



March, 2012

WORKING GROUP 1
Subgroups 1
Report

Table of Contents

1	Preamble.....	4
2	Introduction.....	4
2.1	Overview.....	4
2.1.1	Organizational Chart.....	4
2.1.2	Working Group 1 Membership.....	5
2.2	Objective of CSRIC Working Group 1 Subgroup 1.....	6
2.3	Analysis, Findings, and Recommendations of CSRIC Working Group 1 Subgroup 1.....	6
	Appendix A: Acronyms.....	16
	Appendix B: Glossary.....	31
	Appendix C: System Management Impacts and Interdependencies.....	41
	Appendix D: System Functional Requirements.....	43

1 Preamble

This document contains the report of the Communication Security Reliability and Interoperability (CSRIC) Working Group 1 - Subgroup 1. This report is intended to be incorporated into the overall CSRIC report.

2 Introduction

2.1 Overview

The contents of this document serve as an addendum to the report submitted by Working Group 1 which was accepted by CSRIC during its December meeting. This document contains the description of the assigned action items and the findings of the group related to these action items. The sections and/or tables from Working Group 1’s December report referenced by these action items have been included in this document.

The additional tasks assigned to Working Group 1 sought to clarify and build upon the tasks already accomplished, which broadly include the identification of technical standards, related technical gaps and overall readiness of the 9-1-1 system for accepting information generated by Next Generation 9-1-1 (NG9-1-1) applications. While there is much work that has been done to date, much work remains to be done with respect to NG9-1-1 development, including the completion of a wide range of operational procedures at the overall NG9-1-1 system level, for Public Safety Answering Points (PSAPs) and other emergency entities expected to use NG9-1-1 functionality.

2.1.1 Organization Chart

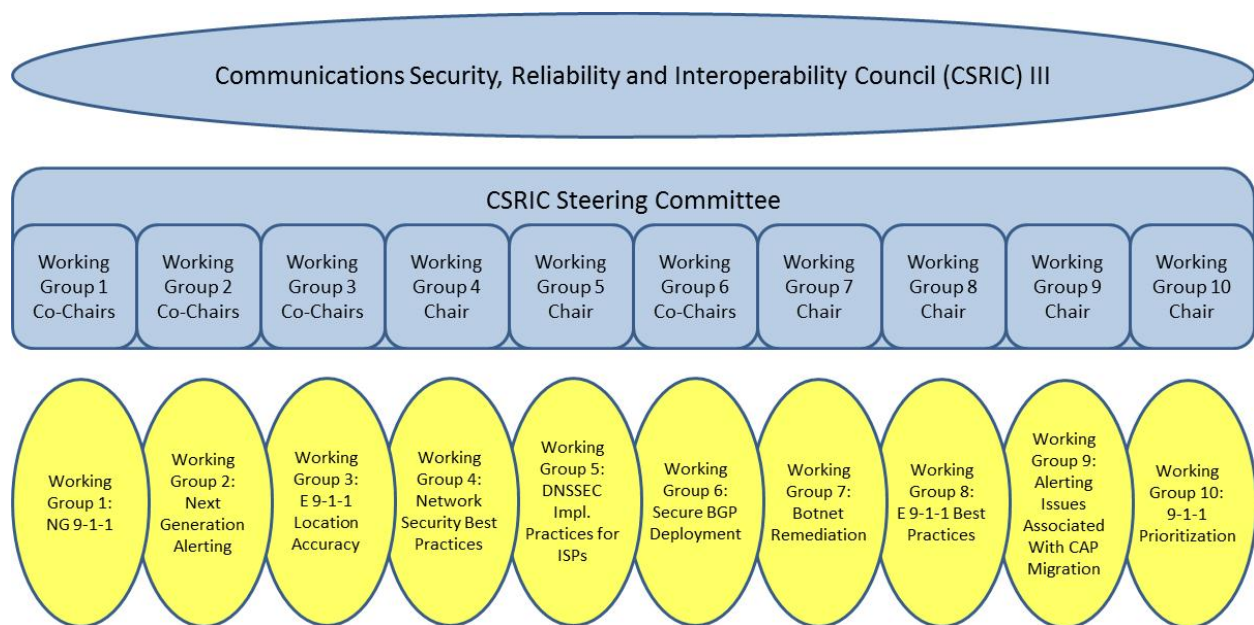


Figure 2-1: CSRIC Organization Chart

2.1.2 Working Group 1 Membership

Table 2-1: CSRIC Working Group Team Members

Name	Organization	Sub 1	Sub 2
Laurie Flaherty, Co-Chair	National Highway Traffic Safety Administration; USDOT		
Brian Fontes, Co-Chair	NENA		
Angel Arocho	Comcast		
Jeb Benedict	CenturyLink	x	x
Marc Berryman	Digital Data Technologies, Inc.	x	x
Donna Bethea-Murphy	Iridium	x	
David Connor	US Cellular Corporation		
Brian Daly	AT&T	x	
Thomas Dombrowsky	Wiley Rein LLP	x	
James Goerke	Texas 9-1-1 Alliance	x	x
Jeanna Green	Sprint	x	
Jenny Hansen	Northrop Grumman Corporation	x	x
Tom Hanson	Charlottesville/UVA/Albemarle County	x	x
Roger Hixson	NENA	x	
Mike Hooker	T-Mobile USA Inc.	x	x
Farrokh Khatibi	ATIS (works for Qualcomm)	x	
Elise Kim	9-1-1 FOR KIDS: Public Education	x	
Frank Korinek	Motorola Solutions		
Michael Mangini	Cassidian Communications, an EADS North America Company	x	
Kathryn Martin	Access Partnership		
Kathy McMahon	APCO	x	x
Jennifer McNamara	CenturyLink	x	x
Richard Muscat	Bexar Metro 911 Network District		x
Mike Nelson	Intrado, Inc.	x	x
Tristan Nelson	Verizon	x	x
Judy Ocondi	TeleCommunication Systems, Inc.	x	
Jerry O'Neill	Northrop Grumman Corporation	x	x
Chuck Powers	Motorola Solutions		
Jacqueline Randall	Washington State Military Department E911 Program Office	x	
Brian Rosen	Neustar	x	x
Brent Schimke	City of New York, Mayor's Office of Citywide Emergency Communications		
Greg Schumacher	Sprint	x	x
Dorothy Spears	Virginia Information Technologies Agency	x	x
Bill Tortoriello	U.S. Cellular		
Christian Vogler	Gallaudet University	x	
Norman Williams	Gallaudet University	x	x
Jeffery Wittek	Cassidian Communications, an EADS North America Company	x	

Also, DeWayne Sennett of AT&T served as document editor for the development of the CSRIC Working Group 1 report.

