the three data items specified above.

^aFor more information visit http://www.leds.state.or.us/resources/ncic_2000/ncic_2000_code_manual.htm.

4.4.4.2 Respond to a “watch for” message

The information shared in responding to a watch for message shall include the following:

Message name, acronym: Respond to watch for, RWF

Table 6—Information for response to a watch for message

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Person match	Flag indicating that the person observed matches the person in the watch for message.
Person sighted	Description of the person sighted, as necessary if person differs from or the information is more specific than the description in the watch for message. Use the three person-data data items used in the watch for message: NCIC personal attributes, non-NCIC personal attributes, and description, though in most cases only a few fields can be filled in.
Vehicle match	Flag indicating that the vehicle observed matches the vehicle in the watch for message.
Vehicle sighted	Description of the vehicle, as necessary if it differs from or the information is more specific than the description in the watch for message: Use the data items specified for tracking involved vehicles (see 4.5.2.5), except for location, as known.
Vehicle description	Free text: Extension to description of vehicle sighted, as necessary.
Object match	Flag indicating that the object observed matches the object in the watch for message.
Object sighted	Free text: Description of object observed, as necessary if it differs from or the information is more specific than the description in the watch for message.
Reported sightings	A list of sightings being reported in this response. For each sighting, six (indented) data items:
Location	Free text description of location.
Direction	(If the watched-for item is a vehicle, or a person, or object sighted in a vehicle.) Enumerated list: N, NE, E, SE, S, SW, W, NW.
Speed	(If the watched-for item is a vehicle, or a person, or object sighted in a vehicle.) In miles per hour.

Table 6—Information for response to a watch for message (continued)

Data items	Description
Associated vehicle	Description of any vehicle associated with the sighting. Use only when the watched-for item is a person or object. Use the data items specified for tracking involved vehicles (see 4.5.2.5), except for location, as known.
Associated person	Description of any person associated with the sighting. Use only when the watched-for item is a vehicle or object. Use the three person-data data items used above for person to watch for.
Multiple associated persons	The message shall be able to carry descriptions of multiple “associated persons” as specified above. Each person shall be described using the three data items specified above.
Person aware	Flag indicating that the watched for person is aware that he/she has been observed.
Actions taken	Free text: Description of any actions taken.
Point of contact	POC information of person who made the sighting, or who is managing the sighting information.

4.5 Situation awareness

4.5.1 Inform of need for response services

In many incident management scenarios, there is a need to be able to exchange information about the need for some services at a higher level of generality than a request for an asset. This is particularly true when the requesting agency does not have the expertise to make an accurate request for an asset. Without this message, the general communication concept of operations (“ConOps”) is that an observing agency broadcasts its description of the incident, using the IDX message specified in the base standard. Then all other agencies monitor the network, reading all the IDX messages and searching them for a need for their services. But some local implementations may want to use active inform-of-need messages, so that all centers do not have to monitor all IDX messages, and the system does not have to rely on the IDX-reading diligence of all agencies. The messages specified in this subclause, then, include the IDX message describing the incident to which the inform-of-need applies. That way, the agency receiving the message does not even need to have been keeping track of the current set of incidents.

The messages specified in this subclause recognize that response personnel from one agency often do not have the expertise required to request specific asset needs for response from another agency. So these messages are quite simple and general. More specific requests for involvement would either be made within one agency (and so not addressed by this standard), or would be made in the context of requesting assets, a situation addressed in asset management messages specified in companion standard IEEE Std 1512.1-2003.

A systematic study of tabletop exercises identified the following 12 different cases where “inform-of-need” messages were required. As noted in the following list, of those 12 cases, 1 is handled in the base standard IEEE Std 1512-2000, 5 are handled in the companion standard IEEE Std 1512.1-2003, and 1 is handled in the companion standard IEEE Std 1512.3-2002, leaving 5, placed at the bottom of the following list, to be handled in this standard:

- 1) Evacuation planning and management (addressed in the base standard)
- 2) Traffic management, local traffic control (addressed in companion standard IEEE Std 1512.1-2003)
- 3) Ingress and/or egress routes (same)
- 4) Priority/preemption on an ingress or egress route (same)
- 5) Towing/recovery (same)

- 6) Cleanup and infrastructure repair/replacement (same)
- 7) Hazardous material management (addressed in companion standard IEEE Std 1512.3-2002)
- 8) Law enforcement (see 4.5.1.1)
- 9) EMS (see 4.5.1.2)
- 10) Rescue (see 4.5.1.3)
- 11) Fire suppression (see 4.5.1.4)
- 12) Other response (see 4.5.1.5)

Responses to any of the five messages specified in 4.5.1.1, 4.5.1.2, 4.5.1.3, 4.5.1.4 and 4.5.1.5 corresponding to the last five inform-of-need messages in the above list would be Asgn-Resrc and perhaps Response submessages from the IDX message specified in the base standard, and perhaps IAP messages, specified in 4.6.

4.5.1.1 Inform of need for law enforcement

In many cases, the on-site response personnel, even if they are lacking any law enforcement personnel, can assess the need for law enforcement. This message allows them to send that information to the law enforcement agency, which can then determine the necessary resources and dispatch them. This message is a focused way to command the attention of that agency and ask for a response, without assuming that the agency has been monitoring the network and so is current with regard to that incident.

Note that request for local traffic control is already handled by a message in companion standard IEEE Std 1512.1-2003. The message specified here is to cover all other cases.

The information shared to inform of need for law enforcement shall include the following:

Message name, acronym: Inform of need for law enforcement, INL

Table 7—Information to inform of need for law enforcement

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
IDX	IDX message (specified in the base standard) describing the incident.

