The National 911 Program

Next Generation 911 (NG911) Standards Identification and Review

A compilation of existing and planned standards for NG911 systems

Washington, DC
October 2019

DOCUMENT CHANGE HISTORY

The table below details the change history of this Standards Identification and Review document.

Version	Publication Date	Description
1.0	September 21, 2011	Initial Release
2.0	September 7, 2012	Updated Standards
3.0	January 8, 2014	Routine Revision / Updated Standards
4.0	March 4, 2015	Routine Revision / Updated Standards
5.0	March 2016	Routine Revision / Updated Standards
6.0	March 2017	Routine Revision / Updated Standards
7.0	April 2018	Routine Revision / Updated Standards
8.0	July 2019	Routine Revision / Updated Standards

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Introduction

One of the most critical aspects of transforming the nation's public safety answering points (PSAPs) from today's legacy 911 technology to Next Generation 911 (NG911) is adherence to a common set of standards. Development and adoption of international standards is key to achieving 911 interoperability across multiple local, regional, state, and national public safety jurisdictions, and beyond into the global emergency communications environment. Based on conceptual definitions dating from 2000, development began on NG911 standards in 2003 when the National Emergency Number Association (NENA) initiated technical requirements and definition work on core Internet Protocol (IP) functionality and architecture.

Beyond the walls of the 911 PSAPs, the consistent observance of standards is essential in accomplishing seamless transmission of data from the caller to 911, and on to emergency responders. As PSAPs expand the forms of data they receive and transmit to each other, and as emergency responders migrate to a broadband network (e.g., FirstNet), it is essential that standards are established and consistently adopted.

A variety of standards already exist, and many are actively under development. However, there is limited coordination across the broad NG911 community regarding what completed standards are available, what standards overlap, and what standards still need to be established. The National 911 Program, led by the United States (U.S.) Department of Transportation (USDOT), National Highway Traffic Safety Administration (NHTSA), has compiled this list of standards activities related to NG911. The standards development organizations (SDOs) mentioned herein were given the opportunity to vet the contents of this document, to assess the status of specific standards. This is a living document, and the National 911 Program will publish,[1] monitor, support, and promote the activities of SDOs in establishing a comprehensive set of standards for NG911.

The hyperlinks to the standards identified in this document, unless otherwise noted, were verified on July 11, 2019.

Input from the standards community and NG911 stakeholders at large is encouraged and appreciated. The National 911 Program can be reached at (202) 366-3485 or via email at: nhtsa.national911@dot.gov.

[1] Available through the National 911 Program at: http://www.911.gov.

What Is a Standard?

The International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) Guide 2:2004, definition 3.2, defines a standard as a[2]—

> ***document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context***

Standards affect the daily lives of everyone across the nation. From the most mundane aspects of life (e.g., electrical cords and wall sockets) to potentially life and death situations (e.g., the concentration of ingredients in generic medications), standards guide the quality, safety, and security of products or processes. Standards are widely used in all areas throughout the U.S. government and public and private sectors.

Standards can be *voluntary*—by themselves imposing no requirement regarding use—or *mandatory*. Generally, a mandatory standard is published as part of a code, rule, or regulation by a regulatory government body and imposes an obligation on specified parties to conform to it. However, the distinction between these two categories may be lost when voluntary consensus standards are referenced in government regulations, effectively making them mandatory standards.[3] Most standards are ***voluntary, consensus-based***, and ***open***: [4]

- Voluntary—Use of the standard is not mandated by law
- Consensus-based—Published standards have attained general agreement through cooperation and compromise in a process that is inclusive of all interested parties
- Open—Standards are not proprietary and are available for anyone to use

A standard may be or contain intellectual property such as patents, and the intellectual property rights (IPR) may still be held by a company. The American National Standards Institute (ANSI) essential elements state this about patents in ANSI standards:

[2] International Organization for Standardization (ISO), *ISO/IEC Directives, Part 2: Rules for the structure and drafting of International Standards.* Available at: http://www.iec.ch/members_experts/refdocs/iec/isoiecdir-2%7Bed7.0%7Den.pdf.
[3] National Institute of Standards and Technology, *The ABC's of Standards Activities.* Available at: http://ws680.nist.gov/publication/get_pdf.cfm?pub_id=903219.
[4] Research and Innovation Technology Administration (RITA) Intelligent Transport Systems (ITS), *What Are Standards?* Available at: http://www.standards.its.dot.gov/LearnAboutStandards/ITSStandardsBackground.

The ASD shall receive from the patent holder or a party authorized to make assurances on its behalf, in written or electronic form, either:
a) assurance in the form of a general disclaimer to the effect that such party does not hold and does not currently intend holding any essential patent claim(s); or
b) assurance that a license to such essential patent claim(s) will be made available to applicants desiring to utilize the license for the purpose of implementing the standard either:
i) under reasonable terms and conditions that are demonstrably free of any unfair discrimination; or
ii) without compensation and under reasonable terms and conditions that are demonstrably free of any unfair discrimination.[5]

What Are Best Practices?

Typically less formal than standards, best practices are methods or techniques that have been identified as the most effective, efficient, and practical means to achieve an objective. Based on a repeatable process, best practices often emerge as the result of generally accepted principles followed by many individuals, groups, or organizations, which have been established over time. Best practices often supplement the standards process and act as common guidelines for policies and operations.

Stakeholders

Stakeholders in standardization encompass all groups that have an interest in a particular standard because those groups are likely to be most affected by changes and, therefore, want to contribute to the development process. NG911 stakeholders are members of a broad and diverse community of users who generally can be categorized as follows:

- 911 and public safety agencies and authorities
- Vendor community (including hardware and software) and related industries
- Technology, services, and consulting industries
- SDOs and standards setting organizations (SSOs)
- Consumer, research, academic, and consortia communities
- Telematics, third-party call centers, Internet, infrastructure, wireline, and wireless service providers
- Transportation agencies
- Local, state, and federal governments

[5] American National Standards Institute (ANSI), *ANSI Essential Requirements: Due process requirements for American National Standards*, January 2019. Available at: https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/2019_ANSI_Essential_Requirements.pdf.

- Regulatory agencies and public utility commissions
- Professional and trade associations
- The public at large[6]

Standards Organizations

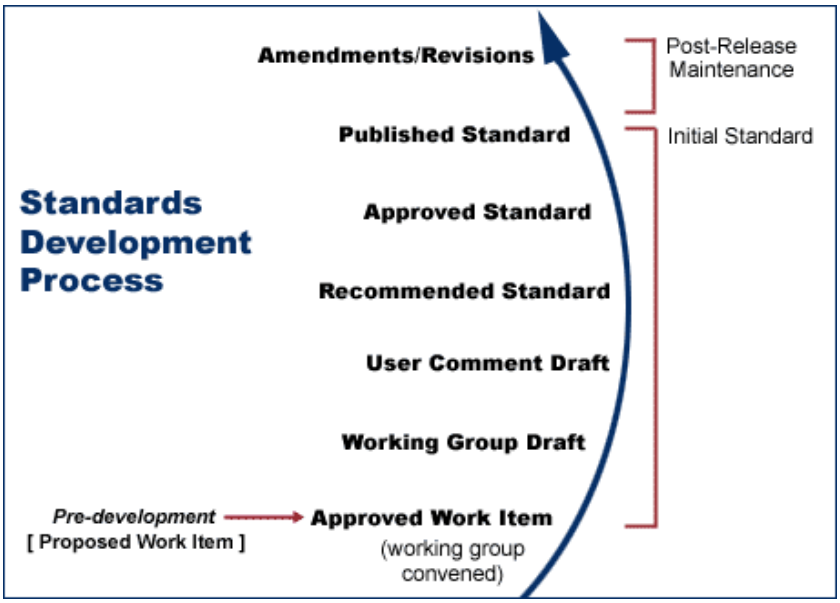
Standards organizations are bodies, organizations, and institutions whose focus is developing and maintaining standards in the interest of a user community. These organizations can be governmental, quasi-governmental, and non-governmental.[7] Typically, their mandate is geographically oriented—international, regional, or national. Organizations that establish, review, and maintain standards are considered to be SDOs,[8] although consortia are sometimes differentiated as SSOs. Generally speaking, SDOs and SSOs consistently adhere to a set of requirements or procedures that govern the standards development process.

How Are Standards Developed?

At the heart of the U.S. standards system are voluntary standards that arise from a formal, coordinated, consensus-based, and open process. Developed by subject matter experts from both the public and private sectors, the voluntary process is open to all affected parties and relies on cooperation and compromise among a diverse range of stakeholders. Organizations also work together to develop joint standards, which forge relationships and allow for a collaborative and cooperative effort. Joint standards will be especially important with respect to the synergistic environment of emergency communications, such as the environment shared by the Nationwide Public Safety Broadband Network (NPSBN) and NG911.

Although the development process may vary to some extent from organization to organization, fundamentally each organization has an established set of formally documented procedures for initiating, developing, reviewing, approving, and maintaining standards. As an example, the following diagram illustrates the USDOT Research and Innovative Technology Administration (RITA) Intelligent Transportation Systems (ITS) standards development process:[9]

[6] Although it is generally accepted that the public is an NG911 stakeholder (as the primary 911 call originator), typically, any involvement with the standards process occurs only when they participate as part of another stakeholder group.
[7] Quasi- and non-governmental standards organizations are often non-profit organizations.
[8] Standards Development Organization or Standard Developing Organization.
[9] Intelligent Transportation Systems Joint Program Office, *Standards Development Process.* http://www.standards.its.dot.gov/LearnAboutStandards/StandardsDevelopment.



The Institute of Electrical and Electronics Engineers (IEEE) emphasizes that standards "are 'living documents', which may initially be published and iteratively modified, corrected, adjusted and/or updated based on market conditions and other factors."[10] Given that standards development is an iterative process, often there are procedures for publishing draft and/or interim documents at different stages in the process prior to formal approval. Once approved, various factors can render standards outdated, including technological advancements and new or revised requirements. ANSI advises periodic maintenance "by review of the entire document and action to revise or reaffirm it on a schedule not to exceed five years from the date of its approval as an American National Standard."[11]

What Is Standards Accreditation?

Typically, process accreditation bodies do not develop standards but instead provide accreditation services for the purpose of assessing and certifying the standards development process of other SDOs. For example, ANSI facilitates development of American National Standards (ANS) by accrediting the procedures of SDOs. Accreditation by ANSI signifies that the procedures used by the standards body, in connection with the development of ANS, meet the Institute's essential requirements for openness, balance, consensus, and due process.[12] Given the voluntary nature of standards, SDOs are not mandated to attain accreditation. However, accreditation does demonstrate adherence and conformity with a formal and recognized standards development

[10] Institute of Electrical and Electronics Engineers (IEEE) Volunteer Training Program, *How are Standards Made?* Available at: http://standards.ieee.org/develop/process.html.
[11] ANSI, *ANSI Essential Requirements: Due process requirements for American National Standards*, January 2019. Available at: https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/2019_ANSI_Essential_Requirements.pdf
[12] ANSI Standards Activities, *Domestic Programs (American National Standards) Overview.* Available at: http://www.ansi.org/standards_activities/domestic_programs/overview.aspx.

process. Given the expense and time involved, not all SDOs pursue accreditation, although they are still likely to adhere to a similarly rigorous standards development process.

Types of Standards

In an effort to organize the numerous standards that are of interest and applicability to the NG911 community, this document groups standards into the following six categories:

- **Product Standard—**Describes the expectations and minimum requirements for a particular product, typically in the context of a specific use. Product standards would most often be reflected in descriptions of hardware, software, and other technology solutions.
- **Interface Standard—**Describes the requirements for connecting two or more systems, or technologies, to one another. User interface standards would describe the interconnection between a human and a machine.
- **Data Standard—**Describes the definition, format, layout, and other characteristics of data stored within a system or shared across systems. Data standards help to ensure the seamless exchange of data between disparate systems and permit a common understanding to interpret and use data consistently.
- **Test Standard—**Describes the test methodologies, processes, and other requirements associated with determining the performance or fitness of a particular product.
- **Performance Standard—**Describes how a product or service should function, often in terms of quality, quantity, or timeliness.
- **Operational Standard—**Describes how a function or business process should occur, setting minimum requirements for performance or delivery. Operational standards could include standard operating procedures (SOPs), training guidelines, and policies.

The first three categories (product, interface, and data) are primarily design standards that describe how a product should be developed and define the particular attributes or characteristics associated with its construction. Alternately, performance standards describe how a product should function and how testing should be used to determine that it meets all affirmed requirements.

The Need for Standards in NG911

It is imperative that the necessary NG911-related standards and technology are determined and available for 911 Authorities and PSAPs to support transitioning to an open, non-proprietary NG911 system. Without the critical standards and technologies in place, service and equipment providers may develop new, vendor-specific solutions. This un-standardized, unplanned approach can and will affect the ability of PSAPs and emergency response entities to effectively share information and be interoperable. Further, without critical processes and protocols (e.g., certification and authentication, routing business rules, and best practices), the benefits of the NG911 system, including routing based on criteria beyond location and connection of service providers beyond common carriers to the 911 system, may not be realized. The appropriate use of standards will ensure the compatibility and interoperability required to realize the full potential of NG911.

Standards Affecting NG911

It is important to identify, understand, and actively monitor those standards that are most likely to have a significant impact on the implementation of NG911. This is consistent with the National Technology Transfer and Advancement Act of 1995[13], which directs government agencies to use "voluntary consensus standards" created by SDOs. Specifically, it instructs federal agencies, such as USDOT, to participate in the standards development process so that these organizations remain aware of USDOT's position on relevant standards. This involvement is expected to influence overall development, thus ensuring that the resulting standard is appropriate for use by federal agencies.

The specific standards identified in this document are limited to those most directly germane to NG911. For example, numerous technical standards are associated with the existing access and originating networks. However, this document undertakes to highlight only those relating to the changes required to support the enhanced capability, such as emergency call support provisioning between the assortment of client devices and Emergency Services IP networks (ESInets). Standards involving network interfaces, including Voice over Packet (VoP), Voice over Internet Protocol (VoIP), or Voice over Digital Subscriber Line (VoDSL), although critical to the end-to-end architecture, are too detailed and non-specific to NG911 for inclusion.

What's New in Standards

Standards and best practices are ever changing to adapt to the current environment. Added in 2016, this new section to the *NG911 Standards Identification and Review* document is included to provide a snapshot of changes that may impact the public safety community. This section is not all inclusive; users are recommended to review any document listed before using it, and should review each document already in use for updates.

3rd Generation Partnership Project (3GPP)

3GPP Release 16 includes several updates to technical standards.

Work continues to refine Release 14 while work on Release 15—which is related to 5G standards—has begun. Meanwhile, Release 16 is scheduled to be completed in March 2020 and will be considered as 5G phase 2.[14]

3rd Generation Partnership Project (3GPP2)

This SDO has been removed as much information and the website is out of date.

Alliance for Telecommunications Industry Solutions (ATIS)

A voluntary agreement for improving location accuracy for emergency calls was developed and signed on November 14, 2014, by the Association of Public-Safety Communication Officials (APCO), NENA, AT&T, Sprint, T-Mobile, and Verizon Wireless. This voluntary agreement

[13] National Technology Transfer and Advancement Act of 1995, P.L. 104-113. Available at: http://www.nist.gov/standardsgov/nttaa-act.cfm.
[14] 3rd Generation Partnership Project (3GPP) Release 16. Available at: https://www.3gpp.org/release-16.

included a roadmap for technology changes that was submitted to the Federal Communications Commission (FCC) in response to an FCC initiative (proceeding 07-114) to provide a number of improvements to emergency location capabilities including providing a dispatchable location for emergency calls to PSAPs. Version 2 of *Location Accuracy Improvements for Emergency Calls,* was released in December 2018.

Association of Public-Safety Communication Officials (APCO)

APCO has several standards in development or revision status.

New or updated:

- APCO ANS 2.106.1-2019: *APCO Public Safety Grade Site Hardening Requirements*
- APCO ANS 1.113.1.2019: *Public Safety Communications Incident Handling Process*
- APCO ANS 1.11.2-2018: *Public Safety Communications Common Disposition Codes for Data Exchange*
- APCO ANS 3.108.2.2018: *Core Competencies and Minimum Training Standards for Public Safety Communications*
- APCO ANS 1.108.1.2018 *Use of TTY/TDD devices in the Public Safety Communications Center*
- APCO ANS 1.115.1-2018: *Core Competencies, Operational Factors, and Training for Next Generation Technologies in Public Safety Communications*

In Development or revision :

- APCO ANS 1.112.1-2014: *Best Practices for The Use of Social Media in Public Safety Communications*
- APCO ANS 3.103.2-2013: *Wireless 9-1-1 Deployment and Management Effective Practices Guide*
- APCO/CSAA ANS 2.101.2-2014: *Alarm Monitoring Company to Public Safety Answering Point (PSAP) Computer-Aided Dispatch (CAD) Automated Secure Alarm Protocol (ASAP)*
- APCO ANS 2.103.1-2012: *Public Safety Communications Common Incident Types For Data Exchange*
- APCO ANS 3.109.2.2014: *Core Competencies and Minimum Training Standards for Public Safety Communications Manager/Director*
- APCO ANS 3.107.1.2015: *Core Competencies and Minimum Training Requirements for Public Safety Communications Technician*
- APCO/NENA ANS 1.102.2-2010: *Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale*
- APCO 2.102.1.201x: *Advanced Automatic Collision Notification (AACN) Data Set*
- APCO 3.110.1-201x: *Cybersecurity Training for Public Safety Communications Personnel*
- APCO 1.117.1-201x: *Public Safety Communications Center Key Performance Indicators*
- APCO 1.118.1-201x: *Key Performance Indicators for Public Safety Communications Personnel*

- APCO 3.112.1-20xx: *Detecting Early Warning Symptoms of Stress in Public Safety Telecommunicators*
- APCO 1.119.1-20xx: *Public Safety Telecommunicator Critical Incident Stress Debriefing (CISD) Program*

Building Industries Consulting Service International (BICSI)

BICSI has released the following standards to provide guidelines and best practices for building a data center. This is important to NG911 as collecting and housing data is a shift away from traditional 911 legacy centers.

- *Data Center Design and Implementation Best Practices*
- *Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices*

Department of Commerce (DOC)

The National Institute of Standards and Technology (NIST) released its *Real-Time Public Safety Data Challenges and Future States.*[15] The report addresses the technical, economic, and governance challenges that need to be addressed for these technologies to provide interoperable communication solutions for all members of the public safety community. NIST's *Security Requirements for Cryptographic Modules* has been updated to address the security requirements related to the secure design, implementation and operation of a cryptographic module.[16] Additionally, NIST is in the process of updating *Mobile Application Single Sign-On: Improving Authentication for Public Safety First Responders.*[17]

Department of Homeland Security (DHS)

In February 2018, SAFECOM published *Recommended Guidelines for Statewide Public Safety Communications Governance Structure.*[18] The purpose was to expand the scope presented in *Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials,*[19] which was published in 2015.

Cybersecurity and Infrastructure Security Agency (CISA): On November 16, 2018, President Trump signed into law the Cybersecurity and Infrastructure Security Agency Act of 2018. This

[15] NIST, *Interoperability of real-time public safety data: Challenges and possible future states*. Available at: https://www.nist.gov/publications/interoperability-real-time-public-safety-data-challenges-and-possible-future-states.
[16] NIST, *Security Requirements for Cryptographic Modules.* Available at: https://nvlpubs.nist.gov/nistpubs/FIPS/NIST.FIPS.140-3.pdf.
[17] NIST, *Mobile Application Single Sign-On: Improving Authentication for Public Safety First Responders (2nd draft).* Available at: https://csrc.nist.gov/publications/detail/sp/1800-13/draft.
[18] DHS, *Recommended Guidelines for Statewide Public Safety Communications Governance Structure.* Available at: https://www.dhs.gov/sites/default/files/publications/SAFECOM%20Rec%20Guidelines%20for%20State%20Governance_FINAL_508C.PDF.
[19] DHS, *Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials.* Available at: *https://www.dhs.gov/sites/default/files/publications/2015%20Governance%20Guide_Master_508c%20Final.pdf.*

landmark legislation elevated the mission of the former National Protection and Programs Directorate (NPPD) within the Department of Homeland Security (DHS) and established CISA, which includes the National Cybersecurity and Communications Integration Center (NCCIC). Prior to the establishment of CISA, NCCIC realigned its organizational structure in 2017, integrating like functions previously performed independently by the U.S. Computer Emergency Readiness Team (US-CERT) and the Industrial Control Systems Cyber Emergency Response Team (ICS-CERT).[20]

Department of Justice (DOJ)

New information was added to the Criminal Justice Information Services (CJIS) Security Policy.[21]

Information Security Forum (ISF)

Standard of Good Practice for Information Security 2018[22] provides comprehensive controls and guidance regarding current and emerging information security topics, enabling organizations to respond to the rapid pace at which threats, technology and risks evolve.

Institute of Electrical and Electronic Engineers (IEEE)

IEEE added a corrigendum to IEEE 802.1AC-2016™, *IEEE Standard for Local and Metropolitan Area Networks—Media Access Control (MAC) Service Definition*, and corrects the value of the LCC Encapsulation EtherType.[23] Additionally, IEEE revised IEEE 802.3-2018, *IEEE Standard for Ethernet*.[24]

International Organization for Standardization (ISO)

ISO updated *Information Technology — Service Management — Part 1: Service Management System Requirements.*[25] This document focuses on service provider requirements for improving a service management system (SMS). *ISO also published part 3 of Information Technology — Security Techniques — A Framework for Identity Management,* which addresses cybersecurity and privacy protection.[26]

National Emergency Number Association (NENA)

NG911 has prompted a review and update of many NENA standards and documents. The following NENA documents have been updated recently or are part of in-progress work:

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[20] DHS, Cybersecurity and Infrastructure. Available at https://www.dhs.gov/cisa/about-cisa.
[21] DOJ, *Criminal Justice Information Services (CJIS) Security Policy*. Available at: https://www.fbi.gov/services/cjis/cjis-security-policy-resource-center.
[22] ISF, *Standard of Good Practice for Information Security 2018*. Available at: https://www.securityforum.org/tool/the-isf-standard-good-practice-information-security-2018/.
[23] IEEE, *Standard for Local and Metropolitan Area Networks—Media Access Control (MAC) Service Definition — Corrigendum 1: Logical Link Control (LLC) Encapsulation EtherType*. Available at: https://ieeexplore.ieee.org/document/8532373.
[24] IEEE, *Standard for Ethernet*. Available at: https://ieeexplore.ieee.org/document/8457469.
[25] ISO, *Information Technology — Service Management — Part 1: Service management system requirements.* Available at: https://www.iso.org/standard/70636.html.
[26] ISO, *Information Technology — Security Techniques — A Framework for Identity Management — Part 3:Practice.* Available at: *https://www.iso.org/standard/57916.html*.

- NENA-STA-015.10-2018 (Originally 02-010): *Legacy NENA Standard Data Formats for E9-1-1 Data Exchange & GIS Mapping*
- NENA-STA-006.1-2018: *GIS Data Model for NG9-1-1*
- NENA-INF-016.2-2018 (Originally NENA 08-506): *Emergency Services IP Network Design (ESIND) Information Document*
- NENA/APCO-REQ-001.1.2.2018: *NENA/APCO Next Generation 9-1-1 Public Safety Answering Point Requirements*
- NENA-STA-028.2-201: *NENA Recommended Generic Standards for E9-1-1 PSAP Intelligent Workstations*
- NENA-STA-027.3-2018: *NENA E9-1-1 PSAP Equipment Standards*
- NENA-REF-010.2-2019 (Originally NENA-INF-006.1-2014): *NG9-1-1 Go-to Handbook*
- NENA-ADM-000.22-2018: *NENA Master Glossary of 9-1-1 Terminology*
- NENA-INF-010.2-2018: *NENA Succession Planning*
- NENA-INF-004.1.2-2018: *NENA Operational Impacts of Devices & Sensors*
- NENA-INF-024.2-2018 (Originally NENA 04-502): *NENA PSAP Site Characteristics Information Document*
- NENA-STA-019.1.2018: *NENA NG9-1-1 Call Processing Metrics Standard*

National Fire Protection Agency (NFPA)

Several standards have been added or updated for this 2019 edition.

- Revised 2019:
  - NFPA 72 – *National Fire Alarm and Signaling Code*
  - NFPA 1221 –*Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*
  - NFPA 1600 – *Standard on Standard on Continuity, Emergency, and Crisis Management*
- Added 2019:
  - NFPA 950 – *Standard for Data Development and Exchange for the Fire Service*
  - NFPA 2400 – *Standard for Small Unmanned Aircraft Systems (sUAS) Used for Public Safety Operations*

Society of Cable Telecommunications and Engineers (SCTE)

Several standards have been added or updated for this 2019 edition.

- SCTE 165-11 2019 – *IPCablecom 1.5 Part 11: Analog Trunking for PBX Specification*
- SCTE 165-13-2019 – *IPCablecom 1.5 Part 13: Electronic Surveillance Standard*
- SCTE 165-14 2019 – *IPCablecom 1.5 Part 14: Embedded MTA Analog Interface and Powering*
- SCTE 165-15 2019 – *IPCablecom 1.5 Part 15: Management Event MIB Specification*
- SCTE 165-17 2019 – *IPCablecom 1.5 Part 17: Audio Server Protocol*
- SCTE 165-19 2019 – *IPCablecom 1.5 Part 19: CMS Subscriber Provisioning Specification*

- SCTE 165-20 2019 – *IPCablecom 1.5 Part 20: MTA Extension MIB*

USTelecom

This section was added to include the 2019 *USTelecom Cybersecurity Toolkit*, which facilitates access to publicly available information regarding venues, participants, public-private partnerships, and other initiatives that compose the cybersecurity ecosystem.[27]

Standards and Best Practices Organizations

This section identifies the work performed and currently underway by professional organizations and SDOs involved with the requirements and specifications pertaining to the implementation of NG911. For each, a summary of the organization includes its purpose (e.g., charter, mission statement), pertinent subgroups within the organization (e.g., committees, working groups), standards involvement, formal activities coordinated with other SDOs, and a statement of the effect of the organization's activities on NG911 implementation. In each case, the information was reviewed by the respective SDO. Additionally, this information provides perspective on the involvement of 911 within the broader world of emergency response and public safety.

For a more detailed look at individual standards, see Appendix A: Standards and Best Practices.

[27] USTelecom, *USTelecom Cybersecurity Toolkit*. Available at: https://www.ustelecom.org/issues/cybersecurity/ustelecom-cybersecurity-toolkit.

3rd Generation Partnership Project (3GPP)

Name	3rd Generation Partnership Project (3GPP)
Type	International Standards Organization—Industry (Mobile Broadband/Universal Mobile Telecommunications System [UMTS])
Summary	3GPP unites seven telecommunications SDOs (Association of Radio Industries and Businesses [ARIB], Alliance for Telecommunications Industry Solutions [ATIS], China Communications Standards Association [CCSA], European Telecommunications Standards Institute [ETSI], Telecommunications Standards Development Society, India [TSDSI], Telecommunications Technology Association, Korea [TTA], and Telecommunication Technology Committee, Japan [TTC]), known as "Organizational Partners," and provides their members with a stable environment to produce the reports and specifications that define 3GPP technologies.
Purpose	The purpose of 3GPP is to prepare, approve, and maintain globally applicable technical specifications and technical reports for: • An evolved 3rd Generation and beyond Mobile System based on the evolved 3GPP core networks, and the radio access technologies supported by the Partners (i.e., UMTS Terrestrial Radio Access [UTRA] both frequency division duplex [FDD] and time division duplex [TDD] modes), to be transposed by the Organizational Partners into appropriate deliverables (e.g., standards). • The Global System for Mobile Communications (GSM) including GSM evolved radio access technologies (e.g., General Packet Radio Service [GPRS] and Enhanced Data Rates for GSM Evolution [EDGE]). • An evolved IP Multimedia Subsystem (IMS) developed in an access independent manner.[28]
Relevant Specification Groups	• TSG CT: The Technical Specification Group (TSG) Core Network and Terminals (CT) is responsible for specifying terminal interfaces (logical and physical), terminal capabilities (e.g., execution environments) and the core network element of 3GPP systems.[29] • TSG SA: The TSG Service and System Aspects (TSG-SA) is responsible for the overall architecture and service capabilities of systems based on 3GPP specifications and, as such, has a responsibility for cross TSG coordination.[30]

[28] 3GPP, *Third Generation Partnership Project Agreement.* Available at: http://www.3gpp.org/ftp/Inbox/2008_web_files/3GPP_Scopeando310807.pdf.
[29] 3GPP, *CT Plenary Core Networks and Terminals.* Available at: https://www.3gpp.org/specifications-groups.
[30] 3GPP, *Service and System Aspects.* Available at: https://www.3gpp.org/specifications-groups.

Standards

- 3GPP TS 23.167: *3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions*
- 3GPP TS 23.228: *3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Stage 2*
- 3GPP TS 23.517: *3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Functional Architecture*
- 3GPP TS 24.229: *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3*
- 3GPP TS 29.010: *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC); Signaling procedures and the Mobile Application Part (MAP)*
- 3GPP TSG SA Release 12*: 3rd Generation Partnership Project; Exploits new business opportunities such as Public Safety and Critical Communications, explores Wi-Fi integration, and system capacity and stability*
- 3GPP TSG SA Release 13: *3rd Generation Partnership Project; 3GPP is considering radio technologies to meet the requirements of very low power consumption and a reduced burden on the network from the growing number of terminals on the IoT* [31]
- 3GPP TSG SA Release 14: *3rd Generation Partnership Project; Focusing at this early stage on Mission Critical enhancements, long-term evolution (LTE) support for V2x services, eLAA, 4-band Carrier Aggregation, inter-band Carrier Aggregation and more*[32]
- 3GPP TSG SA Release 15: *3rd Generation Partnership Project; Focusing in the second half of 2017 to deliver the first set of 5G standards, including new work as well as the maturing of the LTE-Advanced Pro specifications*[33]
- 3GPP TSG SA Release 16: *3rd Generation Partnership Project; Regarded as 5G phase 2 and completes the study into 5G requirements. Prepares the groundwork for IMT-2020*[34]

[31] 3GPP, Release 13. Available at: http://www.3gpp.org/release-13.
[32] 3GPP, Release 14. Available at: http://www.3gpp.org/release-14.
[33] 3GPP, Release 15. Available at: http://www.3gpp.org/release-15.
[34] 3GPP, Release 16. Available at: http://www.3gpp.org/release-16.

Effects on NG911	• Develops standards that enable text and multimedia transmission from the caller to the NG911 system (transport of data). • Develops standards adhered to by originating service providers' (OSP) network and applications services for emergency calling. • Supports location requirements and standards.
Website	• http://www.3gpp.org/

American National Standards Institute (ANSI)

Name	American National Standards Institute (ANSI)
Type	National Standards Organization
Summary	ANSI is a private, not-for-profit organization that oversees development of voluntary consensus standards in the U.S. Activities include accrediting programs, assessing conformance, and approving standards developed by organizations such as ATIS and the Association of Public-Safety Communications Officials, International (APCO). ANSI, itself, does not set standards, but approves and accredits other SDOs. Membership is composed of government agencies, academic and international bodies, and individuals. ANSI is the official U.S. representative to the ISO and, via the U.S. National Committee, the IEC.
Mission	ANSI's mission is to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.[35]
Relevant Standards Panel	• Homeland Defense and Security Standardizations Collaborative (HDSSC): ANSI-HDSSC has as its mission to identify existing consensus standards, or, if none exist, assist government agencies and those sectors requesting assistance to accelerate development and adoption of consensus standards critical to homeland security and homeland defense. Originally established by ANSI in February 2003 as the Homeland Security Standards Panel (HSSP), the HDSSC was renamed in 2013 to reflect a revision of the group's charter expanding its scope to include issues related to homeland defense and to include input from a wider range of government agencies and private groups. The HSSP was originally established to bolster the development of voluntary standards related to homeland security and emergency preparedness. ANSI-HDSSC promotes a positive, cooperative partnership between the public and private sectors to meet the needs of the nation in this critical area.[36]

[35] ANSI, *About ANSI Overview.* Available at: http://www.ansi.org/about_ansi/overview/overview.aspx.
[36] ANSI Standards Activities, *Homeland Defense and Security Standardization Collaborative.* Available at: http://www.ansi.org/standards_activities/standards_boards_panels/hssp/overview.aspx?menuid=3.

Coordinated Activities	• National Institute of Standards and Technology (NIST): A Memorandum of Understanding (MOU) exists between NIST and ANSI that agrees on the need for a unified national approach to develop the best possible national and international standards.[37] • ISO: ANSI is the sole U.S. representative and dues-paying member of the ISO. As a founding member of the ISO, ANSI plays a strong leadership role in its governing body.[38]
Effects on NG911	• Validates the standards development process for SDOs that produce standards affecting NG911.
Website	http://www.ansi.org/

[37] ANSI, *Memorandum of Understanding between the American National Standards Institute (ANSI) and the National Institute of Standards and Technology (NIST)*. Available at: https://share.ansi.org/shared%20documents/About%20ANSI/Memoranda%20of%20Understanding/ansinist_mou.pdf.

[38] ANSI, *ANSI Accredited of U.S. Technical Advisory Groups (TAGs) to ISO.* Available at: http://www.ansi.org/standards_activities/iso_programs/tag_iso.aspx.

Association of Public-Safety Communications Officials (APCO)

Name	Association of Public-Safety Communications Officials-International (APCO)
Type	National Standards Organization (ANSI-accredited)
Summary	APCO is the world's oldest and largest organization dedicated to public safety communications and is an ANSI-accredited SDO committed to ensuring public safety communications personnel have a role in the development of standards that affect the industry. APCO's standards development activities have a broad scope, ranging from actual development of standards to representation of public safety communications organizations in other standards development areas.[39] APCO International develops standards and disseminates information about critical issues such as wireless 9-1-1, staffing and retention, and the impact of emerging technologies. APCO participates in numerous committees, partnerships, and government initiatives. APCO supports agencies around the country grappling with the industry's toughest issues by delivering a variety of resources and engaging in the latest research to find common solutions.[40]
Mission	APCO is an international leader committed to providing complete public safety communications expertise, professional development, technical assistance, advocacy and outreach to benefit our members and the public.
Relevant Committees	• 9-1-1 Emerging Technologies: The 9-1-1 Emerging Technologies Committee identified issues and made recommendations to the standards development for data delivery in an all IP environment. This committee provided subject-matter experts to the International Committee related to U.S. 9-1-1 issues, established at least two strategic alliances related to the mission of APCO, provided leadership opportunities for committee members by establishing work groups within the 9-1-1 Emerging Technologies Committee, and established a 9-1-1 public policy work group to identify key areas of public policy that APCO should influence or advocate for related 9-1-1 operations.[41]

[39] APCO, *About APCO.* Available at: https://www.apcointl.org/about-apco.html and https://www.apcointl.org/standards.html.
[40] APCO, *9-1-1 Resources.* Available at: http://www.apcointl.org/resources.html.
[41] APCO, *9-1-1 Emerging Technologies Committee.* Available at: https://apconetforum.org/eweb/DynamicPage.aspx?Webcode=APCOCommDescript&APCOcmt_key=11e96d6f-46f8-4044-be27-a7aa8233b72f.

Relevant Projects

- Project 25: A joint effort of APCO and the National Association of State Telecommunications Directors, Project 25 concerns the development of standards for digital telecommunications technology, including an objective to determine consensus standards for digital radio equipment embracing elements of interoperability, spectrum efficiency, and cost economies.[42]
- Project 36: This project was developed to research and develop universal standards for computer aided dispatch (CAD) and CAD-to-CAD exchanges. The goal was to develop effective processes for the exchange of data between third-party call centers such as alarm companies and PSAPs.[43]
- Project 42 (Global Operating Picture): The goal of Project 42 is to identify those areas where standards are needed to achieve system interoperability and create a common operating picture at all levels, horizontal and vertical.[44]
- Project 43 (Broadband Implications for the PSAP): The goal of Project 43 is to help telecommunicators, PSAPs, 9-1-1 authorities, emergency operations centers, and others prepare for evolving broadband communications technologies that will impact PSAP operations and support emergency responders.[45]

Standards

- APCO/NENA ANS 1.107.1-2015: *Standard for the Establishment of a Quality Assurance and Quality Improvement Program for Public Safety Answering Points*
- APCO ANS 1.116.1-2015: *Public Safety Communications Common Status Codes for Data Exchange*
- APCO ANS 1.112.1-2014: *Best Practices for The Use of Social Media in Public Safety Communications*
- APCO ANS 1.110.1-2015: *Multi-Functional Multi-Discipline Computer Aided Dispatch (CAD) Minimum Functional Requirements*
- APCO/NPSTC ANS 1.104.2-2017: *Standard Channel Nomenclature for the Public Safety Interoperability Channels*
- APCO ANS 1.101.3-2015: *Standard for Public Safety Telecommunicators When Responding to Calls of Missing, Abducted and Sexually Exploited Children*
- APCO/NENA ANS 1.105.2-2015: *Standard for Telecommunicator Emergency Response Taskforce (TERT) Deployment*
- APCO ANS 3.103.2-2013: *Wireless 9-1-1 Deployment and Management Effective Practices Guide*
- APCO ANS 1.111.2-2018: *Public Safety Communications Common Disposition Codes for Data Exchange*

[42] APCO, *Project 25.* Available at: https://www.apcointl.org/spectrum-management/resources/interoperability/p25.html.
[43] APCO, *APCO Projects.* Available at: http://apcointl.org/about-apco/apco-projects.html.
[44] Ibid.
[45] APCO, *APCO Project 43.* Available at: http://apconetforum.org/eweb/DynamicPage.aspx?WebCode=APCOProject43.

Standards (continued)

- APCO/CSAA ANS 2.101.2-2014: *Alarm Monitoring Company to Public Safety Answering Point (PSAP) Computer-Aided Dispatch (CAD) Automated Secure Alarm Protocol (ASAP)*
- APCO ANS 2.103.1-2012: *Public Safety Communications Common Incident Types for Data Exchange*
- APCO ANS 3.101.3-2017: *Core Competencies and Minimum Training Standards for Public Safety Communications Training Officer (CTO)*
- APCO ANS 3.108.2.2018: *Core Competencies and Minimum Training Standards for Public Safety Communications Instructor*
- APCO ANS 3.106.2-2017: *Core Competencies and Minimum Training Standards for Public Safety Communications Quality Assurance Evaluator* (QAE)
- APCO ANS 3.102.2-2017: *Core Competencies and Minimum Training Standards for Public Safety Communications Supervisor*
- APCO ANS 3.109.2.2014: *Core Competencies and Minimum Training Standards for Public Safety Communications Manager/Director*
- APCO ANS 3.104.2-2017: *Core Competencies and Minimum Training Standards for Public Safety Communications Training Coordinator*
- APCO ANS 3.103.2.2015: *Minimum Training Standards for Public Safety Telecommunicators*
- APCO ANS 3.107.1.2015: *Core Competencies and Minimum Training Requirements for Public Safety Communications Technician*
- APCO/NENA ANS 3.105.1-2015: *Minimum Training Standard for TTY/TDD Use in the Public Safety Communications Center*
- APCO/NENA 2.105.1-2017: *NG9-1-1 Emergency Incident Data Document (EIDD)*
- APCO/NENA ANS 1.102.2-2010: *Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale*
- APCO 1.108.1-2018*: Use of TTY/TDD devices in the Public Safety Communications Center*
- APCO 1.113.1-2019: *Public Safety Communications Call Handling Process*
- APCO ANS 1.114.1-2017: *APCO Recommended Best Practices for PSAPs When Processing Vehicle Telematics Calls from Telematics Service Providers*
- APCO ANS 1.115.1-2018: *Core Competencies, Operational Factors, and Training for Next Generation Technologies in Public Safety Communications*
- APCO ANS 2.106.1-2019: *Public Safety Grade Site Hardening*
- APCO ANS 2.102.1.201x: *Advanced Automatic Collision Notification (AACN) Data Set*
- APCO ANS 3.110.1-201x: *Cybersecurity Training for Public Safety Communications Personnel*
- APCO ANS 1.117.1-201x: *Public Safety Communications Center Key Performance Indicators*
- APCO ANS 1.118.1-201x: *Key Performance Indicators for Public Safety Communications Personnel*
- APCO ANS 3.112.1-20xx: Detecting Early Warning Symptoms of Stress in Public Safety Telecommunicators
- APCO ANS 1.119.1-20xx: *Public Safety Telecommunicator Critical Incident Stress Debriefing (CISD) Program*

Coordinated Activities	• ANSI: As an ANSI-accredited Standards Developer (ASD), APCO is dedicated to ensuring public safety communications personnel have a role in the development of standards that affect communications professionals.[46]
Website	http://www.apcointl.org/

[46] APCO, *APCO Standards Overview.* Available at: http://www.apcointl.org/standards.html.

Alliance for Telecommunications Industry Solutions (ATIS)

Name	Alliance for Telecommunications Industry Solutions (ATIS)
Type	Standards Setting Organization—Industry (Telecommunications)
Summary	ATIS is a standards organization that develops technical and operational standards for the telecommunications industry. Member companies include telecommunications service providers, equipment manufacturers, public sector entities, and others. ATIS is accredited by ANSI; is a member organization of other standards organizations, including the Radiocommunication Sector (ITU-R) and Standardization Sector (ITU-T) of the ITU; and is an Organizational Partner of 3GPP. The priorities that ATIS is currently addressing include the following: • Advancing the 5G network, with a focus on North American requirements contributing to a global 5G standard • Bringing a comprehensive problem-solving approach to the all-IP network transition and ensuring it proceeds at the desired pace of the industry • Creating solutions and an overall industry framework for addressing cybersecurity threats • Developing open source solutions in the context of an interoperable standards environment • Creating the next-generation emergency communications advances that the market demands[47]
Relevant Committees/ Subcommittees	• Emergency Services Interconnection Forum (ESIF): ESIF, composed of wireless and wireline network service providers, manufacturers, public sector entities, and providers of support services, facilitates identification and resolution of technical issues related to the interconnection of telephony and emergency services networks.[48] ○ Next Generation Emergency Services (NGES) Subcommittee: The NGES Subcommittee coordinated emergency services needs and issues with and among SDOs and industry forums/committees, and within and outside ATIS; and developed emergency services (e.g., Enhanced 9-1-1 [E9-1-1]) standards and other documentation related to advanced (i.e., next generation) emergency services architectures, functions, and interfaces for communications networks.

[47] ATIS, *About ATIS.* Available at: http://www.atis.org/01_about/overview/.
[48] ATIS, *Emergency Services Interconnection Forum.* Available at: http://www.atis.org/01_committ_forums/ESIF/index.asp.