2.2 Objective of CSRIC Working Group 1 Subgroup 1

Original Tasks

Subgroup 1 shall identify ongoing work related to Next Generation (NG) NG9-1-1 network architecture, including standards development efforts such as the National Emergency Number Association's (NENA's) i3 standard and others. The Working Group shall label aspects of identified standards as:

- Critical for deployment,
- Critical for competition,
- Desirable,
- Long-term, or
- Non-critical.

In addition, the Working Group shall identify any gaps in existing or developmental standards work and classify the importance and urgency of resolving those gaps.

Additional Tasks

After the December report of Working Group 1 was reviewed by CSRIC and the FCC, the following additional tasks were assigned to Working Group 1 Subgroup 1:

- Complete a prioritization of the standards gaps identified in Table 2-4. We request that the prioritization explain which gaps are the most essential to have closed. Although the alignment of IP Multimedia Subsystem (IMS) with i3 is expected to be completed relatively soon, we request that you include the misalignment as a gap until the alignment is finalized.
- WG1's December Report noted that "NENA 77-501 v1 is the initial version of the transition plan to NG9-1-1 but there are still gaps remaining for some originating access network types." Please clarify the "access network types" that the report was referring to. Is there a problem with the wireline PSTN? Wireless? How broad or narrow are these "access network types"?
- In Section 2.3.7 of WG1's December Report, the column that included "Identified Gaps" for the Legacy Selective Router Gateway (LSRG) was not complete. Please complete the column.

2.3 Analysis, Findings, and Recommendations of CSRIC Working Group 1 Subgroup 1

Methodology

In the December report from Working Group 1, a total of 154 functional entities/interfaces in seven (7) major categories were considered as to the status of their corresponding technical standards. Of these:

- Standards are complete for 125 functional entities,
- 14 are in publication queue,
- 8 are in the approval stage,
- 4 are in development,
- 2 are covered by BCF interface, and

- 1 is without a comprehensive document.

Cumulatively, standards are complete for 81% of the reviewed entities/interfaces.

A total of 35 technical standards were rated. Of these:

- 25 were considered critical for deployment,
- 29 were rated critical for competition,
- 2 were assessed as desirable,
- 23 were applicable to long-term (post transition), and
- 2 were considered non-critical.

These ratings were not mutually exclusive.

The table included in this document (Table 2-4 of the December report of Working Group 1) was revised to include identified standards gaps which have been prioritized as follows:

- Priority 1 indicates the high priority standards gaps to be resolved.
- Priority 2 indicates the medium priority.
- Priority 3 indicates the low priority.

These priority ratings appear in column three of the table. The assignment of Priority 1, 2, or 3 is not based upon the importance of these standards. Rather, the prioritization value of 1, 2, or 3 is based upon their dependence and/or on other activities. For example, items assigned Priority 2 have other work activities which are dependent upon the completion of the Priority 1 items.

Content addressing the second new task can be found in the table, after the process labeled “Security,” after the sub-process labeled “End User Location Integrity” – in column three on page 13 and 14.

Content addressing the third new task can be found in the table, in the following locations:

- In column three of the process labeled “Access Networks” - on page nine.
- In column three of the process labeled “Legacy Origination Networks” on page 10.

Other Considerations:

- The priorities in this document are ranked for cited reasons and do not diminish the importance of one over another, as they all must be considered in the deployment of NG9-1-1;
- As cited, there are going to be additional/identified gaps as the overarching work continues in the industry (and in deployments at PSAPs throughout the US – as Implementations are completed and technologies evolve, etc)
- There is currently no way to quantify ALL end-user devices (related to standards OR general use cases) and there may be significant work needed on specific technologies as the need is identified (e.g., current discussions underway within the PSAPs regarding 9-1-1 “calls” placed over the Telematics networks). Movement onto the 9-1-1 network (NG9-1-1) carries with it a treasure trove of issues we hadn’t thought of until Beta testing – Class of Service is an important indicator in the PSAP (as well as with industry in the development of the device and respective standards. To date, there is no movement to create the new CoS, but provocative discussion is likely. This is just one current example to illustrate the issue of not being able to quantify ALL end-user devices).

- There are several concurrent standards and best practices currently in progress. The results and discoveries of these efforts may have an impact on the priorities of other standards and best practices work that may be required and are identified in this document.
- Because of the technical nature of this document, the appendices entitled Acronyms, Glossary, System Management Impacts and Interdependencies, and System Functional Requirements were attached as they appeared in the December report. They comprise the majority of this document.

It should be noted that the FCC Emergency Access Advisory Committee (EAAC) will be performing a standards gap analysis based upon accessibility in 2012. The EAAC has committed to follow-up work on the following areas that may have an impact on the standards:

1. Identifying gaps with NENA i3 versus the EAAC recommendations
2. Interim text-based access to 9-1-1
3. TTY transition issues and roadmap for phase-out (this will affect the transition to NG9-1-1)
4. Interoperability testing of NG9-1-1 components with respect to accessibility

Standards by Process

Process		Applicable Standards	Identified Gaps
UE (IMS)		IETF phonebc 3GPP IMS Emergency Services ATIS focus group on over the top applications Cable Labs	Several are still in development There is no way to quantify all possible end user devices as related to standards. Priority 3
Access Networks		3GPP wireless and broadband IMS networks Generic IP access networks – IETF phonebc Cable networks Legacy selective router Legacy network gateway Telecommunications network providers connecting by SS7 or 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 LSRG was the same as the 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 will be documented in an approved update of the NENA 08-003 (i3) architecture standard, estimated to be complete in about two months. Priority 2
Origination Networks			
	IMS Origination Networks	3GPP TS 23.228, 23.167, 24.229 ATIS IMS ESInet project (P0030)	None
	Non-IMS Origination Networks	IETF phonebc	Possibly 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. Priority 2
	Third party Originating Service Providers (e.g., OnStar, Relay services)	NENA 08-003	Some are proprietary, but they must comply with ESInet interfaces using a standard public interface Priority 1