Table 7—Information to inform of need for law enforcement (continued)

Data items	Description
Describe need/list	Enumerated list, or an equivalent set of standardized phrases, including but not limited to: (1) armed and/or dangerous; (2) DUI; (3) DUI/juvenile; (4) drunk pedestrian; (5) hit and run; (6) hit and run w/injuries; (7) hit and run w/roadblock; (8) crash; (9) crash w/injuries; (10) patrol car crash; (11) crash w/roadblock; (12) incident (i.e., generic, no other information, or other information specified in the next free text data element); (13) fire; (14) hazmat incident; (15) rock throwing; (16) shooting; (17) animal; (18) impersonating an officer; (19) assault; (20) battery; (21) child abuse/molestation; (22) domestic violence; (23) kidnapping; (24) murder; (25) robbery; (26) strong-arm robbery; (27) sex offense; (28) escaped prisoner; (29) dead person; (30) crash w/fatality; (31) disabled vehicle; (32) missing person; (33) lost/stolen tag; (34) abandoned vehicle; (35) reckless driving; (36) suspicious circumstances; (37) suspicious person; (38) suspicious vehicle; (39) information/intelligence; (40) special detail (i.e., set by local implementation); (41) obstruction on highway; (42) mentally ill person; (43) civil disturbance/disorder; (44) pedestrian/hitchhiker; (45) toll evasion; (46) burglary; (47) larceny; (48) malicious mischief; (49) drug/contraband case; (50) call-box request; (51) sick/injured person; (52) suicide; (53) officer down; (54) bomb threat; (55) juvenile offense; (56) smuggling; (57) aircraft crash; (58) other, specified in the next free text data element. This list is adopted very closely from the local traffic codes of the Florida Highway Patrol (www.fhp.state.fl.us/traffic/codes.html). While many items are not central to transportation-related incidents, any of them could be an attribute of such an incident. Any of these can be extended in the next free text data element.
Describe need/other	Free text description of need for law enforcement not adequately described by the previous enumerated-list data element—either an entirely different description (previous value = (58) other), or an expansion of a value specified in the enumerated list. Examples: “felony in progress,” “crowd control, crowd of about 100 people,” “push people back to a safe perimeter, about 100 people,” “guard high-value cargo spilled on roadway.”

4.5.1.2 Inform of need for Emergency Medical Services

In many cases, the on-site response personnel can assess the number and type of injuries currently on the site, using one of the injury severity indices adopted for this standard, IEEE Std 1512.2-2004. They can also collect data on the status and location of injured persons and fatalities. That data can be encoded in the track involved persons (TIP) message specified in 4.5.2.1. The requirement to inform of need for emergency medical services is included here to specify that the TIP message shall be able to be sent, grouped with an IDX message to an EMS dispatch service, which can then determine the necessary resources and dispatch them. The TIP message, grouped with IDX and used in that way, is a focused way to command the attention of that service and ask for a response, without assuming that the service has been monitoring the network and so is current with regard to that incident.

The information shared to inform of need for emergency medical services shall include the following:

Message name, acronym: Inform of need for emergency medical services, INM

4.5.1.3 Inform of need for rescue

In many cases, the on-site response personnel can assess the number of people in need of rescue. This message allows them to send that information to the fire and rescue agencies, which can then determine the necessary resources and dispatch them. This message is a focused way to command the attention of that agency and ask for a response, without assuming that the agency has been monitoring the network and so is current with regard to that incident.

Table 8—Information to inform of need for emergency medical services

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
IDX	IDX message (specified in the base standard) describing the incident.
TIP message	Message: Tracking involved persons (see 4.5.2.1): A list of involved persons, each one described by person attributes, injury severity, status, location, and free text as necessary.

The information shared to inform of need for rescue shall include the following:

Message name, acronym: Inform of need for rescue, INR

Table 9—Information to inform of need for rescue

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
IDX	IDX message (specified in the base standard) describing the incident.
List of sets of people needing rescue	(Usually only one set of people.) For each set of people, eight (indented) data items:
Number	Number of people in that set of people.
Reason	Reason needing rescue, specified in the next three data items:
Trapped	General nature of entrapment: Enumerated list including but not limited to: (1) trapped; (2) immobile; (3) hostage.
Danger	Enumerated list including but not limited to: (1) no danger; (2) danger of fire; (3) actual fire; (4) danger of toxic fumes or suffocation; (5) toxic fumes or suffocation; (6) danger of collapse; (7) collapse; (8–13) same as 2–7 but involving second story or higher; (14) gunfire; (15) major blood loss; (16) poor vital signs.
Reason	Free text extension of reason rescue is needed.
Urgency	Time before significant degradation in health and/or increase in danger.
Location	Standard location data items.
Location Extension	Free text extension describing location.

4.5.1.4 Inform of need for fire suppression

In many cases, it can be difficult for on-site response personnel to assess the need for fire suppression. This message allows them to pick descriptions from an enumerated list, then send that information to the fire and rescue agencies, which can then determine the necessary resources and dispatch them. This message is a focused way to command the attention of that agency and ask for a response, without assuming that the agency has been monitoring the network and so is current with regard to that incident.

The information shared to inform of need for fire suppression shall include the following:

Message name, acronym: Inform of need for fire suppression, INF

Table 10—Information to inform of need for fire suppression

Data item	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
IDX	IDX message (specified in the base standard) describing the incident.
Fire size	Enumerated list: (1) less than 2 m by 2 m; (2) 2 m by 2 m; (3) 3 m by 3 m; (4) 6 m by 6 m; (5) 9 m by 9 m; (6) 12 m by 12 m; (7) 15 m by 15 m; (8) over 15 m by 15 m. (English units: 5', 10', 20', 30', 40', 50').
Fire type	Enumerated list: (1) brush fire; (2) wild fire (forest); (3) ordinary combustible (paper/wood); (4) flammable liquid; (5) plastic; (6) electrical; (7) flammable metal; (8) hazardous material; (9) other (use next free text data item).
Need ext	Free text: Extension describing need for fire suppression.

4.5.1.5 Inform of need for other response

Local implementation may identify the need to inform of the need for another response not listed in 4.5.1.1, 4.5.1.2, 4.5.1.3, and 4.5.1.4. One example is animal control. This message specifies the format for such a message, allowing the local implementation to specify its own enumerated list, and so that other response agencies can be added. This message is a focused way to command the attention of an agency and ask for a response, without assuming that the agency has been monitoring the network and so is current with regard to that incident.

The information shared to inform of need for other response shall include the following:

Message name, acronym: Inform of need for other response, INO

Table 11—Information to inform of need for other response

Data item	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
IDX	IDX message (specified in the base standard) describing the incident.
Need for other response	Enumerated list, designated by local implementation.
Need extension	Free text: Extension describing need for other response.

4.5.2 Track persons and vehicles

4.5.2.1 Track involved persons

Incident management often involves interagency tracking of involved persons, especially injured persons and fatalities. Local implementation can decide on the concept of operations for maintaining a message tracking that data. That message can be maintained by one agency, with other agencies sending in their updated versions of that message for the central agency to integrate and broadcast, or that message can be exchanged among agencies, with each agency updating it and then broadcasting it. Each local

implementation shall establish its own means of checking for discrepancies between this message and on-scene observations, and what actions are to be taken in the event of discrepancies.