Relevant Committees/ Subcommittees (continued)

  - Emergency Services & Methodologies (ESM) Subcommittee: The mission of the ESIF ESM Subcommittee is to provide a set of minimum, practical requirements that will ensure consistent, valid, verifiable, and reproducible location data in a variety of access environments based on sound engineering and statistical practice.[49]
- Next Generation Interconnection Interoperability Forum (NGIIF): NGIIF addresses next generation network interconnection and interoperability issues associated with emerging technologies. It develops operating procedures that involve the network aspects of architecture, disaster preparedness, installation, maintenance, management, reliability, routing, security, and testing between network operators, with a current focus on call completion.[50]
- Packet Technologies and Systems Committee (PTSC): PTSC develops and recommends standards and technical reports related to packet services and packet service architectures, in addition to related subjects under consideration in other North American and international standards bodies.[51]
- Wireless Technologies and Systems Committee (WTSC): WTSC develops and recommends standards and technical reports related to wireless and/or mobile services and systems, including service descriptions and wireless technologies. WTSC also develops and recommends positions on related subjects under consideration in other North American, regional, and international standards bodies.[52]
  - Emergency Location (ELOC) Task Force: The ELOC Task force was established to focus on the North American specific aspects for improving emergency location capabilities and services.[53]
- Telecom Management and Operations Committee (TMOC): The TMOC develops operations, administration, maintenance and provisioning standards, and other documentation related to Operations Support System (OSS) and Network Element (NE) functions and interfaces for communications networks - with an emphasis on standards development related to U.S. communication networks in coordination with the development of international standards.[54]

[49] ATIS, *Emergency Services & Methodologies (ESM) Subcommittee.* Available at: http://www.atis.org/01_committ_forums/ESIF/.
[50] ATIS, *NGIIF: Next Generation Interconnection Interoperability Forum*. Available at: http://www.atis.org/01_committ_forums/NGIIF/index.asp.
[51] ATIS, *Packet Technologies and Systems Committee (PTSC).* Available at: http://www.atis.org/01_committ_forums/PTSC/index.asp.
[52] ATIS, *Wireless Technologies and Systems Committee (WTSC).* Available at: http://www.atis.org/01_committ_forums/WTSC/index.asp.
[53] ATIS, *Wireless Technologies and Systems Committee (WTSC).* Available at: https://www.atis.org/0160/jointinfo.asp.
[54] ATIS, *Telecom Management and Operations Committee (TMOC).* Available at: http://www.atis.org/01_committ_forums/TMOC/index.asp.

Standards

- ATIS-0100022.2008(R2013): *Priority Classification Levels for Next Generation Networks*
- ATIS-0300104: *Next Generation Interconnection Interoperability Forum (NGIIF) NGN Reference Document - NGN Basics, Emergency Services, NGN Testing, and Network Survivability*
- ATIS-*0300116: Interoperability Standards between Next Generation Networks (NGN) for Signature-Based Handling of Asserted Information Using Tokens (SHAKEN)*
- ATIS-0500001: *High Level Requirements for Accuracy Testing Methodologies*
- ATIS-0500002.2008(R2013): *Emergency Services Messaging Interface (ESMI)*
- ATIS-0500003: *Routing Number Authority (RNA) for pseudo Automatic Number Identification Codes (pANIs) Used for Routing Emergency Calls: pANI Assignment Guidelines and Procedures*
- ATIS-0500004*: Recommendation for the Use of Confidence and Uncertainty for Wireless Phase II*
- ATIS-0500005: *Standard Wireless Text Message Case Matrix*
- ATIS-0500006.2008(R2013): *Emergency Information Services Interfaces (EISI) ALI Service*
- ATIS-0500007.2008: *Emergency Information Services Interface (EISI) Implemented with Web Services*
- ATIS-0500008: *Emergency Services Network Interfaces (ESNI) Framework*
- ATIS-0500009*: High Level Requirements for End-to-End Functional Testing*
- ATIS-0500013: *Approaches to Wireless E9-1-1 Indoor Location Performance Testing*
- ATIS-0500015.2010: *Flexible LDF-AMF (Location Determination Function – Access Measurement Function) Protocol (FLAP) Specification*
- ATIS-0500017: Technical Report: *Considerations for an Emergency Services Next Generation Network (ES-NGN)*
- ATIS-0500018: *P-ANI Allocation Tables for ESQKs, ESRKs, and ESRDs*
- ATIS-0500019.2010: *Request for Assistance Interface (RFAI) Specification*
- ATIS-0500021: *Supplemental Location Data*
- ATIS-0500022: *Test Plan Input for a Location Technology Test Bed*
- ATIS-0500023: *Applying Common IMS to NG9-1-1 Networks*
- ATIS-0500024: Technical Report: *Comparison of SIP Profiles*
- ATIS-0500025: *Class of Service Support for Semi-Static Wireless*
- ATIS-0500026: *Operational Impacts on Public Safety of ATIS-0700015, Implementation of 3GPP Common IMS Emergency Procedures for IMS Origination and ESInet/Legacy Selective Router Termination*
- ATIS-0500027: *Recommendations for Establishing Wide Scale Indoor Location Performance*
- ATIS-0500028: Technical Report*: Analysis of Unwanted User Service Interactions with NG9-1-1 Capabilities*
- ATIS-0500030: *Guidelines for Testing Barometric Pressure-Based Z-Axis Solutions*

Standards (continued)

- ATIS-0500031: *Test Bed and Monitoring Regions Definition and Methodology*
- ATIS-05-00032: *ATIS Standard for Implementation of an IMS-based NG9-1-1 Service Architecture*
- ATIS-0700015.v003: *ATIS Standard for Implementation of 3GPP Common IMS Emergency Procedures for IMS Origination and ESInet/Legacy Selective Router Termination*
- ATIS-0700025: *CMAS International Roaming Specification*
- ATIS-0700028 V002: *Location Accuracy Improvements for Emergency Calls*
- ATIS-1000010.2006(R2011): *Support of Emergency Telecommunications Service ETS in IP Network*
- *ATIS-1000012.2006: Signaling System No. 7 (SS7) – SS7 Network and NNI Interconnection Security Requirements and Guidelines*
- *ATIS-1000019: Network to Network Interface (NNI) Standard for Signaling and Control Security for Evolving VoP Multimedia Networks*
- ATIS-1000023.2013*: ETS Network Element Requirements for A NGN IMS Based Deployments*
- ATIS-1000026.2008(R2013): *Session Border Controller Functions and Requirements*
- ATIS-1000029.2008: *Security Requirements for NGN*
- ATIS-1000034.2010(R2015): *Next Generation Network (NGN): Security Mechanisms and Procedures*
- *ATIS-1000038: Technical Parameters for IP Network to Network Interconnection Release 1.0*
- *ATIS-1000040: Protocol Suite Profile for IP Network to Network Interconnection Release 1.0*
- *ATIS-1000041: Test Suites for IP Network to Network Interconnection Release 1.0*
- ATIS-1000049: *End-to-End NGN GETS Call Flows*
- ATIS-1000055.2013: *Emergency Telecommunications Service (ETS): Core Network Security Requirements*
- ATIS-1000060.2014: *Emergency Telecommunications Service (ETS): Long Term Evolution (LTE) Access Network Security Requirements for National Security/Emergency Preparedness (NS/EP) Next Generation Network (NGN) Priority Services*
- ATIS-1000061.2015: *LTE Access Class 14 for National Security and Emergency Preparedness (NS/EP) Communications*
- ATIS-1000065.2015: *Emergency Telecommunications Service (ETS) Evolved Packet Core (EPC) Network Element Requirements*
- ATIS-1000066.2016: *Emergency Telecommunications Service (ETS) Network Element Requirements for IMS-based Next Generation Network (NGN) Phase 2*
- ATIS-*1000679.2015: Interworking between Session Initiation Protocol (SIP) and ISDN User Part*
- ATIS-1000067.2015: *IP NGN Enhanced Calling Name (eCNAM)*

Standards (continued)

- ATIS-1000068: *Support of TTY Service over IP Using Global Text Telephony* ATIS-1000070: *Emergency Telecommunications Service (ETS) Roadmap*
- ATIS-1000071: *Technical Report on a Nationwide Number Portability Study*
- ATIS-1000072: *Analysis of Mitigation Techniques for Calling Party Spoofing*
- ATIS-1000679.2015: *Interworking between Session Initiation Protocol (SIP) and ISDN User Part*
- ATIS 1000678.v3.2015: *Lawfully Authorized Electronic Surveillance (LAES) for Voice over Internet Protocol in Wireline Telecommunications Networks* (In Revision)
- ELOC Issue 61: *Guidelines for Emergency Call Location Selection and Reporting by Originating Networks*
- ELOC Issue 66: *Requirements and Architecture for Accessing External Enterprise Location Services*
- ESIF Issue 81: *Applying Common IMS to NG9-1-1 Networks (Stage 2 & 3 Specification)* (In Development)
- ESIF Issue 82: *IMS-based Next Generation Emergency Services Network Interconnection*
- ESIF Issue 84: *Approaches to Establishing Wide Scale Indoor Location Performance*
- ESIF Issue 85: *Supplemental Guide to ATIS-0700015 for Public Safety*
- ESIF Issue 86: *Technical Report to describe ATIS-0700015 for Public Safety*
- ESIF Issue 87: *Vertical Axis Measurement Test Methodology*
- ESIF Issue 91: *Implementation Guidelines for ATIS Standard for Implementation of a 3GPP Common IMS-based Emergency Services Network*
- ESIF Issue 93: *Gap Analysis of Legacy & IP Networks for FCC Reportable Data Points*
- ANSI/J-STD-036-C: *Enhanced Wireless 9-1-1 Phase 2*
- ANSI/J-STD-036-C-1: *Addendum to J-STD-036-C- Enhanced Wireless 9-1-1 Phase 2*
- J-STD-110.v002: *Joint ATIS/TIA Native SMS/MMS to 9-1-1 Requirements & Architecture Specification*
- J-STD-110.01.v002: *Joint ATIS/TIA Implementation Guideline for J-STD-110, Joint ATIS/TIA Native SMS/MMS to 9-1-1 Requirements and Architecture Specification, Release 2*
- NGIIF Issue 27: *Documentation of Operational Procedures for Next Generation Networks Interconnection*
- NGIIF Issue 31: *Develop New Text Related to Methodologies That Support TDM/IP Caller ID Services, Call Spoofing, Etc.*
- PTSC Issue 28: *US Standard For IP-IP Network Interconnection - Roadmap Standard*
- PTSC Issue 66: *NGN Architecture Phase 2*
- PTSC Issue 81: *ETS Wireline Access Requirements*

Standards (continued)	• PTSC Issue 82: *ETS Phase 2 Network Element Requirements* • PTSC Issue 93: *NGN Security Planning & Operations Guidelines* • PTSC Issue 98: *ETS Roadmap* • PTSC Issue 100: *Supplement to ATIS-1000010* • PTSC Issue 119: *Dynamic Priority for Next Generation Secure Communications* • WTSC Issue 32: *Support of Public Safety Requirements in LTE Networks* • WTSC Issue 34: *Automating Location Acquisition for Non-Operator-Managed Over-the-Top VoIP Emergency Services Calls* • WTSC Issue 41: *Commercial Mobile Alerts Service (CMAS) International Roaming* • WTSC Issue 44: *Extending ATIS0700015 to Address Multimedia Emergency Services (MMES)* • WTSC Issue 51: *Location Accuracy Improvements for Emergency Calls* • WTSC Issue 60: *Real-Time-Text (RTT)* • WTSC Issue 65: *S8 Home Routing (S8HR) and Home Network-Based Enhanced Services Support of NG9-1-1*
Coordinated Activities	• 3GPP, ETSI, ITU, and NENA: The NGES Subcommittees emphasizes standards development as it relates to North American communications networks, in coordination with the development of standards activities, including relevant ATIS committees (e.g., PTSC), ITU, 3GPP, ETSI, and NENA. [55] • ANSI: ATIS is an ANSI-accredited SDO.[56] • TIA: An MOU exists between ATIS and TIA to jointly sponsor and work cooperatively in the development of joint standards documents that are of mutual interest.[57]
Effects on NG911	• Develops standards adhered to by OSP's network and applications services for emergency calling. • Supports location requirements and standards.
Website	http://www.atis.org/

[55] ATIS, *NGES: Next Generation Emergency Services Subcommittee.* Available at: https://www.atis.org/01_committ_forums/.
[56]ANSI, *ANSI Accredited Standards Developers.* Available at: https://share.ansi.org/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fShared%20Documents%2fStandards%20Activities%2fAmerican%20National%20Standards%2fANSI%20Accredited%20Standards%20Developers&FolderCTID=0x01200019AF95C796227A438566C464851845DB.
[57] ATIS, *General Principles in Sponsorship of Joint Standards Activities Between the Alliance for Telecommunications Industry Solutions (ATIS) and the Telecommunications Industry Association (TIA).* Available at: http://www.atis.org/legal/Docs/MOU/TIA.pdf.

Broadband Forum (BBF)

Name	Broadband Forum (BBF)
Type	Industry (Broadband)
Summary	BBF, a non-profit industry organization, is focused on engineering smarter and faster broadband networks.[58]
Mission	BBF's work enables home, business and converged broadband services, encompassing customer, wireline and wireless access and backbone networks. BBF's mission is to accelerate the adoption of the work in order to bring new, valuable services to its member companies and all stakeholders who use the developed work.[59]
Relevant Working Groups	• Architecture and Migration Work Area: The Architecture and Migration Work Area defines the architecture of Broadband Forum's work. This identifies and documents the key functionalities and relationships between entities to facilitate the transition of networks to encompass new practices such as virtualization while documenting the key functionalities that need to be brought forward to enable a seamless evolution path. A critical element of the work is the long term support of existing and new physical and statically-managed network elements alongside agile and virtualized functions in what effectively will be a stable hybrid network. This enables seamless migration based on market acceptance on new technologies, protection of existing infrastructure investment and normal spread of deployment in different territories.[60] • Broadband User Services: The Broadband User Services Work Area provides the broadband industry with technical specifications, implementation guides, reference implementations, test plans, and marketing white papers for the deployment, management, and consumption of services by the broadband end user. This Work Area represents the end user perspective when incorporating into the Broadband Forum architecture.[61]

[58] Broadband Forum, *About the Broadband Forum.* Available at: https://www.broadband-forum.org/about-the-broadband-forum/about-the-forum/mission-and-vision.
[59] Ibid.
[60] Broadband Forum, *Connected Home.* Available at: https://www.broadband-forum.org/projects/connected-home.
[61] Ibid.

Coordinated Activities	• The Broadband Forum has always committed to cooperation and collaboration in the wider telecommunications industry. The Forum champions innovative work throughout the industry and always look to avoid duplication of effort. Organizations that BBF regularly communicates with on technical questions and projects include: 3GPP, 3GPP2, ATIS, ETSI, IETF, OMA, Wi-Fi Alliance and WiMAX Forum.[62]
Website	http://www.broadband-forum.org/

[62] Broadband Forum, *Liaising and Cooperating with Broadband Forum.* Available at: https://www.broadband-forum.org/about-bbf/liaison-partners.

Building Industries Consulting Service International (BICSI)

Name	Building Industries Consulting Service International (BICSI)
Type	International Trade Association (Infrastructure Systems)
Summary	BICSI is a professional association supporting the advancement of the information and communications technology (ICT) community. ICT covers the spectrum of voice, data, electronic safety and security, project management, and audio and video technologies. It encompasses the design, integration, and installation of pathways, spaces, optical fiber- and copper-based distribution systems, wireless-based systems, and infrastructure that support the transportation of information and associated signaling between and among communications and information-gathering devices. BICSI provides information, education, and knowledge assessment for individuals and companies in the ICT industry. BICSI serves nearly 23,000 ICT professionals, including designers, installers, and technicians. These individuals provide the fundamental infrastructure for telecommunications, audiovisual, life-safety, and automation systems. Through courses, conferences, publications and professional registration programs, BICSI staff and volunteers assist ICT professionals in delivering critical products and services, and offer opportunities for continual improvement and enhanced professional stature. Headquartered in Tampa, Florida, USA, BICSI membership spans nearly 100 countries.[63]
Relevant Technical Subcommittees	• BICSI Standards Program Technical Subcommittees: The majority of work within the BICSI Standards Program is performed by its technical subcommittees. Each subcommittee is comprised of technical experts and is the primary consensus body of the program. Thus, technical subcommittees and their leaders have a great responsibility, as the actions and decisions of a technical subcommittee are the actions and decisions of the entire BICSI Standards Program in that subcommittee's field of expertise.

[63] Building Industries Consulting Service International (BICSI), *Our Story.* Available at: https://www.bicsi.org/about-us/about-bicsi/who-we-are.

CableLabs

Name CableLabs

Type Standards Setting Organization – Industry (Cable)

Summary CableLabs is a non-profit organization, formed by the cable industry to build the foundational technology that now connects the modern world through research, development and innovation. CableLabs works on standards and technologies for the secure delivery of high-speed data, video, voice, and next-generation services. CableLabs provides testing, certification facilities and technical leadership for the industry. The broadband industry has relied on CableLabs as a crucial source for technological breakthroughs accelerating growth and ability to match consumers' changing expectations. At each stage on this path, operators' investments to deploy our inventions has ushered the world into the information age.[64]

Mission CableLabs' mission is to develop life-altering technologies that move communities and industries toward more-connected tomorrows.

Standards

- CL-RQ-IP-CPE-SEC: *Common Security Requirements for IP-Based MSO-Provided CPE*
- PKT-SP-24.229: *PacketCable SIP and SDP Stage 3 Specification 3GPP TS 24.229*
- PKT-SP-33.203: *PacketCable Access Security for IP-Based Services Specification 3GPP TS 33.203*
- PKT-SP-BSSF: *PacketCable Business SIP Services Feature Specification*
- PKT-SP-CI: *PacketCable Cellular Integration Specification*
- PKT-SP-CMSS1.5: *PacketCable 1.5 CMS-to-CMS Signaling Specification*
- PKT-SP-ESG: *PacketCable Enterprise SIP Gateway Specification*
- PKT-SP-RSTF: *PacketCable Residential SIP Telephony Feature Specification*
- PKT-SP-RST-UE-PROV: *PacketCable RST UE Provisioning Specification*
- PKT-SP-TGCP1.5: *PacketCable 1.5 PSTN Gateway Call-Signaling Protocol Specification*
- WR-SP-WiFi-ROAM: *WiFi Roaming Architecture and Interfaces Specification*
- DPoE-SP-IPNEv2.0: *DPoE IP Network Element Requirements*
- DPoE-SP-MEFv2.0: *DPoE Metro Ethernet Forum Specification*

[64] CableLabs, *About CableLabs.* Available at: https://www.cablelabs.com/about-cablelabs.

Coordinated Activities	• Working in cooperation with cable operators and cable equipment manufacturers, CableLabs has developed various specifications to facilitate the manufacture of interoperable cable devices, including telephony. "CableLabs Certified®" or "CableLabs Qualified" means that the device has passed a series of tests for compliance with the applicable specification, and has thus demonstrated interoperable functionality with other CableLabs-certified devices. Interoperable devices based on common specifications facilitate consumer choice, widespread deployment of new technologies, and lower costs to both cable operators and consumers.[65]
Website	https://www.cablelabs.com

[65] CableLabs, *CableLabs Certification Program.* Available at: https://www.cablelabs.com/specs/certification.

Commission on Accreditation for Law Enforcement Agencies (CALEA)

Name	Commission on Accreditation for Law Enforcement Agencies (CALEA®)
Type	Professional Organization
Summary	CALEA® was created as a credentialing authority through the joint efforts of law enforcement's major executive associations—International Association of Chiefs of Police (IACP), National Organization of Black Law Enforcement Executives (NOBLE), National Sheriffs' Association (NSA), and the Police Executive Research Forum (PERF). The purpose of CALEA®'s Accreditation Program is to improve the delivery of public safety services, primarily by maintaining a body of standards, developed by public safety practitioners, that covers a wide range of up-to-date public safety initiatives; establishing and administering an accreditation process; and recognizing professional excellence.[66] APCO partnered with CALEA® to set the *Standards for Public Safety Communications Agencies*©.
Relevant Committees	• Standards Review and Interpretation Committee (SRIC)
Standards	• CALEA® *Standards for Law Enforcement Agencies*© • CALEA® *Standards for Public Safety Communications Agencies*©
Website	http://www.calea.org/

[66] Commission on Accreditation for Law Enforcement Agencies (CALEA), *About Us.* Available at: http://www.calea.orgn.

Department of Commerce (DOC)

Name	Department of Commerce (DOC)
Type	Government Agency
Summary	The Department works with businesses, universities, communities, and the Nation's workers to promote job creation, economic growth, sustainable development, and improved standards of living for Americans. The Department is comprised of 12 bureaus that work together to drive progress in five business facing key goal areas: trade and investment, innovation, environment, data, and operational excellence.[67]

Relevant Agencies	• NIST: NIST is a non-regulatory federal agency within the DOC. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.[68]
	  ○ Information Technology Laboratory (ITL): ITL is one of the major research components of NIST. ITL develops and deploys standards, tests, and metrics to make information systems more secure, usable, interoperable, and reliable. ITL collaborates with national and international stakeholders in both the development and application of new information technologies to help meet national priorities.[69]
	  ○ Physical Measurement Laboratory (PML): The PML develops and disseminates the national standards of length, mass, force and shock, acceleration, time and frequency, electricity, temperature, humidity, pressure and vacuum, liquid and gas flow, and electromagnetic, optical, microwave, acoustic, ultrasonic, and ionizing radiation. Its activities range from fundamental measurement research through the provisioning of measurement services, standards, and data. It supports the research community in such areas as communication, defense, electronics, energy, environment, health, lighting, manufacturing, microelectronics, radiation, remote sensing, space, and transportation.[70]

[67] U.S. Department of Commerce, *About the Department of Commerce.* Available at: https://www.commerce.gov/page/about-commerce.
[68] NIST, *NIST General Information.* Available at: http://www.nist.gov/public_affairs/general_information.cfm.
[69] NIST, *What ITL Does.* Available at: https://www.nist.gov/itl/about-itl.
[70] NIST, *About PML.* Available at: https://www.nist.gov/pml/about-pml.

Relevant Agencies (continued)

- Special Programs Office (SPO): The SPO fosters communication and collaboration between NIST and external communities focused on critical national needs. To meet those needs, SPO works closely with and forges partnerships among government, military, academia, professional organizations, and private industry to provide world-class leadership in standards and technology innovation.[71]
- Trusted Identities Group (TIG): The TIG is committed to advancing measurement science, technology, and standards adoption to improve digital identity for individuals and organizations alike. The TIG aims to convene, facilitate, and catalyze a private sector-led implementation approach to advance trusted digital identity solutions built upon four guiding principles, and to enable government adoption by continually evolving our risk-based federal guidance to encourage the adoption of innovative technologies in the market.[72]

- National Telecommunications and Information Administration (NTIA): NTIA is an agency in the DOC that serves as the Executive Branch agency principally responsible for advising the President on telecommunications and information policies. In addition to representing the Executive Branch in both domestic and international telecommunications and information policy activities, NTIA also manages the federal use of spectrum; performs cutting-edge telecommunications research and engineering, including resolving technical telecommunications issues for the federal government and private sector; and administers infrastructure and public telecommunications facilities grants.[73]
  - Institute for Telecommunication Sciences (ITS): ITS performs cutting-edge telecommunications research and engineering with both federal government and private sector partners. As its research and engineering laboratory, ITS supports NTIA by performing the research and engineering that enables the U.S. Government, national and international standards organizations, and many aspects of private industry to manage the radio spectrum and ensure that innovative, new technologies are recognized and effective.[74]

[71] NIST, *Special Programs Office.* Available at: https://www.nist.gov/spo.
[72] NIST, *About NIST's Trusted Identities Group*. Available at: https://www.nist.gov/itl/tig/about .
[73] NTIA, *About NTIA.* Available at: https://www.ntia.doc.gov/about.
[74] NTIA, *Institute for Telecommunication Sciences.* Available at: https://www.its.bldrdoc.gov/.

Standards	• Federal Information Processing Standards (FIPS) Publications (PUB)
	  ○ FIPS-PUB-140-2: *Security Requirements for Cryptographic Modules*
	  ○ FIPS-PUB-180-4: *Secure Hash Standard (SHS)*
	  ○ FIPS-PUB-197: *Advanced Encryption Standard (AES)*
	• NIST
	  ○ SP 1800-13: *Mobile Application Single Sign-On: Improving Authentication for Public Safety First Responders (2nd Draft)*
	  ○ SP 800-171 Revision 2: *Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations(Draft)*
	  ○ SP 800-*171A: Assessing Security Requirements for Controlled Unclassified Information*
	  ○ SP 800-*171B: Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations: Enhanced Security Requirements for Critical Programs and High-Value Assets(Draft)*

Frameworks	• Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1[75] • Security and Privacy Controls for Federal Information Systems and Organizations[76]
Coordinated Activities	• ANSI: An MOU exists between NIST and ANSI that agrees on the need for a unified national approach to develop the best possible national and international standards. • Department of Homeland Security (DHS) Office of Interoperability and Compatibility (OIC): NIST SPO provides technical expertise to the DHS OIC. • NIEM: National Information Exchange Model
Effects on NG911	• Manages grant programs that may be used for NG911 purposes. • May affect IP networking and ESInet aspects. • Develops standards related to handling emergency datasets.
Website	http://www.commerce.gov/

[75] NIST, *Cybersecurity Framework*. Available at: http://www.nist.gov/cyberframework/.
[76] NIST, *Security and Privacy Controls for Federal Information Systems and Organization*s. Available at: https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r4.pdf.

Department of Energy (DOE)

Name	Department of Energy (DOE)
Type	Government Agency
Summary	The mission of the Energy Department is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions. The focus is Energy, Science and Innovation, Nuclear Safety and Security, and Management and Operational Excellence. [77]
Relevant Agencies	• Office of Cybersecurity, Energy Security, and Emergency Response (CESER) ○ The Office of Cybersecurity, Energy Security, and Emergency Response addresses the emerging threats of tomorrow while protecting the reliable flow of energy to Americans today by improving energy infrastructure security. [78]

Frameworks	• Cybersecurity Capability Maturity Model (C2M2)
	The C2M2 program is a public-private partnership effort that was established as a result of the Administration's efforts to improve electricity subsector cybersecurity capabilities, and to understand the cybersecurity posture of the grid. The C2M2 helps organizations—regardless of size, type, or industry—evaluate, prioritize, and improve their own cybersecurity capabilities. [79]
	
	The C2M2 focused on the implementation and management of cybersecurity practices associated with the information technology (IT) and operations technology (OT) assets and the environments in which they operate. The model can be used to:
	  ○ Strengthen organizations' cybersecurity capabilities
	  ○ Enable organizations to effectively and consistently evaluate and benchmark cybersecurity capabilities
	  ○ Share knowledge, best practices, and relevant references across organizations as a means to improve cybersecurity capabilities
	  ○ Enable organizations to prioritize actions and investments to improve cybersecurity

[77] U.S. DOE, *Department of Energy Mission*. Available at: https://energy.gov/mission.
[78] U.S. DOE, *Department of Energy, Office of Cybersecurity, Energy Security and Emergency Response.* Available at: https://www.energy.gov/national-security-safety/cybersecurity.
[79] U.S. DOE, *Cybersecurity Capability Maturity Model (February 2014)*. Available at: https://www.energy.gov/oe/downloads/cybersecurity-capability-maturity-model-february-2014.

Coordinated Activities	• Energy Sector Cybersecurity Framework • NIST: Cybersecurity Framework
Effects on NG911	• May affect IP networking and ESInet aspects. • Develops standards related to handling emergency datasets.
Website	http://www.energy.gov

Department of Homeland Security (DHS)

Name	Department of Homeland Security (DHS)
Type	Government Agency
Summary	DHS' vision is to ensure a homeland that is safe, secure, and resilient against terrorism and other hazards. There are five core missions for DHS: • Prevent terrorism and enhance security • Secure and manage our borders • Enforce and administer our immigration laws • Safeguard and secure cyberspace • Ensure resilience to disasters[80]
Relevant Directorates	• Cybersecurity and Infrastructure Security Agency (CISA): CISA is the Nation's risk advisor, working with partners to defend against today's threats and collaborating to build more secure and resilient infrastructure for the future.[81] o Cybersecurity Division: Cybersecurity Division leads efforts to protect the federal ".gov" domain of civilian government networks and to collaborate with the private sector - the ".com" domain - to increase the security of critical networks.[82] o Division of Emergency Communications: Leads the Nation's operable and interoperable public safety and national security and emergency preparedness (NS/EP) communications efforts. The Emergency Communications Division provides training, coordination, tools, and guidance to help its federal, state, local, tribal, territorial and industry partners develop their emergency communications capabilities. The Emergency Communications Division's programs and services coordinate emergency communications planning, preparation and evaluation, to ensure safer, better-prepared communities nationwide[83] – United States Computer Emergency Readiness Team (US-CERT): US-CERT responds to major incidents, analyzes threats and exchanges critical cybersecurity information. [84]

[80] U.S. DHS, *Our Mission*. Available at: http://www.dhs.gov/our-mission.
[81] U.S. DHS, Cybersecurity and Infrastructure, *About CISA*. Available at https://www.dhs.gov/cisa/about-cisa.
[82] U.S. DHS, CISA, Division of Cybersecurity. Available at https://www.dhs.gov/cisa/cybersecurity-division.
[83] U.S. DHS, CISA, Division of Emergency Communications. Available at: https://www.dhs.gov/cisa/emergency-communications-division.
[84] U.S. DHS, *Computer Emergency Readiness Team. Available at* https://www.us-cert.gov/about-us.

Relevant Directorates (continued)

- Science & Technology Directorate (S&T): S&T is the primary research and development arm of DHS. S&T's mission is to deliver effective and innovative insight, methods and solutions for the critical needs of the Homeland Security Enterprise.[85]
  - Office for Interoperability and Compatibility (OIC): OIC provides local, tribal, territorial, state, and federal entities with tools, technology, methodology, and guidance to improve interoperability. OIC manages a comprehensive research, development, testing, evaluation, and standards program to further enhance interoperability.[86]

Relevant Programs and Projects

- SAFECOM: SAFECOM is a federal program that assists federal, state, local, tribal, and territorial public safety agencies in identifying wireless interoperable communications requirements and ensures those entities can communicate and share information to effectively respond to emergency incidents.[87]
- Integrated Public Alert & Warning System (IPAWS) Project: The IPAWS project supports the advancement of interoperability and state-of-the-art technologies for alerts and warnings through standards development and adoption, conformity assessment, industry capability analysis, and technology evaluation. The result of these efforts will enable local, tribal, and state practitioners to provide reliable and accurate alerts and warnings to a wider public. As a result, there will be a significant reduction in the loss of life and property from all hazards.[88]
- Interoperability Continuum: The Interoperability Continuum is designed to help the emergency response community and local, tribal, state, and federal policymakers address critical elements for success as they plan and implement interoperability solutions. These elements include governance, standard operating procedures, technology, training and exercises, and use of interoperable communications. Updated in 2008, the Continuum's technology element was divided into data and voice elements to reflect the modern path to improving interoperability via information sharing and voice communications.[89]

[85] U.S. DHS, *Science and Technology Directorate.* Available at: http://www.dhs.gov/science-and-technology/about-st.
[86] U.S. DHS, *Office for Interoperability and Compatibility*. Available at: http://www.dhs.gov/science-and-technology/office-interoperablity-and-compatiblity.
[87] U.S. DHS, SAFECOM. Available at: http://www.dhs.gov/safecom/about-safecom.
[88] Federal Emergency Management Agency (FEMA), *Integrated Public Alert & Warning System (IPAWS.)* Available at: http://www.fema.gov/integrated-public-alert-warning-system.
[89] U.S. DHS *SAFECOM Interoperability Continuum.* Available at: http://www.dhs.gov/sites/default/files/publications/interoperability_continuum_brochure_2.pdf.

Standards	• *National Emergency Communications Plan* • SAFECOM: *Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials*[90]
Coordinated Activities	• OEC: The OIC, in coordination with OEC, is developing an SOP Development Guide, a Shared Channel Guide v2.0, and a brochure on plain language. • NIEM: National Information Exchange Model
Effects on NG911	• Develops standards related to handling emergency datasets.
Website	http://www.dhs.gov/

[90] U.S. DHS, *Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials*. Available at: https://www.dhs.gov/publication/governance-documents.

Department of Justice (DOJ)

Name	Department of Justice (DOJ)
Type	Government Agency
Summary	DOJ's mission is to enforce the law and defend the interests of the U.S. according to the law; to ensure public safety against threats foreign and domestic; to provide federal leadership in preventing and controlling crime; to seek just punishment for those guilty of unlawful behavior; and to ensure fair and impartial administration of justice for all Americans.[91]
Relevant Directorates	• Office of Justice Programs (OJP): OJP's mission is to provide leadership, resources and solutions for creating safe, just and engaged communities.[92]
Relevant Bureaus and Offices	• Bureau of Justice Assistance (BJA): BJA's mission is to provide leadership and services in grant administration and criminal justice policy development to support local, state, and tribal justice strategies to achieve safer communities. BJA supports programs and initiatives in the areas of law enforcement, justice information sharing, countering terrorism, managing offenders, combating drug crime and abuse, adjudication, advancing tribal justice, crime prevention, protecting vulnerable populations, and capacity building.[93]
Standards	• *Criminal Justice Information Services (CJIS) Security Policy*
Coordinated Activities	• NIEM: National Information Exchange Model • LEXS: Logical Entity Exchange Specification (LEXS) 5.0
Effects on NG911	• Develops standards related to handling emergency datasets, specifically pertaining to interoperability for data sharing.
Website	http://www.justice.gov/

[91] United States Department of Justice (DOJ), *About DOJ.* Available at: http://www.justice.gov/about/about.html.
[92] Office of Justice Programs (OJP), *Mission and Vision.* Available at: https://ojp.gov/about/mission.htm.
[93] OJP, *About the Bureau of Justice Assistance.* Available at: https://www.bja.gov/About/index.html.

Department of Transportation (USDOT)

Name	Department of Transportation (USDOT)
Type	Government Agency
Summary	USDOT serves the U.S. by ensuring a fast, safe, efficient, accessible, and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future. [94]
Relevant Entities	• NHTSA: The National Highway Traffic Safety Administration (NHTSA) was established by the Highway Safety Act of 1970 and is dedicated to achieving the highest standards of excellence in motor vehicle and highway safety. NHTSA's mission is to save lives, prevent injuries, and reduce economic costs due to road traffic crashes, through education, research, safety standards, and enforcement activity.[95] • Office of the Assistant Secretary for Research and Technology (OST-R): Comprises all the program offices, statistics, and research activities previously administered by RITA. The mission of OST-R is to transform transportation by expanding the base knowledge to make America's transportation system safer, more competitive and sustainable. In an effort to accomplish this goal, OST-R is responsible to: advance innovation, technology development, and breakthrough knowledge; conduct research and facilitate multimodal research collaboration; foster technology transfer through partnerships within the Department and with other partners; provide useful information and statistics to decision-makers as they debate policies; and develop a highly skilled interdisciplinary transportation workforce for the nation.[96] ○ Intelligent Transportation Systems Joint Program Office (ITS JPO): The ITS JPO program focuses on intelligent vehicles, intelligent infrastructure, and the creation of an intelligent transportation system through integration with and between these two components. The federal ITS program supports the overall advancement of ITS through investments in major initiatives, exploratory studies, and a deployment support program. Increasingly, the federal investments are directed at targets of opportunity—major initiatives—that have the potential for significant payoff in improving safety, mobility, and productivity.[97]

[94] United States Department of Transportation (DOT), *About DOT.* Available at: https://www.transportation.gov/mission/about-us.
[95] National Highway Traffic Safety Administration (NHTSA), *About NHTSA.* Available at: https://www.nhtsa.gov/about-nhtsa/nhtsas-core-values.
[96] Office of the Assistant Secretary for Research and Technology (OST-R), *About OST-R*. Available at: https://www.transportation.gov/transition/assistant-secretary-for-research-and-technology.
[97] Intelligent Transportation Systems (ITS), *ITS Overview.* Available at: http://www.its.dot.gov/about/its_jpo.htm.

Relevant Administrations (continued)	○ Transportation Safety Advancement Group (TSAG): The TSAG serves an important function on behalf of the USDOT, OST-R, and the ITS JPO. Through its members and allied stakeholder groups, TSAG identifies surface transportation-based technologies and applications, and promotes a national dialogue regarding public safety practitioners' first-hand experiences, corresponding best practices, and lessons learned.[98]
Relevant Programs and Projects	• Next-Generation 9-1-1 (NG9-1-1) Initiative: The NG9-1-1 Initiative focused on the research required to produce a design and transition plan for a next-generation 9-1-1 system and established the foundation for public emergency communications services in a digital, Internet-based society.[99] • National 911 Program: The National 911 Program works with States, technology providers, public safety officials and 911 professionals to ensure a smooth transition to an updated 911 system that takes advantage of new communications technologies.[100]
Coordinated Activities	• ETSI: A memorandum of cooperation exists between USDOT/OST-R/ITS and ETSI • FCC Communications Security, Reliability, and Interoperability Council (CSRIC): Seminars and coordination
Websites	http://www.dot.gov/ http://911.gov/

[98] Transportation Safety Advancement Group (TSAG), *About TSAG.* Available at: http://www.tsag-its.org/about/.
[99] ITS JPO, *Next-Generation 9-1-1.* Available at: https://www.its.dot.gov/research_archives/ng911/index.htm.
[100] 911.gov, *About the National 911 Program.* Available at: http://www.911.gov/about_national_911program.html.

European Telecommunications Standards Institute (ETSI)

Name	European Telecommunications Standards Institute (ETSI)
Type	Regional Standards Organization
Summary	ETSI is an independent, not-for-profit organization that produces globally applicable standards for information and communications technologies, including fixed, mobile, radio, converged, broadcast, and Internet technologies.[101]
Relevant Committees and Other Bodies	• EMTEL – Emergency Communications: EMTEL addresses a broad spectrum of issues related to the use of telecommunications services in emergency situations.[102] • TISPAN – Telecommunications & Internet Converged Services & Protocols for Advanced Networks: ETSI TISPAN has been the key standardization body in creating the Next Generation Networking (NGN) specifications.[103] • Next Generation Protocols (NGP): NGP is looking at evolving communications and networking protocols to provide the scale, security, mobility and ease of deployment required for the connected society of the 21st century.[104]
Standards	• ETSI SR 002 777: *Emergency Communications (EMTEL); Test/Verification Procedure for Emergency Calls* • ETSI TS 101 470: *Emergency Communications (EMTEL); Total Conversion Access to Emergency Services* • ETSI TS 102 164: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Emergency Location Protocols* • ETSI TR 102 180: *Emergency Communications (EMTEL); Basis of Requirements for Communication of Individuals with Authorities/Organizations in Case of Distress (emergency call handling)* • ETSI TS 102 424: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN Network to Support Emergency Communication from Citizen to Authority* • ETSI TS 102 476: *Emergency Communications (EMTEL); Emergency calls and VoIP: Possible Short- and Long-Term Solutions and Standardization Activities* • ETSI TR 102 641: *Satellite Earth Stations and Systems (SES); Overview of Present Satellite Emergency Communications Resources* • ETSI TR 103 170: *Emergency Communications (EMTEL); Total Conversation Access to Emergency Services*

[101] European Telecommunications Standards Institute (ETSI), *Introduction.* Available at: http://www.etsi.org/about.
[102] ETSI, *EMTEL Overview.* Available at: http://www.emtel.etsi.org/overview.htm.
[103] ETSI, *Terms of Reference.* Available at: https://portal.etsi.org/tispan/tispan_tor.asp.
[104] ETSI, *Next Generation Protocols (NGP).* Available at: http://www.etsi.org/technologies-clusters/technologies/next-generation-protocols.

Standards (continued)

- *ETSI TR 103 201: Emergency Communications (EMTEL); Total Conversation for Emergency Communications;* Implementation Guidelines
- ETSI TR 103 170: *Emergency Communications (EMTEL); Total Conversation Access to Emergency Services*
- ETSI TS 123 167: *Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) Emergency Sessions*
- ETSI TS 182 009: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN Architecture to Support Emergency Communication from Citizen to Authority*
- ETSI TS 183 036: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); ISDN/SIP Interworking; Protocol Specification*
- ETSI TS 187 001: *Network Technologies (NTECH); NGN SECurity (SEC)Requirements*
- ETSI TR 187 002: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); TISPAN NGN Security (NGN_SEC); Threat, Vulnerability and Risk Analysis*
- ETSI TS 187 003: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN Security; Security Architecture*
- ETSI TS 187 005: *Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN Lawful Interception; Stage 1 and Stage 2 Definition*
- ETSI ES 203 178: *Functional Architecture to Support European Requirements on Emergency Caller Location Determination and Transport*
- ETSI ES 282 007: *Telecommunications and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional Architecture*
- ETSI ES 203 283 V1.1.1: *Protocol Specifications for Emergency Service Caller Location Determination and Transport*

Coordinated Activities

- 3GPP
- USDOT: A memorandum of cooperation exists between USDOT/OST-R/ITS and ETSI

Effects on NG911

- Develops standards that enable text and multimedia transmission from the caller to the NG911 system (transport of data).
- Develops standards adhered to by OSP's network and applications services for emergency calling.
- Supports location requirements and standards.

Website http://www.etsi.org/

Federal Communications Commission (FCC)

Name	Federal Communications Commission (FCC)
Type	Government Agency
Summary	The FCC is an independent United States government agency charged with regulating interstate and international communications by radio, television, wire, satellite, and cable. [105]
Relevant Bureaus	• Public Safety and Homeland Security Bureau (PSHSB): The PSHSB advises, makes recommendations to, or acts for the Commission under delegated authority, in all matters pertaining to public safety, homeland security, national security, emergency management and preparedness, disaster management, and ancillary operations. PSHSB develops, recommends, and administers the agency's policies and rules to advance the security and reliability of the nation's communications infrastructure as well as its public safety and emergency response capabilities. This includes issues related to: 9-1-1, E9-1-1, and NG9-1-1, including location accuracy and text-to-911; cybersecurity; and public safety communications.[106]
Relevant Advisory Committees	• Communications Security, Reliability and Interoperability Council (CSRIC): CSRIC's mission is to provide recommendations to the FCC to ensure, among other things, optimal security and reliability of communications systems, including telecommunications, media, and public safety.[107] CSRIC councils are appointed by the Chairman of the FCC and are typically chartered for two years. The following are CSRIC councils and associated working groups relevant to NG911: o CSRIC II Charter Term: March 19, 2009–March 18, 2011 – Working Group 2A–Cyber Security Best Practices: While a large body of cyber security best practices were previously created by the Network Reliability and Interoperability Council (NRIC), many years have passed and the state of the art in cyber security has advanced rapidly. This Working Group took a fresh look at cyber security best practices, including all segments of the communications industry and public safety communities.