Process		Applicable Standards	Identified Gaps
	Legacy Origination Networks	Legacy selective router Legacy network gateway NENA 08-003 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 NG9-1-1 for legacy wireless calls. This method has been resolved and will be documented in an approved update of the NENA 08-003 (i3) architecture standard, estimated to be complete in about two months. Priority 1
	Femto Cell	NENA 03-509 v1	Specification needs to be updated for NG9-1-1 Priority 3
ESInet			
	IP network	NENA 08-003	Testing, Operations Priority 1
	Core functions (DNS, DHCP, ...)	IETF	None
	Interconnect with other ESInet	NENA 08-003	Testing, Operations Priority 1
	Interconnect with origination networks	NENA 08-003, IETF phonebcp	Testing, Operations Priority 1
	Interconnect with access networks	NENA 08-003, IETF phonebcp	Testing, Operations Priority 1
	ESInet to PSAP interface	NENA 08-003	Testing, Operations Priority 1
	Interconnection with other emergency service entities	NENA 08-003, other NENA and APCO standards in development	Testing, Operations Priority 1
	Management		NENA work in development Priority 2
	ECRF/Forest Guides	NENA 08-003	Implementation, Operations Priority 3
Location		3GPP ATIS IMS ESInet IETF NENA	
	PIDF-LO - the location interchange format	IETF 4119	IMS and IETF/NENA location format incompatibilities Priority 1

Process		Applicable Standards	Identified Gaps
	Functional definition of Location Information Server (and similar terms)		
	IP Based Emergency Services	NENA 08-505	Initial version is incomplete. Future revisions of document are required. Priority 2
	Location Configuration Protocols		IMS OTT issues Priority 2
	Location Dereferencing Protocols	IETF Deref	Depends on results of ATIS IMS ESInet work Priority 2
	Location Query Protocols (to the extent we decide they are different from LCPs)		
	Location Validation	IETF 5222, IETF5223	
	Interwork to existing location sources, such as ALI	NENA LSRG	
GIS & 9-1-1 Attribute Data			
	Address, political boundary, and service boundary layer	NENA GIS V3	
	Service boundary polygons – how we route	NENA GIS V3, NENA 08-003	
	Data management, quality assurance	NENA	Further work needed Priority 2
	Distribution – how does it get from GIS to everything else	NENA 08-003, OGC	OGC work needs further standardization Priority 1
	Adjustment of street/address layer to polygon layer	NENA ECRF/LVF	Further work needed Priority 1
Call Signaling			
	Basic SIP call signaling	IETF 3261, IETF phonebcf	
	IMS SIP call signaling	3GPP	IMS ESINET identified some gaps Priority 1
Call Routing			
	Routing database (ECRF)	IETF 5222, 5223 NENA 08-003	

Process		Applicable Standards	Identified Gaps
	Routing proxies (ESRP)	IETF 3261, phonebcf & NENA 08-003	
	Policy based routing	NENA 08-003	
Media			
	Voice	3GPP, IETF, NENA	
	Video	3GPP, IETF, NENA	
	Text	3GPP, IETF, NENA	
	Data only – “non-human initiated”	3GPP, IETF, NENA	
	RTT, IMS MMES, “total conversation”	3GPP, IETF, NENA	
Accessibility			
	EAAC issues & gaps in i3	FCC EAAC ATIS INES Incubator FCC NG9-1-1 NPRM	EAAC report and recommendations need to be reviewed once finalized and approved and then gaps can be identified. Output of FCC NG9-1-1 NPRM may identify additional gaps Priority 1
	Interface between IMS-originating networks and relay services	FCC EAAC ATIS	How do calls originating from IMS connect to the relay service. Also, given that 9-1-1 calls originating on IMS are direct to ESINet, how do the responders get notification that a relay service needs to be involved? Need to have specification developed to define how IMS interfaces with Relay Service. Priority 1
Callback		3GPP, IETF, NENA	
Additional Data about:			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. Priority 1 (generally)
	Call	NENA 08-003, 70-001 IETF additional data, 3GPP ATIS IMS ESInet	
	Caller	NENA 08-003, 70-001 ATIS IMS ESInet	Emergency Medical Data Priority 2

Process		Applicable Standards	Identified Gaps
	Premise (e.g. Floor plans, alarm data, etc.)	NENA 08-003, 71-001 NIST	Further work needed Priority 3
	PSAP	APCO, NENA, EIDD	Further NIEM work needed Priority 1
Logging			
	Within the ESInet and related functions	NENA 08-003	NENA and APCO have identified a number gaps such as Radio over IP Priority 2
	Within the PSAP	NENA NG PSAP	
	NENA, IETF	Could have IMS and other origination network impacts.	
Bridging/Conference Calls		NENA, IETF	Could have IMS and other origination network impacts. Priority 2
Security			
	Credentials	3GPP, IETF, NENA ATIS IMS ESInet	
	Securing Protocol Interaction including authentication, integrity protection, privacy	IETF, NENA 08-003 ATIS IMS ESInet	
	Attack Mitigation	NENA 08-003	
	End User Location Integrity	IETF ATIS IMS ESInet	Standards in development Priority 3

Process		Applicable Standards	Identified Gaps
			NENA’s “Transition Plan Considerations Information Document (NENA 77-501) Version 1,” by intent, examined logical network transition scenarios of existing originating services today to their counterparts in NG9-1-1. The scope of the document did not include new and emerging communication services, or how those services access NG9-1-1. Other gaps that would benefit from additional work include VoIP service transition (including both NENA i2 compliant deployments and earlier versions of such deployment currently being offered). Finally, Version 1 of the document did not fully address all data transition and potential operational considerations involved in transition, or the regulatory/funding/policy factors that may impact the process. Some of that additional work is currently underway in NENA and APCO workgroups.
Transition (including data)	Wireline	NENA	
	Wireless	NENA	
	VoIP	NENA	
	PSAP aspects	NENA ATIS RFAI	
	Relay services (e.g., IP relay, Video relay, etc.)	NENA	
	TTY	NENA	
	Legacy PSAP	NENA	
			Several gaps associated with Testing Priority 1
Testing	Self-test	IETF, NENA	
		NENA	
Discrepancy Reporting		NENA	
Data Management & Maintenance		NENA	In development Priority 1

Note: The IETF phonebcf specification has a dependency on the IETF ietf-mmusic-media-loopback specification which is still in development as a draft.