The information shared when tracking involved persons shall include the following:

Message name, acronym: Tracking involved persons, TIP

Table 12—Information for tracking involved persons

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
List of involved persons	A list of persons involved in the incident, whether or not they are uninjured, injured, killed, or still on-site. For each person, the following list of 18 (indented) data items. To protect privacy, name, address, and phone number fields can be blanked or filled with code numbers.
Involved person	Description of the involved person. Use the three person-data data items used in other messages in this standard (e.g., in 4.4.4.1: NCIC personal attributes, non-NCIC personal attributes, and description), although in most cases only a few fields can be filled in.
Person type	Enumerated list, the same as that specified in MMUCC, P3.
Non-motorist number	Tracking number. Matches MMUCC, P21.
Driver license state/province	Use data item from IEEE Std 1512.3-2002, 5.17, with regrouping and add country to match MMUCC, P10. Left blank if person is not driver.
Driver license number	Use data item from IEEE Std 1512.3-2002, 5.17, with regrouping to match MMUCC, P11. Left blank if person is not driver.
Injury severity	Using values specified in Table 12a.
Other attributes	Free text description of person and triage status, as necessary to supplement previous data items.
Status	Enumerated list with values including but not limited to: requires extrication, requires movement out of dangerous area, unattended, attended by non-EMT, attended by EMT, in ALS ambulance, in BLS ambulance, en route to hospital, at hospital.
Vehicle	Vehicle number of which the person is/was an occupant. Use DE specified in IEEE Std 1512.1-2003, 6.8. Matches MMUCC, P5.
Seat position	Enumerated list covering all values specified in MMUCC, P6.
Ejection	Enumerated list: (1) not ejected; (2) totally ejected; (3) partially ejected; (4) not applicable; (5) not reported; (6) unknown. Matches MMUCC, P9.
Trapped	Enumerated list: (1) not trapped; (2) extricated by mechanical means; (3) freed by nonmechanical means; (4) not reported; (5) unknown.
Location	Standard location data items.
Transport-1	Source of transport. Enumerated list: (1) not transported; (2) EMS; (3) law enforcement; (4) other; (5) not reported; (6) unknown. This and the next three data items match MMUCC, P28.
Transport-2	EMS response agency identifier.
Transport-3	EMS response run number.

Table 12—Information for tracking involved persons (continued)

Data items	Description
Care facility	Care facility to which the injury/fatality has been transported. Use one instance of care facilities submessage of IDX message. Message can be repeated to update this data item if actual destination care facility changes.
Care confidence	Confidence in care facility information. Enumerated list including but not limited to: (0) unknown, (1) planned/intended, (2) confirmed arrival.
Responsible agency	ID of agency responsible for the care of injury/fatality.

Table 12a—Injury severity indices

Index name	Description
	Injury severity shall be designated by one of the following two indices:
TriageCode	
TriageCode X	Not injured
TriageCode 0	Injured—triage code has not been assigned
TriageCode 1	Treatable life-threatening illness or injury
TriageCode 2	Serious but not life-threatening
TriageCode 3	Minor injuries, not life-threatening
TriageCode 4	Fatality
MMUCC, P4	
MMUCC, K	Fatal Injury
MMUCC, A	Nonfatal injury—incapacitating
MMUCC, B	Nonfatal injury—non-incapacitating
MMUCC, C	Nonfatal injury—possible
MMUCC, O	No injury
MMUCC, N	Not reported
MMUCC, U	Unknown

4.5.2.2 Track response personnel in special circumstances

Incident management often involves interagency tracking of response personnel in conditions of special hazard, specifically referred to as *special circumstance*: unbreathable atmosphere, confined-space operations, or other special circumstances. As with the information presented in 4.5.2.1, track involved persons, local implementation can decide on the concept of operations for maintaining a message tracking that data. That message can be maintained by one agency, with other agencies sending in their updated versions of that message for the central agency to integrate and broadcast, or that message can be exchanged

among agencies, with each agency updating it and then broadcasting it. Each local implementation shall establish its own means of checking for discrepancies between this message and on-scene observations, and the actions to be taken in the event of discrepancies.

The information shared when tracking response personnel in special circumstances shall include the following:

Message name, acronym: Tracking response personnel in special circumstances, TSC

Table 13—Information for tracking response personnel in special circumstances

Data item	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Circumstance	Description of special circumstance (free text): nature of unbreathable air, confined space, or other special circumstance.
Location	Standard location data items.
Location Extension	Free text description of the space, location, extension of “location.”
Response personnel	A list of response personnel in the special circumstance. For each person, the following list of nine (indented) data items:
Employee ID	Response employee ID.
Tracking code	Special code for that person with a tracking system. Such a system might be based on cell phone or GIS technology.
Agency ID	Agency ID
Status	Enumerated list including but not limited to: (1) no reason for concern; (2) actively reporting conditions OK; (3) no reports, there is concern; (4) based on reports, there is reason for concern; (5) immediately rescue.
More status	Free text extension of “status” data item, including, e.g., reasons for concern, reason why immediate rescue.
Equipment	Equipment carried by that person. Enumerated list.
Equipment extension	Free text extension of equipment carried by that person.
Training	Training of that person. Enumerated list.
Training extension	Free text extension on the training of that person.

4.5.2.3 Track response personnel on-site

Incident management often involves interagency tracking of response personnel on-site. Those personnel are to be tracked according to their presence on-site, regardless of whether or not they are considered “involved.” As with the information presented in the previous subclauses, local implementation can decide on the concept of operations for maintaining a message tracking that data. That message can be maintained by one agency, with other agencies sending in their updated versions of that message for the central agency to integrate and broadcast, or that message can be exchanged among agencies, with each agency updating it and then broadcasting it. Each local implementation shall establish its own means of eyes-on checking for discrepancies between this message and observed ground truth, and actions to be taken in the event of discrepancies.

The information shared when tracking response personnel on-site shall include the following:

Message name, acronym: Tracking response personnel on-site, TRP

Table 14—Information for tracking response personnel on-site

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
List of pairs	A list of each agency that has any personnel on-site. For each such agency, paired with its number of personnel on-site. That is, for each agency with personnel on-site:
Agency ID	ID of response agency.
Number personnel	Number of response personnel from that agency on-site.

4.5.2.4 Track witnesses

Incident management often involves interagency tracking of witnesses. As with the information presented in the previous subclauses, local implementation can decide on the concept of operations for maintaining a message tracking that data. That message can be maintained by one agency, with other agencies sending in their updated versions of that message for the central agency to integrate and broadcast, or that message can be exchanged among agencies, with each agency updating it and then broadcasting it.

This information can be included in message(s) fulfilling the track involved persons requirement specified in 4.5.2.1.