[105] Federal Communications Commission (FCC), *About the FCC.* Available at: https://www.fcc.gov/about/overview.
[106] FCC, *Public Safety and Homeland Security Bureau, About Us.* Available at: https://www.fcc.gov/general/about-public-safety-and-homeland-security-bureau.
[107] FCC, *Communications Security, Reliability and Interoperability Council*. Available at: https://www.fcc.gov/about-fcc/advisory-committees/general/communications-security-reliability-and.

Relevant Advisory Committees (continued)

- Working Group 4A–Best Practices for Reliable 9-1-1 and E9-1-1: Investigated and evaluated currently available 9-1-1 related VoIP standards and best practices related to E9-1-1 for completeness and to identify any gaps, including challenges related to implementation of such standards by VoIP providers within the E9-1-1 system. The Working Group evaluated and recommended to CSRIC how to resolve incomplete work and gaps, identified and recommended what groups should perform that work (including the option of the CSRIC Working Group doing so), and recommended to CSRIC an appropriate work schedule.[108]
- Working Group 4B–Transition to Next Generation 9-1-1: Building on the work of Working Group 4A, the group determined what changes or additions in 9-1-1 related VoIP standards and best practices are required for the evolution of IP-based originating service providers to the IP-based NG9-1-1 system environment, both during the transition from E9-1-1 to NG9-1-1 and as identifiable for the longer term all-IP NG9-1-1 environment. The Working Group considered technical issues as well as operational and funding challenges for PSAPs in an NG9-1-1 environment. The Working Group also considered ways that NG9-1-1 architectures and technologies can improve 9-1-1 access for people with disabilities and non-English speaking communities.
- Working Group 4C–Technical Options for E9-1-1 Location Accuracy: The group examined E9-1-1/Public Safety location technologies in use today, identifying current performance and limitations for use in NG Public Safety Applications. They also examined emerging E9-1-1/Public Safety location technologies and recommended options to CSRIC for improvement of E9-1-1 location accuracy including implementation timelines.

[108] Communications Security, Reliability, and Interoperability Council (CSRIC), *CSRIC Working Group Descriptions.* Available at: https://transition.fcc.gov/pshs/advisory/csric/wg-descriptions.pdf.

Relevant Advisory Committees (continued)

- CSRIC III Charter Term: March 19, 2011─March 18, 2013
  - Working Group 1─NG 9-1-1: Recommended additional standards work needed to enable NG911 network architecture, particularly those related to NENA's i3 standard, and related standards needed from other organizations such as the Internet Engineering Task Force (IETF), 3GPP, and ATIS. The Working Group identified gaps in NG911 network architecture standards and labeled them.[109]
  - Working Group 3─E9-1-1 Location Accuracy: Examined E911/public safety indoor and outdoor location technologies in use today, identifying current performance and limitations for use in next generation public safety applications. More specifically, the Working Group examined emerging E911/public safety location technologies and recommended options to CSRIC for improvement of E911 location accuracy, including implementation timelines.[110]
  - Working Group 8─E9-1-1 Best Practices: Reviewed the existing CSRIC/NRIC 9-1-1 best practices and recommended ways to improve them, accounting for the passage of time, technology changes, operational factors, and any identified gaps. As part of this effort, the Working Group provided recommendations regarding the creation of two new, non-industry best practice categories: (i) PSAP and (ii) 9-1-1 Consumer. The Working Group also provided recommendations regarding how to better engage PSAPs in the best practice process.[111]

[109] CSRIC, *CSRIC III Working Group Descriptions.* Available at: http://transition.fcc.gov/pshs/advisory/csric3/wg-descriptions_2-28-12.pdf.
[110] Ibid.
[111] Ibid.

Relevant Advisory Committees (continued)

- CSRIC IV Charter Term: March 19, 2013–March 18, 2015
  - Working Group 1–NG911: The Working Group reported on the technical feasibility for wireless carriers to include E911 Phase 2 location accuracy and information in texts sent to 911, and made recommendations for including enhanced location information in texts to 911. In addition, the Working Group recommended best practices—including testing and trialing—operational procedures, and security requirements that wireless carriers, PSAPs, and third-party service providers should follow in provisioning PSAP requests for text-to-911 service.[112]
  - Working Group 4–Cybersecurity Best Practices: The Working Group developed voluntary mechanisms to provide macro-level assurance to the FCC and the public that communications providers are taking the necessary corporate and operational measures to manage cyber security risks across the enterprise. The mechanisms demonstrate how communications providers are reducing cyber security risks through the application of the NIST Cybersecurity Framework, or an equivalent construct.[113]
- CSRIC V Charter Term: March 19, 2015–March 18, 2017
  - Working Group 1–Evolving 911 Services: The Working Group is reviewing public safety and industry best practices and SOPs for rerouting 911 calls between PSAPs resulting from the use of cell sectors for routing purposes, and where necessary identify gaps and make recommendations towards mitigating PSAP call transfers and optimizing rerouting best practices (Task1). The group is also studying and making recommendations on the architectural, technical, operational standards, and cyber security requirements of location-based routing that uses longitude and latitude information or other location identification methods (when available) to determine and route a 911 call to the nearest appropriate PSAP (Task 2).[114]

[112] CSRIC, *CSRIC IV Working Group Descriptions*. Available at: http://transition.fcc.gov/bureaus/pshs/advisory/csric4/CSRIC_IV_Working_Group_Descriptions_12_31_13.pdf.
[113] Ibid.
[114] CSRIC, *CSRIC V Working Group Descriptions*. Available at: https://transition.fcc.gov/bureaus/pshs/advisory/csric5/Working_GroupCSRICV_110515.pdf.

Relevant Advisory Committees (continued)

  - Working Group 8─Priority Services: Priority communications over commercial networks during a national emergency remains as essential today to responders and national security personnel as in decades past. However, commercial communications networks are increasingly relying on packet-based technology and retiring Time Division Multiplexing (TDM) technology. The Federal government is losing priority capabilities throughout this transition, as voice priority services rely on wireline TDM, which will eventually be replaced by IP-based infrastructure. Lack of priority communications services on packet-based systems could jeopardize national security or domestic incident response. This Working Group is assessing how priority services programs can take advantage of packet-based technologies and will recommend protocols that can be used to ensure priority communications upon retirement of TDM.[115]

- Emergency Response Interoperability Center (ERIC) Public Safety Advisory Committee: The advisory committee's responsibility was terminated February 12, 2012. The mission of ERIC was to establish a technical and operational framework to ensure nationwide operability and interoperability in deployment and operation of the 700 megahertz (MHz) public safety broadband wireless network.[116]
- Emergency Access Advisory Committee (EAAC): The EAAC Charter expired in July 2013. EAAC was chartered to determine the most effective and efficient technologies and methods by which to enable equal access to emergency services by individuals with disabilities as part of the nation's migration to NG911, and to make recommendations to the Commission on how to achieve those effective and efficient technologies and methods.[117]
- NRIC: NRIC was an advisory council, chartered by the FCC to partner with the FCC, the communications industry, and public safety to facilitate enhancement of emergency communications networks, homeland security, and best practices across the burgeoning telecommunications industry. There were seven assemblies of NRIC since 1992. NRIC is no longer active and has been superseded by CSRIC within the FCC. The documents from NRIC can be accessed from the CSRIC website.

[115] Ibid.
[116] FCC, Public Safety and Homeland Security Bureau, *Emergency Response Interoperability Center (ERIC) Public Safety Advisory Committee.* Available at: https://www.fcc.gov/general/emergency-response-interoperability-center-eric-public-safety-advisory-committee.
[117] FCC, *Emergency Access Advisory Committee (EAAC)*. Available at: http://www.fcc.gov/encyclopedia/emergency-access-advisory-committee-eaac.

Relevant Advisory Committees (continued)	• Task Force on Optimal Public Safety Answering Point Architecture (TFOPA): TFOPA is a federal advisory committee that will provide recommendations to the Commission regarding actions that PSAPs can take to optimize their security, operations, and funding as they migrate to NG911. The Phase 1 final report was issued on January 29, 2016.[118] Several supplemental reports were issued by various working groups in late 2016.
Standards	• The CSRIC Best Practices Search Tool allows you to search CSRIC's collection of Best Practices using a variety of criteria including Network Type, Industry Role, Keywords, Priority Levels, and BP Number.[119] • CSRIC IV Working Group 1 Next Generation 9-1-1 Task 1 Subtask 1: *Investigation into Location Improvements for Interim SMS (Text) to 9-1-1* • CSRIC IV Working Group 1 Next Generation 9-1-1 Task 1 Subtask 2: *PSAP Requests for Service for Interim SMS Text-to-9-1-1* • CSRIC IV Working Group 1 Next Generation 9-1-1 Task 2: *Location Accuracy and Testing for Voice-over-LTE Networks* • CSRIC IV Working Group 1 Next Generation 911 Task 3: *Specification for Indoor Location Accuracy Test Bed* • CSRIC IV Working Group 4: *Cybersecurity Risk Management and Best Practices* • CSRIC V Working Group 1 Task 1: *Final Report – Task 1: Optimizing PSAP Re-Routes* • CSRIC V Working Group 1 Task 2: *Final Report – Task 2: 911 Location-Based Routing* • CSRIC V Working Group 6: *Secure Hardware and Software: Security by Design* • CSRIC V Working Group 6: *Secure Hardware and Software: Security-by-Design Attestation Framework* • TFOPA Working Group 1: *Optimal Cybersecurity Approach for PSAPs,* Supplemental Report, issued December 2, 2016 • TFOPA Working Group 2: *Phase II Supplemental Report: NG9-1-1 Readiness Scorecard*, issued December 2, 2016 • TFOPA Working Group 3: *Funding Sustainment Model*, issued December 2, 2016
Website	http://www.fcc.gov/

[118] FCC, Task Force on Optimal Public Safety Answering Point Architecture (TFOPA). Available at: https://www.fcc.gov/about-fcc/advisory-committees/general/task-force-optimal-public-safety-answering-point.
[119] FCC, Public Safety and Homeland Security Bureau, CSRIC Best Practices. Available at: https://catalog.data.gov/dataset/csric-best-practices.

Federal Geographic Data Committee (FGDC)

Name	Federal Geographic Data Committee (FGDC)
Type	Interagency Committee
Summary	FGDC is an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis. This nationwide data publishing effort is known as the National Spatial Data Infrastructure (NSDI). The NSDI is a physical, organizational, and virtual network designed to enable the development and sharing of this nation's digital geographic information resources. FGDC activities are administered through the FGDC Secretariat, hosted by the U.S. Geological Survey. [120]
Relevant Agencies	• FGDC Structure and Federal Agency and Bureau Representation: In accordance with Office of Management and Budget (OMB) Circular A-16, the FGDC is chaired by the Secretary of the Interior with the Deputy Director for Management, OMB as Vice-Chair.[121]
Standards	• FGDC-STD-016-2011: *United States Thoroughfare, Landmark, and Postal Address Data Standard*
Coordinated Activities	• OMB and the U.S. Congress set policy for federal agencies. The FGDC, a federal interagency coordinating committee, is guided by those policies in the design of programs, activities, and technologies. The FGDC sets geospatial information policy in harmony with overall information policy. The FGDC Secretariat engages in on-going strategic planning to ensure continued investment of resources in high-value programs, activities and technologies. [122]
Effects on NG911	• Develops standards pertaining to interoperability for data sharing.
Website	http://www.fgdc.gov/

[120] Federal Geographic Data Committee (FGDC). Available at: https://www.fgdc.gov/organization.
[121] Ibid.
[122] FGDC, *Policies & Planning*. Available at: http://www.fgdc.gov/policyandplanning.

Industrial Internet Consortium (IIC)

Name	Industrial Internet Consortium (IIC)
Type	Consortium of multinational corporations
Summary	The IIC is a global, member-supported, organization that promotes the accelerated growth of the Industrial Internet of Things (IIOT) by coordinating ecosystem initiatives to securely connect, control and integrate assets and systems of assets with people, processes and data using common architectures, interoperability and open standards to deliver transformational business and societal outcomes across industries and public infrastructure. [123]
Relevant Agencies	• Parent organization is Object Management Group (OMG)
Guidance Documents	• Industrial Internet Security Framework (IISF) • Industrial Internet Reference Architecture for Industrial Internet System • Industrial IoT Analytics Framework
Effects on NG911	• Developed Industrial Internet Security Framework with a focus on securing the IIOT
Website	http://www.iiconsortium.org/index.htm

[123] Information on the Industrial Internet Consortium is available at: http://www.iiconsortium.org/faq.htm.

Information Security Forum (ISF)

Name	Information Security Forum (ISF)
Type	Global Information Systems Security and Risk Management Organization
Summary	ISF, an independent, not-for-profit association of leading organizations from around the world, investigates, clarifies and resolves key issues in cyber, information security, and risk management. The ISF develops best practice methodologies, processes, and solutions. The ISF's membership includes some of the world's major corporations, public sector bodies, and government departments. The ISF has a range of products and services available to members and non-members including research reports, tools, methodologies, and free webinars.[124]

Relevant Projects	• Information Risk Assessment Methodology 2 (IRAM2) Tool: The ISF's IRAM2 is designed to help organizations develop impact assessments, threat and vulnerability assessments, and evaluate and select controls to help mitigate threats to the organization.
	• Benchmark: This tool helps organizations manage and control information risk throughout their enterprise. The Benchmark allows comparison of organizational security arrangements against seven internationally recognized standards:
	  ○ ISF *Standard of Good Practice for Information Security*
	  ○ NIST *Cyber Security Framework*
	  ○ The SANS Top 20 Critical Security Controls for Effective Cyber Defense
	  ○ Payment Card Industry Data Security Standard (PCI DSS) version 3.1
	  ○ ISO/IEC 27002: 2013
	  ○ COBIT 5 for Information Security
	  ○ ISO/IEC 27002: 2005
	• ISF Webinar Programme: The webinars provide organizations with an opportunity to find out more about research into key topics such as identifying and managing current and emerging threats. This includes content such as the unintended consequences of state intervention, big data, mobile applications and the Internet of Things (IoT), cybercrime and the growing skills gap in the information security industry.

[124] ISF, *About ISF.* Available at: https://www.securityforum.org/about.

Standards	*Standard of Good Practice for Information Security 2018*: Provides comprehensive controls and guidance regarding current and emerging information security topics, enabling organizations to respond to the rapid pace at which threats, technology and risks evolve.
Website	https://www.securityforum.org

Information Sharing and Analysis Organization (ISAO)

Name	Information Sharing and Analysis Organizations (ISAO)
Type	Government Project
Summary	The establishment of ISAOs allows communities of interest to share cyber threat information with each other on a voluntary basis, resulting in an effective ISAO Ecosystem. ISAOs may also, if they choose, participate in existing federal cybersecurity information sharing programs, providing access to near-real-time cyber threat indicators. The goal is to create deeper and broader networks of information sharing nationally that foster the development and adoption of automated mechanisms for the sharing of information to elevate the security of the Nation. ISAO Standards Organizations work with existing information sharing organizations, owners and operators of critical infrastructure, relevant agencies, and other public- and private-sector stakeholders through a voluntary consensus standards development process to identify a common set of voluntary standards and guidelines for the creation and functioning of ISAOs. These standards address, among other things, contractual agreements, business processes, operating procedures, technical specifications, and privacy protections.
Relevant Projects	• Using significant public input, more than 100 experts from various industry sectors, government agencies, and academia have established working groups, which are now actively working to develop initial documents. We have established an aggressive schedule to publish an initial set of documents that meets the urgent need to confront growing cyber threats as soon as possible while protecting vital privacy and security concerns.
Standards	• ISAO 300-1: *Introduction to Information Sharing* • ISAO 600-2: *U.S. Government Relations, Programs, and Services* • ISAO SP 4000: *Protecting Consumer Privacy in Cybersecurity Information Sharing*
Coordinated Activities	• Advanced Cyber Security Center • Cybersecurity Analysis, Intelligence and Information Research Institute (CAIIRI) • Cyber Information Sharing and Collaboration Program (CISCP) (DHS) • Emergency Management and Response ISAC

Effects on NG911	• Identifies standards and guidelines for robust and effective information sharing and analysis related to cybersecurity risks, incidents, and best practices.
Website	https://www.isao.org/

Institute of Electrical and Electronics Engineers (IEEE)

Name	Institute of Electrical and Electronics Engineers (IEEE)
Type	Professional Association
Summary	IEEE is the world's largest professional association with the core purpose to advance technological innovation and excellence for the benefit of humanity. IEEE and its members are essential to the global technical community and to technical professionals everywhere and are universally recognized for the contributions of technology and of technical professionals in improving global conditions.[125]

Relevant Committees	• IEEE 802 LAN/MAN Standards Committee: The IEEE 802 LAN/MAN Standards Committee develops and maintains networking standards and recommended practices for local, metropolitan, and other area networks, using an open and accredited process, and advocates them on a global basis. The most widely used standards are for Ethernet, Bridging and Virtual Bridged LANs, Wireless LANs, Wireless PANs, Wireless MANs, Wireless Coexistence, Media Independent Handover Services, and Wireless RANs. An individual working group provides the focus for each area.[126]
	  ○ IEEE 802.1 Working Group: The IEEE 802.1 Working Group is chartered to concern itself with and develop standards and recommend practices in the following areas: 802 LANs, MANs, and other wide-area networks (WANs), 802 security, 802 overall network management, and protocol layers above the Media Access Control (MAC) and Logical Link Control (LLC) layers. The 802.1 Working Group has four active task groups: Time Sensitive Networking, Security, Data Center Bridging and OmniRAN.[127]
	  ○ IEEE 802.3 Ethernet Working Group: Within the IEEE 802 LAN/MAN Standards Committee, the IEEE 802.3 Working Group develops standards and recommended practices for Ethernet networks.[128]
	  ○ IEEE 802.11 Wireless Local Area Networks Working Group: The IEEE 802.11 Working Group develops standards and recommended practices to support development and deployment of wireless local-area networks (WLANs).[129]

[125] Institute of Electrical and Electronics Engineers (IEEE), *About IEEE.* Available at: https://www.ieee.org/about/index.html.
[126] IEEE, *IEEE 802 LAN/MAN Standards Committee.* Available at: http://www.ieee802.org/.
[127] IEEE, *IEEE 802.1 Working Group.* Available at: https://1.ieee802.org/.
[128] IEEE, *IEEE 802.3 Ethernet Working Group*. Available at: http://www.ieee802.org/3/.
[129] IEEE, *IEEE 802.11 Wireless Local Area Networks.* Available at: http://www.ieee802.org/11/.

Relevant Committees (continued)

- IEEE 802.16 Working Group on Broadband Wireless Access Standards: The IEEE 802.16 Working Group develops standards and recommended practices to support development and deployment of broadband wireless MANs.[130]
- IEEE 802.18 Radio Regulatory Technical Advisory Group (RR-TAG): The RR-TAG supports the work of the IEEE 802 LMSC and the IEEE 802 wireless working groups – IEEE 802.11 (WLAN), IEEE 802.15 (WSN), IEEE 802.16 (WMAN), IEEE 802.20 (Wireless Mobility), IEEE 802.21 (Handoff/Interoperability Between Networks), and IEEE 802.22 (WRAN) – by actively monitoring and participating in radio regulatory matters worldwide as an advocate for IEEE 802.[131]
- IEEE 802.19 Wireless Coexistence Working Group: IEEE 802.19 reviews coexistence assurance documents produced by working groups developing new wireless standards for unlicensed devices.[132]
- IEEE 802.23 Emergency Services Working Group: The IEEE 802.23 Working Group developed a 2011 final draft standard for local- and metropolitan-area networks – *Emergency Services for Internet Protocol (IP)-Based Citizen-to-Authority Communications*. Due to lack of participation, this working group was disbanded in June 2011.[133]

Standards

- IEEE 802.1AB-2016: *Station and Media Access Control Connectivity Discovery*
- IEEE 802.1AC-2016/Cor 1-2018: *Media Access Control (MAC) Services Definition – Corrigendum 1: Logical Link Control (LLC) Encapsulation EtherType*
- IEEE 802.1AR-2018: *Local and Metropolitan Area Networks – Secure Device Identity, Sept. 2017*
- IEEE 802.3-2018: *IEEE Standard for Ethernet*
- IEEE 802.11-2016: *Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*
- IEEE 802.16-2017: *Air Interface for Broadband Wireless Access Systems*
- IEEE 802.19.1-2018: *Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 19: Wireless Coexistence Methods*
- IEEE 1512-2006: *Common Incident Management Message Sets for Use by Emergency Management Centers*
- IEEE 1903-2011: *Functional Architecture of Next Generation Service Overlay Networks*

[130] IEEE, *IEEE 802.16 Working Group on Broadband Wireless Access Standards.* Available at: http://grouper.ieee.org/groups/802/16/.
[131] IEEE, *IEEE 802.18 Radio Regulatory Technical Advisory Group (RR-TAG).* Available at: http://www.ieee802.org/18/.
[132] IEEE, *IEEE 802.19 Wireless Coexistence Working Group.* Available at: http://www.ieee802.org/19/.
[133] IEEE, *IEEE 802.23 Emergency Services Working Group.* Available at: https://mentor.ieee.org/802.23/dcn/11/23-11-0015-00-ESWG-802-23-final-draft-d1pt0-pdf.pdf.

Coordinated Activities	• WiMAX Forum • 3GPP • IETF • ANSI: IEEE is an ANSI-accredited SDO
Website	https://www.ieee.org/

Internet Engineering Task Force (IETF)

Name	Internet Engineering Task Force (IETF)
Type	International Standards Organization—Industry (Networking)
Summary	IETF's mission is to produce high quality, relevant technical and engineering documents that influence the way people design, use, and manage the Internet, in such a way as to make the Internet work better. These documents include protocol standards, current best practices, and informational documents of various kinds.[134]
Relevant Working Groups	• Emergency Context Resolution with Internet Technologies (ecrit): In a number of areas, the public switched telephone network (PSTN) has been configured to recognize an explicitly specified number as a call for emergency services. These numbers (e.g., 911, 112) relate to an emergency service context and depend on a broad, regional configuration of service contact methods and a geographically constrained context of service delivery. Successful delivery of an emergency service call within those systems requires both an association of the physical location of the originator with an appropriate emergency service center and call routing to deliver the call to the center. Calls placed using Internet technologies do not use the same systems to achieve those goals, and the common use of overlay networks and tunnels (either as virtual private networks [VPNs] or for mobility) makes meeting them more challenging. There are, however, Internet technologies available to describe location and to manage call routing. This Working Group will describe when these may be appropriate and how they can be used, and is considering emergency services calls that might be made by any user of the Internet.[135]

[134] Internet Engineering Task Force (IETF), *Mission Statement.* Available at: http://www.ietf.org/about/mission.html.
[135] IETF, *Emergency Context Resolution with Internet Technology (ecrit).* Available at: https://datatracker.ietf.org/wg/ecrit/documents/.

Relevant Working Groups (continued)

- Geographic Location/Privacy (GEOPRIV): As of November 2014, this Working Group is listed as "concluded." IETF recognized that many applications are emerging that require geographic and civic location information about resources and entities, and that the representation and transmission of that information had significant privacy and security implications. It has created a suite of protocols that allows such applications to represent and transmit such location objects and to allow users to express policies on how these representations are exposed and used. GEOPRIV was chartered to continue to develop and refine representations of location in Internet protocols and to analyze the authorization, integrity, and privacy requirements that must be met when these representations of location are created, stored, and used. The group created and refined mechanisms for the transmission of these representations to address the requirements that have been identified.[136]

Standards

- Request for Comment (RFC) 2328: *OSPF Version 2*
- RFC 2474: *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*
- RFC 2475: *An Architecture for Differentiated Services*
- RFC 3261: *SIP: Session Initiation Protocol*
- RFC 3262: *Reliability of Provisional Responses in Session Initiation Protocol (SIP)*
- RFC 3263: *Session Initiation Protocol (SIP): Locating SIP Servers*
- RFC 3264: *An Offer/Answer Model with Session Description Protocol (SDP)*
- RFC 3265: *Session Initiation Protocol (SIP) – Specific Event Notification*
- RFC 3411: *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*
- RFC 3412: *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)*
- RFC 3413: *Simple Network Management Protocol (SNMP) Applications*
- RFC 3414: *User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*
- RFC 3415: *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*
- RFC 3416: *Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)*
- RFC 3417: *Transport Mappings for the Simple Network Management Protocol (SNMP)*
- RFC 3418: *Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)*
- RFC 3550: *RTP: A Transport Protocol for Real-Time Applications*
- RFC 3856: *A Presence Event Package for the Session Initiation Protocol (SIP)*
- RFC 3863: *Presence Information Data Format (PIDF)*

[136] IETF, *Geographic Location / Privacy (geopriv).* Available at: http://datatracker.ietf.org/wg/geopriv/charter/.

Standards (continued)

- RFC 4079: *A Presence Architecture for the Distribution of GEOPRIV Location Objects*
- RFC 4103: *RTP Payload for Text Conversation*
- RFC 4119*: A Presence-based GEOPRIV Location Object Format*
- RFC 4271: *A Border Gateway Protocol 4 (BGP-4)*
- RFC 4975: *The Message Session Relay Protocol (MSRP)*
- RFC 4976: *Relay Extensions for the Message Sessions Relay Protocol (MSRP)*
- RFC 5012: *Requirements for Emergency Context Resolution with Internet Technologies*
- RFC 5069: *Security Threats and Requirements for Emergency Call Marking and Mapping*
- RFC 5139: *Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)*
- RFC 5194: *Framework for Real-Time Text over IP Using the Session Initiation Protocol (SIP)*
- RFC 5223: *Discovering Location-to-Service Translation (LoST) Servers Using the Dynamic Host Configuration Protocol (DHCP)*
- RFC 5246: *The Transport Layer Security (TLS) Protocol Version 1.2* (update in progress)
- RFC 5340: *OSPF for IPv6*
- RFC 5341: *The Internet Assigned Number Authority (IANA) tel Uniform Resource Identifier (URI) Parameter Registry*
- RFC 5411: *A Hitchhiker's Guide to the Session Initiation Protocol (SIP)*
- RFC 5582: *Location-to-URL Mapping Architecture and Framework*
- RFC 5880: *Bidirectional Forwarding Detection (BFD)*
- RFC 5881: *Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)*
- RFC 5882: *Generic Application of Bidirectional Forwarding Detection (BFD)*
- RFC 6135: *An Alternative Connection Model for the Message Session Relay Protocol (MSRP)*
- RFC 6155: *Use of Device Identity in HTTP-Enabled Location Delivery (HELD)*
- RFC 6280: *Location-Based Services Usage and Privacy*
- RFC 6443: *Framework for Emergency Calling Using Internet Multimedia*
- RFC 6446: *Session Initiation Protocol (SIP) Event Notification Extension for Notification Rate Control*
- RFC 6447: *Filtering Location Notifications in the Session Initiation Protocol (SIP)*
- RFC 6665: *SIP-Specific Event Notification*
- RFC 6714: *Connection Establishment for Media Anchoring (CEMA) for the Message Session Relay Protocol (MSRP)*
- RFC 6739: *Synchronizing Service Boundaries and <mapping> Elements Based on the Location-to-Service Translation (LoST) Protocol*
- RFC 6753: *A Location Dereference Protocol Using HTTP-Enabled Location Delivery (HELD)*

Standards (continued)

- RFC 6772: *Geolocation Policy: A Document Format for Expressing Privacy Preferences for Location Information*
- RFC 6739: *Synchronizing Service Boundaries and <mapping> Elements Based on the Location-to-Service Translation (LoST) Protocol*
- RFC 6848: *Specifying Civic Address Extensions in the Presence Information Data Format Location Object (PIDF-LO)*
- RFC 6874: *Updates RFC 3986 to IPv6 to Include Zone Identifiers and Address Literals*
- RFC 6881: *Best Current Practice for Communications Services in Support of Emergency Calling*
- RFC 6915: *Flow Identity Extension for HTTP-Enabled Location Delivery (HELD)*
- RFC 7035: *Relative Location Representation*
- RFC 7044: *An Extension to the Session Initiation Protocol (SIP) for Request History Information*
- RFC 7090: *Public Safety Answering Point (PSAP) Callback*
- RFC 7105: *Using Device-Provided Location-Related Measurements in Location Configuration Protocols*
- RFC 7163: *URN for Country-Specific Emergency Services*
- RFC 7199: *Location Configuration Extensions for Policy Management*
- RFC 7216: *Location Information Server (LIS) Discovery Using IP Addresses and Reverse DNS*
- RFC 7378: *Trustworthy Location*
- RFC 7406: *Extensions to the Emergency Services Architecture for Dealing With Unauthenticated and Unauthorized Devices*
- RFC 7459: *Representation of Uncertainty and Confidence in the Presence Information Data Format Location Object (PIDF-LO)*
- RFC 7701: *Multi-party Chat Using the Message Session Relay Protocol (MSRP)*
- RFC 7840: *A Routing Request Extension for the HTTP-Enabled Location Delivery (HELD) Protocol*
- RFC 7852: *Additional Data Related to an Emergency Call*
- RFC 7977: *The WebSocket Protocol as a Transport for the Message Session Relay Protocol (MSRP)*
- RFC 8148: *Next-Generation Vehicle-Initiated Emergency Calls*
- RFC 8262: *Location Conveyance, Messaging and Metadata for the Session Initiation Protocol*
- RFC 8447: *Updates Registries Related to Transport Layer Security (TSL) and Datagram Transport Layer Security (DTLS)*
- Internet Draft: *MSRP over Data Channels*
- Internet Draft: *A LoST Extension to Return Complete and Similar Location Info*

Coordinated Activities

- ETSI EMTEL
- NENA

Effects on NG911	• Develops standards that enable text and multimedia transmission from the caller to the NG911 system (transport of data).
Website	http://www.ietf.org/

International Academies of Emergency Dispatch (IAED)

Name	International Academies of Emergency Dispatch (IAED)
Type	Professional Organization
Summary	IAED's mission is to advance and support the public-safety emergency telecommunications professional and ensure that citizens in need of emergency, health, and social services are matched safely, quickly, and effectively with the most appropriate resource.[137]
Certifications	• ETC: Emergency Telecommunicator Certification • EMD: Emergency Medical Dispatch Certification • EFD: Emergency Fire Dispatch Certification • EPD: Emergency Police Dispatch Certification • ED-Q: Quality Improvement Certification • CCM: Communication Center Manager • Executive Certification Course
Effects on NG911	• May drive requirements based on call-handling protocols.
Website	http://www.emergencydispatch.org/

[137] International Academies of Emergency Dispatch (IAED), *Organization.* Available at: http://www.emergencydispatch.org/Organization.

International Organization of Standardization (ISO)

Name International Organization of Standardization (ISO)

Type International Standards Organization

Summary ISO is the world's largest developer and publisher of international standards. ISO is a network of the national standards institutes of 163 countries, with a Central Secretariat in Geneva, Switzerland, that coordinates the system. ISO is a non-governmental organization that forms a bridge between the public and private sectors. An annual meeting is held of the Organization's General Assembly, the governing body. Many of the ISO's member institutes are part of the governmental structure of their countries, or are mandated by their government. Other members have their roots uniquely in the private sector, having been set up by national partnerships of industry associations. Therefore, ISO enables a consensus to be reached on solutions that meet both the requirements of business and the broader needs of society.[138]

Standards

- ISO 19115-1: *Geographic information ─ Metadata ─ Part 1: Fundamentals*
- ISO/IEC 20000-1:2018: *Information technology ─ Service management ─ Part 1: Service management system requirements*
- ISO/IEC 24760-1:2011: *Information technology ─ Security techniques ─ A framework for identity management – Part 1: Terminology and concepts*
- ISO/IEC 24760-2:2015: *Information technology ─ Security techniques ─ A framework for identity management – Part 2: Reference architecture and requirements*
- ISO/IEC 24760-3: *Information technology ─ Security techniques ─ A framework for identity management – Part 3: Practice*
- The ISO 27000 family is a series of standards related to information security. Below is a selection of standards that can be applied to NG911 networks and operations. Please note that other standards in the ISO 27000 family also may be applicable to NG911 networks and operations.
    - ISO/IEC 27000:2018: *Information technology ─ Security techniques ─ Information security management systems – Overview and vocabulary*
    - ISO/IEC 27001:2013: *Information technology ─ Security techniques ─ Information security management systems – Requirements*
      ISO/IEC 27002:2013: *Information technology ─ Security techniques ─ Code of practice for information security controls*
    - ISO/IEC 27003:2017: *Information technology ─ Security techniques ─ Information security management system implementation guidance*
    - ISO/IEC 27004:2016: *Information technology ─ Security techniques ─ Information security management ─ Monitoring, measurement, analysis and evaluation*

[138] International Organization of Standards (ISO), *About ISO*. Available at: https://www.iso.org/structure.html.

Standards (continued)

- ISO/IEC 27005:2018: *Information technology ─ Security techniques ─ Information security risk management*
- ISO/IEC 27011:2016: *Information technology ─ Security techniques ─ Code of practice for Information security controls based on ISO/IEC 27002 for telecommunications organizations*
- ISO/IEC 27031:2011: *Information technology ─ Security techniques ─ Guidelines for information and communication technology readiness for business continuity*
- ISO/IEC 27032:2012: *Information technology – Security techniques – Guidelines for cybersecurity*
- ISO/IEC 27033-1:2015: *Information technology ─ Security techniques ─ Network security ─ Part 1: Overview and concept*
- ISO/IEC 27033-2:2012: *Information technology ─ Security techniques ─ Network security ─ Part 2: Guidelines for the design and implementation of network security*
- ISO/IEC 27033-3:2010: *Information technology ─ Security techniques ─ Network security ─ Part 3: Reference Networking scenarios – Threats, design techniques and control issues*
- ISO/IEC 27033-4:2014: *Information technology ─ Security techniques ─ Network security ─ Part 4: Securing communications between networks using security gateways*
- ISO/IEC 27033-5:2013: *Information technology ─ Security techniques ─ Network security – Part 5: Securing communications across networks using Virtual Private Networks (VPNs)*
- ISO/IEC 27033-6:2016: *Information technology ─ Security techniques ─ Network security – Part 6: Securing wireless IP network access*
- ISO/IEC 27035-1:2016: *Information technology ─ Security techniques ─ Information security incident management – Part 1: Principles of incident management*
- ISO/IEC 27035-2:2016: *Information technology ─ Security techniques ─ Information security incident management – Part 2: Guidelines to plan and prepare for incident response*
- ISO/IEC 27037:2012: *Information technology ─ Security techniques ─ Guidelines for identification, collection, acquisition and preservation of digital evidence*
- ISO/IEC TS 29003:2018: *Information technology – Security techniques – Identity proofing*
- ISO/IEC 29115:2013: *Information technology – Security techniques – Entity authentication assurance framework*
- ISO/IEC 29146:2016: *Information technology – Security techniques – A framework for access management*

Website http://www.iso.org/

International Telecommunication Union (ITU)

Name	International Telecommunications Union (ITU)
Type	International Association
Summary	ITU is the United Nations specialized agency for information and communication technologies (ICTs). Founded in 1865 to facilitate international connectivity in communications networks, we allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect, and strive to improve access to ICTs to underserved communities worldwide. [139] ITU is committed to connecting all the world's people – wherever they live and whatever their means. Through our work, we protect and support everyone's right to communicate. ITU's membership represents 193 countries and over 800 private-sector entities and academic institutions.
Relevant Committees	• ITU Radiocommunication (ITU-R) Sector: The ITU Radiocommunication Sector (ITU-R) plays a vital role in the global management of the radio-frequency spectrum and satellite orbits – limited natural resources that are increasingly in demand from a large and growing number of services such as fixed, mobile, broadcasting, amateur, space research, emergency telecommunications, meteorology, global positioning systems (GPS), environmental monitoring and communication services – that ensure safety of life on land, at sea and in the skies. Their mission is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including those using satellite orbits, and to carry out studies and approve recommendations on radiocommunication matters.[140] • ITU Telecommunication Standardization (ITU-T) Sector: The study groups of ITU's Telecommunication Standardization Sector (ITU-T) assemble experts from around the world to develop international standards known as ITU-T Recommendations, which act as defining elements in the global infrastructure of ICTs. Standards are critical to the interoperability of ICTs and whether we exchange voice, video or data messages, standards enable global communications by ensuring that countries' ICT networks and devices are speaking the same language.[141]

[139] International Telecommunications Union (ITU), *About ITU.* Available at: https://www.itu.int/en/about/Pages/default.aspx.
[140] ITU, *About ITU-R.* Available at: https://www.itu.int/en/ITU-R/information/Pages/default.aspx.
[141] ITU, *About ITU-T.* Available at: https://www.itu.int/en/ITU-T/about/Pages/default.aspx.

Relevant Committees (continued)

- ITU Development (ITU-D) Sector: The ITU-D Sector fosters international cooperation and solidarity in the delivery of technical assistance and in the creation, development and improvement of telecommunication and ICT equipment and networks in developing countries. The ITU-D Sector is required to discharge the Union's dual responsibility as a United Nations specialized agency and executing agency for implementing projects under the United Nations development system or other funding arrangements, so as to facilitate and enhance telecommunication/ICT development by offering, organizing and coordinating technical cooperation and assistance activities.[142]
    - Emergency Telecommunications: Emergency telecommunications play a critical role in disaster risk reduction and management. ICTs are critical to deliver early warnings and in the immediate aftermath of disasters by ensuring timely flow of vital information. ITU-D Emergency Telecommunications plays an important role in emphasizing the critical role of ICTs in disaster risk reduction and management, and it supports its member states before, during and after disasters strike.[143]
- ITU Telecom Sector: ITU Telecom brings global governments, corporations and technical subject-matter experts (SMEs) to accelerate ICT innovation for economic growth and social good and to exhibit innovative solutions, network, share knowledge and debate with experts.[144]

Standards

- *RR5 Table of Frequency Allocations Software*
- *List IV – List of Coast Stations and Special Service Stations*
- *ITU-R Recommendations, Reports and Selected Handbooks*
- *ITU-T Recommendations Series (ITU-T Recs)*
- *Guide to Developing a National Cybersecurity Strategy – Strategic Engagement in Cybersecurity*
- *Powering the Digital Economy: Regulatory Approaches to Securing Consumer Privacy, Trust and Security*
- *Digital Identity in the ICT Ecosystem: An Overview*
- *Utilization of Telecommunications/ICTs for Disaster Preparedness, Mitigation and Response*
- *Preventing the Spread of Epidemics using ICT*

Website https://www.itu.int/en/Pages/default.aspx

[142] ITU, *ITU Telecommunications Development Sector.* Available at: *https://www.itu.int/en/ITU-D/Pages/default.aspx*
[143] ITU, *ITU-D Emergency Telecommunications.* Available at: https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Pages/default.aspx.
[144] ITU, *About ITU Telecom*. Available at: https://www.itu.int/en/itutelecom/Pages/default.aspx.

ISACA®

Name	ISACA®
Type	Global Information Systems Security Organization
Summary	ISACA® is the voice of the information systems audit, IT governance, risk management and cybersecurity professions. ISACA helps enterprises develop strong IT workforces by inspiring and equipping individuals to be more capable, valuable and successful in the fast-changing world of information technology and business. By offering industry-leading knowledge, standards, credentialing and education, ISACA enables professionals to apply technology in ways that instill confidence, address threats, drive innovation and create positive momentum for their organizations. ISACA is a global non-profit association of 140,000 professionals in 187 countries. ISACA also offers the Cybersecurity Nexus™ (CSX), a holistic cybersecurity resource, and COBIT®, a business framework to govern enterprise technology.[145] COBIT 5 is the only business framework for the governance and management of enterprise IT. It is the product of a global task force and development team from ISACA. COBIT 5 is generic and useful for enterprises of all sizes, whether commercial, not-for-profit or in public sector. COBIT 5 is used by those who have the primary responsibility for business processes and technology, depend on technology for relevant and reliable information, and provide quality, reliability and control of information and related technology. Key COBIT 5 users include enterprise executives and consultants in the following areas: • Audit and Assurance • Compliance • IT Operations • Governance • Security and Risk Management[146]
Relevant Committees	• ISACA coordinates and participates in numerous committees, working groups and advisory groups. Those who serve on ISACA's volunteer bodies provide ISACA with insights and expertise from around the world, facilitating the execution of ISACA's strategy while interacting and forming connections with peers worldwide.

[145] ISACA, *About ISACA.* Available at: http://www.isaca.org/about-isaca/pages/default.aspx.
[146] COBIT, *About COBIT 5.* Available at: https://cobitonline.isaca.org/about.

Relevant Projects

- Voice-over Internet Protocol (VoIP) Audit/Assurance Program: IT audit and assurance professionals are expected to use the program document to develop a customized program for the environment in which they are performing an assurance process related to information systems security. The document is to be used as a review tool and starting point and not intended to be a checklist or questionnaire. It is assumed that the IT audit and assurance professional has the necessary subject matter expertise required to conduct the work and is supervised by a professional with the Certified Information Systems Auditor (CISA) designation and/or necessary subject matter expertise to adequately review the work performed.

  A typical VoIP network comprises a complex series of cooperating protocols, networks (wireless and wired), servers, security architectures, special services (such as E-911), backup and recovery systems, and interfaces to the PSTN.

  During the audit planning process, the auditor must determine the scope of the audit. Depending on the specific implementation, this may include:
  - Evaluation of governance, policies, and oversight relating to VoIP
  - Data classification policies and management
  - The appropriate VoIP business case, actual deployment or upgrade processes, strategy and implementation controls
  - Technical architecture(s), including security systems, multiple platforms (different vendors which supply and/or support VoIP), interfaces with data networks, backup and recovery, data retention and destruction policy, and technology
  - Assessments of IT infrastructure and personnel to support the VoIP architecture(s)
  - Baseline configurations of deployed hardware and software
  - Issues related to decentralized VoIP servers
  - Issues related to failover clustering, where appropriate

  Security considerations for the PSTN (or dial-up) are outside the scope of this document.[147]

[147] ISACA, *Voice-over Internet Protocol (VoIP) Audit/Assurance Program*. Available at: http://www.isaca.org/Knowledge-Center/Research/ResearchDeliverables/Pages/Voice-over-Internet-Protocol-VoIP-Audit-Assurance-Program.aspx.

Relevant Projects (continued)

- COBIT 5 Assessment Programme: The Programme is the basis for assessing an enterprise's processes for the governance and management of information technology and related services as described in COBIT 5. The Programme consists of the following segments:
  - Process Assessment Model
  - Self-Assessment Guide
  - Assessor Guide

  It enables the evaluation of selected IT processes. The assessment results provide a determination of process capability and can be used for process improvement, delivering value to the business, measuring the achievement of current or projected business goals, benchmarking, consistent reporting and organizational compliance.