Appendix A: Acronyms

This section contains the acronyms that are referenced within this document.

(Source: NENA Master Glossary of 9-1-1 Terminology, <http://www.nena.org/default.asp?page=Glossary>)

Acronym	Definition
3GPP	3 rd Generation Partner Project
3GPP2	3 rd Generation Partnership Project 2
A&E	Architectural and Engineering
AAA	Authorization, Admission and Accounting
AAR	Association of American Railroads
ABNF	Augmented Backus-Naur Form
ACB	All Circuits Busy
ACCDEN	Access Denied
ACD	Automatic Call Distribution, Automatic Call Distributor
ACK	Acknowledgement
ACM	Address Complete Message
ACN	Automatic Collision Notification
ADA	Americans with Disabilities Act
ADEA	Age Discrimination in Employment Act
ADSL	Asymmetrical Digital Subscriber Line
AEAN	Alternate Emergency Access Number
AES	Advanced Encryption Standard
AHJ	Authority Having Jurisdiction
AIP	Access Infrastructure Provider
ALE	Access Location Entity
ALEC	Alternate Local Exchange Carrier
ALI	Automatic Location Identification
ALI DB	Automatic Location Identification Database
AMPS	Advanced Mobile Phone Service
AMR	Adaptive Multi Rate (codec)
AMR-WB	Adaptive Multi Rate (codec) – Wide Band
ANI	Automatic Number Identification
ANI/ALI	Automatic Number Identification/Automatic Location Identification
ANS	American National Standard
ANSI	American National Standards Institute
AOA	Angle of Arrival
AoR	Address of Record
APCO	Association of Public Safety Communications Officials
API	Application Programming Interface
APU	Answering Position Unit
AQS	NENA ALI Query Service
AQSI	ALI Query Services Interface
ARES	Amateur Radio Emergency Service
ARIB	Association of Radio Industries and Businesses
ARP	Address resolution Protocol
ASCII	American Standard Code for Information Exchange
ASL	American Sign Language
ASLARRA	American Short Line and Regional Railroad Association
ASP	Application Service Provider
ASRR	Average Sector Radius Range
ATA	Analog Terminal Adapter

Acronym	Definition
ATIS	Alliance for Telecommunications Industry Solutions
ATIS-ESIF	Alliance for Telecommunications Industry Solutions – Emergency Services Interconnection Forum
ATM	Asynchronous Transfer Mode
AVL	Automatic Vehicle Location
B2BUA	Back to Back User Agent
BASK	Binary Amplitude Shift Key
BBF	BroadBand Forum
BCD	Binary Coded Decimal
BCF	Border Control Function
BellCore	Bell Communications Research
BISACS	Building Information Services and Control System
BLI	Busy Line Interrupt
BLV	Busy Line Verification
BOC	Bell Operating Company
BOOTP	Bootstrap Protocol
BP	Best Practice
BPL	Broadband Over Power Lines
BRAS	Broadband Remote Access Server
BRI	Basic Rate Interface
BTS	Bureau of Transportation Statistics
BUI	Building Unit Identifier
C-TAG	The innermost VLAN tag as defined in IEEE 802.1ad
CA	Communications Assistant, Certificate Authority
CAD	Computer Aided Dispatch
CAMA	Centralized Automatic Message Accounting
CAP	Competitive Access Provider, Common Alerting Protocol
CART	Child Abduction Response Team
CAS	Call-path Associated Signaling, Channel Associated Signaling
CBA	Cost Benefits Analysis
CBN	Call Back Number
CBR	Constant Bit Rate
CCA	Cost Comparison Analysis
CCH	Computerized Criminal History
CCS	Common Channel Signaling or Hundred Call Seconds
CCSA	China Communications Standards Association
CCS7	Common Channel Signaling 7
CDE	Continuing Dispatch Education
CDMA	Code Division Multiple Access
CdPN	Called Party Number
CDR	Call Detail Record
CERT	Community Emergency Response Team
CFS	Consolidated Firearms System
CGI	Common Gateway Interface
CGL	Calling Geodetic Location Parameter
CgPN	Calling Party Number
CHGN	Charge Number Parameter
CID	Company Identification/Identifier
cid	Content Indirection
CIDB	Call Information Database
CIF	Critical Issues Forum

Acronym	Definition
<i>CII</i>	Criminal Identification and Investigation
<i>CISC</i>	Canadian Radio-Television and Telecommunications Commission Interconnection Steering Committee
<i>CJIC</i>	Criminal Justice Information System
<i>CLEC</i>	Competitive Local Exchange Carrier or Certified Local Exchange Carrier
<i>CLID</i>	Calling Line Identification
<i>CLLI</i>	Common Language Location Identifier
<i>CMRS</i>	Commercial Mobile Radio Service
<i>CMTS</i>	Cable Modem Termination System
<i>CO</i>	Central Office
<i>CODEc</i>	Coder/EDCoder or Compression/DECompression
<i>COG</i>	Council of Government
<i>COLT</i>	Cell on Light Truck
<i>CONUS</i>	Continental United States
<i>COOP</i>	Continuity of Operations Plan
<i>CoS</i>	Class of Service
<i>COW</i>	Cell on Wheels
<i>CPAS</i>	Cellular Priority Access Service
<i>CpCAT</i>	Calling Party CATegory
<i>CPE</i>	Customer Premise Equipment
<i>CPN</i>	Calling Party Number Parameter
<i>CPU</i>	Central Processing Unit
<i>CRDB</i>	Coordinate Routing Data Base
<i>CRL</i>	Certificate Revocation List
<i>CRM</i>	Committee Resource Manager
<i>CRN</i>	Contingency Routing Number
<i>CRT</i>	Cathode Ray Tube
<i>CRTC</i>	Canadian Radio-television and Telecommunications Commission
<i>CS</i>	Circuit Switched
<i>CSCF</i>	Call Session Control Function
<i>CSP</i>	Communications Services Provider
<i>CTI</i>	Computer Telephone Integration
<i>CTIA</i>	Cellular Telephone Industry Association
<i>CTX-IP</i>	Centrex-based Internet Protocol
<i>CW</i>	Call Waiting
<i>dB</i>	Decibels
<i>DB</i>	Deaf-Blind
<i>DBMS</i>	Data Base Management System
<i>DBMSP</i>	Data base Management System Provider
<i>DCE</i>	Data Communications Equipment
<i>DHCP</i>	Dynamic Host Control Protocol (i2) Dynamic Host Configuration Protocol
<i>DHHS</i>	United States Department of Health and Human Services
<i>DHS</i>	United States Department of Homeland Security
<i>DID</i>	Direct Inward Dialing
<i>DMS</i>	Data Management System
<i>dMSID</i>	Default Mobile Station Identity
<i>DMST</i>	Domestic Minor Sex Trafficking
<i>DMT</i>	Discrete Multi Tone
<i>DN</i>	Directory Number
<i>DNS</i>	Domain Name Server (or Service or System)
<i>DOCSIS</i>	Data over Cable Service Interface Specification
<i>DoD</i>	Department of Defense