Local implementations can choose to code witness identities to protect privacy, as noted in Table 15.

The information shared when tracking witnesses shall include the following:

Message name, acronym: Tracking witnesses, TWT

Table 15—Information for tracking witnesses

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
List of witnesses	For each witness, the following thirteen data items:
Witness statement	Free text of witness statement.
Role	Role of the witness in the incident.
Last Name	Last name. To protect privacy, this field can be filled with a code number, and the next four data items left blank.
First Name	First name.
Address	Address.
Home Phone	Home phone number.

Table 15—Information for tracking witnesses (continued)

Data items	Description
Work Phone	Work phone number
NCIC personal attributes	NCIC-based descriptive attributes. See NCIC 2000 Code Manual for details: name (NAM), gender (SEX), skin tone (SKN), race (RAC), age (AGE), height (HGT), weight (WGT), hair color (HAI), eye color (EYE).
Witness status	Status of witness: Enumerated list, including but not limited to: injured; in custody, on-site, off site at unknown location, at work, at home.
Witness location	(Geographic) standard location data items.
Insurance carrier	... of the witness.
Insurance policy	... policy number of the witness
Taker ID	ID of person taking the statement.

4.5.2.5 Track involved vehicles

Incident management often involves interagency tracking of involved (i.e., not responder) vehicles. As with the information presented in the previous subclauses, local implementation can decide on the concept of operations for maintaining a message tracking that data. That message can be maintained by one agency, with other agencies sending in their updated versions of that message for the central agency to integrate and broadcast, or that message can be exchanged among agencies, with each agency updating it and then broadcasting it.

The base standard has a submessage of the IDX incident description message for tracking involved vehicles. But since that standard was written, the development of the IEEE 1512 Family of Standards has led to the specification of additional data that would be desirable to track. This requirement can be met with a modification or replacement of the base standard IDX vehicles submessage.

The information shared when tracking involved vehicles shall include the following:

Message name, acronym: Tracking involved vehicles, TIV

Table 16—Information for tracking involved vehicles

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
List of involved vehicles	List of involved vehicles. For each vehicle, the following 14 data items:
Involved vehicle ID	ID # assigned to the involved vehicle.
Involved vehicle type	Type of vehicle.
Involved vehicle damage	Description of damage to vehicle.
Occupant number	Number of occupants.

Table 16—Information for tracking involved vehicles (continued)

Data items	Description
Vehicle data	Message specified in IEEE Std 1512.3-2002, though not all data items in that message need to be supported in this message. Data items from that message to be included here shall include: VIN, make (NCIC VMA), model (NCIC VMO), color (NCIC VCO), year (nnnn), plate, plate type, plate state, axle count.
GVWR	Gross vehicle weight rating of power unit. Enumerated list: (1) less than or equal to 4536 kg (10 000 lb); (2) 4536–11 793 kg (10 001–26 000 lb); (3) more than 11 793 kg (26 000 lb). Matches MMUCC, V27, Subfield 1.
GCWR	Gross combined weight rating, summing GVWRs of power unit and any towed units. Same enumerated list as for GVWR. Matches MMUCC, V27, Subfield 2.
Vehicle role	Enumerated list: (1) non-contact; (2) non-collision; (3) striking; (4) struck; (5) both striking and struck; (6) not reported; (7) unknown.
Most harmful event	Which of the events of the incident was most harmful to this vehicle. Same enumerated list as specified in MMUCC, V21.
Extent of damage	Enumerated list: (1) no damage; (2) minor damage; (3) functional damage; (4) disabling damage; (5) severe/vehicle totaled; (6) not reported; (7) unknown. Matches MMUCC, V24.
Override/Underride	Enumerated list, the same as that specified in MMUCC, V22.
Location	Location of vehicle. Standard location data items.
More text	Free text as necessary to describe the vehicle role and damage not covered elsewhere.
Responsible agency	ID of agency responsible for that vehicle, if any.

4.6 Incident action plan information, incident management command structure

A key concept in incident management is incident action plans (IAPs)—systematic descriptions of the sequence of tasks to be executed to manage the incident. There are a number of IAP formats in use for incident management, such as the Model Procedures Guide for HAZMAT, and FIREScope and FEMA documents. The standard does not replicate any one of those formats. Rather, it specifies that three messages may be used to publish IAP information:

- 1) The MSG_TrafficCntrlPlan, describing the traffic control plan, specified in companion standard IEEE Std 1512.1-2003.
- 2) A standardized format for describing the incident management command structure (see Table 17).
- 3) A message containing a large free text data item to carry a description of any IAP in any format and its format source, which can be sent simply in a file-transfer submessage of IDX, as specified in the base standard.

There are two reasons the standard does not replicate any of the current IAP formats: First, the standard cannot be responsible for “mimicking” the structure of each of those formats, and so effectively being a publisher for those other formats, and maintaining and updating a list of currently used formats. Second, it does not well serve the cause of interoperability to carry different formats.

Any IAP must include or assume a command structure. The rendition of command structure specified in Table 17 is designed to provide a structure that can accommodate any command structure a local implementation could have. The level of complexity of this message is such that local implementations are unlikely to have it filled in “from scratch” in real time, but rather will have prepared structures and a user interface designed to efficiently fill in whatever information would be specific to the current incident.

The nine data items in Table 17, below the line “Common to both ICS and UCS: The command structure tree,” specify the information describing the rest of the “organization tree” of the command structure below the IC/UCS Commanders. The pattern adapted here flexibly captures any organization tree, does not impose any particular tree, and minimizes data entry. It simply lists the possible positions in all of the next layers of the “tree” below IC/UCS Commanders, with each position specifying the position to which it reports. This representation provides all the information the local implementation needs to route messages and present whatever representation of the organization tree is desired (graphical or text). For most incidents that do not exercise an extensive several-layer incident command system, most of the positions will not be filled, and so this list of data items will be quite short. For large incidents with a fully deployed ICS or UCS, the list of data items will be quite long.

The organization tree, in the abstract, extends down to the “bottom” of the tree, i.e., to a single resource with an identified supervisor. A resource can be an individual, team, or task force, either organized around a vehicle or piece of equipment, or not. In practice, local implementation can choose to fill in the Management Command Structure only for the top two or three layers. Below that level, the organization on any lower branches is almost certain to remain within one agency for each branch, and so not be of concern for interagency communication.

Of primary concern for incident management is any change in command structure. Most important is a change in the Incident Commander. Any such change can be announced by publishing an updated Management Command Structure. It is a simple matter for any receiver of such a message to automatically compare it to the previous command structure and highlight any changes.