  The process capability is expressed in terms of attributes grouped into capability levels and the achievement of specific process attributes as defined in ISO/IEC 15504-2. Processes can be assessed individually or alternatively in logical groups. As such, scoping areas have been defined based on previously developed mappings, published by ISACA, which will allow for focused assessments. These scoping areas include:
  - Capability of IT processes to support cloud services
  - Capability of IT processes to support achievement of IT and business goals
  - Capability of IT processes to support SOX compliance
  - Capability of IT processes to support the enterprise governance of IT[148]

- Cybersecurity Nexus™ (CSX): CSX is a security knowledge platform and professional program from ISACA. CSX is focused on helping shape the future of cybersecurity through cutting-edge thought leadership, as well as training and certification programs for the professionals who are leading it there. Building on the strength of ISACA's globally-recognized expertise, it gives cybersecurity professionals a smarter way to keep organizations and their information more secure. With CSX, business leaders and cyber professionals can obtain the knowledge, tools, guidance and connections to be at the forefront of a vital and rapidly changing industry.[149]

Certifications

- Certified Information Systems Auditor (CISA)
- Certified Information Security Manager (CISM)
- Certified in the Governance of Enterprise IT (CGEIT)
- Certified in Risk and Information Systems Control (CRISC)

[148] ISACA, *COBIT 5 Assessment Programme*. Available at: http://www.isaca.org/COBIT/Pages/Product-Family.aspx#process.
[149] ISACA, *Cybersecurity Nexus*. Available at: http://www.isaca.org/cyber/Pages/default.aspx.

Coordinated Activities	• ISACA is a global non-profit association of professionals in 187 countries that collaborate to help global professionals lead, adapt and assure trust in an evolving digital world by offering innovative and world-class knowledge, standards, networking, credentialing and career development.
Websites	https://www.isaca.org/ https://cobitonline.isaca.org/

National Emergency Number Association (NENA)

Name National Emergency Number Association (NENA)

Type National Standards Organization (ANSI-accredited)

Summary NENA serves its members and the greater public safety community as the only professional organization solely focused on 9-1-1 policy, technology, operations, and education issues. With more than 7,000 members in 48 chapters across the U.S. and around the globe, NENA promotes implementation and awareness of 9-1-1, as well as international three-digit emergency communications systems. NENA is an ANSI-accredited standards developer.

NENA works with 9-1-1 professionals nationwide, public policy leaders, emergency services and telecommunications industry partners, like-minded public safety associations, and other stakeholder groups to develop and carry out critical programs and initiatives; to facilitate the creation of an IP-based NG9-1-1 system; and to establish industry-leading standards, training, and certifications. Through the association's efforts to provide effective and efficient public safety solutions, NENA strives to protect human life, preserve property, and maintain the security of our communities.

NENA began work on what is now termed NG9-1-1 in 2000 with discussion and then production of the NENA Future Path Plan for a technologically updated and more feature-rich replacement for E9-1-1. In 2003, NENA established a committee to develop the technical nature and architecture of NG9-1-1, recognizing that this would also require various other work efforts over time to define databases management, system operations and administration, and PSAP operations requirements and standards, as well as transition plans. The NENA NG9-1-1 Project was formed to tie all aspects together.

Relevant Committees

- NENA NG9-1-1 Project encompasses and coordinates many actions aimed to accomplish the capabilities for IP-based NG9-1-1:
  - Core systems and technical development
  - PSAP operations
  - NG9-1-1 system operations
  - Interconnection and security
  - Policy change needs and methods development
  - Transition planning
  - Public education and PSAP training
  - Interoperability testing (Industry Collaboration Events [ICE])

  There are also plans to conduct a distributed Pilot Testing process to result in national testing recommendations.

Standards

- Data and Network Standards
  - NENA-STA-015.10-2018: *Legacy NENA Standard Data Formats for E9-1-1 Data Exchange & GIS Mapping*
  - NENA-STA-015.10-2018: *Legacy Data Formats for ALI, MSAG & GIS*
  - NENA 02-014 v1: *NENA GIS Data Collection and Maintenance Standards*
  - NENA 02-015 v1: *Resolving ANI/ALI Discrepancies & NRFs*
  - NENA 03-509 v1: *Femtocell and Universal Mobil Access (UMA) Technical Information Document*
  - NENA 04-005 v1: *NENA ALI Query Service Standard*
  - NENA 08-001 v2: *NENA Interim VoIP Architecture for Enhanced 9-1-1 Services (i2)*
  - NENA 08-503 v1: *VoIP Characteristics Technical Information Document*
  - NENA 08-505 v1: *NENA Recommended Method(s) for Location Determination to Support IP-Based Emergency Services*
  - NENA 08-752 v1: *NENA Technical Requirements Document For Location Information to Support IP-Based Emergency Services*
  - NENA-STA-012.2-2017: *NG9-1-1 Additional Data*
  - NENA 71-501 v1: *NENA Information Document for Synchronizing Geographic Information System Databases with MSAG & ALI*
  - NENA-STA-004.1.1-2014: *NENA Next Generation 9-1-1 (NG9-1-1) Civic Location Data Exchange Format (CLDXF) Standard*
  - NENA-STA-005.1.1-2017: *NENA Standards for the Provisioning and Maintenance of GIS data to ECRF and LVFs*
  - NENA-STA-006.1-2018: *GIS Data Model for NG9 1-1*
  - NENA-REQ-002.1-2016: *NENA Next Generation 9-1-1 Data Management Requirements*
  - NENA-INF-009.1-2014: *Requirements for a National Forest Guide Information Document*
  - APCO/NENA 2.105.1-2017: *NG9-1-1 Emergency Incident Data Document (EIDD)*
  - NENA-REQ-001.1-2016: *Discrepancy, Performance and Audits for NG9-1-1*
  - NENA-INF-014.1-2015: *NENA Information Document for Development of Site/Structure Address Point GIS Data for 9-1-1*
- Policy Routing Standards
  - NENA 71-502 v1: *An Overview of Policy Rules for Call Routing and Handling in NG9-1-1*
  - NENA STA-003.1.1-2014: *NENA Standard for NG9-1-1 Policy Routing Rules*
  - NENA-INF-011.1-2014*: NENA NG9-1-1 Policy Routing Rules Operations Guide*

Standards (continued)

- Security Standards
  - NENA 75-001: *NENA Security for Next-Generation 9-1-1 Standard (NG-SEC)*
  - NENA 75-502 v1: *Next Generation 9-1-1 Security (NG-SEC) Audit Checklist*
  - NENA-INF-015.1-2016: *NENA Next Generation 9-1-1 Security (NG-SEC) Information Document*
- NG9-1-1 Architecture Standards
  - NENA 08-002 v1: *NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3)*
  - NENA-STA-010.2-2016: *Detailed Functional and Interface Specification for the NENA i3 Solution*
  - NENA 08-501 v1: *NENA Technical Information Document on the Network Interface to IP Capable PSAP*
  - NENA-INF-016.2-2018: *Emergency Services IP Network Design Information Document*
  - NENA 08-751 v1: *NENA i3 Technical Requirements Document*
  - NENA-INF-0.25.2-2017: *NENA Virtual PSAP Management Operations Information Document (OID)*
  - NENA 73-501 v1: *Use Cases & Suggested Requirements for Non-Voice-Centric (NVC) Emergency Services*
  - NENA-INF-003.1-2013: *NENA Potential Points of Demarcation in NG9-1-1 Networks Information Document*
  - NENA-INF-018.1-2017: *NENA Non-Mobile Wireless Service Interaction Information Document*
  - NENA-INF-TBD: *NENA Classes of Service*
  - NENA/APCO-REQ-001.1.2-2018*: NENA/APCO Next Generation 9-1-1 Public Safety Answering Point Requirements*
- PSAP Operations, Training and Public Education Standards
  - NENA 54-750 v1: *NENA/APCO Human Machine Interface & PSAP Display Requirements (ORD)*
  - NENA 56-005*: NENA Standard for 9-1-1 Call Processing*
  - NENA 57-750 v1: *NG9-1-1 System and PSAP Operational Features and Capabilities Requirements*
  - NENA-STA-028.2-2018: *NENA Recommended Generic Standards for E9-1-1 PSAP Intelligent Workstations*
  - NENA-STA-027.3-2018*: E9-1-1 PSAP Equipment Standards*
  - NENA-INF-007.1-2013*: NENA Information Document for Handling Text-to-9-1-1 in the PSAP*
  - NENA-INF-012.2-2015: *NENA Inter-Agency Agreements Model Recommendations Information Document*
  - NENA-REF-002.2-2014*: PSAP Interim Text-to-9-1-1 Support Documents*
  - NENA-REF-003.1-2015: *NENA Text-to-9-1-1 Public Education*
  - NENA-INF-019.2-2016: *NENA Resource, NENA Hazard and Vulnerability Analysis Information Document*

Standards (continued)

- *SMS Text-to-9-1-1 Resources for PSAPs and 9-1-1 Authorities*NENA-REF-010.2-2019: *NG9-1-1 Go To Handbook*
- *Recommended NG9-1-1 Public Education Plan for Elected Officials and Decision Makers*NENA-STA-019.1.2018:*NENA NG9-1-1 Call Processing Metrics Standard*NENA-INF-023.1-2017*: Call Blocking*

- (Management of) NG9-1-1 System Operations
  - NENA-STA-008.2-2014*: NENA Registry System Standard*
  - NENA-INF-TBD: *Monitoring and Managing NG9-1-1*
- Transition Standards
  - NENA-INF-008.2-2013: *NENA NG9-1-1 Transition Plan Considerations Information Document*
  - *Next Generation 9-1-1 Transition Policy Implementation Handbook*
- Reference Standards
  - NENA-ADM-000.22-2018: *NENA Master Glossary of 9-1-1 Terminology*
  - NENA-INF-004.1.2-2018: *Operational Impacts of Devices & Sensors*
  - NENA-INF-024.2-2018: *NENA PSAP Site Characteristics Information Document*

Coordinated Activities

- USDOT NG911 Initiative
- EIDD
- Integrated Justice Information Systems (IJIS)
- Next Generation Partner Program (NGPP) coordinates with various industry vendors and public safety groups
- NG9-1-1 ICE coordinates with industry vendors on interoperability and standards compliance
- ATIS ESIF regarding emergency services interconnection issues N11 consortium for coordinating interactions between NG911 and N11 services
- Coalition of Geospatial Organizations (COGO)
- Urban and Regional Information Systems Association (URISA)
- National Center for Missing and Exploited Children (NCMEC)
- FCC CSRIC / TFOPA
- ANSI: NENA is an ANSI-accredited SDO
- Implementation and Coordination Office (ICO) 911 Resource Center

Effects on NG911	• Defines ESInet (transport and connectivity) requirements and characteristics, beyond generic IP networking standards • Defines NG9-1-1 IP function and interface standards for NG9-1-1 core architecture • Defines NG9-1-1 databases used to control call-routing processes • Supports location requirements and standards • Defines NG9-1-1 interface options for originating service provider entry to the system • Defines emergency entity functionality in coordination with NG9-1-1 system functions • Defines PSAP functional entity downstream interfaces • Defines mechanisms for acquisition of additional data from beyond the NG9-1-1 system • Addresses PSAP operations
Websites	http://www.nena.org/ http://www.nena.org/?page=Standards

National Fire Protection Association (NFPA)

Name	National Fire Protection Association (NFPA)
Type	National Standards Organization (ANSI-accredited)
Summary	NFPA is a global nonprofit organization, established in 1896, devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards.[150]
Standards	• NFPA 70: *National Electrical Code® (NEC)* • NFPA 72: *National Fire Alarm and Signaling Code* • NFPA 76: *Standard for the Fire Protection of Telecommunications Facilities* • NFPA 950: *Standard for Data Development and Exchange for the Fire Service* • NFPA 1061: *Professional Qualifications for Public Safety Telecommunications Personnel* • NFPA 1201: *Standard for Providing Fire and Emergency Services to the Public* • NFPA 1221: *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems* • NFPA 1600: *Standard on Disaster/Emergency Management and Business Continuity/Continuity of Operations Programs*
Coordinated Activities	• ANSI: NFPA is an ANSI-accredited SDO[151]
Website	http://www.nfpa.org/

[150] National Fire Protection Agency (NFPA), *NFPA overview.* Available at: http://www.nfpa.org/overview.
[151] Ibid.

National Information Exchange Model (NIEM)

Name	National Information Exchange Model (NIEM)
Type	Government Project
Summary	The National Information Exchange Model (NIEM) is a common vocabulary that enables efficient information exchange across diverse public and private organizations. NIEM connects communities of people who share a common need to exchange information in order to advance their mission.[152] The NIEM community includes members from federal, state, local, tribal, private, and international organizations.[153] Today all 50 states and many federal agencies are using (at varying levels of maturity) or considering using NIEM.[154]
Relevant Programs and Projects	• NIEM Management Office (NMO): The NMO executes the vision of NIEM established by the Executive Steering Council (ESC), while managing the day-to-day operations of NIEM. The office encourages the adoption and use of NIEM and oversees all working group and committee activities, regularly coordinating with communities of interest, principal stakeholders, and other information-sharing initiatives to promote collaboration and interest in NIEM priorities.[155] • NIEM Business Architecture Committee (NBAC): NBAC's mission is to set the business architecture and requirements of NIEM, manage NIEM core and facilitate the processes for the regulation and support of NIEM domains.[156] • NIEM Technical Architecture Committee (NTAC): NTAC's mission is to define and support the technical architecture that governs NIEM.[157]
Standards	• NIEM version 4.1: *National Information Exchange Model*
Coordinated Activities	• The Geospatial Enhancement for NIEM (Geo4NIEM) initiative was a collaboration between NIEM PMO, the Open Geospatial Consortium (OGC), DHS and the Program Manager for the Information Sharing Environment to enhance the capabilities of NIEM's geospatial exchange.[158]

[152] National Information Exchange Model (NIEM), *About NIEM*. Available at: https://www.niem.gov/about-niem.
[153] Ibid.
[154] NIEM, *NIEM's History*. Available at: https://www.niem.gov/about-niem/history.
[155] NIEM, *NIEM Governance*. Available at: https://www.niem.gov/about-niem/niem-governance.
[156] Ibid.
[157] Ibid.
[158] NIEM, *Geospatial Integration*. Available at: https://niem.github.io/geospatial/.

Effects on NG911	• Develops standards related to handling emergency datasets, specifically pertaining to interoperability for data sharing.
Website	http://niem.gov

North American Electric Reliability Corporation (NERC)

Name	North American Electric Reliability Corporation (NERC)
Type	Professional Organization
Summary	NERC is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental U.S., Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization for North America, subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. NERC's jurisdiction includes users, owners, and operators of the bulk power system, which serves more than 334 million people.[159]
Relevant Committees	• Standards Committee • Critical Infrastructure Protection Committee
Standards	• CIP-002-5.1a: *Cyber Security – BES Cyber System Categorization* • CIP-003-6: *Cyber Security – Security Management Controls* • CIP-004-6: *Cyber Security – Personnel & Training* • CIP-005-5: *Cyber Security – Electronic Security Perimeter(s)* • CIP-006-6: *Cyber Security – Physical Security of BES Cyber Systems* • CIP-007-6: *Cyber Security – System Security Management* • CIP-008-5: *Cyber Security – Incident Reporting and Response Planning* • CIP-009-6: *Cyber Security – Recovery Plans for BES Cyber Systems* • CIP-010-2: *Cyber Security – Configuration Change Management and Vulnerability Assessments* • CIP-011-2*: Cyber Security – Information Protection*
Effects on NG911	• These standards apply to the electrical critical infrastructure and will not have direct impact on NG911. This level of cyber security for critical infrastructure is in line with what is needed for NG911.
Website	http://www.nerc.com/

[159] North American Electric Reliability Corporation (NERC) website is available at http://www.nerc.com/Pages/default.aspx.

Object Management Group® (OMG®)

Name	Object Management Group (OMG)
Type	Not-for-profit technology standards consortium
Summary	OMG is an international, open membership, not-for-profit technology standards consortium, founded in 1989. OMG standards are driven by vendors, end-users, academic institutions and government agencies. OMG Task Forces develop enterprise integration standards for a wide range of technologies and an even wider range of industries. OMG's modeling standards, including the Unified Modeling Language® (UML) and Model Driven Architecture® (MDA), enable powerful visual design, execution and maintenance of software and other processes. OMG also hosts organizations such as the user-driven information-sharing Cloud Standards Customer Council™ and the IT industry software quality standardization group, the Consortium for IT Software Quality.™ OMG also managed the Industrial Internet Consortium, the public-private partnership that was formed in 2014 with AT&T, Cisco, GE, IBM, and Intel to forward the development, adoption, and innovation of the Industrial IoT.[160]
Mission Statement	OMG's mission is to develop technology standards that provide real-world value for thousands of vertical industries. OMG is dedicated to bringing together its international membership of end-users, vendors, government agencies, universities and research institutions to develop and revise these standards as technologies change throughout the years.[161]
Relevant Documents	• Cyber Security Protection for Front Line Real-Time Systems RFI: This Request for Information (RFI) solicited information about requirements, standards, products, and work in progress as well as prospective work related to Security Services along with digital (non-XML) Security Data Tagging and other Security-related Services. OMG and, specifically, the coordination task force C4I DTF, and related task forces such as MARS PTF, System Assurance (SysA), Government, DDS PSIG, SysML PSIG and other groups within OMG, will use this information to begin the process for OMG-compliant models and interface standards to be used in platforms. Responses were due November 7, 2016.[162]

[160] Object Management Group (OMG), *About OMG*. Available at: http://www.omg.org/gettingstarted/gettingstartedindex.htm.
[161] Ibid.
[162] OMG, *Current OMG Technology Adoption Processes Under Way.* Available at: http://www.omg.org/public_schedule/.

Relevant Documents (continued)	• UML Operational Threat & Risk Model RFP: Multiple communities have developed data and exchange schema and interfaces for sharing information about threats, risks and incidents that impact important government, commercial, and personal assets and privacy. This RFP called for a conceptual model for operational threats and risks that unifies the semantics of and can provide a bridge across multiple threat and risk schema and interfaces. The conceptual model will be informed by high-level concepts as defined by the Cyber domain, existing NIEM domains and other applicable domains, but is not specific to those domains. This will enable combined Cyber, physical, criminal and natural threats and risks to be federated, understood and responded to effectively. Responses were due February 23, 2015.[163]
Coordinated Activities	OMG maintains active relationships with many other standards bodies and consortia such as: [164] • IJIS Institute • ISO • ITU-T Standardization Sector • OASIS • Open GIS Consortium
Effects on NG911	• Current work on cybersecurity and risk may benefit the NG911 environment.
Website	http://www.omg.org

[163] Ibid.
[164] OMG, *Liaison AB Subcommittee*. Available at: http://www.omg.org/news/about/liaison.htm.

Organization for the Advancement of Structured Information Standards (OASIS)

Name	Organization for the Advancement of Structured Information Standards (OASIS)
Type	Standards Setting Organization (Community)
Summary	OASIS is a not-for-profit consortium that drives the development, convergence, and adoption of open standards for the global information society.[165]
Relevant Committees	• OASIS Emergency Management Technical Committee (EM-TC): EM-TC creates vendor-neutral and platform agnostic standards for organizations and agencies to more easily exchange emergency information. The EM-TC welcomes participation from members of the emergency management community, developers and implementers, and members of the public concerned with disaster management and response.[166]
Standards	• OASIS CAP v1.2: *Common Alerting Protocol* • OASIS EDXL-DE v1.0: *Emergency Data Exchange Language (EDXL) Distribution Element, v 1.0* • OASIS EDXL-HAVE*: Emergency Data Exchange Language (EDXL) Hospital AVailability Exchange Version 2.0* • OASIS EDXL-RM: *Emergency Data Exchange Language Resource Messaging (EDXL-RM) 1.0* • OASIS EDXL-SitRep v1.0*: Emergency Data Exchange Language Situation Reporting (EDXL-SitRep) Version 1.0* • OASIS EDXL-TEC*: Emergency Data Exchange Language (EDXL) Tracking of Emergency Clients (TEC) Client Registry Exchange Version 1.0* • OASIS EDXL-TEP v1.1: *Emergency Data Exchange Language (EDXL) Tracking of Emergency Patients (TEP) Version 1.1*
Effects on NG911	• Develops standards related to handling emergency datasets.
Website	http://www.oasis-open.org/

[165] Organization for the Advancement of Structured Information Standards (OASIS), *About Us.* Available at: http://www.oasis-open.org/org.
[166] OASIS, *OASIS Emergency Management TC.* Available at: http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=emergency.

Open Geospatial Consortium (OGC®)

Name Open Geospatial Consortium (OGC)

Type Standards Setting Organization (Community)

Summary OGC is an international industry consortium of over 500 companies, government agencies, and universities participating in a consensus process to develop publicly available interface standards. OGC standards support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT. The standards empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications.[167]

The OGC Innovation Program supports test beds for multi-vendor collaborative efforts to define, design, develop, and test candidate interface and encoding specifications. These draft specifications then move into the OGC Standards Program where they are reviewed, revised and potentially approved as new international standards.[168]

Testbed 13 kicked off in 2017 and brings value as shared investment in spatial standards for improved sharing and integration of spatial information, which has widespread and longstanding benefit for sponsors and for society at large.[169] Testbed 14 is tentatively planned for kickoff in April 2018 and will integrate both architectural and thematic views, allowing a grouping of closely related work items and reduction of cross-thread dependencies.[170]

Mission OGC's mission is to advance the development and use of international standards and supporting services that promote geospatial interoperability. To accomplish this mission, OGC serves as the global forum for the collaboration of geospatial data/solution providers and users.

Standards

- OGC 04-094: *Web Feature Service Implementation Standard*
- OGC 06-042: *OpenGIS Web Map Server Implementation Specification*
- OGC 07-006r1: *OpenGIS Catalogue Services Specification*
- OGC 07-074: *OpenGIS Location Service (OpenLS): Core Services*
- OGC 09-025r2*: OGC Web Feature Service 2.0 Interface Standard – With Corrigendum*
- OGC 09-083r3: *GeoAPI 3.0 Implementation Standard*
- OGC 10-129r1: *OGC Geography Markup Language (GML) – Extended schemas and encoding rules*
- OGC 11-030r1: *OGC Open GeoSMS Standard – Core*

[167] Open Geospatial Consortium (OGC), *About OGC.* Available at: http://www.opengeospatial.org/ogc.
[168] Information on OGC's Innovation Program is available at: http://www.opengeospatial.org/ogc/programs/ip.
[169] OGC, *OGC Testbed 13*. Available at: http://www.opengeospatial.org/projects/initiatives/testbed13 .
[170] Open Geospatial Consortium (OGC), *OGC Testbed 14*. Available at: www.opengeospatial.org/projects/initiatives/testbed14.

Standards (continued)	• OGC 12-019: *OGC City Geography Markup Language (CityGML) Encoding Standard* • OGC KML 2.3: *OGC KML 2.3*
Alliance Partners/ Coordinated Activities[171]	• IEEE • IETF • ISO • OASIS • OMA
Effects on NG911	• Supports geospatial data standards for data sharing, implementation and interoperability.
Website	http://www.opengeospatial.org/

[171] OGC, *OGC Alliance Partners.* Available at: http://www.opengeospatial.org/ogc/alliancepartners.

Open Mobile Alliance (OMA)

Name	Open Mobile Alliance (OMA)
Type	International Standards Organization
Summary	OMA is the focal point for the development of mobile service enabler specifications, which support the creation of interoperable end-to-end mobile services. OMA is a non-profit organization that delivers open specifications for creating interoperable services that work across all geographical boundaries, on any bearer network. OMA's specifications support the billions of new and existing terminals across a variety of wireless networks, including traditional cellular operator networks and emerging networks supporting machine-to-machine device communications for the Internet of Things (IoT).[172]
Goals	• Deliver high quality, open technical specifications based upon market requirements that drive modularity, extensibility, and consistency amongst enablers to reduce industry implementation efforts. • Ensure OMA service enabler specifications provide interoperability across different devices, geographies, service providers, operators, and networks; facilitate interoperability of the resulting product implementations. • Be the catalyst for the consolidation of standards activity within the mobile data service industry; work in conjunction with other existing standards organizations and industry fora to improve interoperability and decrease operational costs for all involved. • Provide value and benefits to members in OMA from all parts of the value chain including content and service providers, information technology providers, mobile operators and wireless vendors, such that they elect to actively participate in the organization.[173]
Relevant Working Groups	• Location Working Group: The Location Working Group develops specifications to ensure interoperability of mobile location services on an end-to-end basis, as well as to provide technical expertise and consultancy on location services for other groups within OMA.[174] • Device Management & Service Enablement Working Group: The Device Management & Service Enablement Working Group specifies protocols and mechanisms to achieve the management of mobile devices, services access and software on connected devices for mobile networks and the Internet of Things (IoT).[175]

[172] Open Mobile Alliance (OMA), *About OMA.* Available at: https://www.omaspecworks.org/about/.
[173] Ibid.
[174] OMA, *Location Working Group.* Available at: https://www.omaspecworks.org/about/the-oma-specworks-work-program/location-working-group/.
[175] OMA, *Device Management & Service Enablement Working Group.* Available at: http://openmobilealliance.org/about-oma/work-program/device-management/.

Specifications	• OMA-ERP-SUPL-V3_0_2-20110920-C: *OMA Secure User Plane Location V3.0* • OMA-ERELD-LPPe-V2_0-20141202-C: *OMA LPP Extensions (LPPe) v2.0* • OMA-ERP-MLP-V3_1-20110920-A: *OMA Mobile Location Protocol V3.1* • OMA-ERELD-LOCSIP-V1_0-201201717-A: *OMA Location in SIP/IP Core V1.0* • OMA SEC_CF 1.1: *OMA Application Layer Security Common Functions V1.1*
Coordinated Activities	• 3GPP • ETSI • IETF • ITU-T • OASIS • Wi-Fi Alliance • WiMAX Forum[176]
Effects on NG911	• Develops standards that enable text and multimedia transmission from the caller to the NG911 system (transport of data). • Supports location requirements and/or specifies standards.
Website	http://www.openmobilealliance.org/

[176] OMA, *Collaboration and Affiliates.* Available at: https://www.omaspecworks.org/about/the-oma-specworks-work-program/ipso-smart-objects-working-group/.

Standards Coordinating Council (SCC)

Name	Standards Coordinating Council (SCC)
Summary	SCC grew out of a need for a high-level view of the information sharing and safeguarding standards landscape. As information sharing standards grow and develop, there needed to be a body to oversee this development and provide guidance to SDOs on issues related to these standards and how they fit in the context of the overall landscape of information sharing and safeguarding initiatives. SCC serves as this high-level oversight, and the SCC provides advice and counsel to the standards development stakeholder community on matters related to information sharing and safeguarding standards.[177]
Goals	In addition to providing advice and counsel, the SCC is intended to advance responsible information sharing and safeguarding and information sharing standards. To do this, the SCC will: • Identify high-priority standards activities that can be coordinated across SDOs for greater return on resources. • Communicate stakeholder requirements to identify opportunities to develop or integrate technical and functional roadmaps. • Coordinate governance processes across SDOs to streamline standards development activities and to enhance communication, collaboration, and consensus between standards partners. • Coordinate outreach and training opportunities to reach a broader constituency. • Coordinate private sector standards activities with federal governance bodies such as the Federal CIO Council.[178]
Relevant Committees	• Project Interoperability: Project Interoperability is a start-up guide for information interoperability. Information interoperability is the ability to transfer and use information in a consistent, efficient way across multiple organizations and IT systems to accomplish operational missions. From a technical perspective, interoperability is developed through the consistent application of design principles and design standards to address a specific mission problem.[179]

[177] Standards Coordination Council (SCC), *About the Standards Coordinating Council*, Available at: http://www.standardscoordination.org/about.
[178] Ibid.
[179] SCC, *Project Interoperability*, Available at: http://sccupdate.ijis.org/project_interoperability.

Relevant Committees (continued)

- Incident Management Information Sharing (IMIS): Current systems that are implemented to support the emergency management community are typically developed using proprietary data models that may inhibit information sharing. The IMIS Framework recommends an architecture where standard information encodings and standard data services are implemented in the IMIS-compliant systems to support the necessary data exchanges and improve overall interoperability between systems holding information and systems supporting consumers of the information.[180]
- Cross-border Trusted Information Sharing: This effort plans to address cross-border information sharing between Canada and U.S. emergency management mission partners. Standardized data-sharing will provide mission partners that exist across borders to access situational-awareness information; in addition, a standardized message can be generated and sent based on predefined policies and rules. The goal of the project is to validate and enhance the IEF architecture.[181]
- OGC Geo4NIEM Testbed: A series of engineering reports was issued in June 2015. The purpose of this initiative was to test NIEM IC IEPs containing geospatial data or GML feature representations leveraging NIEM components to:
    - Validate and provide recommendations to enhance NIEM 3.0 architecture related to the Intelligence Community data encoding specifications (i.e., ISM, NTK, and TDF) aligned to OGC Testbed 9.
    - Provide recommendations to enable full-round tripping from NIEM information exchange packages to GML features and back to provide a comprehensive view of NIEM and GML capabilities and to document NIEM architectural gaps.
    - Test and demonstrate 1) use of NIEM 3.0 tagging related to IC data encoding specifications and 2) round tripping of NIEM information exchange packages to GML features and back.
    - Test and demonstrate use of an application programming interface (API) for operating on GML feature representations leveraging NIEM components; features may be searched, retrieved, inserted, updated, and deleted.[182]

SCC, SCC Initiatives, Available at: http://standardscoordination.org/content/incident-management-information-sharing-dhs-st.

[181] Ibid.

[182] Ibid.

Standards	• *Information Sharing Environment (ISE) Information Interoperability Framework (I^2F)*: ISE I^2F is a national architecture framework designed to support information sharing for the public safety and national security missions across all levels of government – federal, state, local, tribal, and territorial. The content of Project Interoperability comes directly from the I^2F.[183] • *The Information Sharing and Safeguarding (IS&S) Playbook:* This Playbook is intended to help users in their quest to create or enhance an effective and efficient Information Sharing and Safeguarding environment, and can be used at any point in the environment's lifecycle.[184]
Effects on NG911	• Impacts the sharing of information with other public safety and homeland security entities.
Website	http://www.standardscoordination.org

[183] SCC, *Project Interoperability*. Available at: http://sccupdate.ijis.org/project_interoperability.
[184] SCC, *IS&S Playbook*. Available at: http://www.standardscoordination.org/content/playbook-principles.

Society of Cable Telecommunications Engineers (SCTE)

Name	Society of Cable Telecommunications Engineers (SCTE)
Type	Standards Setting Organization—Industry (Cable Telecommunications)
Summary	SCTE is a non-profit professional association that provides technical leadership for the telecommunications industry and serves its members through professional development, standards, certification, and information.[185]
Mission	SCTE's mission is to provide technical leadership for the telecommunications industry and serve its members through excellence in professional development, standards, certification, and information.
Standards	• ANSI/SCTE 24-1 2016: *IPCablecom 1.0 Part 1: Architecture Framework for the Delivery of Time-Critical Services over Cable Television Networks Using Cable Modems* • ANSI/SCTE 24-2 2016: *IPCablecom 1.0 Part 2: Audio Codec Requirements for the Provision of Bi-directional Audio Service over Cable Television Networks Using Cable Modems* • ANSI/SCTE 24-03 2016: *IPCablecom Part 3: Network Signaling Protocol for the Delivery of Time-Critical Services over Cable Television Using Data Modems* • ANSI/SCTE 24-04 2016: *IPCablecom 1.0 Part 4: Dynamic Quality of Service for the Provision of Real-Time Services over Cable Television Networks Using Data Modems* • ANSI/SCTE 24-21 2017: *BV16 Speech Codec Specification for Voice over IP Applications in Cable Telephony* • ANSI/SCTE 24-22 2013: *iLBCv2.0 Speech Codec Specification for Voice over IP Applications in Cable Telephony* • ANSI/SCTE 24-23 2017: *BV32 Speech Codec Specification for Voice over IP Applications in Cable Telephony* • ANSI/SCTE 162 2009: *Emergency Alert Signaling for the Home Network* • ANSI/SCTE 164 2010: *Emergency Alert Metadata Descriptor* • ANSI/SCTE 165-1 2009: *IPCablecom 1.5 Part 1: Architecture Framework Technical Report* • ANSI/SCTE 165-2 2016: *IPCablecom 1.5 Part 2: Audio/Video Codecs* • ANSI/SCTE 165-3 2016: *IPCablecom 1.5 Part 3: Network-Based Call Signaling Protocol* • ANSI/SCTE 165-4 2009: *IPCablecom 1.5 Part 4: Dynamic Quality-of-Service* • ANSI/SCTE 24-1 2016: *IPCablecom 1.0 Part 1: Architecture Framework for the Delivery of Time-Critical Services over Cable Television Networks Using Cable Modems*

[185] Society of Cable Telecommunications Engineers (SCTE), *About SCTE/ISBE*. Available at: http://www.scte.org/SCTE/About.

Standards (continued)

- ANSI/SCTE 24-02 2016: *IPCablecom 1.0 Part 2: Audio Codec Requirements for the Provision of Bidirectional Audio Service over Cable Television Networks Using Cable Modems*
- ANSI/SCTE 24-3 2016: *IPCablecom Part 3: Network Call Signaling Protocol for the Delivery of Time-Critical Services over Cable Television Using Data Modems*
- ANSI/SCTE 24-4 2016: *IPCablecom 1.0 Part 4: Dynamic Quality of Service for the Provision of Real-Time Services over Cable Television Networks Using Data Modems*
- ANSI/SCTE 24-21 2017: *BV16 Speech Codec Specification for Voice over IP Applications in Cable Telephony*
- ANSI/SCTE 24-22 2018: *iLBCv2.0 Speech Codec Specification for Voice over IP Applications in Cable Telephony*
- ANSI/SCTE 24-23 2017: *BV32 Speech Codec Specification for Voice over IP Applications in Cable Telephony*
- ANSI/SCTE-162 2019: *Emergency Alert Signaling for the Home Network*
- SCTE 164 2019: *Emergency Alert Metadata Descriptor*
- SCTE 165-01 2019: *IPCablecom 1.5 Part 1: Architecture Framework Technical Report*
- ANSI/SCTE 165-2 2016: *IPCablecom 1.5 Part 2: Audio/Video Codecs*
- ANSI/SCTE 165-3 2016: *IPCablecom 1.5 Part 3: Network-Based Call Signaling Protocol*
- SCTE 165-04 2019: *IPCablecom 1.5 Part 4: Dynamic Quality of Service*
- ANSI/SCTE 165-5 2009: *IPCablecom 1.5 Part 5: Media Terminal Adapter (MTA) Device Provisioning*
- ANSI/SCTE 165-6 2009: *IPCablecom 1.5 Part 6: MIBS Framework*
- ANSI/SCTE 165-7 2009: *IPCablecom 1.5 Part 7: MTA MIB*
- ANSI/SCTE 165-8 2009: *IPCablecom 1.5 Part 8: Signaling MIB*
- ANSI/SCTE 165-9 2009: *IPCablecom 1.5 Part 9: Event Messaging*
- ANSI/SCTE 165-10 2009: *IPCablecom 1.5 Part 10: Security*
- ANSI/SCTE 165-11 2009: *IPCablecom 1.5 Part 11: Analog Trunking for PBX Specification*
- ANSI/SCTE 165-12 2016: *IPCablecom 1.5 Part 12: PSTN Gateway Call Signaling Protocol*
- ANSI/SCTE 165-13 2009: *IPCablecom 1.5 Part 13: Electronic Surveillance Standard*
- ANSI/SCTE 165-14 2009: *IPCablecom 1.5 Part 14: Embedded MTA Analog Interface and Powering*
- ANSI/SCTE 165-15 2009: *IPCablecom 1.5 Part 15: Management Event MIB Specification*
- ANSI/SCTE 165-16 2016: *IPCablecom 1.5 Part 16: Management Event Mechanism*
- ANSI/SCTE 165-17 2009: *IPCablecom 1.5 Part 17: Audio Server Protocol*
- ANSI/SCTE 165-18 2016: *IPCablecom 1.5 Part 18: CMS to CMS Signaling*
- ANSI/SCTE 165-19 2009: *IPCablecom 1.5 Part 19: CMS Subscriber Provisioning Specification*

Standards (continued)	• ANSI/SCTE 165-20 2009: *IPCablecom 1.5 Part 20: MTA Extension MIB* • ANSI/SCTE 165-21 2016: *IPCablecom 1.5 Part 21: Signaling Extension MIB*
Coordinated Activities	• ANSI: The SCTE Standards Program provides an ANSI-accredited forum for development of technical specifications supporting the cable telecommunications industry.[186]
Website	http://www.scte.org/

[186] SCTE, *SCTE Standards Program.* Available at: http://www.scte.org/SCTE/Standards.

Telcordia

Name Telcordia (now part of Ericsson)

Type General requirements documents and reports for the telecommunications industry

Summary Telcordia is a for-profit subsidiary of Ericsson, Inc. Telcordia provides vendor-neutral services to the industry, including generic requirements (GR) development, technical documentation and roadmaps to implementation of new technologies from the central office perspective.[187]

Mission The Telcordia Information SuperStore features information products that are widely utilized, referenced, and accepted worldwide. Many of the GR documents and special reports on telecommunications equipment, systems, and services are developed with industry participation, making them timely, high-quality, vendor-neutral technical specifications that are valuable to suppliers and service providers.[188]

Standards

- GR-63: *NEBS Requirements: Physical Protection*
- GR-78: *Generic Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment*
- GR-357: *Generic Requirements for Assuring the Reliability of Components Used in Telecommunications Equipment*
- GR-468: *Generic Reliability Assurance Requirements for Optoelectronic Devices Used in Telecommunications Equipment*
- GR-487: *Generic Requirements for Electronic Equipment Cabinets*
- GR-513: *Power Requirements in Telecommunications Plant*
- GR-1217: *Generic Requirements for Separable Electrical Connectors Used in Telecommunications Hardware*
- GR-1221: *Generic Reliability Assurance Requirements for Passive Optical Components*
- GR-1293: *Generic Requirements for Permanent AC & DC Backup Generators Including Fuel Cells for Remote Electronic Sites*
- GR-1298: *AINGR: Switching Systems*
- GR-2930: *NEBS: Raised Floor Generic Requirements for Network and Data Centers*
- GR-2969: *Generic Requirements for the Design and Manufacture of Short-Life Information-Handling Products and Equipment*
- GR-3028: *Thermal Management in Telecommunications Central Offices: Thermal GR-3028*
- GR-3112: *Emergency Services Network Interconnection*
- GR-3118: *Voice over Internet Protocol (VoIP) Positioning Center (VPC) Generic Requirements*

[187] Telcordia, *Information SuperStore.* Available https://telecom-info.telcordia.com/site-cgi/ido/docs2.pl?ID=194307990&page=home.
[188] Ibid.

Standards (continued)	• GR-3119: *Emergency Service Zone (ESZ) Routing Database (ERDB) Generic Requirements* • GR-3129: *Emergency Services Gateway (ESGW) Generic Requirements* • GR-3130: *Location Validation Database (VDB) Generic Requirements in Support of E9-1-1 Service* • GR-3157: *Emergency Services Routing Proxy (ESRP) Generic Requirements* • GR-3158: *Generic Requirements for a Service Provider Location Information Server (LIS)* • GR-3160: *Generic Requirements for Telecommunications Data Center Equipment and Spaces* • GR-3162: *Legacy Network Gateway Generic Requirements* • GR-3165: *Emergency Services Border Control Function (BCF) Generic Requirements* • GR-3166: *Legacy Public Safety Answering Point (PSAP) Gateway Generic Requirements* • GR-3170: *Legacy Selective Router (SR) Gateway Generic Requirements* • SR-3580: *NEBS Criteria Levels*
Coordinated Activities	• Coordination with telecommunications equipment manufacturers from around the world, and the carrier industry to establish common interfaces and system requirements to ensure resiliency and interoperability. GRs provide the industry view of proposed generic criteria for telecommunications equipment, systems, or services. These criteria consider a wide variety of factors, including interoperability, network integrity, participating-client expressed needs, and other inputs. We invite all interested parties to participate in our various projects to develop industry-wide generic requirements.[189]
Website	https://telecom-info.telcordia.com/site-cgi/ido/docs2.pl?ID=194307990&page=home

[189] Telcordia, *Generic Requirements (GRs), The GR Development Process*. Available at: https://telecom-info.telcordia.com/site-cgi/ido/docs2.pl?ID=158226857&page=gr_process.

Telecommunications Industry Association (TIA)

Name	Telecommunications Industry Association (TIA)
Type	National Standards Organization—Industry (Telecommunications)
Summary	The Telecommunications Industry Association (TIA) is the leading trade association representing the global information and communications technology (ICT) industry through standards development, policy initiatives, business opportunities, market intelligence and networking events. With support from hundreds of members, TIA enhances the business environment for companies involved in telecom, broadband, mobile wireless, information technology, networks, cable, satellite, unified communications, emergency communications and the greening of technology. TIA is accredited by ANSI.[190] TIA is the leading trade association representing the global ICT industries through standards development, policy initiatives, business opportunities and networking, market intelligence, and worldwide environmental regulatory compliance.

[190] Telecommunications Industry Association (TIA), *About TIA*. Available at: https://www.tiaonline.org/.