Acronym	Definition
<i>DOD</i>	Direct Outward Dialing
<i>DOE</i>	United States Department of Energy
<i>DOJ</i>	United States Department of Justice
<i>DOL</i>	United States Department of Labor
<i>DoS</i>	Denial of Service
<i>DOS</i>	Disk Operating System
<i>DOT</i>	Department of Transportation
<i>DP</i>	Dial Pulse
<i>DRP</i>	Disaster Recovery Plan
<i>DSL</i>	Digital Subscriber Line
<i>DSLAM</i>	Digital Subscriber Line Access Multiplexer
<i>DSP</i>	Digital Signal Processing
<i>DTE</i>	Data Terminal Equipment
<i>DTMF</i>	Dual Tone Multi-Frequency
<i>DVROS</i>	Domestic Violence Restraining Order System
<i>E9-1-1</i>	Enhanced 9-1-1
<i>E9-1-1M</i>	Mobile E9-1-1, Mobile Emergency Service
<i>EAAC</i>	Emergency Access Advisory Committee
<i>EAB</i>	Education Advisory Board
<i>EAS</i>	Emergency Alert Systems
<i>ECOM</i>	Essential Communications During Emergencies
<i>ECR</i>	Emergency Call Register
<i>ECRF</i>	Emergency Call Routing Function
<i>ecrit</i>	Emergency Context Resolution In the Internet
<i>E-CSCF</i>	Emergency Call Session Control Function
<i>EDGE</i>	Enhanced Data rates for GSM Evolution
<i>EDXL</i>	Emergency Data eXchange Language
<i>EEOC</i>	Equal Employment Opportunity Commission
<i>EENA</i>	European Emergency Number Association
<i>EFM</i>	Ethernet in the First Mile
<i>EIA</i>	Electronic Industry Association
<i>EIA RS-232</i>	Electronic Industry Alliance Recommended Standard 232 (serial interface)
<i>EISI</i>	Emergency Information Services Interface
<i>ELA</i>	Emergency Line Access
<i>ELD</i>	Electro-Luminescent Display
<i>ELIN</i>	Emergency Location Identification Number
<i>ELT</i>	English Language Translation
<i>EM</i>	Emergency Message
<i>EMD</i>	Emergency Medical Dispatcher
<i>EMS</i>	Emergency Medical Service
<i>EMT</i>	Emergency Medical Technician
<i>EMTEL</i>	Emergency Telecommunications
<i>ENS</i>	Emergency Notification Systems
<i>EO</i>	End Office
<i>EOC</i>	Emergency Operations Center
<i>EPAD</i>	Emergency Provider Access Directory
<i>EPROM</i>	Erasable Programmable Read-Only Memory
<i>EPZ</i>	Emergency Planning Zone
<i>ERDB</i>	Emergency Services Zone Routing Database
<i>ERL</i>	Emergency Response Location
<i>ES</i>	Emergency Service
<i>ESA</i>	Emergency Stand Alone

Acronym	Definition
<i>ESC</i>	Emergency Services Call
<i>ESCO</i>	Emergency Service Central Office
<i>ESGW</i>	Emergency Services Gateway
<i>ESIF</i>	Emergency Services Interconnection Forum
<i>ESInet</i>	Emergency Services IP Network
<i>ESME</i>	Emergency Services Message Entity
<i>ESMI</i>	Emergency Services Messaging Interface
<i>ESMR</i>	Enhanced Specialized Mobile Radio
<i>ESN</i>	Emergency Service Number, Electronic Serial Number, Emergency Service Network
<i>ESNE</i>	Emergency Services Network Entity/Element
<i>ESNet</i>	Emergency Services Network
<i>ESNI</i>	Emergency Services Network Interfaces
<i>ESQK</i>	Emergency Services Query Key
<i>ESP</i>	Emergency Services Provider, or Emergency Services Protocol
<i>ESRD</i>	Emergency Services Routing Digit
<i>ESRI</i>	Environmental Services Research Incorporated
<i>ESRK</i>	Emergency Services Routing Key
<i>ESRN</i>	Emergency Services Routing Number/Name
<i>ESRP</i>	Emergency Services Routing Proxy
<i>ESZ</i>	Emergency Services Zone (same as ESN)
<i>ETA</i>	Estimated Time of Arrival
<i>ETB</i>	Emergency Transport Backup
<i>ETNS</i>	Emergency Telephone Notification System
<i>ETSI</i>	European Telecommunications Standards Institute
<i>EUMI</i>	End User Move Indicator
<i>EVRC</i>	Enhanced Variable Rate Narrowband Codec
<i>EVRC-WB</i>	Enhanced Variable Rate Wideband Codec
<i>FAA</i>	Federal Aviation Administration
<i>FAQ</i>	Frequently Asked Questions
<i>FBI</i>	Federal Bureau of Investigation
<i>FCC</i>	Federal Communications Commission
<i>FDD</i>	Frequency Division Duplex
<i>FDDI</i>	Fiber Optic interface
<i>FE</i>	Functional Entity
<i>FG-D</i>	Feature Group D
<i>FGDC</i>	Federal Geographic Data Committee
<i>FHA</i>	United States Federal Highway Administration
<i>FLSA</i>	Fair Labor Standards Act
<i>FMLA</i>	Family and Medical Leave Act
<i>FOC</i>	Function of Change
<i>FQDN</i>	Fully Qualified Domain Name
<i>FRA</i>	United States Federal Railway Administration
<i>FTP</i>	File Transfer Protocol
<i>FTTA</i>	Fiber To The Access
<i>FTTH</i>	Fiber To The Home
<i>FTTP</i>	Fiber To The Premises
<i>FX</i>	Foreign Exchange
<i>GA</i>	Go ahead
<i>GAP</i>	Global Address Parameter
<i>GA SK</i>	Go Ahead Stop Keying (Go Ahead or Ready to Hang Up)
<i>GDP</i>	Generic Digit Parameter
<i>geopriv</i>	Geolocation and Privacy