The information shared describing an incident management command structure shall include the following:

Message name, acronym: Management command structure, MCS

Table 17—Information for IAP, command structure

Data items	Description
Header	Header information specified in the base standard, including the ID of the incident concerned.
Command structure type	What type of command structure is being employed: An enumerated list including but not limited to Incident Command System (ICS) and Unified Command System (UCS) (meaning multiple commanders together executing incident command).
	If ICS, six data items:
IC ID	The ID of the IC.
IC Organization	The organization to which the IC belongs.
IC Location	Geographic location of IC. Standard location data items.
IC Address	Any special information needed to route messages to the IC. That is, in a particular incident the IC may be reached at a special messaging address.

Table 17—Information for IAP, command structure (continued)

Data items	Description
IC POC roles	List of special POC roles fulfilled by the IC: An enumerated list, arranged such that the IC can have multiple roles. The list should include but not be limited to: all POC roles, report-to-upon-arrival-at-site, report-to-upon-arrival-at-staging-area, contact-concerning-any-site-matter, and contact-concerning-any-staging-area-matter. This data item is necessary since report-to and contact roles may shift from incident to incident and do not always associate tightly with the title specified in this message. This data item structure does not allow for mandating the specification of each or any report-to or contact role, but local implementation can impose requirements, such as all report-to and contact roles must be specified or defaulted to, and the guide document can suggest that.
IC coordination roles	List of special coordination roles fulfilled by the IC. An enumerated list, arranged such that the IC can have multiple such roles. The list should include but not be limited to: coordination of: all functions; medical care; triage; on-site safety; hazmat; evacuation; local traffic control; vehicle recovery; witness statements; evidence control; infrastructure assessment/recovery; cleanup. This data item is necessary since coordination roles may shift from incident to incident and do not always associate tightly with the title specified in this message. This data item structure does not allow for mandating the specification of each or any coordination role, but local implementation can impose requirements such as all coordination roles must be specified or defaulted to, and the guide document can suggest that.
	If UCS, one address, then six data items for each commander:
UC Address	The single address to be used for messages to incident command. That is, with UCS, there may be ambiguity as to how to address a message to incident command, unless the address is explicitly specified.
List of Commanders	A list of the multiple agency commanders. For each agency commander, six (indented) data items:
Agency Commander ID	The ID of the agency commander.
A Commander Agency	The organization to which that commander belongs.
A Commander Location	Geographic location of commander.
A Commander Address	Any special information needed to route messages to the commander. That is, in a particular incident the commander may be reached at a special messaging address.
Commander POC Roles	List of special POC roles fulfilled by the commander. An enumerated list, identical to the one above for IC POC roles.
Commander Coordination Roles	List of special coordination roles fulfilled by the commander. An enumerated list, identical to the one above for IC coordination roles.
List of positions	Common to both ICS and UCS: The command structure tree. For each position in that tree, for as many levels down from the top that the local implementation agrees are necessary, the following nine data items:
Title	Titles to match FEMA ICS terminology.
Title Extension	Free text modification of the title. For example, the division of a division supervisor.
ID	ID of the person in the position.
Organization	Organization to which the person belongs.
Location	Geographic location of the person.
Address	Any special information needed to route messages to the person. That is, in a particular incident the person may be reached at a special messaging address.

Table 17—Information for IAP, command structure (continued)

Data items	Description
Reports to	The ID of the person to whom the person reports. If a local implementation adheres to a strict ICS structure, this data item will not be necessary in that it can be inferred from the title of this position. However, the standard shall support implementations that do not adhere to a strict ICS structure, and even in cases where a strict ICS structure is intended, exceptions may be made, in which case the data-entry-minimizing way to record the exception is simply to fill in this data item.
POC roles	List of special POC roles fulfilled by the position: An enumerated list, identical to the one above for IC POC roles, plus one value: All POC roles within the title scope (e.g., LE, EMS).
Coordination roles	List of special coordination roles fulfilled by the position. An enumerated list, identical to the one above for IC coordination role, plus one value: All coordination roles within the title scope (e.g., LE).
Default address	Common to both ICS and UCS: The address to be used when a message is directed to a position that has not been specified in the previous list of positions. That will typically be the IC addr or UC addr previously specified. However, certain implementations may want to specify a separate default address for better message flow control.

5. Message sets and data frames

Incident management (IM) message sets for this standard shall consist of the following message sets and data frames. Each shall be further divided into specific messages and elements as defined in this clause. Typically, these messages shall be made up of message content internal to this standard (made up of DEs that are either simple or complex) and message content external to this standard (from other functional areas and companion standards).

Definitions for these messages are presented in the following subclauses. One style change in the ASN.1 listing should be noted. In former standards in the IEEE 1512 Family of Standards, it was common to add a comment line stating where a foreign data element was taken from. This has been superseded by the use of module definitions where groups of elements taken from a single standard are all placed in a similar module. For example, in the listing that follows, the concept of date and time is taken from the ATIS work. Citations of these elements have the word “ATIS,” followed by a period, before them, as in “ATIS.DateTimePair” in the code. Similar abbreviations are used for TMDD and TCIP. In addition, the ASN is presented in a section called “ASN.1 Representation,” formerly called “Format.” In a similar manner, the equivalent XML expression is presented in a section called “XML Representation,” which follows the translation rule set cited in Clause 2.

Regarding equivalent entries to be placed into a data registry, the mapping between data elements and analogous metadata entries has been explained in a prior clause. In addition, some meta information is constant in this entire standard and need not be repeated with each entry here. These include the sponsor and steward of the entries (IEEE), the registration status (registered once the standard is adopted), and the revision date (the date of the standards adoption). The class name is always ITS and the descriptive name context is Manage Traffic.

The productions of ASN.1 that follow shall be considered normative in nature. While the majority of the normative content is reflected in the actual syntax of the ASN.1, some entries also have additional statements in the ASN.1 comments that shall be considered to be normative as well. In addition, the commentary provided with each entry may also provide additional normative restrictions on the proper use

of the entry that shall be followed. The XML productions follow directly from the ASN.1 specifications and the same rules shall be applied.

5.1 Data frame: DF_IDX_CautionsForResponders

Use: Publish cautions and possible dangers for responders to be aware of about an event.

The structure meets the requirements outlined in Table 4.