Standards

- TIA J-STD-110.01: *Joint ATIS/TIA Implementation Guideline for J-STD-110, Joint ATIS/TIA Native SMS/MMS Text to 9-1-1 Requirements and Architecture Specification Release 2*
- TIA J-STD-110.A: *ATIS/TIA Supplement A to J-STD-110, Joint ATIS/TIA Native SMS to 9-1-1 Requirements & Architecture Specification*
- TIA J-STD-110: *Joint ATIS/TIA Native SMS/MMS Text to 9-1-1 Requirements and Architecture Specification Release 2*
- TIA TSB-102.BACC: *Project 25 Interface-RF-Subsystem Interface Overview*
- TIA TSB-102.BAGA: *Project 25 Console Subsystem Interface Overview*
- TIA TSB-102.BAJA: *Project 25 Location Services Overview*
- TIA TSB-146: *Telecommunications IP Telephony Infrastructures IP Telephony Support for Emergency Calling Service*
- TIA TSB-5017: *Telecommunications Physical Network Security Standard*
- TIA TSB-5021: *Guidelines for the Use of Installed Category 5e and Category 6 Cabling to Support 2.5GBASE-T and 5GBASE-T*
- TIA/EIA/IS-834: *G3G CDMA-DS to ANSI/TIA/EIA-41*
- TIA-102 SERIES: *Telecommunications, Land Mobile Communications*
- TIA-102.BAED: *Project 25 Packet Data Logical Link Control Procedures*
- TIA-222, REV. H: *Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures*
- TIA-568 Set: *Commercial Building Telecommunications Cabling Standard Set (contains TIA-568.0-D, TIA-568.1-D, TIA-568-C.2, TIA-568.3-D AND TIA-568.4-D – with addendums and erratas)*
- TIA-569: *Telecommunications Pathways and Spaces*
- TIA-606: *Administration Standard for Telecommunications Infrastructure*
- *TIA-607: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises*
- TIA-664.529: *Wireless Features Description: Emergency Services (9-1-1)*
- TIA-942: *Telecommunications Infrastructure Standard for Data Centers*
- TIA-1039: *QoS Signaling for IP QoS Support and Sender Authentication*
- TIA-1057: *Telecommunications IP Telephony Infrastructure Link Layer Discovery Protocol for Media Endpoint Devices*
- TIA-1191: *Callback to an Emergency Call Origination Stage 1 Requirements*
- TIA-4973.201: *Requirements for Mission-Critical PTT and Related Supplementary Services*
- TIA-4973.211: *Requirements for the Mission-Critical Priority and QoS Control Service*

Relevant Engineering Committees

- TR-8 Mobile and Personal Private Radio Standards: The TR-8 engineering committee formulates and maintains standards for private radio communications systems and equipment for both voice and data applications. TR-8 addresses all technical matters for systems and services, including definitions, interoperability, compatibility, and compliance requirements. The types of systems addressed by these standards include business and industrial dispatch applications, as well as public safety (such as police, ambulance and firefighting) applications.[191]
- TR-42 Telecommunications Cabling Systems: The TR-42 engineering committee develops and maintains voluntary telecommunications standards for telecommunications cabling infrastructure in user-owned buildings, such as commercial buildings, residential buildings, homes, data centers, and industrial buildings. The generic cabling topologies, design, distances and outlet configurations, as well as specifics for these locations, are addressed. The committee's standards work covers requirements for copper and optical-fiber cabling components (such as cables, connectors and cable assemblies), installation, and field testing in addition to the administration, pathways and spaces to support the cabling.[192]

[191] TIA, *TR-8 Mobile and Personal Private Radio Standards.* Available at: http://standards.tiaonline.org/all-standards/committees/tr-8.
[192] TIA, *TR-42 Telecommunications Systems Standards.* Available at: http://standards.tiaonline.org/all-standards/committees/tr-42.

USTelecom

Name	USTelecom
Type	Industry (Broadband)
Summary	USTelecom is the nation's leading trade association representing and promoting the interests of its members, broadband service providers and suppliers for the telecom industry. Our diverse member base ranges from large publicly traded communications corporations to small companies and cooperatives – all providing advanced communications services to markets both urban and rural. We serve as the go-to source for broadband news and industry events.
Mission	Broadband technology is the primary foundation for modern communications, providing essential services that enable the nation's economy, education, health care, government and daily life for all Americans. A robust broadband infrastructure is now available coast-to-coast, thanks to ongoing investment to extend high-speed Internet services and applications. USTelecom strives to unite the broad base of members that provide U.S. consumers with these vital services in advocating for pro-investment policies.
Related Activities	• National Security and Public Safety Committee
Relevant Programs	• USTelecom Cybersecurity Toolkit: The Toolkit, an authoritative threat-intelligence resource, includes a collection of key cybersecurity initiatives and practical guidance related to issues that have gained traction among policymakers or risen to prominence in the stakeholder community.[193]
Effects on NG911	• Provides resources related to cybersecurity risks, incidents, and best practices.
Website	https://www.ustelecom.org/

[193] USTelecom, *Cybersecurity Toolkit*. Available at: https://www.ustelecom.org/research/ustelecom-cybersecurity-toolkit-2.

Wi-Fi Alliance

Name	Wi-Fi Alliance®
Type	Industry Organization
Summary	Wi-Fi Alliance is the worldwide network of companies that brings you Wi-Fi. Wi-Fi Alliance drives the adoption and evolution of Wi-Fi globally. Company representatives from around the world collaborate here to define new Wi-Fi technologies, create interoperability certification programs, provide industry thought leadership, and ensure that all Wi-Fi CERTIFIED™ products provide backward compatibility, the highest level of security, and a quality user experience.[194]
Mission	The Wi-Fi Alliance's mission is to: • Foster highly effective collaboration among stakeholders • Deliver excellent connectivity experiences through interoperability • Embrace technology innovation • Promote the adoption of our technologies worldwide • Advocate for fair worldwide spectrum rules • Lead, develop and embrace industry-agreed standards[195]
Related Activities	• International Telecommunications Union (ITU)
Website	http://www.wi-fi.org/

[194] Wi-Fi Alliance, *Who We Are*. Available at: http://www.wi-fi.org/who-we-are.
[195] Ibid.

WiMAX Forum

Name	WiMAX Forum
Type	Industry Organization
Summary	The WiMAX Forum is a not-for-profit consortium of industry leaders representing the entire mobile internet ecosystem. With more than 580 WiMAX networks active in 149 countries, the WiMAX Forum and its members are committed to the global adoption of 4G mobile broadband.[196]
Mission	The WiMAX Forum is a worldwide consortium chartered to: deliver certification that achieves global interoperability; develop technical specifications based on open standards; pursue a favorable regulatory environment; and promote the vision.[197]
Website	http://www.wimaxforum.org/

[196] WiMAX Forum, *WiMAX Forum Membership.* Available at: http://wimaxforum.org/Page/Membership.
[197] WiMAX Forum, *WiMAX Forum Vision and Mission.* Available at: http://wimaxforum.org/Page/Membership/vision_and_mission.

Moving Forward

It is important for NG911 stakeholders to be mindful of how the un-standardized, semi-planned approach to standards development can and will affect the ability of PSAPs and emergency response entities to effectively share information and be interoperable. To alleviate this issue, increased national activities (e.g., state oversight, state/regional compliant designs, and federal coordination working groups) should be considered to ensure that a complete set of NG911 open standards are accepted and adopted by all relevant stakeholders. This should include active participation by the stakeholders. Additionally, increased national collaboration could be utilized to monitor progress on the options below to address standards, technological barriers, and issues identified in *A National Plan for Migrating to IP-Enabled 9-1-1 Systems*:

- Strive for IP-enabled 9-1-1 open standards and understand future technology trends to encourage system interoperability and emergency data sharing
- Establish routing, prioritization, and business rules
- Determine the responsible entity and mechanisms for location acquisition and determination
- Establish system access and security controls to protect and manage access to the IP-enabled 9-1-1 system of systems
- Develop a certification and authentication process to ensure service providers and 9-1-1 authorities meet security and system access requirements.[198]

Lastly, without processes and protocols (e.g., certification and authentication, routing business rules), the benefits of the NG911 system—including routing based on criteria beyond location and connection of service providers beyond common carriers to the 911 system—are unlikely to be fully realized.

A significant number and variety of standards potentially will have a key impact on the implementation of NG911. Continuing to actively monitor standards that have been completed, along with relevant standards that are likely to emerge, will be essential in ensuring the greatest benefit to the global community. The National 911 Program will continue to monitor NG911 standards and update this "living" document to reflect the progress made by SDOs and SSOs.

[198] A *National Plan for Migrating to IP-Enabled 9-1-1 Systems.* Executive Summary, (C), Standards and Technology. Page 1-6. Available at: https://www.911.gov/pdf/National_NG911_Migration_Plan_FINAL.pdf.

Acronym List

ACRONYM	DESCRIPTION
3GPP	3rd Generation Partnership Project
AACN	Advanced Automatic Collision Notification
AES	Advanced Encryption Standard
AIN	Advanced Intelligent Network
ALI	Automatic Location Identification
AMF	Access Measurement Function
ANS	American National Standard
ANSI	American National Standards Institute
APCO	Association of Public-Safety Communication Officials, International
API	Application Programming Interface
AQS	ALI Query Service
ARIB	Association of Radio Industries and Businesses
ASAP	Automated Secure Alarm Protocol
ASD	ANSI-accredited Standards Developer
ATIS	Alliance for Telecommunications Industry Solutions
BBF	Broadband Forum
BCF	Border Control Function
BES	Bulk Electric System
BFD	Bidirectional Forwarding Detection
BGP	Border Gateway Protocol
BICSI	Building Industries Consulting Service International
BIM	Building Information Modeling
BJA	Bureau of Justice Assistance
BSS	Base Station System
BSS – MSC	Base Station System – Mobile-services Switching Center
BWA	Broadband Wireless Access
C2M2	Cybersecurity Capability Maturity Model
CAD	Computer Aided Dispatch
CALEA®	Commission on Accreditation for Law Enforcement Agencies, Inc.
CAP	Common Alerting Protocol
CCSA	China Communications Standards Association
CDMA	Code Division Multiple Access
CEMA	Connection Establishment for Media Anchoring
CET	Cybersecurity and Emerging Threats
CGEIT	Certified in the Governance of Enterprise IT
CISA	Certified Information Systems Auditor
CISM	Certified Information Security Manager
CityGML	City Geography Markup Language
CJI	Criminal Justice Information

ACRONYM	DESCRIPTION
CJIS	Criminal Justice Information Services
CLDXF	Civic Location Data Exchange Format
CMAS	Commercial Mobile Alerts Service
CMM	Communication Center Manager (Certification)
CMRS	Commercial Mobile Radio Service
CMSP	Commercial Mobile Service Provider
CN	Core Network
COGO	Coalition of Geospatial Organizations
COMEDIA	Connection-oriented Media
COS	Class of Service
CPE	Customer Premise Equipment
CPP	Common Profile for Presence
CRISC	Certified in Risk and Information Systems Control
CS&C	Office of Cybersecurity and Communications
CSRIC	Communications Security, Reliability, and Interoperability Council
CSX	Cybersecurity Nexus™
CTO	Communications Training Officer
DAS	Distributed Antenna System
DHCP	Dynamic Host Control Protocol
DHS	Department of Homeland Security
DNS	Domain Name System
DOC	Department of Commerce
DOE	Department of Energy
DOJ	Department of Justice
DOT	Department of Transportation
DS	Differentiated Services
DSCP	Differentiated Code Point
DSL	Digital Subscriber Line
DSS	Data Security Standard
E911 or E9-1-1	Enhanced 911
EAAC	Emergency Access Advisory Committee
ECES	Entities Consuming Emergency Services
eCNAM	Enhanced Calling Name
ECRF	Emergency Call Routing Function
ecrit	Emergency Context Resolution with Internet Technologies
ECS	Emergency Calling Service
EDGE	Enhanced Data Rates for GSM Evolution
ED-Q	Emergency Dispatch Quality (QI Certification)
EDXL	Emergency Data Exchange Language
EDXL-DE	EDXL Distribution Element
EDXL-RM	EDXL Resource Messaging

ACRONYM	DESCRIPTION
EDXL-SitRep	EDXL Situation Reporting
EDXL-TEC	EDXL Tracking of Emergency Clients
EDXL-TEP	EDXL Tracking of Emergency Patients
EFD	Emergency Fire Dispatch
eHRPD	Evolved High Rate Packet Data
EIA	Electronics Industry Alliance
EIDD	Emergency Incident Data Document
EISI	Emergency Information Services Interface
ELOC	Emergency Location
EMD	Emergency Medical Dispatch
EM-TC	Emergency Management Technical Committee
EMTEL	Emergency Communications
ENUM	E.164 Number Mapping
EP	Emergency Preparedness
EPC	Evolved Packet Core
EPD	Emergency Police Dispatch
EPES	Entities Providing Emergency Services
ERIC	Emergency Response Interoperability Center
ESC	Executive Steering Council
ESGW	Emergency Services Gateway
ESIF	Emergency Services Interconnection Forum
ESInet	Emergency Services IP Network
ESM	Emergency Services & Methodologies
ESMI	Emergency Services Messaging Interface
ESNet	Emergency Services Network
ES-NGN	Emergency Services Next Generation Network
ESNI	Emergency Services Network Interfaces
ESQK	Emergency Services Query Key
ESRD	Emergency Services Routing Digit
ESRK	Emergency Services Routing Key
ESRP	Emergency Services Routing Proxy
ESS	Electronic Safety and Security
ESZ	Emergency Service Zone
ETC	Emergency Telecommunicator Certification
ETS	Emergency Telecommunications Service
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
FDD	Frequency Division Duplex
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standard
FIPS PUB	FIPS Publication

ACRONYM	DESCRIPTION
FLAP	Flexible LDF-AMP Protocol
FRG	First Responders Group
GEOPRIV	Geographic Location/Privacy
GETS	Government Emergency Telecommunications Service
GIS	Geographic Information System
GML	Geography Markup Language
GPRS	General Packet Radio Service
GRA	Government and Regulatory Agency
GSM	Global System for Mobile Communications
HAVE	Hospital Availability Exchange
HDSSC	Homeland Defense and Security Standardizations Collaborative
HELD	HTTP-enabled Location Delivery
HMI	Human Machine Interface
HRPD	High Rate Packet Data
HSGW	eHRPD Serving Gateway
HSSP	Homeland Security Standards Panel
HTTP	Hypertext Transfer Protocol
I^2F	Information Interoperability Framework
IACP	International Association of Chiefs of Police
IAED	International Academies of Emergency Dispatch
ICE	Industry Collaboration Event
ICO	Implementation and Coordination Office
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IIC	Industrial Internet Consortium
IIOC	Industrial Internet of Things
IISF	Industrial Internet Security Framework
IJIS	Integrated Justice Information Systems
IM	IP Multimedia
IMIS	Incident Management Information Sharing
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
INP	Interim Number Portability
IoT	Internet of Things
IP	Internet Protocol
IPAWS	Integrated Public Alert and Warning System
IPR	Intellectual Property Rights
ISAO	Information Sharing and Analysis Organization
IS&S	Information Sharing and Safeguarding

ACRONYM	DESCRIPTION
ISDN	Integrated Services Digital Network
ISE	Information Sharing Environment
ISF	Information Security Forum
ISMS	Information Security Management Systems
ISO	International Organization for Standardization
ISUP	ISDN User Part
IT	Information Technology
ITL	Information Technology Laboratory
ITS	Institute for Telecommunication Sciences
ITS	Intelligent Transportation Systems
ITS JPO	Intelligent Transportation Systems Joint Program Office
ITU	International Telecommunication Union
ITU-R	ITU—Radiocommunication Sector
ITU-T	ITU—Standardization Sector
IWS	Intelligent Workstation
kHz	Kilohertz
LAN	Local Area Network
LCP	Location Configuration Protocol
LDF	Location Determination Function
LEXS	Logical Entity Exchange Specification
LIS	Location Information Server
LLC	Logical Link Control
LMR	Land Mobile Radio
LNP	Local Number Portability
LoST	Location-to-Service Translation
LTE	Long-term Evolution
LVF	Location Validation Function
M2M	Machine-to-machine
MAC	Media Access Control
MAN	Metropolitan Area Network
MAP	Mobile Application Part
MDA®	Model Driven Architecture®
MGCP	Media Gateway Control Protocol
MHz	Megahertz
MIB	Management Information Base
MLP	Mobile Location Protocol
MLTS	Multi-line Telephone System
MMES	Multimedia Messaging Emergency Services
MMS	Multimedia Messaging Service
MOS	Mean Opinion Score
MOU	Memorandum of Understanding

ACRONYM	DESCRIPTION
MPC	Mobile Positioning Center
MS	Mobile Station
MS – BSS	Mobile Station – Base Station System
MSAG	Master Street Address Guide
MSC	Mobile-services Switching Center
MSRP	Message Session Relay Protocol
NBAC	NIEM Business Architecture Committee
NCMEC	National Center for Missing and Exploited Children
NE	Network Element
NEC	National Electrical Code®
NENA	National Emergency Number Association
NERC	North American Electric Reliability Corporation
NFPA	National Fire Protection Association
NG911	Next Generation 911
NGES	Next Generation Emergency Services
NGIIF	Next Generation Interconnection Interoperability Forum
NGN	Next Generation Network
NGP	Next Generation Protocols
NGPP	Next Generation Partner Program
NHTSA	National Highway Traffic Safety Administration
NIEM	National Information Exchange Model
NIST	National Institute of Standards and Technology
NNI	Network to Network Interface
NOBLE	National Organization of Black Law Enforcement Executives
NPPD	National Protection and Programs Directorate
NPSBN	Nationwide Public Safety Broadband Network
NRIC	Network Reliability and Interoperability Council
NS	National Security
NSA	National Sheriffs' Association
NSDI	National Spatial Data Infrastructure
NTAC	NIEM Technical Architecture Committee
NTIA	National Telecommunications and Information Administration
OASIS	Organization for the Advancement of Structured Information Standards
OEC	Office of Emergency Communications
OGC®	Open Geospatial Consortium
OIC	Office of Interoperability and Compatibility
OJP	Office of Justice Programs
OMA	Open Mobile Alliance
OMB	Office of Management and Budget
OMG®	Object Management Group®
OpenLS	OpenGIS Location Service

ACRONYM	DESCRIPTION
OSP	Originating Service Provider
OSPF	Open Shortest Path First
OSS	Operations Support System
OST-R	Office of the Assistant Secretary for Research and Technology
OT	Operations Technology
pANI	Pseudo Automatic Number Identification
PBX	Private Branch Exchange
PCI	Payment Card Industry
PDE	Position Determining Equipment
PERF	Police Executive Research Forum
PIDF	Presence Information Data Format
PIDF-LO	Presence Information Data Format-Location Object
PML	Physical Measurement Laboratory
PMO	Program Management Office
PRACK	Provisional Response Acknowledgement
PSAP	Public Safety Answering Point
PSHSB	Public Safety and Homeland Security Bureau
PSTN	Public Switched Telephone Network
PTSC	Packet Technologies and Systems Committee
PTT	Push-to-talk
QA	Quality Assurance
QAE	Quality Assurance Evaluator
QI	Quality Improvement
QoS	Quality of Service
R&D	Research and Development
RF	Radio Frequency
RFAI	Request for Assistance Interface
RFC	Request for Comment
RFI	Request for Information
RG	Residential Gateway
RITA	Research and Innovative Technology Administration
RNA	Routing Number Authority
RTP	Real-time Transport Protocol
RTT	Real-time Text
S&T	Science & Technology Directorate
S8HR	S8 Home Routing
SAFECOM	Wireless Public Safety Interoperable Communications Program
SBC	Session Border Controller
SCC	Standards Coordinating Council
SCTE	Society of Cable Telecommunications Engineers
SDN	Software-defined Networking

ACRONYM	DESCRIPTION
SDO	Standards Development Organization
SDP	Session Description Protocol
SEC	Security
SHS	Secure Hash Standard
SIP	Session Initiated Protocol
SIPREC	SIP Recording
SMS	Short Message Service
SNMP	Simple Network Management Protocol
SOP	Standard Operating Procedure
SPO	Special Programs Office
SR	Selective Router
SRIC	Standards Review and Interpretation Committee
SS7	Signaling System 7
SSO	Standards Setting Organization
SUPL	Secure User Plan Location
TCC	Text Control Center
TDD	Time Division Duplex
TDM	Time Division Multiplexing
TERT	Telecommunicator Emergency Response Taskforce
TFOPA	Task Force on Optimal PSAP Architecture
TIA	Telecommunications Industry Association
TIG	Trusted Identities Group
TISPAN	Telecommunications & Internet Converged Services & Protocols for Advanced Networks
TLS	Transport Layer Security
TMOC	Telecom Management and Operations Committee
TSAG	Transportation Safety Advancement Group
TSB	Technical Service Bulletin
TSDSI	Telecommunications Standards Development Society, India
TSG	Technical Specification Group
TTA	Telecommunications Technology Association, Korea
TTC	Telecommunication Technology Committee, Japan
TTY/TDD	Teletypewriter/Telecommunications Device for the Deaf
TVRA	Threat Vulnerability Risk Analysis
U.S.	United States
UA	User Agents
UMA	Universal Mobile Access
UML®	Unified Modeling Language®
UMTS	Universal Mobile Telecommunications System
URI	Uniform Resource Identifier
URISA	Urban and Regional Information Systems Association

ACRONYM	DESCRIPTION
URL	Uniform Resource Locator
URN	Uniform Resource Number
US-CERT	United States Computer Emergency Readiness Team
USM	User-based Security Model
UTRA	UTMS Terrestrial Radio Access
VACM	View-based Access Control Model
VDB	Validation Database
VoDSL	Voice over Digital Subscriber Line
VoIP	Voice over Internet Protocol
VOP	Voice over Packet
VPC	VoIP Positioning Center
VPN	Virtual Private Network
WAN	Wide Area Network
WLAN	Wireless Local Area Network
WSP	Wireless Service Provider
WTSC	Wireless Technologies and Systems Committee
XML	eXtensible Markup Language

Appendix A: Standards and Best Practices

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
3GPP	3GPP TS 23.167 (Free)	*IP Multimedia Subsystem (IMS) emergency sessions*	Defines the service description (Stage 2) for emergency services in the IMS, including the elements necessary to support SIP multimedia emergency services.	ETSI TS 123 167	Version 15.4.0 December 18, 2018	Technical Standard (Product/ Design)		A	O		
3GPP	3GPP TS 23.228 (Free)	*IP Multimedia Subsystem (IMS); Stage 2*	Defines the Stage 2 service description for the IMS, which includes the elements necessary to support IP multimedia (IM) services.		Version 16.1.0 June 11, 2019	Technical Standard		A	O		
3GPP	3GPP TS 23.517 (Free)	*TISPAN; IP Multimedia Subsystem (IMS); Functional architecture*	Describes the IMS core component of the TISPAN NGN functional architecture and its relationships to other subsystems and components.	ETSI ES 282 007	Version 8.0.0 December 11, 2007	Technical Standard (Interface/ Design)		A	O		

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
3GPP	3GPP TS 24.229 (Free)	*IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3*	Defines a call control protocol for use in the IM Core Network (CN) subsystem based on the SIP and the associated SDP.		Version 16.2.0 June 14, 2019	Technical Standard		A	O		

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
3GPP	3GPP TS 29.010 (Free)	*Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC); Signaling Procedures and the Mobile Application Part (MAP)*	Provides a detailed specification for the interworking between information elements contained in layer 3 messages sent on the MS-MSC interface where the MSC acts as a transparent relay of information; provides a detailed specification for the interworking between information elements contained in BSSMAP messages sent on the BSC-MSC interface and parameters contained in MAP services sent over the MSC-VLR interface where the MSC acts as a transparent relay of information.		Version 15.1.0 December 22, 2018	Technical Standard		A	O		

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
3GPP	3GPP TSG SA Release 12 (Free)	Release 12	Focuses on the use of LTE technology for emergency and security services, with technical specifications for mission-critical application layer functional elements and interfaces being developed in the newly formed SA6 working group.		March 2015	Technical Standard		A			
3GPP	3GPP TSG SA Release 13 (Free)	Release 13	Exploits new business opportunities such as public safety and critical communications, explores Wi-Fi integration and system capacity and stability.		January 2016	Technical Standard		A			
3GPP	3GPP TSG SA Release 14 (Free)	Release 14	Supports V2x services, eLAA, 4 band carrier aggregation, and inter-band carrier aggregation.		March 2017	Technical Standard		A			

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO/NENA ANS 1.107.1.2015 (Free)	*Standard for the Establishment of a Quality Assurance and Quality Improvement Program for Public Safety Answering Points*	Defines minimum components of a QA/QI program within a PSAP. Recommends effective procedures for implementing the components a QA/QI program to evaluate the performance of public safety communications personnel.		Version 1 April 2, 2015	Operational Standard					P
APCO	APCO ANS 1.116.1-2015 (Free)	*Public Safety Communications Common Status Codes for Data Exchange*	Provides a standardized list of status codes that can be used by emergency communications and public safety stakeholders when sharing incident related information; each agency should map their internal codes to the standardized list.		Version 1 April 7, 2015	Operational Standard				E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 1.112.1-2014 (Free)	*Best Practices for The Use of Social Media in Public Safety Communications*	Provides a consistent foundation for agencies to develop specific operational procedures and competencies; recognizes the need for each agency to customize specific procedures to their local environment.		Version 1 2014 (Version 2 in Development)	Operational Standard					P
APCO	APCO ANS 1.110.1-2015 (Free)	*Multi-Functional Multi-Discipline Computer Aided Dispatch (CAD) Minimum Functional Requirements*	Provides minimum functional requirements that a CAD system shall include, broken down by public safety discipline; also identified are the optional functional requirements that a CAD system should include.		Version 1 January 9, 2015	Operational Standard					P
APCO	APCO/NPSTC ANS 1.104.2-2017 (Free)	*Standard Channel Nomenclature for the Public Safety Interoperability Channels*	Provides standard nomenclature for FCC and NTIA-designated nationwide interoperability channels used for public safety voice communications.		Version 2 January 3, 2017	Operational Standard					P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 1.101.3-2015 (Free)	*Standard for Public Safety Telecommunicators When Responding to Calls of Missing, Abducted and Sexually Exploited Children*	Presents the missing, abducted, and/or sexually exploited child response process for public safety telecommunicators; includes the process from first response through ongoing incident and case support.		Version 3 January 8, 2015	Operational Standard					P
APCO	APCO/NENA ANS 1.105.2-2015 (Free)	*Standard for Telecommunicator Emergency Response Taskforce (TERT) Deployment*	Includes information to provide guidance and helpful material regarding the development, maintenance, and deployment of a TERT.		Version 2 July 14, 2015	Operational Standard					P
APCO	APCO ANS 3.103.2-2013 (Free)	*Wireless 9-1-1 Deployment and Management Effective Practices Guide*	Provides effective practices to increase a PSAP manager's understanding of the technology application and the ability to better manage wireless calls, as well as public and responder expectations.		Version 2 September 27, 2013 (Version 3 In Development)	Operational Standard					P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 1.111.2-2018 (Free)	*Public Safety Communications Common Disposition Codes for Data Exchange*	Provides a standardized list of disposition codes to facilitate effective incident exchange between NG9-1-1 PSAPs and other authorized agencies.		Version 2 March 20, 2018	Operational Standard					P
APCO	APCO/CSAA ANS 2.101.2-2014 (Free)	*Alarm Monitoring Company to Public Safety Answering Point (PSAP) Computer-Aided Dispatch (CAD) Automated Secure Alarm Protocol (ASAP)*	Provides detailed technical data to software providers who support CAD systems or alarm monitoring applications concerning the common data elements and structure that shall be utilized when electronically transmitting a new alarm event from an alarm monitoring company to a PSAP.		Version 2 August 5, 2014 (Version 3 In Development)	Technical Standard					P
APCO	APCO ANS 2.103.1-2012 (Free)	*Public Safety Communications Common Incident Types for Data Exchange*	Defines and outlines public safety communications common incident types for data exchange.		Version 1 November 2012 (Version 3 In Development)	Technical Standard				E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 3.101.3-2017 (Free)	*Core Competencies and Minimum Training Standards for Public Safety Communications Training Officer (CTO)*	Addresses the minimum training requirements necessary to foster levels of consistency for all personnel in an emergency communications environment assigned to providing on-the-job training to active 9-1-1 professionals and telecommunicators, as well as to promote the leadership role of the CTO.		Version 3 September 12, 2017	Training Standard					P
APCO	APCO ANS 3.108.2.2018 (Free)	*Core Competencies and Minimum Training Standards for Public Safety Communications Instructor*	Defines the minimum training standards for PSAP instructors.		Version 1 February 3, 2014 Version 2 June 7, 2018	Training Standard					P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 3.106.2-2017 (Free)	*Core Competencies and Minimum Training Standards for Public Safety Communications Quality Assurance Evaluators (QAE)*	Defines the minimum training standards for PSAP QA evaluators.		Version 2 September 12, 2017	Training Standard					P
APCO	APCO ANS 3.102.2-2017 (Free)	*Core Competencies and Minimum Training Standards for Public Safety Communications Supervisor*	Identifies the core competencies and minimum training requirements for public safety communications supervisors relating to managing daily operations, performing administrative duties, and maintaining employee relations.		Version 2 September 12, 2017	Training Standard					P
APCO	APCO ANS 3.109.2.2014 (Free)	*Core Competencies and Minimum Training Standards for Public Safety Communications Manager/Director*	Defines the core competencies and minimum training requirements for communications managers and/or directors.		Version 2 June 9, 2014 (Version 2 In Development)	Training Standard					P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 3.104.2-2017 (Free)	*Core Competencies and Minimum Training Standards for Public Safety Communications Training Coordinator*	Defines the minimum training standards for PSAP training coordinators.		Version 2 September 19, 2017	Training Standard					P
APCO	APCO ANS 3.103.2.2015 (Free)	*Minimum Training Standards for Public Safety Telecommunicators*	Identifies the minimum training requirements for public safety telecommunicators, which typically includes with receiving, processing, transmitting, and conveying public safety information to dispatchers, first responders (police, fire, EMS), and emergency management personnel.		Version 2 July 14, 2015	Training Standard					P
APCO	APCO ANS 3.107.1.2015 (Free)	*Core Competencies and Minimum Training Requirements for Public Safety Communications Technician*	Defines the minimum training standards for PSAP communications technicians.		Version 1 February 24, 2015 In Revision	Training Standard					P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO/NENA ANS 3.105.1-2015 (Free)	*Minimum Training Standard for TTY/TDD Use in the Public Safety Communications Center*	Defines the minimum training standards for TTY/TDD use in communications centers.		Version 1 February 24, 2015	Training Standard					P
APCO	APCO/NENA 2.105.1-2017 (Free)	*NG9-1-1 Emergency Incident Data Document (EIDD)*	Provides format for sharing emergency incident information.		January 3, 2017	Technical Standard				E	P
APCO	APCO/NENA ANS 1.102.2-2010 (Free)	*Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale*	Provides an assessment tool for PSAP managers and their governing authorities to identify their current level of service capability; objectively assesses the capabilities of the PSAP against models representing the best level of preparedness, survivability, and sustainability amidst a wide range of natural and man-made events.		Version 2 July 28, 2010 (Version 3 in Development)	Operational Standard					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO 1.108.1-2018 (Free)	*Minimum Operational Standards for the Use of TTY/TDD devices in the Public Safety Communications Center*	Defines the minimum operational standards for the use of TTY/TDD devices in a PSAP.		Version 1 August 13, 2018	Operational Standard					P
APCO	APCO 1.113.1-2019 (Free)	*Public Safety Communications Incident Handling Process*	Provides best practices for call handling in the PSAP.		January 9, 2019	Operational Standard					P
APCO	APCO ANS 1.114.1-2017 (Free)	*APCO Recommended Best Practices for PSAPs When Processing Vehicle Telematics Calls from Telematics Service Providers*	Provides best practices to guide the interactions between Telematics Call Center Operators and PSAP Telecommunicators.		January 29, 2017	Operational Standard					P
APCO	APCO ANS 1.115.1-2018 (Free)	*Core Competencies, Operational Factors, and Training for Next Generation Technologies in Public Safety Communications*	Identifies the core competencies, operational factors and minimum training requirements relating to next generation technologies.		July 3, 2018	Operational Standard					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO 2.102.1.201x	*Advanced Automatic Collision Notification (AACN) Data Set*	Describes and outlines the AACN data set.		In Development	Technical Standard				E	P
APCO	APCO 3.111.1-201x	*Core Competencies and Minimum Training Standards for Public Safety Crisis Intervention Telecommunicator*			In Development	Training Standard					P
APCO	APCO 3.110.1-201x	*Cybersecurity Training for Public Safety Communications Personnel*			In Development	Operational Standard					P
APCO	APCO 1.117.1-201x	*Public Safety Communications Center Key Performance Indicators*			In Development	Operational Standard					P
APCO	APCO 1.118.1-201x	*Key Performance Indicators for Public Safety Communications Personnel*			In Development	Operational Standard					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO ANS 2.106.1-2019 (Free)	*Public Safety Grade Site Hardening*	Addresses the requirements for "public safety grade" site hardening of wireless communications sites and facilities. The establishment of a standard is intended to assist public safety communications wireless network builders in constructing hardened public safety wireless networks and systems.		June 21, 2019	Technical Standard					P
APCO	APCO 3.112.1-20xx	*Detecting Early Warning Symptoms of Stress in Public Safety Telecommunicators*	Provides Communications Center management with Key Performance Indicators (KPIs) as they relate to personnel performance measurements, accuracy and quality of information logged or provided by communications center personnel.		In Development	Training Standard					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
APCO	APCO 1.119.1-20xx	*Public Safety Telecommunicator Critical Incident Stress Debriefing (CISD) Program*	Provides the requirements for a Critical Incident Stress Debriefing (CISD) program specifically geared towards identifying and assisting Public Safety Telecommunicators.		In Development	Operational Standard					P
ATIS	ATIS-0100022 (Fee/Charge)	*Priority Classification Levels for Next Generation Networks*	Formalizes a set of priority classification levels for admission control and service restoration in NGNs; highest priority classifications are reserved for ETS.		December 2008	Technical Standard		A	O	E	
ATIS	ATIS-0300104 (Fee/Charge)	*Next Generation Interconnection Interoperability Forum (NGIIF) NGN Reference Document - NGN Basics, Emergency Services, NGN Testing, and Network Survivability*	Provides basic information regarding NGNs, as applicable to the NGIIF.	ATIS-0300109, ATIS-0300112, ATIS-0300111	June 2017	Technical Standard		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-0300116 (Fee/Charge)	*Interoperability Standards between Next Generation Networks (NGN) for Signature-Based Handling of Asserted Information Using Tokens (SHAKEN)*	This document is intended to provide Next Generation Network (NGN) telephone service providers (SPs) with a framework and guidance for interoperability as calls process through their networks implementing Signature-Based Handling of Asserted Information Using Tokens (SHAKEN) technologies to ensure the validation as well as the completion of legitimate calls and the mitigation of illegitimate spoofing of telephone identities		January 2017	Technical Standard		A	O	E	
ATIS	ATIS-0500001 (Fee/Charge)	*High Level Requirements for Accuracy Testing Methodologies*	Provides a common frame of reference that stakeholders can use to validate the accuracy methodology of 9-1-1 location technologies and whether test equipment meets requirements.		November 2011	Technical Report		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-0500002.2008(R2013) (Fee/Charge)	*Emergency Services Messaging Interface (ESMI)*	Contains standards for an Emergency Services Interface to the Emergency Services Network (ESNet); specifies protocols and message sets for use in the ESMI.		July 2008	Technical Standard (Interface/ Design)		A	O		
ATIS	ATIS-0500003 (Fee/Charge)	*Routing Number Authority (RNA) for pseudo Automatic Number Identification Codes (pANIs) Used for Routing Emergency Calls: pANI Assignment Guidelines and Procedures*	Contains the guidelines and procedures for the assignment and use of pANIs used to route emergency calls, such as E9-1-1 calls or other types of emergency calls that need to become native E9-1-1 calls throughout the North American E9-1-1 systems (U.S. and Canada).		July 2005	Technical Standard		A	O		
ATIS	ATIS-0500004 (Fee/Charge)	*Recommendation for the Use of Confidence and Uncertainty for Wireless Phase II*	Contains ESIF recommendation for managing location confidence and uncertainty for wireless Phase 2 calls.		August 2005	Technical Standard		A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-0500005 (Fee/Charge)	*Standard Wireless Text Message Case Matrix*	Addresses the need for standard wireless text messages; some PSAP screen formats provide space ALI text messages and the text messages are used to alert the call taker of a unique condition.		September 2005	Technical Standard		A	O		P
ATIS	ATIS-0500006.2008(R2013) (Fee/Charge)	*Emergency Information Services Interfaces (EISI) ALI Service*	Specifies protocols and message sets used within the ESNet to communicate between Entities Consuming Emergency Services (ECES) and Entities Providing Emergency Services (EPES).		August 2008	Technical Standard (Interface-Data/Design)		A	O		
ATIS	ATIS-0500007.2008 (Fee/Charge)	*Emergency Information Services Interface (EISI) Implemented with Web Services*	Specifies protocols and message sets used within the ESNet to communicate via web services between ECES and EPES.		January 2008	Technical Standard (Interface-Data/Design)		A	O		

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ATIS	ATIS-0500008 (Fee/Charge)	*Emergency Services Network Interfaces (ESNI) Framework*	Defines the framework and structure of the ESNI suite of standards; includes the ESMI that provides interconnections between next generation PSAPs and the ESNet.		October 2006	Technical Report		A	O		
ATIS	ATIS-0500009 (Fee/Charge)	*High Level Requirements for End-to-End Functional Testing*	Establishes procedures/standards to test that delivery of wireless 9-1-1 data remains constant through the network and is delivered with integrity to the PSAP.		April 2006	Technical Report		A	O	E	P
ATIS	ATIS-0500013 (Fee/Charge)	*Approaches to Wireless E9-1-1 Indoor Location Performance Testing*	Provides recommendations for indoor wireless testing methodologies and validation.		February 2010	Technical Standard		A	O		

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ATIS	ATIS-0500015.2010 (Fee/Charge)	*Flexible LDF-AMF (Location Determination Function – Access Measurement Function) Protocol (FLAP) Specification*	Provides a framework and associated protocols to allow an LDF to obtain the value of relevant network parameters associated with an end device, and from which the location of that end device may be determined.		August 2010	Technical Standard		A	O		
ATIS	ATIS-0500017 (Fee/Charge)	*Considerations for an Emergency Services Next Generation Network (ES-NGN)*	Defines an emergency services architecture based upon the ATIS definition of an ES-NGN; identifies potential standards gaps and focuses on the interconnection between the ES-NGN and networks that originate emergency calls.		June 2009	Technical Report		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-0500018 (Fee/Charge)	*P-ANI Allocation Tables for ESQKs, ESRKs, and ESRDs*	Contains ESQK, ESRK, and ESRD allocation tables and capacities; assists Wireless Service Providers (WSPs) and Mobile Positioning Centers (MPCs) in improving the efficacy of p-ANI number use and administration, and complement preservation and utilization of limited p-ANI number resources.		August 2014	Technical Standard		A	O		
ATIS	ATIS-0500019.2010 (Fee/Charge)	*Request for Assistance Interface (RFAI) Specification*	Defines/describes the RFAI between the ES-NGN and a PSAP.		September 2010	Technical Standard				E	P
ATIS	ATIS-0500021 (Fee/Charge)	*Supplemental Location Data*	Contains standard for including supplemental location data to the ALI database from technologies providing indoor radio frequency (RF) coverage requiring a small signal footprint.		October 2012	Technical Standard		A	O	E	P

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ATIS	ATIS-0500022 (Fee/Charge)	*Test Plan Input for a Location Technology Test Bed*	Leverages earlier standards and methods to provide a broad baseline test plan document for wireless indoor location accuracy testing.	ATIS-050000, 0500001, 0500013, CSRIC III WG3	October 2012	Technical Standard		A	O		P
ATIS	ATIS-0500023 (Fee/Charge)	*Applying Common IMS to NG9-1-1 Networks*	Provides the stage 1 definition for an IMS-based next generation emergency services architecture based on the 3GPP IMS standards.		April 2013	Technical Standard		A	O	E	
ATIS	ATIS-0500024 (Fee/Charge)	*Comparison of SIP Profiles*	Compares SIP profiles defined by ATIS, 3GPP, and NENA as they relate to emergency services.		April 2013	Technical Report		A	O		
ATIS	ATIS-0500025 (Fee/Charge)	*Class of Service Support for Semi-Static Wireless*	Addresses E9-1-1 Class of Service associated with a small cell that has a less than 100 meter coverage in an indoor environment.		July 2013	Technical Standard		A	O	E	P

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ATIS	ATIS-0500026 (Fee/Charge)	*Operational Impacts on Public Safety of ATIS-0700015, Implementation of 3GPP Common IMS Emergency Procedures for IMS Origination and ESInet/Legacy Selective Router Termination*	Explains the IP to NG9-1-1 interfaces, without overdependence on technical terms and acronyms, to assist public safety in understanding the operational impact from future IMS-originated emergency calls.	ATIS-0700015	September 2014	Information Standard		A	O	E	P
ATIS	ATIS-0500027 (Fee/Charge)	*Recommendations for Establishing Wide Scale Indoor Location Performance*	Provides the methodology to characterize wide-scale indoor location accuracy performance by creating regional test beds and extrapolating their test results.		May 2015	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-0500028 (Fee/Charge)	*Analysis of Unwanted User Service Interactions with NG9-1-1 Capabilities*	Illustrates use cases that convey the need for a broader analysis of standardized user service definitions for possible interactions with NG9-1-1 capabilities and identification of which interactions could lead to unwanted behavior.		February 2015	Technical Report		A	O	E	P
ATIS	ATIS-0700015.v003 (Fee/Charge)	*ATIS Standard for Implementation of 3GPP Common IMS Emergency Procedures for IMS Origination and ESInet/Legacy Selective Router Termination*	Identifies and adapts 3GPP common IMS emergency procedures for applicability in North America to support emergency communications originating from an IMS subscriber.	ATIS-0500026	May 2015	Technical Standard		A	O		
ATIS	ATIS-1000010.2006 (R2011) (Fee/Charge)	*Support of Emergency Telecommunications Service ETS in IP Network*	Defines the procedures and capabilities required to support ETS within and between IP-based service provider networks.		June 2006	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-1000012.2006 (S2016) (Fee/Charge)	*Signaling System No. 7 (SS7) – SS7 Network and NNI Interconnection Security Requirements and Guidelines*	Provides security requirements and guidelines for SS7 network and its network interconnections.		November 2006	Technical Standard		A	O	E	
ATIS	ATIS-1000019.2007 (S2017) (Fee/Charge)	*Network to Network Interface (NNI) Standard for Signaling and Control Security for Evolving VoP Multimedia Networks*	Specifies VoP and multimedia signaling and control plane security requirements for evolving networks.		March 2007	Technical Standard		A	O	E	
ATIS	ATIS-1000023.2013 (Fee/Charge)	*ETS Network Element Requirements for A NGN IMS Based Deployments*	Defines network element requirements to ensure that ETS is implementable and interoperable in a multi-vendor environment for an NGN IMS-based network deployment; refines the procedures defined in the ETS in IP Networks Phase 1 standard.	ATIS-1000010	August 2013	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-1000026.2008 (S2018) (Fee/Charge)	*Session Border Controller Functions and Requirements*	Defines the Session Border Controller (SBC) functions and requirements that reside within a service provider's network.		April 2008	Technical Standard		A	O		
ATIS	ATIS-1000029.2008 (S2018) (Fee/Charge)	*Security Requirements for NGN*	Provides security requirements for the NGN against security threats, and to mitigate the effects of security attacks.	ATIS-1000034.2010 (R2015)	November 2008	Technical Standard		A	O	E	
ATIS	ATIS-1000034.2010(R2015) (Fee/Charge)	*Next Generation Network (NGN): Security Mechanisms and Procedures*	Describes some security mechanisms that can be used to fulfill the requirements described in ATIS-1000029.2008 and specifies the suite of options for each selected mechanism.	ATIS-1000029.2008	November 2010	Technical Standard		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-1000038 (Fee/Charge)	*Technical Parameters for IP Network to Network Interconnection Release 1.0*	Specifies the "Interconnection Technical Parameters" that need to be collected and eventually exchanged between two service providers so that they can successfully interconnect IP-based facilities and VoIP services at an NNI.		August 2010	Technical Standard					
ATIS	ATIS-1000040 (Fee/Charge)	*Protocol Suite Profile for IP Network to Network Interconnection Release 1.0*	Identifies a set of protocols and specifies their profile so that signaling, media, and network related parameters can be uniformly and consistently utilized across the interconnection interface; supports a service seamlessly across an IP network to network interconnection as identified by the test scenarios defined in ATIS-1000041.	ATIS-1000041	August 2010	Technical Standard					