Acronym	Definition
<i>GeoRSS</i>	Geodetic Really Simple Syndication
<i>Geoshape</i>	Geodetic Shape
<i>GETS</i>	Government Emergency Telecommunications Service
<i>GHC911</i>	Greater Harris County 9-1-1 Network
<i>GIS</i>	Geographic Information Systems
<i>GML</i>	Geographic Markup Language
<i>GMLC</i>	Gateway Mobile Location Center (MLC)
<i>GMT</i>	Greenwich Mean Time
<i>GNP</i>	Geographic Number Portability
<i>GOS</i>	Grade of Service
<i>GPOSDIR</i>	GeoPositionDirective INVOKE (see JSTD-036)
<i>Gposdir</i>	GeoPositionDirective RETURN RESULT (see JSTD-036)
<i>GPOSREQ</i>	GeoPositionRequest INVOKE (see JSTD-036)
<i>gposreq</i>	GeoPositionRequest RETURN RESULT (see JSTD-036)
<i>GPRS</i>	General Packet Radio Service
<i>GPS</i>	Global Positioning System
<i>GR-2945</i>	Telcordia Year 2000: Systems and Interfaces General Requirements Document
<i>GSM</i>	Global Standard for Mobile Communication
<i>GUID</i>	Globally Unique Identifier
<i>HCO</i>	Hearing Carry Over
<i>HELD</i>	HTTP-Enabled Location Delivery protocol
<i>HFC</i>	Hybrid Fiber Coax
<i>HDSL</i>	High bit rate Digital Subscriber Line
<i>HDTV</i>	High-Definition Television
<i>HID</i>	Hardware Identity
<i>HIPAA</i>	Health Insurance Portability and Accountability Act
<i>HLR</i>	Home Location Register (see ANSI-41)
<i>HOH</i>	Hard of Hearing
<i>HRRC</i>	Houston Rescue and Restore Coalition
<i>HSPD</i>	Homeland Security Presidential Directive
<i>HSS</i>	Home Subscriber Server
<i>HTML</i>	Hyper Text Markup Language
<i>HTRA</i>	Human Trafficking Rescue Alliance
<i>HTTP</i>	Hyper Text Transfer Protocol
<i>HVAC</i>	Heating Ventilation and Air Conditioning
<i>Hz</i>	Hertz
<i>i2</i>	NENA 08-001 Interim VoIP Architecture for Enhanced 9-1-1 Services (i2)
<i>IAB</i>	Internet Architecture Board
<i>IAD</i>	Integrated Access Device
<i>IAM</i>	Initial Address Message
<i>IANA</i>	Internet Assigned Numbers Authority
<i>ICANN</i>	Internet Corporation Assigned Names and Numbers
<i>ICE</i>	Immigration Customs Enforcement
<i>ICO</i>	National 9-1-1 Implementation and Coordination Office
<i>ICR/IRR</i>	Instant Call Recorder/Instant Recall Recorder
<i>ICS</i>	Incident Command System
<i>ID</i>	Identified
<i>IDP</i>	Identity Provider
<i>IEEE</i>	Institute of Electrical and Electronics Engineers
<i>IESG</i>	Internet Engineering Steering Group
<i>IETF</i>	Internet Engineering Task Force
<i>IID</i>	Incident Identification

Acronym	Definition
<i>ILEC</i>	Incumbent Local Exchange Carrier
<i>IM</i>	Instant Messaging
<i>IMEI</i>	International Mobile Equipment Identity
<i>IMS</i>	IP Multimedia Subsystem
<i>IMSI</i>	International Mobile Station Identity
<i>IMTC</i>	International Multimedia Teleconferencing Consortium
<i>IN</i>	Intelligent Network
<i>INP</i>	Interim Number Portability
<i>IP</i>	Internet Protocol
<i>IPBX (or IP-PBX)</i>	Internet Protocol Private Branch Exchange
<i>IP-CAN</i>	IP Connectivity Access Network
<i>IP-COAD</i>	Internet Protocol-Coordination Ad-Hoc Committee
<i>IPI</i>	Imagery and Geospatial Plans and Policy Branch
<i>ipm</i>	Interrupts per minute
<i>IpoE</i>	Internet Protocol over Ethernet
<i>IP PSAP</i>	Internet Protocol Public Safety Answering Point
<i>IP Relay</i>	Internet Protocol Relay
<i>IPSec</i>	Internet Protocol Security
<i>Ipv4</i>	Version 4 of the Internet Protocol
<i>IRIG</i>	Inter-Range Instrumentation Group
<i>ISDL</i>	ISDN Digital Subscriber Line
<i>ISDN</i>	Integrated Services Digital Network
<i>ISOC</i>	Internet Society
<i>ISP</i>	Internet Service Provider
<i>ISUP</i>	Integrated Services Digital Network User Part
<i>ITS</i>	Intelligent Transportation System
<i>ITSP</i>	Internet Telephone Service Provider
<i>ITU</i>	International Telecommunications Union
<i>ITU-D</i>	International Telecommunications Union – Development
<i>ITU-R</i>	International Telecommunications Union – Radiocommunications
<i>ITU-T</i>	International Telecommunications Union – Telecommunications
<i>IVR</i>	Interactive Voice Response
<i>IWS</i>	Intelligent Workstation
<i>J CM</i>	Joint Committee Meeting
<i>KP</i>	Key Pulse
<i>KSU</i>	Key Service Unit
<i>KTS</i>	Key Telephone System
<i>KTU</i>	Key Telephone Unit
<i>LAENS</i>	Large Area Emergency Notification System
<i>L2TP</i>	Layer-2 Tunneling Protocol
<i>LAN</i>	Local Area Network
<i>LATA</i>	Local Access and Transport Area
<i>LCD</i>	Liquid Crystal Display
<i>LCP</i>	
<i>LCR</i>	Least Cost Routing
<i>LDAP</i>	Lightweight Directory Access Protocol
<i>LDT</i>	Location Determination Technology or Line Digital to Trunk
<i>LEC</i>	Local Exchange Carrier
<i>LED</i>	Light Emitting Diode
<i>LERG</i>	Local Exchange Routing Guide
<i>LIE</i>	Location Information Element
<i>LIF</i>	Location Interwork Function