ASN.1 Representation

```
CautionsForResponders ::= SEQUENCE {
    refData CHOICE {
        header          Header,
                        -- if not present then the header content of the message
                        -- which carries this DF shall be applied to the context
                        -- of this message. The header has the data creator, time
                        -- stamps, location, and what to do when the message
                        -- becomes old (how to get a fresh one)
        subMessageId    ReferenceID
                        -- the reference value of this sub message
    }, -- # UNTAGGED
    waitOnLE            BOOLEAN,
                        -- if set True, wait for law enforcement
                        -- instructions before proceeding
    rationalLE          FreeText OPTIONAL,
                        -- text regarding the reason for the LE flag to be set
    crimeScene          BOOLEAN,
                        -- if set True, law enforcement has decided that
                        -- the area is to be treated as a crime scene,
                        -- local procedures for this shall be in effect
    rationalCS          FreeText OPTIONAL,
                        -- text regarding the reason for the crime
                        -- scene flag to be set to true
    cautions            SEQUENCE (SIZE(1..8)) OF ResponderCautions OPTIONAL,
                        -- to be a list of responder cautions to be issued
    cautionText         FreeText OPTIONAL,
    ... -- # LOCAL_CONTENT
}
```

XML Representation

```
<xs:complexType name="CautionsForResponders" >
  <xs:sequence>
    <xs:choice >
      <xs:element name="header" type="Header" />
      <!-- if not present then the header content of the message
      which carries this DF shall be applied to the context
      of this message. The header has the data creator, time
      stamps, location, and what to do when the message
      becomes old (how to get a fresh one) -->
      <xs:element name="subMessageId" type="ReferenceID" />
      <!-- the reference value of this sub message -->
    </xs:choice>
    <xs:element name="waitOnLE" >
      <xs:simpleType>
        <xs:restriction base="xs:boolean"/>
      </xs:simpleType>
    </xs:element>
    <!-- if set True, wait for law enforcement
    instructions before proceeding -->
    <xs:element name="rationalLE" type="FreeText" minOccurs="0"/>
    <!-- text regarding the reason for the LE flag to be set -->
```

```

    <xs:element name="crimeScene" >
      <xs:simpleType>
        <xs:restriction base="xs:boolean"/>
      </xs:simpleType>
    </xs:element>
    <!-- if set True, law enforcement has decided that
    the area is to be treated as a crime scene,
    local procedures for this shall be in effect -->
    <xs:element name="rationalCS" type="FreeText" minOccurs="0"/>
    <!-- text regarding the reason for the crime
    scene flag to be set to true -->
    <xs:element name="cautions" minOccurs="0">
      <xs:complexType>
        <xs:sequence minOccurs="1" maxOccurs="8">
          <xs:element name="caution" type="ResponderCautions" />
          <!-- to be a list of responder cautions to be issued -->
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="cautionText" type="FreeText" minOccurs="0"/>
    <xs:element name="localCautionsForResponders" type="local:CautionsForResponders"
minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

```

5.2 Data frame: DF_IDX_ImmediateSiteEvacuation

Use: Advise all personnel to immediately evacuate (immediate site evacuation or pull back).

The structure meets the requirements outlined in Table 2.

ASN.1 Representation

```

ImmediateSiteEvacuation ::= SEQUENCE {
  refData CHOICE {
    header
      Header,
      -- if not present then the header content of the message
      -- which carries this DF shall be applied to the context
      -- of this message. The header has the data creator, time
      -- stamps, location, and what to do when the message
      -- becomes old (how to get a fresh one)
    subMessageId
      ReferenceID
      -- the reference value of this sub message
  }, -- # UNTAGGED
  evacArea
    StagingArea OPTIONAL,
    -- Area to be evacuated
  proceedToArea
    StagingArea OPTIONAL,
    -- Area to reassemble at
  routeSets
    SEQUENCE (SIZE(1..32)) OF RouteSet OPTIONAL,
    -- a set of routes, enclosing routes as per SAE work
    -- as well as detours and itineraries
    -- this structure also provides a human name for
    -- each route and a set of start and end date-times
  pullBackDistance
    LRMS.Distance OPTIONAL,
  pullBackDirection
    ITIS.CompassDirection OPTIONAL,
  rational
    FreeText OPTIONAL,
    -- Examples: sniper fire, explosion hazard,
    -- toxic fumes, etc.
  guidance
    SEQUENCE (SIZE(0..5)) OF Guidance OPTIONAL,
    -- sets of advice and warning phrases
  ... -- # LOCAL_CONTENT
}

```

XML Representation

```

<xs:complexType name="ImmediateSiteEvacuation" >
  <xs:sequence>
    <xs:choice >
      <xs:element name="header" type="Header" />
      <!-- if not present then the header content of the message
      which carries this DF shall be applied to the context
      of this message. The header has the data creator, time
      stamps, location, and what to do when the message
      becomes old (how to get a fresh one) -->
      <xs:element name="subMessageId" type="ReferenceID" />
      <!-- the reference value of this sub message -->
    </xs:choice>
    <xs:element name="evacArea" type="StagingArea" minOccurs="0"/>
    <!-- Area to be evacuated -->
    <xs:element name="proceedToArea" type="StagingArea" minOccurs="0"/>
    <!-- Area to reassemble at -->
    <xs:element name="routeSets" minOccurs="0">
      <xs:complexType>
        <xs:sequence minOccurs="1" maxOccurs="32">
          <xs:element name="routeSet" type="RouteSet" />
          <!-- a set of routes, enclosing routes as per SAE work as well as
          detours and itineraries this structure also provides a human name for each route and a
          set of start and end date-times -->
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="pullBackDistance" type="lrms:" minOccurs="0"/>
    <xs:element name="pullBackDirection" type="itis:CompassDirection"
minOccurs="0"/>
    <xs:element name="rational" type="FreeText" minOccurs="0"/>
    <!-- Examples: sniper fire, explosion hazard,
    toxic fumes, etc. -->
    <xs:element name="guidance" minOccurs="0">
      <xs:complexType>
        <xs:sequence minOccurs="0" maxOccurs="5">
          <xs:element name="guidance-item" type="Guidance" />
          <!-- sets of advice and warning phrases -->
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="localImmediateSiteEvacuation"
type="local:ImmediateSiteEvacuation" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

```

Remarks

NOTE—Remove units from the XML variant above (it is carried in the LRMS part already).¹¹

5.3 Data frame: DF_IDX_NeedEMS

Use: Inform others of the need for EMS. Provide a basic triage count of persons using one of several triage level codes. Local deployments must decide what triage code system is to be used in their deployment; multiple encoding systems must never be used. Note that a count of involved persons at each level of triage can be conveyed and that reference pointers to individual data on some, all, or none of the involved persons can also be attached to each level. Given a valid reference number for a person, additional information can be requested, such as NCIC data elements, where the person was transported for treatment, insurance

¹¹Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

contact data, and additional medical information. This is subject to the local deployment conditional use agreements of such data.