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ATIS	ATIS-1000041 (Fee/Charge)	*Test Suites for IP Network to Network Interconnection Release 1.0*	Specifies a set of call test scenarios involving SIP and other signaling messages which for various situations may be required to provide an expected reaction to an event or a sequence of events appropriate to the previously signaled message; "expected reaction" is based upon the protocol profile established in the messages that flow across the NNI.	ATIS-1000040	August 2010	Technical Standard					
ATIS	ATIS-1000049 (Fee/Charge)	*End-to-End NGN GETS Call Flows*	Describes end-to-end call/session flows for various wireline and wireless access technologies, in addition to the IMS Core Network call/session flows in support of NGN GETS.		August 2011	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-1000055.2013 (R2018) (Fee/Charge)	*Emergency Telecommunications Service (ETS): Core Network Security Requirements*	Provides a minimum set of common (i.e., independent of network type or technology) and core network security requirements for the protection of ETS in a multi-provider NGN environment.		August 2013	Technical Standard		A	O		
ATIS	ATIS-1000060.2014 (Fee/Charge)	*Emergency Telecommunications Service (ETS): Long Term Evolution (LTE) Access Network Security Requirements for National Security/Emergency Preparedness (NS/EP) Next Generation Network (NGN) Priority Services*	Provides a minimum set of requirements for the security protection of NS/EP NGN-PS in LTE access networks.		October 2014	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-1000061.2015 (Fee/Charge)	*LTE Access Class 14 for National Security and Emergency Preparedness (NS/EP) Communications*	Provides operational guidance regarding the assignment and use of the 3GPP LTE specifications for Access Class Barring to support NS/EP NGN-PS.		February 2015	Technical Standard		A	O		
ATIS	ATIS-1000065.2015 (Fee/Charge)	*Emergency Telecommunications Service (ETS) Evolved Packet Core (EPC) Network Element Requirements*	Specifies ETS requirements for an EPS consisting of the E-UTRAN and EPC for support of NGN GETS voice, NGN GETS video, NGN GETS Guaranteed Bit Rate (GBR) data, and NGN GETS data transport.		February 2015	Technical Standard		A	O		
ATIS	ATIS-1000067.2015 (Fee/Charge)	*IP NGN Enhanced Calling Name (eCNAM)*	Defines a Calling Name Delivery service in the IP-based NGN; includes a mandatory longer name field and optional additional information about the caller.		August 2015	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	ATIS-1000679.2015 (Fee/Charge)	*Interworking between Session Initiation Protocol (SIP) and ISDN User Part*	Defines the signaling interworking between the ISDN User Part (ISUP) protocol and SIP in order to support services that can be commonly supported by ISUP and SIP based network domains.		April 2015	Technical Standard		A	O		
ATIS	ESIF Issue 81	*Applying Common IMS to NG9-1-1 Networks (Stage 2 & 3) Specification*	Defines call processing, transport, or delivery of emergency service calls within the NG9-1-1 network to the appropriate PSAP.		In Development	Technical Issue Documentation		A	O	E	P
ATIS	ESIF Issue 82	*IMS-based Next Generation Emergency Services Network Interconnection*			In Development	Technical Issue Documentation		A	O	E	P
ATIS	ESIF Issue 86	*Technical Report to describe ATIS-0700015 for Public Safety*	Will address technical impact from future IMS-originated emergency calls.	ATIS-0700015	In Development	Technical Issue Documentation		A	O	E	P

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ATIS	ESIF Issue 87	*Vertical Axis Measurement Test Methodology*			In Development	Technical Issue Documentation		A	O		
ATIS/TIA	ANSI/J-STD-036-C (Fee/Charge)	*Enhanced Wireless 9-1-1 Phase II*	Defines the messaging required to support information transfer to identify and locate wireless emergency service callers.		June 2011	Technical Standard (Joint TIA/ATIS ANS)		A	O	E	P
ATIS/TIA	ANSI/J-STD-036-C-1 (Fee/Charge)	*Addendum to J-STD-036-C, Enhanced Wireless 9-1-1 Phase II*	Enables an MPC and PDE to assign appropriate COS when delivering data to a PSAP.		October 2013	Technical Standard		A	O	E	P
ATIS/TIA	J-STD-110.01.v002 (Fee/Charge)	*Joint ATIS/TIA Implementation Guideline for J-STD-110, Joint ATIS/TIA Native SMS/MMS to 9-1-1 Requirements and Architecture Specification, Release 2*	Addresses CMSP and TCC provider deployment considerations of J-STD-110.v002.	J-STD-110.v002	May 2015	Technical Standard (Joint TIA/ATIS ANS, including J-STD-110.01.v002)		A	O	E	P

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ATIS/TIA	J-STD-110.v002 including J-STD-110.01.v002 (Fee/Charge)	*Joint ATIS/TIA Native SMS/MMS to 9-1-1 Requirements and Architecture Specification, Release 2*	Defines the requirements, architecture and procedures for text messaging to 9-1-1 emergency services using native wireless operator SMS capabilities for the existing generation and next generation PSAPs.	J-STD-110.01. v002	May 2015	Technical Standard (Joint TIA/ATIS ANS)		A	O	E	P
ATIS	ESIF-E911-Phase2ReadinessPackage	*Wireless E9-1-1 Phase II Readiness Package*	Supplies PSAPs with a standard method for verifying readiness and providing carriers with complete information to speed implementation.		January 2003	Other		A	O		P
ATIS	NGIIF Issue 27	*Documentation of Operational Procedures for Next Generation Networks Interconnection*			In Development	Technical Issue Documentation		A	O	E	P
ATIS	NGIIF Issue 31	*Develop New Text Related to Methodologies That Support TDM/IP Caller ID Services, Call Spoofing, Etc.*			In Development	Technical Issue Documentation		A	O		

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ATIS	PTSC Issue 28	*US Standard For IP-IP Network Interconnection - Roadmap Standard*			In Development	Technical Issue Documentation		A	O		
ATIS	PTSC Issue 66	*NGN Architecture Phase 2*			In Development	Technical Issue Documentation		A	O		
ATIS	PTSC Issue 81	*ETS Wireline Access Requirements*			In Development	Technical Issue Documentation		A	O		
ATIS	PTSC Issue 82	*ETS Phase 2 Network Element Requirements*			In Development	Technical Issue Documentation		A	O		
ATIS	PTSC Issue 93	*NGN Security Planning & Operations Guidelines*			In Development	Technical Issue Documentation		A	O	E	P
ATIS	PTSC Issue 98	*ETS Roadmap*			In Development	Technical Issue Documentation		A	O	E	P
ATIS	PTSC Issue 100	*Supplement to ATIS-1000010*			In Development	Technical Issue Documentation		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	PTSC Issue 119	*Dynamic Priority for Next Generation Secure Communications*			In Development	Technical Issue Documentation		A	O	E	
ATIS	WTSC Issue 32	*Support of Public Safety Requirements in LTE Networks*			In Development	Technical Issue Documentation		A	O	E	P
ATIS	WTSC Issue 34	*Automating Location Acquisition for Non-Operator-Managed Over-the-Top VoIP Emergency Services Calls*			In Development	Technical Issue Documentation		A	O	E	
ATIS	WTSC Issue 39	*Public Safety Mission Critical Push to Talk (PTT) Voice Interoperation between Land Mobile Radio (LMR) and Long Term Evolution (LTE) Systems*			In Development	Technical Issue Documentation		A	O	E	
ATIS	WTSC Issue 41	*Commercial Mobile Alerts Service (CMAS) International Roaming*			In Development	Technical Issue Documentation		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ATIS	WTSC Issue 44	*Extending ATIS 0700015 to address Multimedia Emergency Services (MMES)*			In Progress	Technical Issue Documentation		A	O	E	P
ATIS	WTSC Issue 51	*Location Accuracy Improvements for Emergency Calls*		ATIS-0700028.v1.0	In Development	Technical Issue Documentation		A	O	E	P
ATIS	WTSC Issue 60	*Real-Time-Text (RTT)*		ATIS-0700029	In Development	Technical Issue Documentation		A	O	E	P
ATIS	WTSC Issue 65	*S8 Home Routing (S8HR) and Home Network-Based Enhanced Services Support of NG9-1-1*			In Development						
BICSI	ANSI/BICSI 002-2019 (Fee/Charge)	*Data Center Design and Implementation Best Practices*	Provides requirements, guidelines and best practices applicable to any data center, including security, power, cooling, cabling, and other topics.		2019 Edition	Informational Document - Best Practices	C	A		E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
BICSI	ANSI/BICSI 003-2014 (Fee/Charge)	*Building Information Modeling (BIM) Practices for Information Technology Systems*	Provides detailed information about BIM content models and object parameters, setting the recommended levels and guidelines for BIM models.		2014 Edition	Best Practices					
BICSI	ANSI/BICSI-005-2016 (Fee/Charge)	*Electronic Safety and Security (ESS) System Design and Implementation Best Practices*	Provides the requirements and recommendations of a structured cabling infrastructure that would support all types of security systems.		2016 Edition	Informational Document - Best Practices	C				P
BICSI	ANSI/BICSI 006-2015 (Fee/Charge)	*Distributed Antenna System (DAS) Design and Implementation Best Practices*	Provides requirements and recommendations for the design and installation of a standards-compliant, vendor-neutral DAS to be used for a wide range of applications, environments and locations.		2015 Edition	Informational Document - Best Practices	C				P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
BICSI	ANSI/BICSI 007-2017 (Fee/Charge)	*Information Communication Technology Design and Implementation Practices for Intelligent Building and Premises*	Provides requirements and recommendation for design and implementation of the structured cabling system and related applications for any size building or premise, regardless if it is serves commercial, government, transportation, residential, or any other functions.		2017 Edition	Informational Document – Best Practices		A		E	P
BICSI	ANSI/BICSI 008-2018 (Fee/Charge)	*Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices*	Provides requirements and recommendation for design and implementation of the structured cabling system supporting a WLAN; and concepts within wireless transmission for developing WLAN deployments.		2018 Edition	Informational Document – Best Practices		A		E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
BICSI	ANSI/NECA /BICSI 607-2011 (Fee/Charge)	*Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings*	Specifies aspects of planning and installation of telecommunications bonding and grounding systems.		Version 5 2011	Technical Standard		A		E	P
BICSI	Telecommunications Distribution Methods Manual (TDMM) (Fee/Charge)	*Telecommunications Distribution Methods Manual*	This is the definitive reference manual for telecommunications and information communications technology infrastructure design		13th Edition / 2014	Informational Document - Best Practices	C	A		E	P
BICSI	Information Technology Systems Installation Methods Manual (Fee/Charge)	*Information Technology Systems Installation Methods Manual*	Provides ICT industry installation practices.		7th Edition	Informational Document - Best Practices		A		E	P

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BICSI	Outside Plant Design Reference Manual (Fee/Charge)	*Outside Plant Design Reference Manual*	Provides information on traditional infrastructure such as cabling and pathways, but also items not typically found within interior design work, such as right-of-way, permitting and service restoration.		6th Edition	Informational Document - Best Practices		A		E	
BICSI	Telecommunications Project Management Manual (TPMM) (Fee/Charge)	*Telecommunications Project Management Manual*	Provides key information needed to execute successful telecommunications projects.		1st Edition	Informational Document - Best Practices		A		E	
CALEA	Standards for Law Enforcement Agencies (Fee/Charge)	*CALEA® Standards for Law Enforcement Agencies*	Defines a law enforcement agency's role in administration, operations, and facilities and equipment of communications center under their control.		2010	Operational Standard (Chapter 81 Communications applicable)					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
CALEA	Standards for Communications Agencies (Fee/Charge)	*CALEA® Standards for Communications Agencies*	Provides a management model for agency administration and operations, addressing seven critical areas of communications center operations.		2011	Operational Standard					P
CableLabs	CL-RQ-IP-CPE-SEC (Free)	*Common Security Requirements for IP-Based MSO-Provided CPE*	Identifies the areas where common vulnerabilities exist for such CPEs, and crafts requirements to avoid those vulnerabilities.		Version I01 March 15, 2013				O		
CableLabs	PKT-SP-24.229 (Free)	*PacketCable SIP and SDP Stage 3 Specification 3GPP TS 24.229*	Defines a call control protocol for use in the IP Multimedia (IM) Core Network (CN) subsystem based on SIP and the associated SDP.		Version C01 March 14, 2014				O		
CableLabs	PKT-SP-33.203 (Free)	*PacketCable Access Security for IP-Based Services Specification 3GPP TS 33.203*	Specifies the security features and mechanisms for secure access to the IM subsystem (IMS) for the 3G mobile telecommunication system.		Version C01 March 14, 2014				O		

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CableLabs	PKT-SP-BSSF (Free)	*PacketCable Business SIP Services Feature Specification*	Specifies emergency call procedures for business (IP Centrex) phones (i.e., endpoint is not embedded in CM, and can be behind NAT).		Version C01 March 14, 2014				O		
CableLabs	PKT-SP-CI (Free)	*PacketCable Cellular Integration Specification*	Addresses how to provide the user a consistent telephony feature experience on either PacketCable or circuit cellular networks (3GPP or 3GPP2) and during domain transfers between PacketCable and 3GPP or 3GPP2 circuit cellular networks.		Version C01 March 14, 2014				O		
CableLabs	PKT-SP-CMSS1.5 (Free)	*PacketCable 1.5 CMS to CMS Signaling Specification*	Specifies the protocols and procedures to use between call management servers (CMSs) belonging to a single service provider as well as between CMSs that belong to different service providers.		Version I07 April 12, 2012				O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
CableLabs	PKT-SP-ESG (Free)	*PacketCable Enterprise SIP Gateway Specification*	Defines the requirements for the PacketCable 2.0 Enterprise SIP Gateway (ESG) device to simplify and streamline the initial deployment and ongoing management of Business Voice services to enterprise customers. The ESG sits at the boundary between the Service Provider and Enterprise network, and serves as a demarcation point between these two networks.		Version C01 April 5, 2017				O		
CableLabs	PKT-SP-RSTF (Free)	*PacketCable Residential SIP Telephony Feature Specification*	Specifies implementation of common residential telephony features in a PacketCable network with SIP-based User Equipment (UEs).		Version C01 March 14, 2014				O		
CableLabs	PKT-SP-RST-UE-PROV (Free)	*PacketCable RST UE Provisioning Specification*	Specifies RST UE provisioning attributes to support emergency calls.		Version C01 March 14, 2014				O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
CableLabs	PKT-SP-TGCP1.5 (Free)	*PacketCable 1.5 PSTN Gateway Call Signaling Protocol Specification*	Describes an application programming interface called a Media Gateway Control Interface (MGCI) and a corresponding protocol (MGCP) for controlling voice-over-IP (VoIP) PSTN Gateways from external call control elements. The MGCP assumes external call control elements, referred to as the Trunking Gateway Control Protocol (TGCP).		Version I04 April 12, 2012				O		
CableLabs	WR-SP-WiFi-ROAM (Free)	*WiFi Roaming Architecture and Interfaces Specification*	Specifies architecture requirements for best effort data roaming among cable operator Wi-Fi networks.		Version I04 December 1, 2014				O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
CableLabs	DPoE-SP-IPNEv2.0 (Free)	*DPoE IP Network Element Requirements*	Specifications to provide requirements for additional service capabilities and corresponding provisioning and network management capabilities.		Version I07 February 28, 2018				O		
CableLabs	DPoE-SP-MEFv2.0 (Free)	*DPoE Metro Ethernet Forum Specification*	Specifications on DOCSIS-based provisioning and operations of IP using DOCSIS Internet service (which is typically referred to as High Speed Data (HSD)), or IP(HSD) for short, and Metro Ethernet services as described by Metro Ethernet Forum (MEF) standards.		Version I06 February 28, 2018				O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
DOC	FIPS-PUB-140-3 (Free)	*Security Requirements for Cryptographic Modules*	Specifies the security requirements that will be satisfied by a cryptographic module utilized within a security system protecting sensitive but unclassified information.	ISO/IEC 19790:2012	March 22, 2019	Technical Standard		A	O		
DOC	FIPS-PUB-180-4 (Free)	*Secure Hash Standards (SHS)*	Specifies hash algorithms to detect whether messages have not been altered since they were originally generated.		August 2015	Technical Standard		A	O		
DOC	FIPS-PUB-197 (Free)	*Advanced Encryption Standards (AES)*	Specifies a FIPS-approved cryptographic algorithm that can be used to protect electronic data; the AES algorithm is a symmetric block cipher that can encrypt and decrypt information.		November 2001	Technical Standard (Data/Design)		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
DOC	NIST Cybersecurity Framework (Free)	*Framework for Improving Critical Infrastructure Cybersecurity*	Consists of standards, guidelines, and practices to promote the protection of critical infrastructure; focuses on using business drivers to guide cybersecurity activities and considering cybersecurity risks as part of the organization's risk management process.		February 12, 2014			A	O	E	P
DOC NIST NSTIC	GTRI NSTIC Trustmark Framework (Free)	*Trustmark Framework Technical Specification*	Provides normative language that governs the structures that comprise the Trustmark Framework and the rules and policies related to the operational use of these structures.		Version 1.2 November 6, 2017			A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
DOC NIST NCCoE	Mobile Application Single Sign-On (Free)	*Mobile Application Single Sign-On: Improving Authentication for Public Safety First Responders (2nd Draft)*	Provides a method for public safety organizations to deploy efficient and interoperable multifactor authentication and single sign-on tools to protect access to sensitive information while meeting the demands of an operational environment that relies on rapid response.		SP 1800-13 (Draft) May 2019	Technical/ Operational					
DHS	2014 National Emergency Communications Plan (Free)	*2014 National Emergency Communications Plan*	Provides recommendations to the emergency response community for maintaining communications during routine operations, as well as disasters and acts of terrorism requiring cross-border, multi-state, and multi-jurisdictional responses.		2014	Technical/ Operational	C				P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
DHS	SAFECOM (Free)	*Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials*	Provides recommendations and best practices for public safety officials at all levels of government to establish, assess, and update governance structures that represent all emergency communications capabilities.		February 2018	Operational	C				P
DOJ	CJISD-ITS-DOC-08140-5.8 (Free)	*Criminal Justice Information Services (CJIS) Security Policy*	Contains information security requirements, guidelines, and agreements reflecting the will of law enforcement and criminal justice agencies for protecting the sources, transmission, storage, and generation of Criminal Justice Information (CJI).		Version 5.8 June 1, 2019		C	A		E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ETSI	ETSI SR 002 777 (Free)	*Emergency Communications (EMTEL); Test/verification procedure for emergency calls*	Outlines test procedures for emergency calls from individuals (citizens) to authorities.		Version 1.1.1 July 2010	Special Report					
ETSI	ETSI TS 101 470 (Free)	*Emergency Communications (EMTEL); Total Conversation Access to Emergency Services*	Defines conditions for using Total Conversation for emergency services with more media than in the regular voice call providing opportunities to more rapid, reliable and confidence-creating resolution of the emergency service cases.		Version 1.1.1 November 2013	Technical Standard	C				P
ETSI	ETSI TS 102 164 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Emergency Location Protocols*	Specifies the protocol that is used by the local emergency operator to obtain the location information that is registered on the operator location server.	OMA-TS-MLP-V3_2-20051124-C	Version 1.3.1 September 2006	Technical Standard	C	A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ETSI	ETSI TR 102 180 (Free)	*Emergency Communications (EMTEL); Basis of requirements for communication of individuals with authorities/ organizations in case of distress (Emergency call handling)*	Provides the requirements for communication from individuals to authorities and organizations in all types of emergencies.		Version 1.5.1 July 2015	Technical Report	C	A			P
ETSI	ETSI TS 102 424 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN network to support Emergency Communication from Citizen to Authority*	Contains the requirements of an NGN to support EMTEL from the citizen to authority.		Version 1.1.1 September 2005	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ETSI	ETSI TR 102 476 (Free)	*Emergency Communications (EMTEL); Emergency calls and VoIP: possible short and long term solutions and standardization activities*		ETSI SR 002 777 ETSI TR 102 641	July 1, 2008						

ETSI	ETSI TR 102 641 (Free)	*Satellite Earth Stations and Systems (SES); Overview of present satellite emergency communications resources*	Provides an overview of concepts, systems and initiatives related to the use of space resources in the context of disaster management, including an introduction to the field of disaster management and the relation with Information and Communication Technology, the role of space technology in disaster management, the requirements of telecommunication systems deployed for disaster management; a list of typical space resources used, covering earth observation, satellite navigation and satellite communications; a list of initiatives in the field of emergency communications, including standardization activities.	ETSI SR 002 777 ETSI TR 102 299	August 1, 2013	Technical					

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ETSI	ETSI TR 103 170 (Free)	*Emergency Communications (EMTEL); Total Conversation Access to Emergency Services*	Describes conditions for using Total Conversation for emergency services and makes access of emergency services possible to people with disabilities.		Version 1.1.1 November 2012	Technical Report	C	A	O		P
ETSI	ETSI TS 123 167 (Free)	*Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) emergency sessions*	Defines the stage two service description for emergency services in the IMS, including the elements necessary to support IM emergency services.	3GPP TS 23.167 Version 12.0.0 Release 12	Version 14.3.0 May 2017	Technical Standard (Product-Interface/ Design)	C	A			
ETSI	ETSI TS 182 009 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Architecture to support emergency communication from citizen to authority*	Defines the architectural description for emergency services in the IMS, including the elements necessary to support IM emergency services.	3GPP TS 23.09 (Release 7) 3GPP TS 23.167, (Release 9)	Version 2.1.1 October 2008	Technical Standard		A	O		

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ETSI	ETSI TS 183 036 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); ISDN/SIP interworking; Protocol specification*	Specifies the stage three Protocol Description of the signaling interworking between ISDN DSS1 protocol and SIP.		Version 3.5.1 August 2012	Technical Specification		A			
ETSI	ETSI TS 187 001 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN SECurity (SEC); Requirements*	Defines the security requirements pertaining to TISPAN NGN Release 3.	TISPAN NGN Release 3	Version 3.9.1 July 2014	Technical Specification		A	O	E	

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ETSI	ETSI TR 187 002 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); TISPAN NGN Security (NGN_SEC); Threat, Vulnerability and Risk Analysis*	Presents the results of the Threat Vulnerability Risk Analysis (TVRA) for the NGN.		Version 3.1.1 April 2011	Technical Report		A	O	E	
ETSI	ETSI TS 187 003 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Security; Security Architecture*	Defines the security architecture of NGN.		Version 3.4.1 March 2011	Technical Specification		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ETSI	ETSI TS 187 005 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Lawful Interception; Stage 1 and Stage 2 definition*	Specifies the stage two model for Lawful Interception of TISPAN NGN services.		Version 3.1.1 June 2012	Technical Specification		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ETSI	ETSI ES 203 178 (Free)	*Functional architecture to support European requirements on emergency caller location determination and transport*	Describes the unified functional architecture to support European requirements on emergency caller location determination and transport, in particular for the case where VoIP service provider and one or several network operators - all serving the customer in the establishment of an emergency call - are independent enterprises needing to co-operate to determine the location of the (nomadic) caller.		Version 1.1.1 February 2015	Architectural	C	A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ETSI	ETSI ES 282 007 (Free)	*Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture*	Describes the IMS core component of the TISPAN NGN functional architecture and its relationship to other subsystems and components.	3GPP TS 23.517 (Release 8)	Version 2.1.1 November 2008	Technical Standard (Interface/ Design)	C	A	O		
FCC TFOPA	TFOPA Working Group 2 (Free)	*Task Force on Optimal PSAP Architecture (TFOPA)*	Provides recommendations to the Commission regarding actions PSAPs can take to optimize their security, operations, and funding as they migrate to NG9-1-1.		January 29, 2016	Best Practice			O	E	P
FCC CSRIC	CSRIC Best Practices Database (Free)	CSRIC Best Practices	Includes search features by number, text, type and keywords to locate best practices resulting from work performed by CSRIC, NRIC and other related FCC initiatives.		Ongoing	Best Practices	C	A	O	E	P

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FCC CSRIC	CSRIC V, Working Group 1: Evolving 911 Services Task 2 (Free)	Final Report – 911 Location Based Routing	Reviews and identifies several location-based routing methods that could be used for wireless 911 call routing. It also reviews transition considerations for NG911 Emergency Services IP Networks (ESInets)		September 2016	Report		A	O		P
FCC CSRIC	CSRIC V, Working Group 6: Secure Hardware and Software – Security by Design (Free)	*Best Practice Recommendations for Hardware and Software Critical to the Security of the Core Communications Network*	Identifies voluntary recommendations and best practices to enhance the security of hardware and software in the core public communications network		March 2016	Report		A	O		P

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FCC CSRIC	CSRIC V, Working Group 6: Secure Hardware and Software – Security-by-Design Attestation Framework (Free)	*Final Report: Voluntary Security-by-Design Attestation Framework for Hardware and Software Critical to the Security of the Core Communications Network*	Reviews the best ways to provide assurances to the FCC and the public that recommended security capabilities are being implemented by network equipment vendors, and to recommend voluntary mechanisms that provide assurances to the FCC and the public that the security practices are being applied		September 2016	Report		A	O		P
FCC CSRIC	CSRIC IV Working Group 1 Next Generation 9-1-1 Task 1 Subtask 1 (Free)	*Final Report - Investigation into Location Improvements for Interim SMS (Text) to 9-1-1*	Reviews approaches to provide enhanced location information and evaluates associated limitations and challenges for SMS text to 9-1-1 services.		June 2014	Report		A	O		P

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FCC CSRIC	CSRIC IV Working Group 1 Next Generation 9-1-1 Task 1 Subtask 2 (Free)	*Final Report - PSAP Requests for Service for Interim SMS Text-to-9-1-1*	Provides recommended best practices for 9-1-1 authorities to utilize when requesting the interim SMS text-to-9-1-1 service.		May 2014	Report		A	O		P
FCC CSRIC	CSRIC IV Working Group 1 Next Generation 9-1-1 Task 2 (Free)	*Final Report - Location Accuracy and Testing for Voice-over-LTE Networks*	Provides information on the impact VoLTE implementation will have on carriers' ability to comply with existing wireless E9-1-1 location accuracy levels.	CSRIC III WG3 March 2012	September 2014	Report		A	O		
FCC CSRIC	CSRIC IV Working Group 1 Next Generation 911 Task 3 (Free)	*Final Report - Specification for Indoor Location Accuracy Test Bed*	Provides guidance to the Commission on establishing a permanent entity to design, develop, and manage an ongoing public test bed for indoor location technologies.		June 2014	Report		A	O		P

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FCC CSRIC	CSRIC IV Working Group 4 (Free)	*Cybersecurity Risk Management and Best Practices*	Provides recommendations on voluntary mechanisms to assure communication providers are taking necessary measures to manage cybersecurity risks and implementation guidance to help adapt the voluntary NIST Cybersecurity Framework.	NIST Cyber-security Framework	March 2015	Report		A	O		
FGDC	FGDC-STD-016-2011 (Free)	*United States Thoroughfare, Landmark, and Postal Address Data Standard*	Provides a data content, classification, quality, and exchange standard for thoroughfare, landmark and postal addresses, and for address reference systems; provides a complete XML schema description for exchange of address data.		Version 2.0 February 2011	Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IEEE	IEEE 802.1AB-2016 (Fee/Charge)	*Station and Media Access Control Connectivity Discovery*	Defines a protocol and a set of managed objects that can be used for discovering the physical topology from adjacent stations in IEEE 802(R) LANs.		March 11, 2016	Technical Standard	C	A	O		
IEEE	IEEE 802.1AC-2016/Cor 1-2018 (Fee/Charge)	*Media Access Control (MAC) Service Definition - Corrigendum 1: Logical Link Control (LLC) Encapsulation EtherType*	Defines the MAC service found in LANs and MANs, and the Internal Sublayer Service and External Internal Sublayer Service provided within MAC Bridges, in abstract terms of their semantics, primitive actions and events, and the parameters of, interrelationship between, and valid sequences of, these actions and events.		Nov. 9, 2018	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IEEE	IEEE 802.1AR-2018 (Fee/Charge)	*Local and Metropolitan Area Networks - Secure Device Identity*	Secure Device Identifier (DevID) is cryptographically bound to a device and supports authentication of the device's identity.		Aug. 2, 2018	Technical Standard		A	O		
IEEE	IEEE 802.3-2018 (Fee/Charge)	*IEEE Standard for Ethernet*	Specifies selected speeds of operation from 1 Mb/s to 100 Gb/s using a common MAC specification and management information base (MIB) for Ethernet LAN operation.		Aug. 31, 2018	Technical Standard		A	O		
IEEE	IEEE 802.11-2016 (Fee/Charge)	*Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*	Specifies technical corrections and clarifications to IEEE Standard 802.11 for WLANS as well as enhancements to the existing MAC and PHY functions.		Dec. 14, 2016	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IEEE	IEEE 802.16-2017 (Fee/Charge)	*Air Interface for Broadband Wireless Access Systems*	Specifies the air interface, including the MAC and PHY, of combined fixed and mobile point-to-multipoint broadband wireless access (BWA) systems providing multiple services.	ETSI HiperMAN	March 2, 2018	Technical Standard		A	O		
IEEE	IEEE 802.19.1-2018 (Fee/Charge)	*Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 19: Wireless Network Coexistence Methods*	Specifies radio technology independent methods for coexistence among dissimilar television band devices (TVBDs) and dissimilar or independently operated networks of TVBDs.		Nov. 2, 2018	Technical Standard					
IEEE	IEEE 1512-2006 (Fee/Charge)	*Common Incident Management Message Sets for Use by Emergency Management Centers*	Addresses the exchange of vital data about public safety and emergency management issues involved in transportation-related events, through common incident management sets.	IEEE 2000; IEEE 1512.1-2003; IEEE 1512.3-2002	Aug. 8, 2006	Technical Standard					

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IEEE	IEEE 1903-2011 (Fee/Charge)	*Functional Architecture of Next Generation Service Overlay Networks*	Specifies a functional architecture for a Next Generation Service Overlay Network, consisting of a set of functional entities, their functions, reference points and information flows to illustrate service interaction and media delivery.		Oct. 7, 2011	Technical Standard		A	O		
ISF	ISF Standard of Good Practice for Information Security (Free Executive Summary, Fee/Charge for Full Standard)	*The ISF Standard of Good Practice for Information Security*	Presents effect practices and tools for IT professionals to personnel to manage information risks; enables compliance with ISO/IEC 27002:2013, COBIT 5 for Information Security and the SANS Top 20 Critical Security Controls.		2014	Technical Guidance		A	O	E	
IETF	RFC 2328 (Free)	*OSPF Version 2*	Describes the OSPF protocol implementation.		March 2, 2013	Proposed Technical Standard				E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 2474 (Free)	*Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*	Defines the fields used by the Differentiated Code Point (DSCP) protocol to provide QoS traffic prioritization in an IP network.		March 2, 2013	Proposed Technical Standard				E	
IETF	RFC 2475 (Free)	*An Architecture for Differentiated Services*	Describes a protocol that provides QoS in an IP network.		March 2, 2013	Proposed Technical Standard				E	
IETF	RFC 3261 (Free)	*SIP: Session Initiation Protocol*	Describes SIP, an application-layer control (signaling) protocol for creating, modifying, and terminating sessions (including Internet telephone calls, multimedia distribution, and multimedia conferences) with one or more participants.		December 7, 2015	Proposed Technical Standard (Interface/ Design)		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 3262 (Free)	*Reliability of Provisional Responses in Session Initiation Protocol (SIP)*	Describes an extension to SIP providing reliable provisional response messages; the extension uses the option tag "100rel" and defines the Provisional Response Acknowledgement (PRACK) method.		December 7, 2015	Proposed Technical Standard		A	O	E	
IETF	RFC 3263 (Free)	*Session Initiation Protocol (SIP): Locating SIP Servers*	Describes the DNS procedures to resolve SIP URI into the IP address, port, and transport protocol of the next hop to contact.		December 7, 2015	Proposed Technical Standard		A	O	E	
IETF	RFC 3264 (Free)	*An Offer/Answer Model with Session Description Protocol (SDP)*	Describes a mechanism by which two entities can make use of the SDP to arrive at a common view of a multimedia session between them.		March 2, 2013	Proposed Technical Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 3265 (Free)	*Session Initiation Protocol (SIP)-Specific Event Notification*	Describes a SIP extension to provide an extensible framework by which SIP nodes can request notification from remote nodes indicating that certain events have occurred.		October 14, 2015	Proposed Technical Standard		A	O	E	P
IETF	RFC 3411 (Free)	*An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*	Describes an architecture for describing SNMP management frameworks.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 3412 (Free)	*Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)*	Describes the message processing and dispatching for SNMP messages within the SNMP architecture; defines the procedures for dispatching potentially multiple versions of SNMP messages.		October 14, 2015	Proposed Technical Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 3413 (Free)	*Simple Network Management Protocol (SNMP) Applications*	Describes five types of SNMP applications that make use of an SNMP engine as described in RFC 3411.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 3414 (Free)	*User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*	Defines the elements of procedure for providing SNMP message level security; includes an MIB for remotely monitoring/ managing the configuration parameters.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 3415 (Free)	*View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*	Defines the elements of procedure for controlling access to management information; includes an MIB for remotely managing the configuration parameters.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 3416 (Free)	*Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)*	Defines version 2 of the protocol operations for SNMP; defines the syntax and elements of procedure of sending, receiving, and processing SNMP PDUs.		October 14, 2015	Proposed Technical Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 3417 (Free)	*Transport Mappings for the Simple Network Management Protocol (SNMP)*	Defines the transport of SNMP messages over various protocols.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 3418 (Free)	*Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)*	Defines managed objects which describe the behavior of an SNMP entity.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 3550 (Free)	*RTP: A Transport Protocol for Real-Time Applications*	Describes the Real-time Transport Protocol (RTP), suitable for transmitting real-time information such as voice, video, and other delay-sensitive media.		October 14, 2015	Proposed Technical Standard				E	P
IETF	RFC 6280 (Free)	*An Architecture for Location-based services usage and privacy*	Describes access control, usage rules and privacy requirements for location-based services regarding the geographic location of an individual or device.		October 14, 2015	Proposed Technical Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 7459 (Free)	*Representation of Uncertainty and Confidence in the PIDF-LO*	Describes the concepts of uncertainty and confidence as they pertain to location information.		February 20, 2015	Proposed Technical Standard		A	O	E	
IETF	RFC 3856 (Free)	*A Presence Event Package for the Session Initiation Protocol (SIP)*	Describes the usage of SIP for subscriptions and notifications of presence.		July 18, 2018	Proposed Technical Standard		A	O		
IETF	RFC 3863 (Free)	*Presence Information Data Format (PIDF)*	Specifies the Common Profile for Presence (CPP) PIDF as a common presence data format.		October 14, 2015	Proposed Technical Standard	C	A	O	E	P
IETF	RFC 5341 (Free)	*The Internet Assigned Number Authority (IANA) tel Uniform Resource Identifier (URI) Parameter Registry*	The Internet Assigned Number Authority (IANA) registry for *tel* Uniform Resource Identifier (URI) parameters and their values.		October 14, 2015	Proposed Technical Standard		A	O		
IETF	RFC 6874 (Free)	*Representing IPv6 Zone Identifiers in Address Literals and Uniform Resource Identifiers*	Extends RFC 3986 to include IPv6 to include zone identifiers and address literals		October 14, 2015	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 4079 (Free)	*A Presence Architecture for the Distribution of GEOPRIV Location Objects*	Examines some existing IETF work on the concept of presence, shows how presence architectures map onto GEOPRIV architectures, and demonstrates that tools already developed for presence could be reused to simplify the standardization and implementation of GEOPRIV.		March 2, 2013	Technical Information Document		A	O		
IETF	RFC 4119 (Free)	*A Presence-based GEOPRIV Location Object Format*	Describes an object format for carrying geographical information on the Internet.		March 2, 2013	Proposed Technical Standard (Data/Design)		A	O		
IETF	RFC 4271 (Free)	*A Border Gateway Protocol 4 (BGP-4)*	Discusses the BGP, which is an inter-Autonomous System routing protocol; provides a set of mechanisms for supporting Classless Inter-Domain Routing.		December 20, 2018	Proposed Technical Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 4975 (Free)	*The Message Session Relay Protocol (MSRP)*	Describes MSRP, a protocol for transmitting a series of related instant messages in the context of a session.		September 2007	Proposed Technical Standard		A	O		P
IETF	RFC 4976 (Free)	*Relay Extensions for the Message Sessions Relay Protocol (MSRP)*	Introduces the concept of message relay intermediaries to MSRP and describes the extensions necessary to use them.		September 2007	Proposed Technical Standard		A	O		P
IETF	RFC 5069 (Free)	*Security Threats and Requirements for Emergency Call Marking and Mapping*	Reviews the security threats associated with the marking of signaling messages to indicate that they are related to an emergency, and with the process of mapping locations to URIs that point to PSAPs.		January 2008	Informational Document		A	O		
IETF	RFC 5139 (Free)	*Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)*	Defines an XML format for the representation of civic location.		October 14, 2015	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 6848 (Free)	*Specifying Civic Addressing Extensions in the Presence Information Data Format Location Object (PIDF-LO)*	Updates RFC 4776 and RFC 5222 by defining new fields for adding civic address elements to the Geopriv civic address format.		October 14, 2015	Proposed Technical Standard (Interface/ Design)		A	O		
IETF	RFC 5223 (Free)	*Discovering Location-to-Service Translation (LoST) Servers Using the Dynamic Configuration Protocol (DHCP)*	Describes how a LoST client can discover other LoST servers using DHCP.		December 20, 2018	Proposed Technical Standard		A	O		
IETF	RFC 8447 (Free)	*Updates registries related to Transport Layer Security (TSL) and Datagram Transport Layer Security (DTLS)*	Updates RFC 4680, RFC 7301, RFC 5705, RFC 5077, RFC 3749, RFC 5878, RFC 6520, RFC 5246 registries and registration policies.		December 19, 2018	Proposed Technical Standard		A	O	E	P
IETF	RFC 5340 (Free)	*OSPF for IPv6*	Describes the modifications to Open Shortest Path First (OSPF) to support IPv6.		December 20, 2018	Proposed Technical Standard		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 5411 (Free)	*A Hitchhiker's Guide to the Session Initiation Protocol (SIP)*	Provides high-level overview of Session Initiation Protocol (SIP).		October 14, 2015	Informational Document	C	A	O	E	P
IETF	RFC 7459 (Free)	*GEOPRIV Presence Information Data Format Location Object (PIDF-LO) Usage Clarification, Considerations, and Recommendations*	Defines key concepts of uncertainty and confidence as they pertain to location information in the Presence Information Data Format Location Object (PIDF-LO)		December 20, 2018	Proposed Technical Standard		A	O		
IETF	RFC 5582 (Free)	*Location-to-URL Mapping Architecture and Framework*	Describes an architecture for a global, scalable, resilient, and administratively distributed system for mapping geographic location information to URLs, using the LoST protocol.		October 14, 2015	Proposed Technical Standard			O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 5880 (Free)	*Bidirectional Forwarding Detection (BFD)*	Describes a protocol intended to detect faults in the bidirectional path between two forwarding engines, including interfaces, data link, and the forwarding engines themselves where possible.		October 14, 2015	Proposed Technical Standard			O	E	
IETF	RFC 5881 (Free)	*Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)*	Describes the particulars necessary to used BFD in the IPv4 and IPv6 environments.		October 14, 2015	Proposed Technical Standard			O	E	
IETF	RFC 5882 (Free)	*Generic Application of Bidirectional Forwarding Detection (BFD)*	Describes the generic application of the BFD protocol.		September 28, 2016	Proposed Technical Standard			O	E	
IETF	RFC 7840 (Free)	*A Routing Request Extension for the HTTP-Enabled Location Delivery (HELD)*	A Routing Request Extension for the HTTP-Enabled Location Delivery (HELD) Protocol.		May 9, 2016	Proposed Technical Standard (Interface/ Design)		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 6135 (Free)	*An Alternative Connection Model for the Message Session Relay Protocol (MSRP)*	Defines an alternative connection model MSRP User Agents (UAs); uses the connection-oriented media (COMEDIA) mechanism in order to create the MSRP transport connection.		February 2011	Proposed Technical Standard		A	O		P
IETF	RFC 6155 (Free)	*Use of Device Identity in HTTP-Enabled Location Delivery (HELD)*	Extends the HELD protocol to allow the location request message to carry device identifiers; privacy and security considerations.		December 20, 2018	Proposed Technical Standard		A	O		
IETF	RFC 8262 (Free)	*Location Conveyance, messaging and metadata for the Session Initiation Protocol*	Defines content-ID URL to reference a complete message-body and metadata as provided by some SIP header fields.		December 20, 2018	Proposed Technical Standard		A	O		
IETF	RFC 6446 (Free)	*Session Initiation Protocol (SIP) Event Notification Extension for Notification Rate Control*	Specifies mechanisms for adjusting the rate of SIP event notifications.		October 14, 2015	Proposed Technical Standard		A	O	E	P