Acronym	Definition
<i>LIS</i>	Location Information Server
<i>LIS-ID</i>	Location Information Server Identifier
<i>LK</i>	Location Key
<i>LLDP-MED</i>	Link Layer Discovery Protocol Media Endpoint Discovery
<i>LNP</i>	Local Number Portability
<i>LO</i>	Location Object
<i>LOCREQ</i>	Location Request
<i>LoST</i>	Location to Service Translation
<i>LPN</i>	Local Public Safety Number
<i>LRF</i>	Location Retrieval Function
<i>LRO</i>	Last Routing Option
<i>LSMS</i>	Local Service Management System
<i>LSO</i>	Local Serving Office
<i>LSP</i>	Local Service Provider
<i>LSR</i>	Local Service Request
<i>LSSGR</i>	LATA Switching Systems Generic Requirements
<i>LTD</i>	Long Term Definition
<i>LVF</i>	Location Validation Function
<i>MapInfo</i>	Mobile Information (see JSTD-036) (MapInfo is a trademark registered name!)
<i>MCC</i>	Mobile Competence Centre
<i>MDC</i>	Mobile Data Communications
<i>MDF</i>	Main Distribution Frame
<i>MDN</i>	Mobile Directory Number
<i>MDT</i>	Mobile Data Terminal
<i>MEC</i>	Missing and Exploited Children
<i>MEID</i>	Mobile Equipment Identity
<i>MEP</i>	Message Exchange Pattern
<i>MF</i>	Multi-Frequency
<i>MGCP</i>	Media Gateway Control Protocol
<i>MIB</i>	Management Information Base
<i>MIN</i>	Mobile Identified Number, Mobile Identification Number
<i>MLP</i>	Mobile Location Protocol
<i>MIS</i>	Management Information System
<i>MLTS</i>	Multi-Line Telephone System
<i>MMES</i>	Multi-Media Emergency Services
<i>MMTA</i>	MultiMedia Telecommunications Association
<i>MOA</i>	Memorandum of Agreement
<i>MOU</i>	Memorandum of Understanding
<i>MP</i>	Mobile Phone
<i>MPC</i>	Mobile Positioning Center
<i>MPCAP</i>	Mobile Positioning Capability (see JSTD-036)
<i>MPLS</i>	Multi-Protocol Label Switching
<i>MPOA</i>	Multi-Protocol Over ATM
<i>ms</i>	Milliseconds
<i>MS</i>	Mobile Station
<i>MSA</i>	Metropolitan Statistical Area
<i>MSC</i>	Mobile Switching Center
<i>MSAG</i>	Master Street Address Guide
<i>MSC</i>	Mobile Switching Center
<i>MSID</i>	Mobile Station Identity
<i>MSISDN</i>	Mobile Station ISDN Number
<i>MSO</i>	Mobile Switching Office

Acronym	Definition
<i>MSRN</i>	Mobile Station Routing Number
<i>MSRP</i>	Message Session Relay Protocol
<i>MSS</i>	Mobile Satellite Services
<i>MTA</i>	Multimedia Terminal Adapter
<i>MTID</i>	Mobile Terminal Identity
<i>MTP</i>	Message Transfer Point
<i>MTSO</i>	Mobile Telephone Switching Office
<i>NAD83</i>	North American Datum 83
<i>NAED</i>	National Academies of Emergency Dispatch
<i>NAI</i>	Network Access Identifier
<i>NANP</i>	North American Numbering Plan
<i>NANPA</i>	North American Numbering Plan Administration
<i>NARUC</i>	National Association of Regulatory Utility Commissioners
<i>NAS</i>	Network Access Server
<i>NASAR</i>	National Association of Search and Rescue
<i>NASNA</i>	National Association of State 9-1-1 Administrators
<i>NAT</i>	Network Address Translation
<i>NBMA</i>	Non-Broadcast Multiple Access
<i>NCAS</i>	Non Call-path Associated Signaling
<i>NCIC</i>	National Crime Enforcement Center, National Crime Information Center
<i>NCMEC</i>	National Center for Missing and Exploited Children
<i>NECA</i>	National Exchange Carrier Association
<i>NENA</i>	National Emergency Number Association
<i>NFPA</i>	National Fire Protection Association
<i>NGA</i>	United States National Geospatial Intelligence Agency
<i>NG9-1-1</i>	Next Generation 9-1-1
<i>NGES</i>	Next Generation Emergency Services
<i>NGESN</i>	Next Generation Emergency Services Network
<i>NGN</i>	Next Generation Network
<i>NGO</i>	Non-Governmental Organization
<i>NHTRC</i>	National Human Trafficking Resource Hotline
<i>NHTSA</i>	National Highway Traffic Safety Administration, United States Department of Transportation
<i>NID</i>	Network Interface Device
<i>NIF</i>	NG9-1-1 Specific Interwork Function
<i>NIMS</i>	National Incident Management System
<i>NIP</i>	NYNEX Information Publication
<i>NIS</i>	Not In Service
<i>NIST</i>	National Institute of Standards and Technology
<i>NLSI</i>	National Lighting Safety Institute
<i>NMC</i>	9-1-1 Malicious Content
<i>NNSA</i>	United States National Nuclear Security Administration
<i>NOCC</i>	Network Operations Control Center (for wireless carriers)
<i>NORAD</i>	North American Aerospace Defense Command
<i>NPA</i>	Numbering Plan Area
<i>NPAC</i>	Number Portability/Pooling Administration Center
<i>NPD</i>	Numbering Plan Digit
<i>NPRM</i>	Notice of Proposed Rulemaking
<i>NRC</i>	National Reliability Council
<i>NRIC</i>	Network Reliability and Interoperability Council
<i>NRF</i>	No Record Found
<i>NRS</i>	NENA Registry System