The structure meets the requirements outlined in Table 8.

ASN.1 Representation

```
NeedEMS ::= SEQUENCE {
    refData CHOICE {
        header
            -- if not present then the header content of the message
            -- which carries this DF shall be applied to the context
            -- of this message. The header has the data creator, time
            -- stamps, location, and what to do when the message
            -- becomes old (how to get a fresh one)
        subMessageId
            ReferenceID
            -- the reference value of this sub message
    }, -- # UNTAGGED
    comments      FreeText OPTIONAL,
    classifications SEQUENCE (SIZE(0..5)) OF SEQUENCE {
        class      InjuryCode,
        count       INTEGER (0..1001),
        -- use zero when count is unknown
        -- use 1001 when count exceeds 1000
        refs        SEQUENCE (SIZE(0..1000)) OF ReferenceID OPTIONAL,
        -- a set of pointers to each comeplete person
        -- in this class (if known)
        ...
    },
    -- an entry for each level of triage code
    ... -- # LOCAL_CONTENT
}
```

XML Representation

```
<xs:complexType name="NeedEMS" >
  <xs:sequence>
    <xs:choice >
      <xs:element name="header" type="Header" />
      <!-- if not present then the header content of the message
      which carries this DF shall be applied to the context
      of this message. The header has the data creator, time
      stamps, location, and what to do when the message
      becomes old (how to get a fresh one) -->
      <xs:element name="subMessageId" type="ReferenceID" />
      <!-- the reference value of this sub message -->
    </xs:choice>
    <xs:element name="comments" type="FreeText" minOccurs="0"/>
    <xs:element name="classifications" >
      <xs:complexType>
        <xs:sequence minOccurs="0" maxOccurs="5">
          <xs:element name="classification" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="class" type="InjuryCode" />
                <xs:element name="count" >
                  <xs:simpleType>
                    <xs:restriction base="xs:unsignedShort">
                      <xs:maxInclusive value="1001"/>
                    </xs:restriction>
                  </xs:simpleType>
                </xs:element>
                <!-- use zero when count is unknown
                use 1001 when count exceeds 1000 -->
                <xs:element name="refs" minOccurs="0">
```

```

        <xs:complexType>
          <xs:sequence minOccurs="0" maxOccurs="1000">
            <xs:element name="ref" type="ReferenceID" />
            <!-- a set of pointers to each complete person in
this class (if known) -->
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>
  <!-- an entry for each level of triage code -->
</xs:sequence>
</xs:complexType>
</xs:element>
  <xs:element name="localNeedEMS" type="local:NeedEMS" minOccurs="0"/>
</xs:sequence>
</xs:complexType>

```

Remarks: This message is functionally very similar to several of the descriptive IDX submessages that also carry free text. However, by giving it a unique message name, it is presumed that the user interface between the center where it is sent and the dispatch operators will be developed to give it additional emphasis and significance in how it is displayed, to alert the end user to the urgency of this message.

5.4 Data frame: DF_IDX_NeedFireSuppression

Use: Inform others of the need for fire suppression or other fire-related responses.

The structure meets the requirements outlined in Table 10.

ASN.1 Representation

```

NeedFireSuppression ::= SEQUENCE {
    refData CHOICE {
        header
            Header,
            -- if not present then the header content of the message
            -- which carries this DF shall be applied to the context
            -- of this message. The header has the data creator, time
            -- stamps, location, and what to do when the message
            -- becomes old (how to get a fresh one)
        subMessageId
            ReferenceID
            -- the reference value of this sub message
    }, -- # UNTAGGED
    request
        FreeText OPTIONAL,
    fireSize
        FireSize OPTIONAL,
    fireType
        FireType OPTIONAL,
    otherText
        FreeText OPTIONAL,
    ... -- # LOCAL_CONTENT
}

```

XML Representation

```

<xs:complexType name="NeedFireSuppression" >
  <xs:sequence>
    <xs:choice >
      <xs:element name="header" type="Header" />
      <!-- if not present then the header content of the message
which carries this DF shall be applied to the context
of this message. The header has the data creator, time
stamps, location, and what to do when the message
becomes old (how to get a fresh one) -->
      <xs:element name="subMessageId" type="ReferenceID" />
      <!-- the reference value of this sub message -->
    </xs:choice>
  </xs:sequence>
</xs:complexType>

```

```

    </xs:choice>
    <xs:element name="request" type="FreeText" minOccurs="0"/>
    <xs:element name="fireSize" type="FireSize" minOccurs="0"/>
    <xs:element name="fireType" type="FireType" minOccurs="0"/>
    <xs:element name="otherText" type="FreeText" minOccurs="0"/>
    <xs:element name="localNeedFireSuppression" type="local:NeedFireSuppression"
minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

```

Remarks: This message is functionally very similar to several of the descriptive IDX submessages that also carry free text. However, by giving it a unique message name, it is presumed that the user interface between the center where it is sent and the dispatch operators will be developed to give it additional emphasis and significance in how it is displayed, to alert the end user to the urgency of this message.

5.5 Data frame: DF_IDX_NeedLawEnforcement

Use: Inform others of the need for law enforcement. The value of the IncidentRef, taken together with the incident number in the header, forms a unique sequence that can be used to refer to the event and all its details.

The structure meets the requirements outlined in Table 7.

ASN.1 Representation

```

NeedLawEnforcement ::= SEQUENCE {
    refData CHOICE {
        header
            Header,
            -- if not present then the header content of the message
            -- which carries this DF shall be applied to the context
            -- of this message. The header has the data creator, time
            -- stamps, location, and what to do when the message
            -- becomes old (how to get a fresh one)

        subMessageId
            ReferenceID
            -- the reference value of this sub message
    }, -- # UNTAGGED
    reasonType
        LawEnforcementEventNeed OPTIONAL,
    request
        FreeText OPTIONAL,
    ... -- # LOCAL_CONTENT
}

```

XML Representation

```

<xs:complexType name="NeedLawEnforcement" >
  <xs:sequence>
    <xs:choice >
      <xs:element name="header" type="Header" />
      <!-- if not present then the header content of the message
      which carries this DF shall be applied to the context
      of this message. The header has the data creator, time
      stamps, location, and what to do when the message
      becomes old (how to get a fresh one) -->
      <xs:element name="subMessageId" type="ReferenceID" />
      <!-- the reference value of this sub message -->
    </xs:choice>
    <xs:element name="reasonType" type="LawEnforcementEventNeed" minOccurs="0"/>
    <xs:element name="request" type="FreeText" minOccurs="0"/>
    <xs:element name="localNeedLawEnforcement" type="local:NeedLawEnforcement"
minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

```

Remarks: This message is functionally very similar to several of the descriptive IDX submessages that also carry free text. However, by giving it a unique message name, it is presumed that the user interface between the center where it is sent and the dispatch operators will be developed to give it additional emphasis and significance in how it is displayed, to alert the end user to the urgency of this message.