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IETF	RFC 6447 (Free)	*Filtering Location Notifications in the Session Initiation Protocol (SIP)*	Describes filters that limit asynchronous location notifications to compelling events.		October 14, 2015	Proposed Technical Standard		A	O	E	P
IETF	RFC 6714 (Free)	*Connection Establishment for Media Anchoring (CEMA) for the Message Session Relay Protocol (MSRP)*	Defines an MSRP extension, CEMA; support of this extension is optional.		August 2012	Proposed Technical Standard		A	O		P
IETF	RFC 6739 (Free)	*Synchronizing Service Boundaries and <mapping> Elements Based on the Location-to-Service Translation (LoST) Protocol*	Defines mapping service identifiers and geodetic or civic location information to service URIs and service boundaries to determine the location-appropriate public safety answering point (PSAP) for emergency services.		December 20, 2018	Experimental Technical Standard		A		E	P
IETF	RFC 6753 (Free)	*A Location Dereference Protocol Using HTTP-Enabled Location Delivery (HELD)*	Describes how to use HTTP over TLS as a dereferencing protocol to resolve a reference to a PIDF-LO.		October 2012	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 6772 (Free)	*Geolocation Policy: A Document Format for Expressing Privacy Preferences for Location Information*	Defines an authorization policy language for controlling access to location information and location-specific access control.		January 2013	Proposed Technical Standard	C	A			
IETF	RFC 6848 (Free)	*Specifying Civic Address Extensions in the Presence Information Data Format Location Object (PIDF-LO)*	Describes a backward-compatible mechanism for adding civic address elements to the Geopriv civic address format.		January 2013	Proposed Technical Standard		A	O		
IETF	RFC 6881 (Free)	*Best Current Practice for Communications Services in Support of Emergency Calling*	Describes best current practice on how devices, networks, and services using IETF protocols should use such standards to make emergency calls.		March 2013	Best Current Practice		A	O		
IETF	RFC 6915 (Free)	*Flow Identity Extension for HTTP-Enabled Location Delivery (HELD)*	Specifies an XML schema and a URN sub-namespace for a Flow Identity Extension for HELD.		April 2013	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 7035 (Free)	*Relative Location Representation*	Defines an extension to the PIDF-LO for the expression of location information that is defined relative to a reference point.		October 2013	Proposed Technical Standard		A	O		
IETF	RFC 7090 (Free)	*Public Safety Answering Point (PSAP) Callback*	Discusses shortcomings of the current PSAP call-back mechanisms and illustrates additional scenarios where better-than-normal call treatment behavior would be desirable.		April 2014	Proposed Technical Standard		A	O		
IETF	RFC 7105 (Free)	*Using Device-Provided Location-Related Measurements in Location Configuration Protocols*	Describes a protocol for a device to provide location-related measurement data to a LIS within a request for location information.		January 2014	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 7163 (Free)	*URN for Country-Specific Emergency Services*	Updates the registration guidance provided in Section 4.2 of RFC 5031, which allows the registration of service URNs with the "sos" service type only for emergency services "that are offered widely and in different countries;" updates those instructions to allow such registrations.		March 2014	Proposed Technical Standard		A	O		
IETF	RFC 7199 (Free)	*Location Configuration Extensions for Policy Management*	Extends the current location configuration protocols to provide hosts with a reference to the rules that are applied to a URI so that the host can view or set these rules.		April 2014	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 7216 (Free)	*Location Information Server (LIS) Discovery Using IP Addresses and Reverse DNS*	Describes the configuration challenge of discovering a LIS when a residential gateway is present, requiring a method that is able to work around the obstacle presented by the gateway.		April 2014	Proposed Technical Standard		A	O		
IETF	RFC 7378 (Free)	*Trustworthy Location*	Describes threats to conveying location, particularly for emergency calls, and describes techniques that improve the reliability and security of location information.		December 2014	Informational Document		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 7406 (Free)	*Extensions to the Emergency Services Architecture for Dealing with Unauthenticated and Unauthorized Devices*	Provides a problem statement, introduces terminology and describes an extension for the base IETF emergency services architecture to address scenarios involving situations dealing with unauthenticated and unauthorized devices making emergency calls.		December 2014	Informational Document		A	O		
IETF	RFC 7701 (Free)	*Multi-party Chat Using the Message Session Relay Protocol (MSRP)*	Defines the necessary tools for establishing multi-party chat sessions, or chat rooms, using MSRP.		December 2015	Proposed Technical Standard		A	O		P
IETF	RFC 7852 (Free)	*Additional Data Related to an Emergency Call*	Describes data structures and mechanisms to convey information about the call, caller or location to a PSAP.		December 20, 2018	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 8148 (Free)	*Next-Generation Vehicle-Initiated Calls*	Describes how to use IP-based emergency services mechanisms to support the next generation of emergency calls placed by vehicles		December 20, 2018	Proposed Technical Standard		A	O		
IETF	Internet Draft (draft-ietf-ecrit-similar-location-08 (Free)	*A LoST extension to return complete and similar location info*	A LOST extension to return completed or similar form to the original input civic location, based on whether valid or invalid civic address elements are returned within the findServiceResponse message.		January 17, 2019	Proposed Technical Standard		A	O		
IETF	Internet Draft draft-ietf-mmusic-msrp-usage-data-channel-11 (Free)	*MSRP over Data Channels*	Specifies how MSRP can be instantiated as a data channel sub-protocol.		June 1, 2019	Proposed Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
IETF	RFC 7977 (Free)	*Message Session Relay Protocol (MSRP)*	Specifies a new WebSocket sub-protocol as a reliable transport mechanism between MSRP clients and relays.		September 21 2016	Technical Standard		A	O		
ISO	ISO 19115-1 (Fee/Charge)	*Geographic information — Metadata — Part 1: Fundamentals*	Defines the schema required for describing geographic information and services by means of metadata; provides information about the identification, the extent, the quality, the spatial and temporal aspects, the content, the spatial reference, the portrayal, distribution, and other properties of digital geographic data and services.		April 1, 2014 First Edition	Technical Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISO	ISO/IEC 20000-1:2018 (Fee/Charge)	*Information technology — Service management — Part 1: Service management system requirements*	Updates 2011 requirements for the service provider to plan, establish, implement, operate, monitor, review, maintain and improve an SMS; includes the design, transition, delivery and improvement of services to fulfill agreed service requirements.	ISO 20000 Family	September 9, 2018 Edition 3	Operational Standard	C	A	O	E	P
ISO	ISO/IEC 24760-1:2019 (Fee Charge)	*IT Security and Privacy – IT Security and Privacy A framework for identity management – Part 1: Terminology and concepts*	Defines terms for identity management and specifies core concepts of identity and identity management, and their relationships.		May, 2019 Edition 2					E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISO	ISO/IEC 24760-2:2015 (Fee/Charge)	*Information technology — Security techniques — A framework for identity management – Part 2: Reference architecture and requirements*	Provides guidelines for the implementation of systems for the management of identity information and specifies requirements for the implementation and operation of a framework for identity management.		June 1, 2015 Edition 1					E	P
ISO	ISO/IEC 24760-1 (Fee/Charge)	*Information technology — Security techniques — A framework for identity management – Part 3: Practice*	Provides guidance for the management of identity information and for ensuring that an identity management system conforms to ISO/IEC 24760-1 and ISO/IEC 24760-2	ISO 27000 Family	August 2, 2018	Standard for Security, cybersecurity and privacy protection				E	P
ISO	ISO/IEC 27000:2018 (Fee/Charge)	*Information technology — Security techniques — Information security management systems – Overview and vocabulary*	Provides an overview of information security management systems (ISMS), and terms and definitions commonly used in the ISMS family of standards.	ISO 27000 Family	February 2018 Edition 5	Operational Standard	C	A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISO	ISO/IEC 27001:2013 (Fee/Charge)	*Information technology — Security techniques — Information security management systems – Requirements*	Specifies the requirements for establishing, implementing, maintaining and continually improving an ISMS within the context of the organization; includes requirements for the assessment and treatment of information security risks tailored to the needs of the organization.	ISO 27000 Family	October 10, 2013 Edition 2 – Note: This document was reviewed and confirmed in 2019 and this version remains current.	Operational Requirements	C	A	O	E	P
ISO	ISO/IEC 27002:2013 (Fee/Charge)	*Information top Sat –technology — Security techniques — Code of practice for information security controls*	Provides guidelines for organizational information security standards and information security management practices including the selection, implementation and management of controls taking into consideration the organization's information security risk environment(s).	ISO 27000 Family	October 1, 2013 Edition 2	Guidelines	C	A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISO	ISO/IEC 27003:2017 (Fee/Charge)	*Information technology — Security techniques — Information security management system implementation guidance*	Focuses on the critical aspects needed for successful design and implementation of ISMS; describes the process of ISMS specification and design from inception to the production of implementation plans.	ISO 27000 Family	March 1, 2017 Edition 2	Security Management	C	A	O	E	P
ISO	ISO/IEC 27004:2016 (Fee/Charge)	*Information technology — Security techniques — Information security management — Monitoring, measurement, analysis and evaluation*	Provides guidance on the development and use of measures and measurement in order to assess the effectiveness of an implemented ISMS and controls or groups of controls.	ISO 27000 Family	December 15, 2016 Edition 2	Security Management	C	A	O	E	P
ISO	ISO/IEC 27005:2018 (Fee/Charge)	*Information technology — Security techniques — Information security risk management*	Provides guidelines for information security risk management; is designed to assist the satisfactory implementation of information security based on a risk management approach.	ISO 27000 Family	July 2018 Edition 3	Information security risk management	C	A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISO	ISO/IEC 27011:2016 (Fee/Charge)	*Information technology — Security techniques — Information security management guidelines for telecommunications organizations based on ISO/IEC 27002*	Defines guidelines supporting the implementation of information security management in telecommunications organizations.	ISO 27000 Family	December 2016 Edition 2	Information security risk management		A	O	E	P
ISO	ISO/IEC 27031:2011 (Fee/Charge)	*Information technology — Security techniques — Guidelines for information and communication technology readiness for business continuity*	Describes the concepts and principles of ICT readiness for business continuity, and provides a framework of methods and processes to identify and specify all aspects for improving an organization's ICT readiness to ensure business continuity.	ISO 27000 Family	March 1, 2011 Edition 1	Guidelines Operational	C	A	O	E	P

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ISO	ISO/IEC 27033-1:2015 (Fee/Charge)	*Information technology — Security techniques — Network security — Part 1: Overview and concepts*	Provides an overview of network security and related definitions. It defines and describes the concepts associated with, and provides management guidance on, network security.	ISO 27000 Family	August 15, 2015 Edition 2	Network Security Overview	C	A	O	E	P
ISO	ISO/IEC 27033-2:2012 (Fee/Charge)	*Information technology — Security techniques — Network security — Part 2: Guidelines for the design and implementation of network security*	Provides guidelines for organizations to plan, design, implement and document network security.	ISO 27000 Family	This standard was last reviewed and confirmed current in 2018	Network Security Guidelines	C	A	O	E	P

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ISO	ISO/IEC 27033-3:2010 (Fee/Charge)	*Information technology — Security techniques — Network security — Part 3: Reference Networking scenarios – Threats, design techniques and control issues*	Describes the threats, design techniques and control issues associated with reference network scenarios; provides detailed guidance on the security threats and the security design techniques and controls required to mitigate the associated risks.	ISO 27000 Family	This standard was last reviewed and confirmed current in 2018	Information Security Guidelines	C	A	O	E	P
ISO	ISO/IEC 27033-4:2014 (Fee/Charge)	*Information technology — Security techniques — Network security — Part 4: Securing communications between networks using security gateways*	Provides guidance for securing communications between networks using security gateways (firewall, application firewall, intrusion protection system, etc.) in accordance with a documented information security policy of the security gateways.	ISO 27000 Family	March 1, 2014 Edition 1	Information Security Guidelines	C	A	O	E	P

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ISO	ISO/IEC 27033-5:2013 (Fee/Charge)	*Information technology — Security techniques — Network security – Part 5: Securing communications across networks using Virtual Private Networks (VPNs)*	Provides guidelines for the selection, implementation, and monitoring of the technical controls necessary to provide network security using VPN connections to interconnect networks and connect remote users to networks.	ISO 27000 Family	This standard was last reviewed and confirmed current in 2019	Guidelines	C	A	O	E	P
ISO	ISO/IEC 27035:1:2016 and ISO/IEC 27035-2:2016 (Fee/Charge)	*Information technology — Security techniques — Information security incident management*	Presents basic concepts and phases of information security incident management with concepts and principles in a structured approach to detecting, reporting, assessing, and responding to incidents, and applying lessons learned.	ISO 27000 Family	Edition 1 and 2 published November 2016	Information security, cybersecurity and privacy protection	C	A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISO	ISO/IEC 27037:2012 (Fee/Charge)	*Information technology — Security techniques — Guidelines for identification, collection, acquisition and preservation of digital evidence*	Provides guidelines for specific activities in the handling of digital evidence, which are identification, collection, acquisition and preservation of potential digital evidence that can be of evidential value.	ISO 27000 Family	This standard was last reviewed and confirmed current in 2018	Guidelines	C	A	O	E	P
ISO	ISO/IEC TS 29003:2018 (Fee/Charge)	*Information technology – Security techniques – Identity proofing*	Provides security techniques for identity proofing		March 2018 Edition 1	Technical		A	O	E	
ISO	ISO/IEC 29115:2013 (Fee/Charge)	*Information technology – Security techniques – Entity authentication assurance framework*	Provides a framework for managing entity authentication assurance in a given context.		April 1, 2013 Edition 1	Technical		A	O	E	
ISO	ISO/IEC FDIS 29146 (Fee/Charge)	*Information technology – Security techniques – A framework for access management*	Provides guidelines for the identity proofing of a person; specifies levels of identity proofing, and requirements to achieve these levels.		June 2016 Edition 1	Technical		A	O	E	

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ITU	ITU-T P.800.2 (Free)	*Mean opinion score interpretation and reporting*	Introduces some of the more common types of mean opinion score (MOS) and describes the minimum information that should accompany MOS values to enable them to be correctly interpreted.		May 14, 2013	Technical				E	P
ITU	ITU-T X.509 (Free)	*Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks*	Defines frameworks for public-key certificates and attribute certificates.		October 14, 2012 Edition 7	Technical		A	O	E	P
ITU	ITU-T Y.1271 (Free)	*Framework(s) on network requirements and capabilities to support emergency telecommunications over evolving circuit-switched and packet-switched networks*	Presents an overview of the basic requirements, features, and concepts for emergency telecommunications that evolving networks are capable of providing.		July 18, 2014	Technical		A	O	E	P

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ITU	ITU-T Y.2705 (Free)	*Minimum security requirements for the interconnection of the Emergency Telecommunications Service (ETS)*	Provides minimum security requirements for the inter-network interconnection of ETS, allowing ETS to be supported with the necessary security protection between different national networks with bilateral and/or multilateral agreements in times of disaster and emergencies.		March 1, 2013	Technical		A	O	E	P
ISACA	Voice-over Internet Protocol (VoIP) Audit/ Assurance Program (Fee/Charge)	*Voice-over Internet Protocol (VoIP) Audit/Assurance Program*	Presents effect practices and tools for IT professionals to develop an audit/assurance program for VoIP networks including those that provide special services such as E-911, backup and recovery systems, and interfaces to the PSTN.		2012	Technical Guidance		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
ISACA	COBIT 5 Assessment Programme (Fee/Charge)	*COBIT 5 Assessment Programme*	Provides the basis for assessing an enterprise's processes for the governance and management of IT and related services as described in COBIT 5; provides the basis for a robust, dependable assessment approach, details how to undertake an assessment and provides an alternative and less rigorous approach to performing an assessment.	ISO/IEC 15504-2	Version 5	Technical Guidance		A	O	E	
ISACA	Cybersecurity Nexus™ (CSX) (Fee/Charge)		Provides effective practices to cybersecurity professionals to keep organizations and their information more secure.			Technical Guidance		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-STA-015.10-2018 (Originally 02-010) (Free)	*Legacy NENA Standard Data Formats for E9-1-1 Data Exchange & GIS Mapping*	Sets forth NENA standard formats for ALI-related data exchange between service providers and data base management system providers, a GIS data model, a data dictionary, and formats for data exchange between the ALI database and PSAP controller equipment.		August 12, 2018	Technical Standard		A	O	E	
NENA	NENA-STA-015.10-2018 (Free)	*Legacy Data Formats for ALI, MSAG & GIS*	Adds to legacy Class of Services (CoS) and specifies the recommended GIS data model.		August 12, 2018	Technical Standard		A	O	E	P
NENA	NENA 02-014 v1 (Free)	*NENA GIS Data Collection and Maintenance Standards*	Provides necessary guidelines for collecting and maintaining GIS data.		July 17, 2007 Version 1	Technical Standard		C	A	E	

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NENA	NENA 02-015 v1 (Free)	*Resolving ANI/ALI Discrepancies & NRFs*	Sets forth standards for PSAP jurisdictions, Access Infrastructure Providers, Service Providers and Data Base Management System Providers in reporting and resolving ANI/ALI discrepancies that occurred during an E911 call.		June 6, 2009 Version 1	Technical Standard		A	O	E	P
NENA	NENA 03-509 v1 (Free)	*Femtocell and UMA Technical Information Document*	Describes the current state of femtocell and *Universal Mobil Access (*UMA) deployments with respect to call processing of E911 calls and identifies the impacts to PSAPs of receiving and processing calls from femtocells.		January 27, 2011 Version 1	Technical Information Document					P

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NENA	NENA 04-005 v1 (Free)	*NENA ALI Query Service Standard*	Defines the NENA XML ALI Query Service (AQS) that specifies new protocols between the PSAP and the Next Generation Emergency Services Network; provides the rationale behind the AQS and how it relates to the current ALI protocol.		November 21, 2006	Technical Standard		A	O	E	P
NENA	NENA 08-001 v2 (Free)	*NENA Interim VoIP Architecture for Enhanced 9-1-1 Services (i2)*	Provides outline of an interim architecture to connect callers in the IP domain with public safety answering points (PSAPs) supported by the existing E911 service provider network.		August 11, 2010 Version 2	Technical Standard		A	O	E	
NENA	NENA 08-505 v1 (Free)	*NENA Recommended Method(s) for Location Determination to Support IP-Based Emergency Services*	Describes solutions that meet the proposed requirements for automatically determining the location of IP devices inside a residential broadband network.		December 21, 2006 Version 1	Technical Information Document		A	O	E	

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NENA	NENA 08-752 v1 (Free)	*NENA Technical Requirements Document for Location Information to Support IP-Based Emergency Services*	Provides the NENA requirements for providing information to support emergency calling.		December 21, 2006 Version 1	Technical Standard		A	O	E	
NENA	NENA 71-001 v1 (Free)	*NENA Standard For NG9-1-1 Additional Data*	Describes the use of additional data available with NG9-1-1 (associated with a call, a location, a caller, and a PSAP) that assists in determining the appropriate call routing and handling.		September 17, 2009 Version 1 Update in Progress	Technical Standard (Data/ Design)		A	O	E	P
NENA	NENA 71-501 v1 (Free)	*NENA Information Document for Synchronizing Geographic Information System Databases with MSAG & ALI*	Provides PSAP management, vendors, and other interested parties the necessary guidelines for synchronizing GIS data with existing 9-1-1 databases.		September 8, 2009 Version 1	Technical and Operational Standard		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-STA-004.1.1-2014 (Free)	*NENA Next Generation 9-1-1 (NG9-1-1) Civic Location Data Exchange Format (CLDXF) Standard*	Supports the exchange of U.S. civic location address information about 9-1-1 calls, both within the U.S. and internationally; defines the detailed data elements needed for address data exchange.		March 23, 2014 Version 1	Technical Standard		A	O	E	
NENA	NENA-STA-006.1-2018 (Free)	*NENA Standard for NG9-1-1 GIS Data Model*	Defines the Geographic Information Systems (GIS) Data Model, which supports the NENA Next Generation Core Services of location validation and routing, geospatial call routing, and appropriate agency for dispatch.		June 16, 2018	Technical Standard		A	O	E	

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NENA	NENA-INF-009.1-2014 (Free)	*Requirements for a National Forest Guide Information Document*	Gathers a set of requirements for a national, authoritative Forest Guide in order to allow an entity to procure the technology and services required from this NG9-1-1 functional element.		August 14, 2014	Information Document	C				P
NENA	APCO / NENA 2.105.1-2017 (Free)	*NENA/APCO Emergency Incident Data Document (EIDD) Information Document*	Provides a standardized, industry-neutral National Information Exchange Model (NIEM) conformant (XML-based) specifications for exchanging emergency incident information to agencies and regions that implement NG911	Joint NENA/ APCO technical ANSI standard in progress	January 3, 2017	ANSI Accredited Standard				E	P

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NENA	NENA-STA-005.1-2017 (Free)	*NENA Standards for the Provisioning and Maintenance of GIS data to ECRFs and LVFs*	Defines the operational processes and procedures necessary to support the i3 ECRF and LVF; identifies ECRF/LVF performance and implementation tradeoffs for 9-1-1 Authorities' consideration.		August 10, 2017	Technical Standard			**O**	**E**	
NENA	NENA-REQ-002.1-2016 (Free)	*NENA Next Generation 9-1-1 Data Management Requirements*	Defines discrepancy report and the performance reports associated with processes within the NG911 system.		March 10, 2016	Technical Standard				E	P
NENA	NENA-INF-014.1-2015 (Free)	*NENA Information Document for Development of Site/Structure Address Point GIS Data for 9-1-1*	Provides guidelines for the development of a site/structure GIS layer, including sub-address level attribute fields and address point placement.	NENA-STA-006.1-2018	September 18, 2015	Information Document				E	P
NENA	NENA 71-502 v1 (Free)	*An Overview of Policy Rules for Call Routing and Handling in NG9-1-1*	Provides an overview of what policy rules are, how policy is defined, and the ways that they may be used.		August 24, 2010 Version 1	Technical and Operational Information Document				E	P

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NENA	NENA-STA-003.1.1-2014 (Free)	*NENA Standard for NG9-1-1 Policy Routing Rules*	Defines templates to be used when drafting policy rules to address how and where calls are diverted if the target PSAP is unreachable.		December 1, 2014	Technical Standard				E	P
NENA	NENA-INF-011.1-2014 (Free)	*NENA NG9-1-1 Policy Routing Rules Operations Guide*	Assists 9-1-1 Governing Authorities in using Policy Routing Rules during the full life cycle of a NG9-1-1 System.		October 6, 2014	Information Document				E	P
NENA	NENA 75-001 (Free)	*NENA Security for Next-Generation 9-1-1 Standard (NG-SEC)*	Establishes the minimal guidelines and requirements for the protection of NG9-1-1 assets or elements within a changing business environment.		February 6, 2010 Version 2 In Progress	Technical Standard (Interface/ Design)		A	O	E	P
NENA	NENA 75-502 v1 (Free)	*Next Generation 9-1-1 Security (NG-SEC) Audit Checklist*	Provides a summary of the requirements and recommendations detailed in the NG-SEC standard and provides the educated user a method to document an NG-SEC audit.		December 14, 2011 Version 1	Technical Information Document				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA 08-002 v1 (Free)	*NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3)*	Describes the ESInet, which is designed as an IP-based inter-network (network of networks) shared by all agencies that may be involved in any emergency; specifies that all calls enter the ESInet using SIP signaling.		December 18, 2007 Version 1	Technical Standard (Interface/ Design)		A	O	E	P
NENA	NENA-STA-010.2-2016 (Free)	*Detailed Functional and Interface Specification for the NENA i3 Solution – Stage 3*	Builds upon prior NENA publications including i3 requirements and architecture documents and provides a baseline to other NG9-1-1-related specifications.		Revised September 10, 2016	Technical Standard		A	O	E	P

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NENA	NENA 08-501 v1 (Free)	*NENA Technical Information Document on the Network Interface to IP Capable PSAP*	Provides technical information to guide manufacturers of network equipment and PSAP CPE in the development of IP-based interfaces between the network and PSAP CPE and to assist E9-1-1 Network Service Providers and PSAPs in implementing such interfaces.		June 15, 2004 Version 1	Technical Information Document	C	A	O	E	P
NENA	NENA-INF-016.2-2018 (was NENA 08-506) (Free)	*Emergency Services IP Network Design (ESIND) Information Document*	This document is intended to provide information that will assist in the development of requirements necessary to design ESInets that meet industry standards and best practices related to the NG911 systems that will depend on them for services.		April 5, 2018	Technical Information Document				E	

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NENA	NENA 08-751 v1 (Free)	*NENA i3 Technical Requirements Document*	Specifies the requirements the i3 (Long Term Definition) Standard should meet.		September 28, 2006 Version 1	Technical Standard	C	A	O	E	P
NENA	NENA-INF-025.2-2017 (Free)	*NENA Virtual PSAP Management Operations Information Document (OID)*	Guides PSAP staff and policy makers in evaluating and considering the opportunities and challenges presented with NG9-1-1 systems as they relate to personnel and PSAP management.		December 21, 2017	Operational Information Document					P
NENA	NENA 73-501 v1 (Free)	*Use Cases & Suggested Requirements for Non-Voice-Centric (NVC) Emergency Services*	Identifies suggested requirements for NVC Emergency Service.		January 11, 2011 Version 1	Technical Information Document	C	A	O	E	P
NENA	NENA-INF-003.1-2013 (Free)	*NENA Potential Points of Demarcation in NG9-1-1 Networks Information Document*	Identifies points of demarcation.		March 21, 2013	Information Document				E	P

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NENA	NENA-INF-018.1-2017 (Free)	*NENA Non-Mobile Wireless Service Interaction Information Document*	Analyzes current wireless home phone, small cell, femtocell and CMRS handsets with Wi-Fi voice capability and makes recommendations for how to provide the most accurate 9-1-1 location information.		February 16, 2017	Information Document	C	A	O	E	P
NENA	NENA/APCO-REQ-001.1.2.2018 (Free)	*NENA/APCO Next Generation 9-1-1 Public Safety Answering Point Requirements*	Detailed technical requirements for a NENA i3 PSAP that is capable of interoperating with NGCS. It also describes the application service environment of the NENA i3 PSAP and the interfaces required for processing of an incident. .		April 5, 2018	Requirements Document					P
NENA	NENA 54-750 v1 (Free)	*NENA/APCO Human Machine Interface & PSAP Display Requirements (ORD)*	Prescribes the requirements for the human machine interface (HMI) display for the NG911 system.		October 20, 2010 Version 1	Operational Standard					P

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NENA	NENA 57-750 v1 (Free)	*NG9-1-1 System and PSAP Operational Features and Capabilities Requirements*	Contains a list of operational capabilities or features that are expected to be supported in a standards-based NG911 system.		June 14, 2011 Version 1	Operational Standard					P
NENA	NENA-STA-028.2-2018 (Free)	*NENA Recommended Generic Standards for E9-1-1 PSAP Intelligent Workstations*	Defines PSAP Intelligent Workstations (IWS) for customer premises equipment		June 16, 2018	Technical Standard					P
NENA	NENA-STA-027.3-2018 (Free)	*NENA E9-1-1 PSAP Equipment Standards*	ANSI-approved NENA standard defines the PSAP equipment requirements (for E911) intended for use by users, manufacturers, and providers of E911 customer premises equipment (CPE).		July 2, 2018	Technical Standard					
NENA	NENA-INF-007.1-2013 (Free)	*NENA Information Document for Handling Text-to-9-1-1 in the PSAP*	Provides a guideline for PSAPs with recommendations for emergency calling to 9-1-1 using text messaging.		October 9, 2013	Information Document					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-INF-012.2-2015 (Free)	*NENA Inter-Agency Agreements Model Recommendations Information Document*	Provides a model recommendation for the development of mutual aid agreements and MOUs between PSAPs and affiliated or support organizations.		January 8, 2015	Information Document				E	P
NENA	NENA-REF-002.2-2014 (Free)	*PSAP Interim Text-to-9-1-1 Support Documents*	Provides support information and education materials for PSAPs planning on moving forward with the interim solution for Text-to-9-1-1.	NENA-REF-003.1-2015:	December 2, 2014	Information Documents					P
NENA	NENA-REF-003.1-2015 (Free)	*NENA Text-to-9-1-1 Public Education*	Provides guidance when reaching out to local decision makers to educate them on NG9-1-1.	NENA-REF-002.2-2014	March 31, 2015	Information Documents					P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	SMS Text-to-9-1-1 Resources for PSAPs & 9-1-1 Authorities (Free)	More than a dozen different documents to assist NENA members in reaching out to the public, special interest groups, and other key stakeholders regarding the implementation of Interim SMS Text-to-9-1-1	Provides public education guidelines, logos and planning strategies.		Varies	Outreach documents related to SMS Text to 9-1-1					P
NENA	NENA-REF-010.2-2019 (Previously NENA-INF-006.1-2014) (Free)	*NENA NG9-1-1 Go-To Handbook*	Provides guidance to help 911 authorities create a smooth, timely and efficient project management approach and transition plan to accomplish implementation of NG911		May 7, 2019	Reference Handbook				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	Recommended NG9-1-1 Public Education Plan for Elected Officials and Decision Makers (Free)	*Recommended NG9-1-1 Public Education Plan for Elected Officials and Decision Makers*	Provides guidance when reaching out to local decision-makers to educate them on NG9-1-1 basics and the need to address funding, legislative and regulatory issues to enable the transition to NG9-1-1.		September 24, 2013	Information Document					P
NENA	NENA-STA-008.2-2014 (Free)	*NENA Registry System Standard*	Describes how registries are created and maintained in NENA.		Updated October 6, 2014	Joint Technical (Data) and Operational Standard				E	P
NENA	NENA-INF-TBD	*Monitoring and Managing NG9-1-1*	Will address specific operational topics and procedures associated with the transition to monitoring and managing NG9-1-1 software functions and infrastructure.		In Progress	Operational Information Document				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-INF-008.2-2013 (Free)	*NENA NG9-1-1 Transition Plan Considerations Information Document*	Focuses on the aspect of transitioning data from the legacy environment to the NG9-1-1 environment.		November 20, 2013 Version 2	Information Document		A	O	E	P
NENA	Next Generation 9-1-1 Transition Policy Implementation Handbook (Free)	*Next Generation 9-1-1 Transition Policy Implementation Handbook*	Provides guidance for 9-1-1 leaders and government officials responsible for ensuring that federal, state and local 9-1-1 laws and regulations effectively enable the implementation of NG9-1-1 systems.		March 2010	Best Practice					P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-ADM-000.22-2018 (Free)	*NENA Master Glossary of 9-1-1 Terminology*	Guide for readers of NENA publications and a tool for members of the NENA committees that prepare them. It defines the terms, acronyms, and definitions associated with the 9-1-1 industry. Intended users of this document are any person needing NENA's definition/description of a 9-1-1 related term.		April 13, 2018	Information Document	C	A	O	E	P
NENA	NENA-INF-010.2-2018 (Free)	NENA Succession Planning Information Document	NENA Information Document is provided to assist PSAPs and governing 911 authorities with information to identify and plan for changes in critical tasks positions.		May 24, 2018	Information Document	C	A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-INF-004.1.2-2018 (Free)	*NENA Operational Impacts of Devices & Sensors Information Document*	Assists PSAPs and governing 911 authorities with information for evaluating the operational impacts of devices and sensors that may interface with the PSAP.		August 17, 2018	Information Document	C	A	O	E	P
NENA	NENA-INF-024.2-2018 (originally NENA 04-502) (Free)	*NENA PSAP Site Characteristics Information Document*	Sets required and desirable characteristics of the PSAP facilities that house the supporting CPE, including the equipment and facilities that support PSAP operations, with the exception of call-taker- or dispatch-related equipment that is located in the workspace.		February 14, 2018	Information Document	C	A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NENA	NENA-STA-019.1.2018 (Free)	*NG9-1-1 Call Processing Metrics Standard*	The intent of this document is to define normalized NG911 call-processing metrics for computing useful statistics so that independent implementations can derive the same comparable measurements.		May 24, 2018	A NG9-1-1 Call Processing Metrics Standard	C	A	O	E	P
NFPA	NFPA 70 (Fee/Charge) (Free online, read-only access)	*National Electrical Code® (NEC)*	Addresses the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways in commercial, residential, and industrial occupancies.		2017 Edition	Technical Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NFPA	NFPA 72 (Fee/Charge) (Free on-line read-only access)	*National Fire Alarm and Signaling Code*	Provides the latest safety provisions to meet society's changing fire detection, signaling, and emergency communications demands; includes requirements for mass notification systems used for weather emergencies; terrorist events; biological, chemical, and nuclear emergencies; and other threats.		2019 Edition	Technical Standard		A	O	E	P
NFPA	NFPA 76 (Fee/Charge) (Free on-line read-only access)	*Standard for the Fire Protection of Telecommunications Facilities*	Provides requirements for fire protection of telecommunications facilities providing telephone, data, internet transmission, wireless, and video services to the public as well as life safety for the occupants plus protection of equipment and service continuity.		2016 Edition	Technical Standard		A	O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NFPA	NFPA 950 (Fee/Charge) (Free online, read-only access)	*Standard for Data Development and Exchange for the Fire Service*	Standardizes data for operable information sharing in support of the all-hazards response. Describes a digital information structure and associated requirements and workflows common to fire and emergency services delivery and management for emergency response and administrative use.		2015 Edition	Technical Standard					
NFPA	NFPA 1061 (Fee/Charge) (Free on-line read-only access)	*Professional Qualifications for Public Safety Telecommunications Personnel*	Identifies the minimum job performance requirements for public safety telecommunicators.		2018 Edition	Operational Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NFPA	NFPA 1201 (Fee/Charge) (Free on-line read-only access)	*Standard for Providing Fire and Emergency Services to the Public*	Contains requirements on the structure and operations of fire emergency service organizations to help protect lives, property, critical infrastructure, and the environment from the effects of hazards.		2015 Edition	Technical Standard					P
NFPA	NFPA 1221 (Fee/Charge) (Free on-line read-only access)	*Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*	Defines and describes the installation, performance, operation, and maintenance of public emergency services communications systems and facilities.		2019 Edition	Technical Standard				E	P
NFPA	NFPA 1600 (Fee/Charge) (Free on-line read-only access)	*Standard on Continuity, Emergency, and Crisis Management*	Covers the development, implementation, assessment, and maintenance of programs for prevention, mitigation, preparedness, response, continuity, and recovery.		2019 Edition	Operational Standard					

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NFPA	NFPA 2400 (Fee/Charge) (Free online, read-only access)	*Standard for Small Unmanned Aircraft Systems (sUAS) Used for Public Safety Operations*	Covers the minimum requirements relating to the operation, deployment, and implementation of small unmanned aircraft systems (sUAS) for public safety operations.		2019 Edition	Operational Standard					
NIEM	NIEM 4.1 (Free)	*National Information Exchange Model*	Designed to develop, disseminate and support enterprise-wide information exchange standards and processes that can enable jurisdictions to effectively share critical information in emergency situations, as well as support the day-to-day operations of agencies throughout the U.S.		Version 4.1 July 31, 2018	Technical Architecture				E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NERC	CIP-002-5.1a (Free)	*Cyber Security — BES Cyber System Categorization*	Identifies and categorizes BES Cyber Systems and their associated BES Cyber Assets for the application of cyber security requirements commensurate with the adverse impact that loss, compromise, or misuse of those BES Cyber Systems could have on the reliable operation of the BES.		December 27, 2016	Operational Standard		A	O	E	P
NERC	CIP-003-6 (Free)	*Cyber Security — Security Management Controls*	Specifies consistent and sustainable security management controls that establish responsibility and accountability to protect BES Cyber Systems against compromise that could lead to misoperation or instability in the BES.		July 1 2016	Operational Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NERC	CIP-004-6 (Free)	*Cyber Security — Personnel & Training*	Requires that personnel having authorized cyber or authorized unescorted physical access to Critical Cyber Assets, including contractors and service vendors, have an appropriate level of personnel risk assessment, training, and security awareness.		July 1, 2016	Operational Standard		A	O	E	P
NERC	CIP-005-5 (Free)	*Cyber Security — Electronic Security Perimeter(s)*	Requires the identification and protection of the Electronic Security Perimeter(s) inside which all Critical Cyber Assets reside, as well as all access points on the perimeter.		July 1, 2016	Operational Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NERC	CIP-006-6 (Free)	*Cyber Security — Physical Security of BES Cyber Systems*	Manages physical access to BES Cyber Systems by specifying a physical security plan in support of protecting BES Cyber Systems against compromise that could lead to misoperation or instability in the BES.		July 1, 2016 Version 5	Operational Standard		A	O	E	P
NERC	CIP-007-6 (Free)	*Cyber Security — System Security Management*	Manages system security by specifying select technical, operational, and procedural requirements in support of protecting BES Cyber Systems against compromise that could lead to misoperation or instability in the BES.		July 1, 2016 Version 5	Operational Standard		A	O	E	P
NERC	CIP-008-5 (Free)	*Cyber Security — Incident Reporting and Response Planning*	Mitigates the risk to the reliable operation of the BES as the result of a Cyber Security Incident by specifying incident response requirements.		July 1, 2016 Version 5	Operational Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NERC	CIP-009-6 (Free)	*Cyber Security — Recovery Plans for BES Cyber Systems*	Recovers reliability functions performed by BES Cyber Systems by specifying recovery plan requirements in support of the continued stability, operability, and reliability of the BES.		July 1, 2016 Version 5	Operational Standard		A	O	E	P
NERC	CIP-010-2 (Free)	*Cyber Security — Configuration Change Management and Vulnerability Assessments*	Prevents and detects unauthorized changes to BES Cyber Systems by specifying configuration change management and vulnerability assessment requirements in support of protecting BES Cyber Systems from compromise that could lead to misoperation or instability in the BES.		July 1, 2016 Version 1	Operational Standard		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
NERC	CIP-011-2 (Free)	*Cyber Security — Information Protection*	Prevents unauthorized access to BES Cyber System Information by specifying information protection requirements in support of protecting BES Cyber Systems against compromise that could lead to mis-operation or instability in the Bulk Electric System (BES).		July 1, 2016	Operational Standard		A	O	E	P
OASIS	OASIS CAP v1.2 (Free)	*Common Alerting Protocol*	Defines and describes CAP, which provides an open, non-proprietary digital message format for all types of alerts and notifications.		July 1, 2010 Version 1.2	Technical Standard	C	A	O	E	P
OASIS	OASIS EDXL-DE v1.0 (Free)	*Emergency Data Exchange Language (EDXL) Distribution Element, v. 1.0*	Describes a standard message distribution framework for data sharing among emergency information systems using the XML-based EDXL.		May 1, 2006 Version 1.0	Technical Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OASIS	OASIS EDXL-HAVE (Free)	*Emergency Data Exchange Language (EDXL) Hospital AVailability Exchange Version 2.0*	Specifies an XML document format that allows the communication of the status of a hospital, its services and resources.		December 13, 2018 Version 2.0	Technical Standard				E	P
OASIS	OASIS EDXL-RM (Free)	*Emergency Data Exchange Language Resource Messaging (EDXL-RM) 1.0*	Describes a suite of standard messages for data sharing among emergency and other information systems that deal in requesting and providing emergency equipment, supplies, people and teams.		December 22, 2009 Version 1.0	Technical Standard				E	P
OASIS	OASIS EDXL-SitRep v1.0 (Free)	*Emergency Data Exchange Language Situation Reporting (EDXL-SitRep) Version 1.0*	Describes a set of standard reports and elements that can be used for data sharing among emergency information systems, and that provide incident information for situation awareness on which incident command can base decisions.		April 11, 2013 Version 1.0	Technical Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OASIS	OASIS EDXL-TEC (Free)	*Emergency Data Exchange Language (EDXL) Tracking of Emergency Clients (TEC) Client Registry Exchange Version 1.0*	Provides a standard messaging format for the creation and exchange of client records in and among publicly-accessible registries to assist in tracking and repatriation of displaced individuals during emergencies, disasters, and routine day-to-day incidents.		June 13, 2014 Version 1.0	Technical Standard				E	P
OASIS	OASIS EDXL-TEP (Free)	*Emergency Data Exchange Language (EDXL) Tracking of Emergency Patients (TEP) Version 1.1*	Provides XML messaging standard for exchange of emergency patient and tracking information during patient encounter through admission or release.		January 20, 2016 Version 1.1	Technical Standard				E	P
OGC	OGC 04-094 (Free)	*Web Feature Service Implementation Standard*	Defines interfaces for data access and manipulation operations on geographic features using HTTP as the distributed computing platform.		May 3, 2005 Version 1.1.0	Technical Standard			O	E	

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OGC	OGC 06-042 (Free)	*OpenGIS® Web Map Server Implementation Specification*	Specifies the behavior of a service that produces spatially referenced maps dynamically from geographic information; specifies operations to retrieve a description of the maps offered by a server to retrieve a map, and to query a server about features displayed on a map.		March 15, 2006 Version 1.3.0	Technical Standard			O	E	
OGC	OGC 07-006r1 (Free)	*OpenGIS® Catalogue Services Specification*	Specifies the interfaces, bindings, and a framework for defining application profiles required to publish and access digital catalogues of metadata for geospatial data, services, and related resource information.		February 23, 2007 Version 2.02	Technical Standard			O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OGC	OGC 07-074 (Free)	*OpenGIS® Location Services (OpenLS): Core Services*	Defines OpenLS: Core Services, Parts 1-5, which consists of the composite set of basic services comprising the OpenLS Platform.		September 9, 2008 Version 1.2	Technical Standard			O	E	
OGC	OGC 09-025r2 (Free)	*OGC® Web Feature Service 2.0 Interface Standard – With Corrigendum*	Specifies discovery operations, query operations, locking operations, transaction operations and operations to manage stored, parameterized query expressions.		Version 2.0.2 July 10, 2014	Technical Standard			O	E	
OGC	OGC 09-083r3 (Free)	*GeoAPI 3.0 Implementation Standard*	Defines application programming interface (API) which can be used for the manipulation of geographic information.		April 25, 2011 Version 3.0.0	Technical Standard			O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OGC	OGC 10-129r1 (Free)	*OGC® Geography Markup Language (GML) – Extended schemas and encoding rules*	Defines the XML schema syntax, mechanisms and conventions that provide an open, vendor-neutral framework for the description of geospatial application schemas for the transport and storage of geographic information in XML.		February 7, 2012 Version 3.3.0	Technical Standard			O	E	
OGC	OGC 11-030r1 (Free)	*OGC®: Open GeoSMS Standard – Core*	Defines an encoding for location enabling a text message to be communicated using SMS.		January 19, 2012 Version 1.0	Technical Standard			O	E	
OGC	OGC 12-019 (Free)	*OGC City Geography Markup Language (CityGML) Encoding Standard*	Is an open data model and XML-based format for the storage and exchange of virtual 3D city models.		March 9, 2012 Version 2.0.0	Technical Standard			O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OGC	OGC KML 2.3 (Free)	*OGC KML 2.3*	Defines three conformance classes (levels) for KML resources, indicating the relative importance or priority of a particular set of constraints; the highest level (CL3) indicates full conformance.		August 4, 2015 Version 1.0	Technical Standard			O	E	P
OMA	OMA-ERP-SUPL-V3_0_2-20110920-C (Free)	*OMA Secure User Plane Location Architecture Candidate Version 3.0*	Outlines the enabler release definition for SUPL Enabler and the respective conformance requirements for clients and servers claiming compliance to it as defined by OMA across the specification baseline.		Candidate September 20, 2011 Version 3.0	Technical Standard		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
OMA	OMA-ERELD-LPPe-V2_0-20141202-C (Free)	*OMA LPP Extensions (LPPe) v2.0*	Outlines the enabler release definition for LPPe Enabler and the respective conformance requirements for clients and servers claiming compliance to it as defined by OMA across the specification baseline.		Candidate December 2014 Version 2.0	Technical Standard		A	O		
OMA	OMA-ERP-MLP-V3_1-20110920-A (Free)	*OMA Mobile Location Protocol V3.1*	Identifies the MLP, an application-level protocol for getting the position of mobile stations independent of underlying network technology.		Approved September 20, 2011 Version 3.1	Technical Standard		A	O		
OMA	OMA-ERELD-LOCSIP-V1_0-201201717-A (Free)	*OMA Location in SIP/IP Core V1.0*	Provides mechanisms to expose location information to application servers connected to a SIP/IP core network.		Approved Version 1.0 January 17, 2012	Technical Standard		A	O		