5.6 Data frame: DF_IDX_NeedOtherServices

Use: Inform others of the need for other (nonspecific) services.

The structure meets the requirements outlined in Table 11.

ASN.1 Representation

```
NeedOtherServices ::= SEQUENCE {
    refData CHOICE {
        header          Header,
                        -- if not present then the header content of the message
                        -- which carries this DF shall be applied to the context
                        -- of this message. The header has the data creator, time
                        -- stamps, location, and what to do when the message
                        -- becomes old (how to get a fresh one)
        subMessageId    ReferenceID
                        -- the reference value of this sub message
    }, -- # UNTAGGED
    request              FreeText,
    ... -- # LOCAL_CONTENT
}
```

XML Representation

```
<xs:complexType name="NeedOtherServices" >
    <xs:sequence>
        <xs:choice >
            <xs:element name="header" type="Header" />
            <!-- if not present then the header content of the message
            which carries this DF shall be applied to the context
            of this message. The header has the data creator, time
            stamps, location, and what to do when the message
            becomes old (how to get a fresh one) -->
            <xs:element name="subMessageId" type="ReferenceID" />
            <!-- the reference value of this sub message -->
        </xs:choice>
        <xs:element name="request" type="FreeText" />
        <xs:element name="localNeedOtherServices" type="local:NeedOtherServices"
minOccurs="0"/>
    </xs:sequence>
</xs:complexType>
```

Remarks: This message is functionally very similar to several of the descriptive IDX submessages that also carry free text. However, by giving it a unique message name, it is presumed that the user interface between the center where it is sent and the dispatch operators will be developed to give it additional emphasis and significance in how it is displayed, to alert the end user to the urgency of this message.

5.7 Data frame: DF_IDX_NeedRescueServices

Use: Inform others of the need for emergency rescue services.

The structure meets the requirements outlined in Table 9.

ASN.1 Representation

```
NeedRescueServices ::= SEQUENCE {
    refData CHOICE {
        header          Header,
                        -- if not present then the header content of the message
                        -- which carries this DF shall be applied to the context
                        -- of this message. The header has the data creator, time
                        -- stamps, location, and what to do when the message
                        -- becomes old (how to get a fresh one)
        subMessageId    ReferenceID
                        -- the reference value of this sub message
    }, -- # UNTAGGED
    history             PremiseHistory OPTIONAL,
    rescues             SEQUENCE (SIZE(1..64)) OF SEQUENCE {
        -- RescueReports
        victimCount INTEGER (0..1001),
        -- use zero when count is unknown
        -- use 1001 when count exceeds 1000
        refs            SEQUENCE (SIZE(0..1000)) OF ReferenceID OPTIONAL,
        -- a set of pointers to each complete person
        -- in this class (if known)
        reason          CHOICE {
            trapped     TrappedList,
            danger      DangerList,
            other       FreeText,
            ...
        } OPTIONAL,
        urgency         INTEGER (0..10) OPTIONAL,
        -- where 10 is most urgent
        where           LRMS.LocationReference OPTIONAL,
        whereText       FreeText OPTIONAL,
        why             FreeText OPTIONAL,
        -- reason for rescue
        lastContact     ATIS.DateTimePair OPTIONAL,
        ...
    },
    ... -- # LOCAL_CONTENT
}
```

XML Representation

```
<xs:complexType name="NeedRescueServices" >
  <xs:sequence>
    <xs:choice >
      <xs:element name="header" type="Header" />
      <!-- if not present then the header content of the message
      which carries this DF shall be applied to the context
      of this message. The header has the data creator, time
      stamps, location, and what to do when the message
      becomes old (how to get a fresh one) -->
      <xs:element name="subMessageId" type="ReferenceID" />
      <!-- the reference value of this sub message -->
    </xs:choice>
    <xs:element name="history" type="PremiseHistory" minOccurs="0"/>
    <xs:element name="rescues" >
      <xs:complexType>
        <xs:sequence minOccurs="1" maxOccurs="64">
          <xs:element name="rescue" >
            <xs:complexType>
              <xs:sequence>
                <!-- RescueReports -->
                <xs:element name="victimCount" >
                  <xs:simpleType>
                    <xs:restriction base="xs:unsignedShort">
                      <xs:maxInclusive value="1001"/>
                    
```

```

        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <!-- use zero when count is unknown
    use 1001 when count exceeds 1000 -->
    <xs:element name="refs" minOccurs="0">
      <xs:complexType>
        <xs:sequence minOccurs="0" maxOccurs="1000">
          <xs:element name="ref" type="ReferenceID" />
          <!-- a set of pointers to each complete person in
this class (if known) -->
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="reason" minOccurs="0">
      <xs:complexType>
        <xs:choice>
          <xs:element name="trapped" type="TrappedList" />
          <xs:element name="danger" type="DangerList" />
          <xs:element name="other" type="FreeText" />
        </xs:choice>
      </xs:complexType>
    </xs:element>
    <xs:element name="urgency" minOccurs="0">
      <xs:simpleType>
        <xs:restriction base="xs:unsignedByte">
          <xs:maxInclusive value="10"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
    <!-- where 10 is most urgent -->
    <xs:element name="where" type="lrms:LocationReference"
minOccurs="0"/>
    <xs:element name="whereText" type="FreeText" minOccurs="0"/>
    <xs:element name="why" type="FreeText" minOccurs="0"/>
    <!-- reason for rescue -->
    <xs:element name="lastContact" type="atis:DateTimePair"
minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="localNeedRescueServices" type="local:NeedRescueServices"
minOccurs="0"/>
</xs:sequence>
</xs:complexType>

```

Remarks: This message is functionally very similar to several of the descriptive IDX submessages that also carry free text. However, by giving it a unique message name, it is presumed that the user interface between the center where it is sent and the dispatch operators will be developed to give it additional emphasis and significance in how it is displayed, to alert the end user to the urgency of this message.

5.8 Data frame: DF_IDX_RequestImmediateAssistance

Use: A request for immediate emergency assistance (a “help” alert message) for a group of persons (one or more) in a related situation.

The structure meets the requirements outlined in Table 3.