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OMA	OMA SEC_CF 1.1 (Free)	*OMA Application Layer Security Common Functions V1.1*	Supports OMA Push services, enablers over SIP and UDP protocols, delegated authentication for Web services, and DTLS, GBA Push, and IPSec profiles.		Candidate Version 1.1 July 31, 2012	Technical Standard		A	O		
SCC	ISE I^2F (Free)	*Information Sharing Environment Information Interoperability Framework (I^2F)*	Guides the implementation of the ISE information sharing capabilities.		March 2014 Version 0.5	Framework				E	P
SCC	IS&S Playbook (Free)	*Information Sharing and Safeguarding (IS&S) Playbook*	Aids users in their quest to create or enhance an effective and efficient IS&S environment, and can be used at any point in the environment's lifecycle.		October 31, 2016 – Version 2	Framework				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	ANSI/SCTE 24-1 2016 (Free)	*IPCablecom 1.0 Part 1: Architecture Framework for the Delivery of Time-Critical Services over Cable Television Networks Using Cable Modems*	Provides the architectural framework that will enable cable television operators to provide time-critical services over their networks that have been enhanced to support cable modems.	IPCable-com Series 1.5	2016	Technical Standard			O		
SCTE	ANSI/SCTE 24-02 2016 (Free)	*IPCablecom 1.0 Part 2: Audio Codec Requirements for the Provision of Bi-directional Audio Service over Cable Television Networks Using Cable Modems*	This standard specifies the audio (voice) codes that are to be used in the provisioning of bi-directional audio services over cable television distribution networks using IP technology.	IPCable-com Series 1.5	2016	Technical Standard			O		
SCTE	ANSI/SCTE 24-3 2016 (Free)	*IPCablecom Part 3: Network Call Signaling Protocol for the Delivery of Time-Critical Services over Cable Television Using Data Modems*	Describes a profile of the Media Gateway Control Protocol (MGCP) for IPCablecom embedded clients.	IPCable-com Series 1.5	2016	Technical Standard			O		

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SCTE	ANSI/SCTE 24-4 2016 (Free)	*IPCablecom 1.0 Part 4: Dynamic Quality of Service for the Provision of Real-Time Services over Cable Television Networks Using Data Modems*	Describes a dynamic QoS mechanism for the IPCablecom project; facilitates design and field-testing leading to the manufacture and interoperability of conforming hardware and software by multiple vendors.	IPCable-com Series 1.5	2016	Technical Standard			O		
SCTE	ANSI/SCTE 24-21 2017 (Free)	*BV16 Speech Codec Specification for Voice over IP Applications in Cable Telephony*	Contains the description of the BV16 speech codec; gives detailed description of the BV16 encoder and decoder, and contains sufficient details to allow those skilled in the art to implement bit-stream compatible and functionally equivalent BV16 encoders and decoders.	IPCable-com Series 1.5	2017	Technical Standard			O		

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SCTE	ANSI/SCTE 24-22 2018 (Free)	*iLBCv2.0 Speech Codec Specification for Voice over IP Applications in Cable Telephony*	Contains the description of an algorithm for coding of speech signals sampled at 8 kHz.	IPCable-com Series 1.5	2018	Technical Standard			O		
SCTE	ANSI/SCTE 24-23 2017 (Free)	*BV32 Speech Codec Specification for Voice over IP Applications in Cable Telephony*	Contains the description of the BV32 speech codec.	IPCable-com Series 1.5	2017	Technical Standard			O		
SCTE	ANSI/SCTE-162 2019 (Free)	*Emergency Alert Signaling for the Home Network*	Defines an Emergency Alert signaling method for use by cable TV systems to signal emergencies.	ANSI J-STD-042-B	2019	Technical Standard			O		
SCTE	SCTE 164 2019 (Free)	*Emergency Alert Metadata Descriptor*	Defines a container usable by cable system operators for the delivery of Emergency Alert (EA) metadata into the consumer domain.		2019	Technical Standard			O		
SCTE	SCTE 165-01 2019 (Free)	*IPCablecom 1.5 Part 1: Architecture Framework Technical Report*	Defines the specifications that define the IPCablecom 1.5 reference architecture.		2019	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	ANSI/SCTE 165-2 2016 (Free)	*IPCablecom 1.5 Part 2: Audio/Video Codecs*	Addresses interfaces between IPCablecom client devices for audio and video communication.		2016	Technical Standard			O		
SCTE	ANSI/SCTE 165-3 2016 (Free)	*IPCablecom 1.5 Part 3: Network-Based Call Signaling Protocol*	Describes an IPCablecom profile of an application programming interface (MGCI), and a corresponding protocol (MGCP) for controlling voice-over-IP (VoIP) embedded clients from external call control elements.		2016	Technical Standard			O		
SCTE	SCTE 165-04 2019 (Free)	*IPCablecom 1.5 Part 4: Dynamic Quality-of-Service*	Specifies a comprehensive mechanism for a client device to request a specific Quality of Service from the DOCSIS® network.		2019	Technical Standard			O		
SCTE	SCTE 165-05 2019 (Free)	*IPCablecom 1.5 Part 5: Media Terminal Adapter (MTA) Device Provisioning*	Defines the provisioning of MTA components of the embedded MTA device.		2019	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	SCTE 165-06 2019 (Free)	*IPCablecom 1.5 Part 6: MIBS Framework*	Provides information on the management requirements of IPCablecom-compliant devices and functions and how these requirements are supported in the MIB modules.		2019	Technical Standard			O		
SCTE	SCTE 165-07 2019 (Free)	*IPCablecom 1.5 Part 7: MTA MIB*	Describes the IPCablecom 1.5 MTA MIB requirement.		2019	Technical Standard			O		
SCTE	SCTE 165-08 2019 (Free)	*IPCablecom 1.5 Part 8: Signaling MIB*	Describes the IPCablecom Signaling (SIG) MIB requirements.		2019	Technical Standard			O		
SCTE	SCTE 165-09 2019 (Free)	*IPCablecom 1.5 Part 9: Event Messaging*	Describes the concept of Event Messages used to collect usage for the purposes of billing within the IPCablecom architecture.		2019	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	ANSI/SCTE 165-10 2009 (Free)	*IPCablecom 1.5 Part 10: Security*	Defines the IPCablecom Security architecture, protocols, algorithms, associated functional requirements and any technological requirements that can provide for the security of the system for the IPCablecom network.		2009	Technical Standard			O		
SCTE	SCTE 165-11 2019 (Free)	*IPCablecom 1.5 Part 11: Analog Trunking for PBX Specification*	Defines extensions to the IPCablecom Network-based Call Signaling [NCS] protocol to support analog trunking for PBX interfaces on an embedded Voice-Over-IP client device in an IPCablecom Environment.		2019	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	ANSI/SCTE 165-12 2016 (Free)	*IPCablecom 1.5 Part 12: PSTN Gateway Call Signaling Protocol*	Describes an IPCablecom profile of an application programming interface and a corresponding protocol for controlling VoIP PSTN Gateways from external call control elements.		2016	Technical Standard			O		
SCTE	SCTE 165-13 2019 (Free)	*IPCablecom 1.5 Part 13: Electronic Surveillance Standard*	Defines the interface between a telecommunications carrier that provides telecommunications services to the public for hire using IPCablecom capabilities and a Law Enforcement Agency (LEA)to assist the LEA in conducting lawfully authorized electronic surveillance.		2019	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	SCTE 165-14 2019 (Free)	*IPCablecom 1.5 Part 14: Embedded MTA Analog Interface and Powering*	Defines a set of requirements that will enable a service that is sufficiently reliable to meet an assumed consumer expectation of constant availability, including availability during power failure at the customer's premises, and (assuming the service is used to connect to the PSTN), access to emergency services (911, etc.).		2019	Technical Standard			O		
SCTE	SCTE 165-15 2019 (Free)	*IPCablecom 1.5 Part 15: Management Event MIB Specification*	Provides a common data and format definition for events (informative, alarm, etc.).		2019	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	ANSI/SCTE 165-16 2016 (Free)	*IPCablecom 1.5 Part 16: Management Event Mechanism*	Defines the general event reporting mechanism, which consists of a set of protocols and interfaces that can be used by individual elements and components in the IPCablecom architecture, and framework.		2016	Technical Standard			O		
SCTE	SCTE 165-17 2019 (Free)	*IPCablecom 1.5 Part 17: Audio Server Protocol*	Describes the architecture and protocols that are required for playing announcements in VoIP IPCablecom networks.		2019	Technical Standard			O		
SCTE	ANSI/SCTE 165-18 2016 (Free)	*IPCablecom 1.5 Part 18: CMS to CMS Signaling*	Describes the IPCablecom Call Management Server (CMS) to CMS Signaling protocol intended for use by a CMS to communicate with another CMS to support packet-based voice and other real-time multimedia applications.		2016	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
SCTE	SCTE 165-19 2019 (Free)	*IPCablecom 1.5 Part 19: CMS Subscriber Provisioning Specification*	Defines the interface used between the CMS and Provisioning Server for the exchange of service provisioning information to facilitate interoperability of conforming hardware and software from multiple vendors.		2019	Technical Standard			O		
SCTE	SCTE 165-20 2019 (Free)	*IPCablecom 1.5 Part 20: MTA Extension MIB*	Specifies new objects that are being introduced beyond IPCablecom 1.0 for MTA MIBS so that the additional changes made can be tracked easily.		2019	Technical Standard			O		
SCTE	ANSI/SCTE 165-21 2016 (Free)	*IPCablecom 1.5 Part 21: Signaling Extension MIB*	Specifies new objects that are being introduced beyond IPCablecom 1.0 for Signaling MIBS so that the additional changes made can be tracked easily.		2016	Technical Standard			O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-63 (Fee/Charge)	*NEBS Requirements: Physical Protection*	Presents minimum spatial and environmental criteria for all new telecommunications equipment used in Central Offices (COs) and other environmentally controlled telephone equipment spaces	Telcordia GR-1089, GR-3580, GR-78, GR-357, GR-2930, GR-3160	Issue 05 Dec 2017	Technical Information Document		A	O		
Telcordia	GR-78 (Fee/Charge)	*Generic Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment*	Contains the key industry requirements for how to design and build reliable electronics for telecom network use.	Telcordia GR-63	Issue 2 Sept. 2007	Technical Information Document		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-357 (Fee/Charge)	*Generic Requirements for Assuring the Reliability of Components Used in Telecommunications Equipment*	Defines a set of NEBS (Network Equipment-Building System) requirements that are reasonable and would help ensure satisfactory device reliability in a manufacturer's products.	Telcordia GR-63, GR-78, SR-332, GR-468, TR-NWT-000870, TR-NWT-000930, GR-1221, GR-929	Issue 1 Mar. 2001	Technical Information Document		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-468 (Fee/Charge)	*Generic Reliability Assurance Requirements for Optoelectronic Devices Used in Telecommunications Equipment*	Helps ensure the reliable operation of optoelectronic devices, and helps minimize life-cycle cost.	Telcordia GR-63, GR-78, GR-326, GR-357, GR-418, GR-487, GR-874, GR-909, GR-1221, GR-1252, GR-1312, GR-2882, SR-332, TR-NWT-000870, TR-NWT-000930, GR-3160	Issue 2 Sept. 2004	Technical Information Document		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-487 (Fee/Charge)	*Generic Requirements for Electronic Equipment Cabinets*	Provides the latest criteria (2016) for analyzing Electronic Equipment Cabinets used in a variety of outside plant environments and applications, including wireless.	Telcordia GR-3108, GR-63, GR-209, TR-NWT-001011, TR-NWT-001293, GR-2836	Issue 5 Mar. 2016	Technical Information Document		A	O		
Telcordia	GR-513 (Fee/Charge)	*Power Requirements in Telecommunications Plant*	Provides the industry's most complete generic requirements for power systems designed for network telecommunications equipment in Central Offices (COs) and similar locations.	Telcordia GR-63	Issue 02 Jan. 2010	Technical Information Document		A	O		P
Telcordia	GR-1217 (Fee/Charge)	*Generic Requirements for Separable Electrical Connectors Used in Telecommunications Hardware*	Contains proposed, generic physical design requirements for separable connector products used in a typical service provider network.	Telcordia GR-63, GR-78, GR-357, SR-332	Issue 2 Dec. 2008	Technical Information Document		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-1221 (Fee/Charge)	*Generic Reliability Assurance Requirements for Passive Optical Components*	Presents the Telcordia view of proposed generic reliability assurance requirements for passive optical components, and is directed toward an equipment supplier's design engineering, manufacturing, procurement, and reliability/quality organizations.	Telcordia GR-357, GR-1209, GR-2854, GR-2882, GR-2883	Issue 3 Sept. 2010	Technical Information Document		A	O		
Telcordia	GR-1293 (Fee/Charge)	*Generic Requirements for Permanent AC & DC Backup Generators Including Fuel Cells for Remote Electronic Sites.*	Provides requirements for standby engine-generator systems including fuel cells to be used in remote telecommunications sites	Telcordia GR-513, GR-947, GR-1089	Issue 01 Mar 2017	Technical Information Document		A	O		P

Telcordia	GR-1298 (Fee/Charge)	*AINGR: Switching Systems*	Provides generic requirements to implement the Advanced Intelligent Network (AIN) switching system technology in a public telephone network.	Telcordia GR-815, GR-1129, GR-1299, GR-30, GR-199, GR-215, GR-217, GR-218, GR-219, GR-220, GR-227, GR-268, GR-317, GR-385, GR-391, GR-394, TR-NWT-000444, GR-478, GR-505, GR-508, GR-511, GR-529, GR-533, GR-567, GR-570, GR-571, GR-572, GR-575, GR-580, GR-586, GR-610, GR-690, TR-740,	Issue 10 Nov. 2004	Technical Information Document		A	O		

				GR-831 , GR-833, TR-TSY-000857, GR-858, TR-TSY-000861, GR-862, TR-NWT-000864, TR-NWT-000865, GR-866, GR-972, TA-TSY-001034, GR-1083, GR-1100, GR-1245, GR-1310, GR-1343, GR-1364, GR-1401, GR-1436, GR-1512, GR-1520, GR-2801, GR-2822, GR-2932, GR-2956							

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-2930 (Fee/Charge)	*NEBS: Raised Floor Generic Requirements for Network and Data Centers*	Presents generic engineering requirements for raised floor systems that, if implemented, will provide raised floor assemblies commensurate with the current requirements contained in GR-63 for equipment systems.	Telcordia GR-63	Issue 2 July 2012	Technical Information Document		A	O		
Telcordia	GR-2969 (Fee/Charge)	*Generic Requirements for the Design and Manufacture of Short-Life Information Handling Products and Equipment*	Facilitates rapid deployment and allows network operators the necessary flexibility to mix and match different equipment categories (long-life and short-life) as needed to optimize network solutions in terms of performance and cost.	Telcordia GR-78 GR-357	Issue 1 Dec. 1997	Technical Information Document		A	O		

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-3028 (Fee/Charge)	*Thermal Management In Telecommunications Central Offices: Thermal GR-3028*	Provides NEB-related thermal management information, guidelines, targets, Objectives, and Requirements for equipment manufacturers and service providers for ensuring network integrity.	Telcordia GR-63	Issue 1 Dec. 2001	Technical Information Document		A	O		
Telcordia	GR-3112 (Fee/Charge)	*Emergency Services Network Interconnection*	Focuses on the interconnection of client company Emergency Services Networks and ESInets with Session Initiated Protocol (SIP)-based originating networks.	Telcordia GR-394, GR-905, TR-NWT-001268, GR-1280, GR-1298, GR-1299, GR-1432, GR-2863, GR-2956, GR-3017, GR-3051, GR-3054, GR-3113	Issue 5 Oct. 2007	Technical Information Document		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-3118 (Fee/Charge)	*Voice over Internet Protocol (VoIP) Positioning Center (VPC) Generic Requirements*	Defines the required functions and interfaces that must be supported by the VPC to facilitate the routing of emergency calls and to ensure the delivery of location information related to VoIP emergency call originations.	Telcordia GR-2956, GR-3112, GR-3119, GR-815, GR-3158	Issue 4 Sept. 2008	Technical Information Document		A	O		
Telcordia	GR-3119 (Fee/Charge)	*Emergency Service Zone (ESZ) Routing Database (ERDB) Generic Requirements*	Provides generic requirements for an Emergency Services Zone (ESZ) Routing Database (ERDB) to support VoIP-originated calls.	Telcordia GR-3118, GR-350, GR-2956, GR-3112, GR-3129, GR-3130, GR-3156	Issue 4 Oct. 2008	Technical Information Document		A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-3129 (Fee/Charge)	*Emergency Services Gateway (ESGW) Generic Requirements*	Provides generic requirements for an Emergency Services Gateway (ESGW) to support the routing of VoIP-originated 9-1-1 calls to legacy PSAPs via traditional Emergency Services networks.		Issue 2 Dec. 2007	Technical Information Document		A	O	E	P
Telcordia	GR-3130 (Fee/Charge)	*Location Validation Database (VDB) Generic Requirements in Support of E9-1-1 Service*	Provides generic requirements for the functions and interfaces supported by a VDB as a key element of the NENA i2 Solution.	Telcordia GR-350, GR-815, GR-3112, GR-3113, GR-3118, GR-3119, GR-3120, GR-3129, GR-3158	Issue 2 Nov. 2007	Technical Information Document		A	O		P
Telcordia	GR-3157 (Fee/Charge)	*Emergency Services Routing Proxy (ESRP) Generic Requirements*	Provides the requirements for the functions and interfaces that need to be supported at the Emergency Services Routing Proxy (ESRP).	Telcordia GR-3156, GR-3162, GR-3165, GR-815	Issue 3 July 2010	Technical Information Document		A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-3158 (Fee/Charge)	*Generic Requirements for a Service Provider Location Information Server (LIS)*	Details requirements for the functionality and interfaces of a Location Information Server (LIS) providing location capabilities in a service provider network.	Telcordia GR-3113, GR-3118, GR-3130, GR-3156	Issue 2 June 2009	Technical Information Document		A	O		P
Telcordia	GR-3160 (Fee/Charge)	*Generic Requirements for Telecommunications Data Center Equipment and Spaces*	Presents minimum spatial and environmental requirements for data center equipment and spaces.	Telcordia GR-78, GR-209, GR-295, GR-1089, GR-1275, GR-1502, GR-2930, GR-3028	Issue 2 July 2013	Technical Information Document		A	O		P

Telcordia	GR-3162 (Fee/Charge)	*Legacy Network Gateway Generic Requirements*	Provides generic requirements for a Legacy Network Gateway to support the routing of 9-1-1 calls that originate in the legacy wireline or wireless networks to IP-enabled (i3) Public Safety Answering Points (PSAPs) via Emergency Services IP Networks (ESInets).	Telcordia GR-253, GR-317, GR-246, GR-284, GR-474, GR-499, GR-606, GR-820, GR-905, GR-2956, GR-3010, GR-3053, GR-3054, GR-3059, GR-3060, GR-3070, GR-3112, GR-3156, GR-3157, GR-3158, TR-TSY-000824, TR-TSY-000825, TR-NWT-001112	Issue 4 Apr. 2012	Technical Information Document		A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-3165 (Fee/Charge)	*Emergency Services Border Control Function (BCF) Generic Requirements*	Describes the functionality, interfaces, and operations requirements associated with an emergency service Border Control Function.	Telcordia GR-3157	Issue 2 Feb. 2010	Technical Information Document		A	O	E	P
Telcordia	GR-3166 (Fee/Charge)	*Legacy Public Safety Answering Point (PSAP) Gateway Generic Requirements*	Describes the functionality, interfaces, and operations requirements associated with a Legacy PSAP Gateway routed via i3 ESInets.	Telcordia GR-2953, GR-350, GR-506, GR-3156, GR-3157, GR-3158, GR-3162	Issue 3 Dec. 2012	Technical Information Document		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	GR-3170 (Fee/Charge)	*Legacy Selective Router (SR) Gateway Generic Requirements*	Addresses the functions, interfaces, and data that must be supported by a Legacy Selective Router Gateway to facilitate the interconnection of i3 Emergency Services IP Networks (ESInets) with legacy SRs and Internet Protocol Selective Routing (IPSR) functional elements.	Telcordia GR-246, GR-253, GR-284, GR-317, GR-474, GR-499, GR-606, GR-820, GR-905, GR-2956, GR-3010, GR-3053, GR-3054, GR-3112, GR-3156, GR-3157, GR-3158, GR-3162, GR-3166	Issue 1 Oct. 2010	Technical Information Document		A	O	E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
Telcordia	SR-3580 (Fee/Charge)	*NEBS Criteria Levels*	Groups NEBS criteria into three functional level to clarify the impact of non-conformance and allows the broad range of NEBS requirements to be applied to equipment.	Telcordia GR-63, GR-1089, GR-974, SR-3858	Issue 6 Jan 2018	Technical Information Document		A	O		
TIA	TIA J-STD-110.01 (Fee/Charge)	*Joint ATIS/TIA Implementation Guideline for J-STD-110, Joint ATIS/TIA Native SMS/MMS Text to 9-1-1 Requirements and Architecture Specification Release 2*	Addresses CMSPs and TCC provider deployment considerations of J-STD-110.	ATIS J-STD-036 Revision C, RFC 3261, RFC-3265, IETF RFC, 4244, IETF RFC 4975, IETF RFC 5222, IETF RFC 6753	May 2015	Joint Standard		A	O		P
TIA	TIA J-STD-110.A (Fee/Charge)	*ATIS/TIA Supplement A to J-STD-110, Joint ATIS/TIA Native SMS to 9-1-1 Requirements & Architecture Specification*	Provides errata and clarifications to *Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification*.	J-STD-110.01	November 2013	Joint Standard		A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA J-STD-110 (Fee/Charge)	*Joint ATIS/TIA Native SMS/MMS Text to 9-1-1 Requirements and Architecture Specification Release 2*	Defines the requirements, architecture, and procedures for text messaging to 9-1-1 emergency services using native CMSP SMS or MMS capabilities for the existing generation and NG9-1-1 PSAPs.	ATIS J-STD-036, ATIS J-STD-110, RFC 3261, RFC 3265, IETF RFC 4244, IETF RFC 4975, IETF RFC 5222, IETF RFC 6442, IETF RFC 6753, TIA-41.000, TIA J-STD-110.A, TIA J-STD-110.01	May 2015	Technical Standard		A	O		P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA TSB-102.BACC (Fee/Charge)	*Project 25 Interface-RF-Subsystem Interface Overview*	Provides an informative overview of key technical aspects and considerations supporting specification of the ISSI.	RFC 3261, RFC 3550, TIA TSB-102.BAGA, TIA TSB-102.CBBK, TIA-102.BAHA	November 2011 Revision B	Technical Standard		A	O		
TIA	TIA TSB-102.BAGA (Fee/Charge)	*Project 25 Console Subsystem Interface Overview*	Provides information relevant to the development of standards supporting voice services, and certain supplemental services involving the CSSI.	RFC 3261, RFC 3550, TIA TSB-102, TIA-102.BAAD, TIA-102.BACA, TIA-102.BAEB, TIA-102.BAHA	February 1, 2008 Reaffirmation Notice , January 2013	Technical Standard		A	O		
TIA	TIA TSB-102.BAJA (Fee/Charge)	*Project 25 Location Services Overview*	Describes a two-tiered approach to providing location services.	TIA TSB-12, TIA-102.BAEA, TIA-102.BAJB, TIA-102.BAJC	November 2017 Revision B	Technical Standard		A			

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TIA	TIA TSB-146 (Fee/Charge)	*Telecommunications IP Telephony Infrastructures IP Telephony Support for Emergency Calling Service*	Covers issues associated with support of ECS from IP Telephony terminals connected to an Enterprise Network (EN); describes new network architecture elements needed to support ECS, and the functionality of those new elements.	ISO/IEC 15992, TIA-1057	March 1, 2007, Revision A Reaffirmation November 2012	Technical Standard		A	O		
TIA	TIA-5017 (Fee/Charge)	*Telecommunications Physical Network Security Standard*	Describes the security of the telecommunications cables, pathways, spaces, and other elements of the physical infrastructure.	TIA-568.0, TIA-569, TIA-606, TIA-607, TIA-862, TIA-942, UL 639	February 19, 2016	Technical Standard				E	P
TIA	TIA TSB-5021 (Fee/Charge)	*Guidelines for the Use of Installed Category 5e and Category 6 Cabling to Support 2.5GBASE-T and 5GBASE-T*	Describes the evaluation of category 5e and category 6 cabling configurations for support of 2.5GBASE-T and 5GBASE-T applications as specified in IEEE 802.3bz.	TIA-568.0, IEEE 802.3bz	January 1, 2017	Technical Standard				E	P

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							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA/EIA/IS-834 (Fee/Charge)	*G3G CDMA-DS to ANSI/TIA/EIA-41*	Provides general requirements and detailed Upper Layer (Layer 3) signaling radio protocols and procedures for the DS-41 radio interface.		March 1, 2000	Technical Standard		A	O		
TIA	TIA-102 Series (Fee/Charge)	*Telecommunications, Land Mobile Communications*	A collection of 81 documents which define LMR technologies and operational needs.	Telecom muni-cations, Land Mobile Communic ations (APCO/Pr oject 25) Includes all current TIA/EIA TSB 102, TIA/EIA-102 AND TIA-102 Standards	2019 Edition, April 2019	Technical Standard (Product/ Design)	C	A	O		P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA-102.BAED (Fee/Charge)	*Project 25 Packet Data Logical Link Control Procedures*	Specifies the LLC procedures that permit the conveyance of Common Air Interface (CAI) data packets between air interface endpoints for all packet data configurations.	TIA-102 SERIES	2013 Edition September 26, 2013	Procedural Standard		A			
TIA	TIA-222 Revision H (Fee/Charge)	*Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures*	Provides the requirements for the structural design and fabrication of new and the modification of existing antenna supporting structures, antennas, small wind turbine supporting structures, appurtenance mounting systems, structural components, guy assemblies, insulators and foundations	TIA/ASSE COMM Tower Set, TIA-322, TIA-569, TIA-606, TIA-607, TIA-758, TIA-942, TIA-5053, BICSI-006	October 5, 2017 Revision H Includes all amendments and changes through Reprint , June 25, 2018	Technical Standard				E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA-568 Set (Fee/Charge)	*Commercial Building Telecommunications Cabling Standard Set (CONTAINS: TIA-568.0-D, TIA-568.1-D, TIA-568-C.2, TIA-568.3-D AND TIA-568.4-D - WITH ADDENDUMS AND ERRATAS)*	Defines structured cabling system standards for commercial buildings, and between buildings in campus environments; defines cabling types, distances, connectors, cable system architectures, cable termination standards and performance characteristics, cable installation requirements and methods of testing installed cable.	TIA-569, TIA-606, TIA-607, TIA-758, TIA-942	January 2019	Technical Standard		A	O	E	P
TIA	TIA-569 (Fee/Charge)	*Telecommunications Pathways and Spaces*	Describes requirements for telecommunications pathways and spaces.	TIA-568, TIA-606, TIA-607, TIA-758, TIA-942	May 23, 2019 Revision E	Technical Standard				E	P
TIA	TIA-606 (Fee/Charge)	*Administration Standard for Telecommunications Infrastructure*	Addresses the administrative needs of a data center as well as that of general administration.	TIA-568, TIA-569, TIA-607, TIA-758, TIA-942	June 19, 2017 Revision C	Technical Standard				E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA-607 (Fee/Charge)	*Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises*	Describes bonding and grounding of telecommunications systems and equipment.	TIA-568, TIA-569, TIA-606, TIA-758, TIA-942, BICSI/NECA-607	November 9, 2015 Revision C; Includes all amendments and changes through Addendum 1, January 2017	Technical Standard				E	P
TIA	TIA-664.529 (Fee/Charge)	*Wireless Features Description: Emergency Services (9-1-1)*	Describes services and features so that the manner in which a subscriber may place calls using such features and services may remain reasonably consistent from system to system.	TIA-664 series	October 23, 2007 Revision B	Technical Standard (Product/ Design)		A	O		
TIA	TIA-942 (Fee/Charge)	*Telecommunications Infrastructure Standard for Data Centers*	Addresses data center design guidelines, structured cabling systems, and network design.	TIA-568, TIA-569, TIA-606, TIA-607, TIA-758, BICSI-002	July 12, 2017 Revision B	Technical Standard		A	O	E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA-1039 (Fee/Charge)	*QoS Signaling for IP QoS Support and Sender Authentication*	Provides a QoS signaling standard for use within IPv4 and IPv6 network-layer protocols; adds a security capability which allows sender authentication to greatly increase the network security.		August 2011 Revision A	Technical Standard		A	O	E	
TIA	TIA-1057 (Fee/Charge)	*Telecommunications IP Telephony Infrastructure Link Layer Discovery Protocol for Media Endpoint Devices*	Defines extensions to the IEEE 802.1AB protocol requirements that support VoIP equipment in IEEE 802-based LAN environments.		April 6, 2006 Reaffirmation August 26, 2011	Technical Standard (Product/ Design)	C	A	O		
TIA	TIA-1191 (Fee/Charge)	*Callback to an Emergency Call Origination Stage 1 Requirements*	Specifies access network requirements for Callback to an Emergency Call Origination; pertains to 1x Circuit Switched (1xCS) calls routed to a 1xCS access network and 1xCS calls routed to a non-1xCS access network.		August 1, 2011	Technical Standard (Product/ Design)	C	A	O		

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
TIA	TIA-4973.201 (Fee/Charge)	*Requirements for Mission Critical PTT and Related Supplementary Services*	Describes requirements for a mission critical Push-to-Talk (MC-PTT) services intended to operate over broadband networks.	TIA TSB-4973.000, TIA-102.BABA, TIA-102.BABG	January 2014	Technical Standard	C	A	O	E	P
TIA	TIA-4973.211 (Fee/Charge)	*Requirements for the Mission Critical Priority and QoS Control Service*	Describes requirements for a mission critical Priority and QoS Control Service for a wireless broadband network; includes requirements to determine a user's default priority on the broadband network, and also provides requirements for dynamic prioritization changes to meet situational needs.	TIA-4973.201	August 2014	Technical Standard	C	A	O	E	P

Entity	Standard or Document ID	Standard or Document Title	Standard or Document Description	Associated Documents	Latest Revision/ Release Date	Standard or Document Type	Relation to NENA i3 Architecture				
							Client (C)	Access Networks (A)	Origination Networks (O)	ESInets (E)	PSAPs (P)
USTelecom	2019 USTelecom Cybersecurity Toolkit (Free)	*USTelecom Cybersecurity Toolkit*	The Toolkit, an authoritative threat-intelligence resource, includes a collection of key cybersecurity initiatives and practical guidance related to issues that have gained traction among policymakers or risen to prominence in the stakeholder community		2019	Toolkit					

Appendix B: Standards Gap Analysis

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
UE (IMS)	• IETF RFC 6881 3GPP IMS Emergency Services • ATIS focus group on over the top applications • CableLabs	Several are still in development. There is no way to quantify all possible end user devices as related to standards.	**ESIF Issue 74** has been developed and defines an IMS counterpart to the NENA i3 specification. Access requirements are being addressed in **ESIF Issue 81.**
Access Networks	• 3GPP wireless and broadband IMS networks • Generic IP access networks – IETF RFC 6881 • Cable networks • Legacy selective router • Legacy network gateway • Telecommunications network providers connecting by SS7 or centralized automatic message accounting (CAMA)	IMS networks for OTT origination. Cable networks for both cable specific VoIP and OTT origination, DSL networks for both DSL specific VoIP and OTT origination including possibly FTTC and FTTH. The gap for the legacy selective router gateway (LSRG) was the same as the legacy network gateway (LNG), defining a method for acquiring call related location to enable call routing in NG9-1-1 for legacy wireless calls. This method has been resolved and is documented in an approved update of the NENA-STA-010.2-2016 (i3) architecture standard.	Call routing partially addressed in **NENA-STA-010.2-2016**.

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Origination Networks			
IMS Origination Networks	• 3GPP TS 23.228, 23.167, 24.229 • ATIS IMS ESInet project (P0030)	None	N/A
Non-IMS Origination Networks	• IETF RFC 6881 • CableLabs PKT-SP-CMSS1.5	Possibly cable networks for both cable specific VoIP and Over-the-top (OTT) origination, DSL networks for both DSL specific VoIP and OTT origination including possibly fiber-to-the-cabinet (FTTC) and fiber-to-the-home (FTTH).	**RFC 5985 (September 2010)** defines and describes an XML-based protocol that can be used to acquire device location information from an LIS within access networks employing both wired technology (DSL, cable) and wireless technology.
Third-party Originating Service Providers (e.g., OnStar, relay services)	• NENA-STA-010.2-2016 • IETF • TIA	Some are proprietary, but they must comply with ESInet interfaces using a standard public interface.	**NENA-STA-010.2-2016** specifies a SIP call interface.
Legacy Origination Networks	• Legacy selective router • Legacy network gateway • NENA-STA-010.2-2016 • Telecommunications network providers connecting by SS7 or CAMA	The gap for the LSRG was the same as the LNG, defining a method for acquiring call related location to enable call routing in NG911 for legacy wireless calls.	Call routing addressed in **NENA-STA-010.2-2016.** Legacy Selective Router Gateway technical standard still in development.
Femto Cell	• NENA 03-509 v1	Specification needs to be updated for NG911.	Still needs to be addressed.

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
ESInet			
IP network	• NENA-STA-010.2-2016 • NENA 08-506	Testing, Operations Priority 1	Operations partially addressed in **NENA-STA-010.2-2016.**
Core functions (DNS, DHCP)	• IETF	None	N/A
Interconnect with other ESInets	• NENA-STA-010.2-2016 • Telcordia GR-3112	None	N/A
Interconnect with origination networks	• NENA-STA-010.2-2016 • IETF RFC 6881 • Telcordia GR-3112	None	N/A
Interconnect with access networks	• NENA-STA-010.2-2016 • IETF RFC 6881	None	N/A
ESInet to PSAP interface	• NENA-STA-010.2-2016	None	N/A
Interconnection with other emergency service entities	• NENA-STA-010.2-2016 • APCO/NENA 2.105.1-2017	None	N/A
Management	• NENA NG9-1-1 Planning Guidelines Information Document • Next Generation 9-1-1 Transition Policy Implementation Handbook	None	N/A

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Location	• 3GPP • ATIS IMS ESInet • IETF • NENA		
PIDF-LO - the location interchange format	• IETF RFC 4119	IMS and IETF/NENA location format incompatibilities.	Addressed by **RFC 477.** Provides a full set of parameters that may be used to describe a civic location.
Functional definition of LIS (and similar terms)	• NENA-STA-010.2-2016	None	N/A
IP-based Emergency Services	• NENA 08-505	Initial version is incomplete. Future revisions of document are required.	**NENA 08-505** (December 2006) acknowledges the first edition of what will be a comprehensive document addressing many access network configurations. This edition has a narrow solutions focus and addresses only the automated mechanism for the residential broadband market.
Location Configuration Protocols		IMS OTT issues.	Still needs to be addressed.
Location Dereferencing Protocols	IETF RFC 6753	Depends on results of ATIS IMS ESInet work.	Still needs to be addressed.

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Location Query Protocols (to the extent it is decided they are different from location configuration protocols [LCPs])		Pending other work.	N/A
Location Validation	• IETF RFC 5222 • IETF RFC 5223	None	N/A
Interwork to existing location sources, such as automatic location identification (ALI)	• NENA LSRG • NENA-STA-010.2-2016	None	N/A
GIS & 9-1-1 Attribute Data			
Address, political boundary, and service boundary layer	• NENA GIS V3	None	
Service boundary polygons – how routing occurs	• NENA GIS V3 • NENA-STA-010.2-2016	None	N/A

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Distribution to other entities outside the normal area of service	• NENA-STA-010.2-2016	Further work needed. In 2018, NENA began development of work that will define both the WFS (features) and WMS (image) to allow PSAPs and other authorized entities to select and download GIS data that can be used for allowing tactical map displays for handling 911 calls from otherwise out-of-service area PSAPs.	Still needs to be addressed.
Adjustment of street/address layer to polygon layer	• NENA Emergency Call Routing Function (ECRF)/Location Validation Function (LVF)	Further work needed.	**NENA-STA-010.2-2016**, describes the end state required for NG9-1-1.
Call Signaling			
Basic SIP call signaling	• IETF RFC 3261 • IETF RFC 6881	None	N/A
IMS SIP call signaling	• 3GPP	IMS ESINET identified some gaps.	Still needs to be addressed.

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Call Routing			
Routing database (ECRF)	• IETF RFC 5222 • IETF RFC 5223 • NENA-STA-010.2-2016	None	N/A
Routing proxies (Emergency Services Routing Proxy [ESRP])	• IETF RFC 3261 • IETF RFC 6881 • NENA-STA-010.2-2016	None	N/A
Policy-based routing	• NENA-STA-010.2-2016	None	N/A
Media			
Voice	• 3GPP • IETF • NENA	None	N/A
Video	• 3GPP • IETF • NENA	None	N/A
Text	• 3GPP • IETF • NENA	None	N/A
Data only – "non-human initiated"	• 3GPP • IETF • NENA	None	N/A

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Real-time Text (RTT), IMS Multimedia Messaging Emergency Services (MMES), "total conversation"	• 3GPP • IETF • NENA	None	N/A
Accessibility			
EAAC issues and gaps in i3	• FCC EAAC • ATIS INES Incubator • FCC NG911 Notice of Proposed Rulemaking (NPRM)	Identify the teletypewriter (TTY) replacement technology, adoption of that technology, and method of delivering TTY replacement to the NG911 and PSAP. Output of FCC NG911 NPRM may identify additional gaps.	Still needs to be addressed. The FCC EAAC Report lists some gaps, and makes recommendations to fill some of these gaps. **NENA-STA-010.2-2016** begins to identify these requirements. The FCC is developing a record on this issue.
Interface between IMS-originating networks and relay services	• FCC EAAC • ATIS	How calls originating from IMS connect to the relay service. Also, given that 911 calls originating on IMS are direct to the ESInet, how do responders get notification that a relay service needs to be involved? Need to have specification developed to define how IMS interfaces with relay services.	Still needs to be addressed.
Callback	• 3GPP • IETF • NENA		

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Additional Data about:	• NENA	NENA 71-001: NENA Standard for NG9-1-1 Additional Data – There are significant gaps on how this data is obtained, stored, accessed, secured, and maintained.	**NENA 71-001** describes the use of additional data available with NG9-1-1 (associated with a call, a location, a caller, and a PSAP) that assists in determining the appropriate call routing and handling. Version 2 will include the EIDD specification. **NENA STA-NG9-1-1,** additional data under review.
Call	• NENA-STA-010.2-2016 • NENA 71-001 • IETF additional data • 3GPP • ATIS IMS ESInet	None	N/A
Caller	• NENA-STA-010.2-2016 • NENA 71-001 • ATIS IMS ESInet	Emergency Medical Data Priority 2	Addressed by **NENA 71-001** Appendix A, page 23. **NENA 71-001** describes the use of additional data available with NG9-1-1 (associated with a call, a location, a caller, and a PSAP) that assists in determining the appropriate call routing and handling. Version 2 will include the EIDD specification. **NENA-STA-010.2-2016**, identifies an identity searchable additional data repository (IS-ADR) that can be used.

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Premise (e.g., floor plans, alarm data, etc.)	• NENA-STA-010.2-2016 • NENA 71-001 • NIST	Further work needed.	Partially addressed by **NENA 71-001,** version 1, page 28. NENA 71-001, Version 2, and **NENA-STA-010.2-2016,** discuss floor plans as a source of additional data.
PSAP	• APCO • NENA • EIDD	Further NIEM work needed.	Still needs to be addressed.
Logging			
Within the ESInet and related functions	• NENA-STA-010.2-2016	NENA and APCO have identified a number of gaps, such as Radio over IP (RoIP).	**NENA-STA-010.2-2016** may address some of the gaps.
Within the PSAP	• NENA NG PSAP	None	N/A
Call origination	• NENA • IETF	Could have IMS and other origination network impacts.	N/A
Bridging/Conference Calls	• NENA • IETF	Could have IMS and other origination network impacts.	Still needs to be addressed.

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Security			
Credentials	• 3GPP • IETF • NENA • ATIS IMS ESInet • NIST	Accessibility and privacy controls across the enterprise and diverse systems are still in development.	NIST National Strategy for Trusted Identities in Cyberspace.
Securing protocol interaction including authentication, integrity protection, privacy	• IETF • NENA-STA-010.2-2016 • ATIS IMS ESInet • NIST	Accessibility and privacy controls across the enterprise and diverse systems are still in development.	NIST National Strategy for Trusted Identities in Cyberspace.
Attack Mitigation	• NENA-STA-010.2-2016 • NIST	None	N/A
End User Location Integrity	• IETF • ATIS IMS ESInet	Standards in development.	Still needs to be addressed.
Federated credentials for sharing credentials between systems			Still needs to be addressed.
Transition (including data)			
Wireline	• NENA	None	N/A
Wireless	• NENA	None	N/A
VoIP	• NENA	None	N/A

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
PSAP aspects	• NENA • ATIS RFAI	None	N/A
Relay services (e.g., IP relay, video relay, etc.)	• NENA	None	N/A
TTY	• NENA	None	N/A
Legacy PSAP	• NENA	None	N/A
Testing	• NENA	Several gaps associated with Testing.	**NENA 06-750** is a policy document that reflects changes in: IP technology; implementation and testing; training; and use of building code fire zones to facilitate the creation of the Emergency Response Location and MLTS.
Self-test	• IETF • NENA	None	N/A
Discrepancy Reporting	• NENA	None	N/A
Data Management and Maintenance	• NENA-REQ-002.1-2016	None	N/A

Process	Applicable Standards	Identified Gaps	Gap Addressed in Standards Document?
Dispatch Systems			
Interface to call processing or CAD systems			
Sharing Call Information (EIDD)	• APCO/NENA	None	APCO/NENA 2.105 2017 is a standard that provides a standardized, industry-neutral NIEM conformant (XML-based) specifications for exchanging emergency incident information to agencies and regions that implement NG9-1-1 and IP-based emergency communications systems.
Interface to dispatch broadband networks (FirstNet)	• N/A	N/A	Still needs to be addressed.