Acronym	Definition
<i>NRTL</i>	National Recognized Testing Laboratory
<i>NSI</i>	Non-Service Initialized (as in phones)
<i>NSP</i>	Network Service Provider
<i>NTIA</i>	National Telecommunications and Information Administration, United States Department of Commerce
<i>NTP</i>	Network Time Protocol
<i>NTSB</i>	United States National Transportation Safety Board
<i>NXX</i>	Telephone Numbering Code for Exchange Code or Telephone exchange code
<i>OASIS</i>	Organization for the Advancement of Structured Information Standards
<i>OCN</i>	Operating Company Number
<i>ODC</i>	Operations Development Conference
<i>OEM</i>	Original Equipment Manufacturer
<i>OID</i>	Operations Information Document
<i>OGC</i>	Open Geospatial Consortium
<i>OLI</i>	Originating Line Identification parameter
<i>OMA</i>	Open Mobile Alliance
<i>ORD</i>	Operations Requirement Document
<i>ORR</i>	Office of Refugee and Resettlement
<i>ORREQ</i>	Origination Request Invoke (see JSTD-036)
<i>Orreq</i>	Origination Request RETURN RESULT (see JSTD-036)
<i>OSI</i>	Open Systems Interconnection
<i>OST</i>	United States Office of Secure Transportation
<i>P.01</i>	Probability of one (1) call in one (100) hundred calls being blocked
<i>PAI</i>	P-Asserted-Identity
<i>pALI</i>	Pseudo Automatic Location Identification
<i>PAM</i>	PSAP to ALI Message specification
<i>PAN</i>	Personal Area Network
<i>PAP</i>	Prohibited Armed Persons
<i>pANI</i>	Pseudo Automatic Number Identification
<i>PAS</i>	Priority Access Service
<i>PBX</i>	Private Branch Exchange
<i>PCA</i>	PSAP Credentialing Agency
<i>P-CBN</i>	PSAP Call Back Number
<i>PCIA</i>	Personal Communications Industry Association
<i>PCS</i>	Personal Communications Service
<i>PCSC</i>	Personal Communications Switching Center
<i>P-CSCF</i>	Proxy Call Session Control Function
<i>PDA</i>	Personal Digital Assistant
<i>PDE</i>	Position Determining Entity
<i>PDOP</i>	Position Dilution of Precision
<i>Pesn</i>	Pseudo Electronic Serial Number
<i>PGID</i>	Paging Identity
<i>PHB</i>	Per Hop Behaviors
<i>PIDF</i>	Presence Information Data Format
<i>PIDF-LO</i>	Presence Information Data Format – Location Objects
<i>PIF</i>	Protocol Interworking Function
<i>PIO</i>	Public Information Office
<i>PKI</i>	Public Key Infrastructure
<i>PMI</i>	Project Management Institute
<i>PMP</i>	Project Management Professional
<i>POC</i>	Point of Contact
<i>PON</i>	Passive Optical Network

Acronym	Definition
<i>POS</i>	Packet Over SONET
<i>PPP</i>	Point-to-Point Protocol
<i>PPPoA</i>	Point-to-Point Protocol over ATM
<i>PPPoE</i>	Point-to-Point Protocol over Ethernet
<i>PRF</i>	Policy Routing Function
<i>PRI</i>	Primary Rate Interface/ISDN
<i>PSA</i>	Public Safety Agency, Public Service Announcement
<i>PSALI</i>	Private Switch ALI
<i>PSAP</i>	Public Safety Answering Point or Primary Public Safety Answering Point
<i>PSAP-ECR</i>	Public Safety Answering Point – Emergency Call Register
<i>PSO</i>	Provisioning Service Object
<i>PSQM</i>	Perceptual Speech Quality Measurements
<i>PSP</i>	Provisioning Service Provider
<i>PSTN</i>	Public Switched Telephone Network
<i>PTSC</i>	Packet Technologies and Services Committee (ATIS Standards Committees)
<i>PUC</i>	Public Utility Commission
<i>PVC</i>	Permanent Virtual Circuit
<i>Q or QQ</i>	Indicates a question
<i>QoS</i>	Quality of Service
<i>RA</i>	Requesting Authority
<i>RACES</i>	Radio Amateur Civil Emergency Service
<i>RADIUS</i>	Remote Authentication Dial-In User Service
<i>RANP</i>	Regional Access Network Provider
<i>RAS</i>	Remote Access Server
<i>RBAC</i>	Role Based Access Control profile
<i>RCC</i>	Remote Call Center or Rate Center Consolidation
<i>RDF</i>	Routing Determination Function
<i>RDO</i>	Root Discovery Operator
<i>REL</i>	Release (message)
<i>REST</i>	Representational State Transfer
<i>RF</i>	Radio Frequency
<i>RFC</i>	Request for Comments
<i>RFI</i>	Request for Information
<i>RFP</i>	Request for Proposal
<i>RFQ</i>	Request for Quote
<i>RG</i>	Response Gateway, Routing Gateway
<i>RLC</i>	Release Complete (message)
<i>RMS</i>	Records Management System
<i>RNA</i>	Routing Number Authority
<i>ROHC</i>	Robust Header Compression
<i>ROI</i>	Return on Investment
<i>ROM</i>	Rough Order of Magnitude
<i>ROUTREQ</i>	Route Request (see ANSI-41)
<i>RPC</i>	Remote Procedure Call
<i>RSU</i>	Remote Switching Unit
<i>RSVP</i>	Resource Reservation Protocol
<i>RTCP</i>	Real Time Control Protocol
<i> RTP</i>	Real Time Transport Protocol
<i>RTSP</i>	Real Time Streaming Protocol
<i>RTT</i>	Real Time Text
<i>SAC</i>	Standards Advisory Committee
<i>SAE</i>	Society of Automotive Engineers

Acronym	Definition
<i>SAML</i>	Security Assertion Markup Language
<i>SBC</i>	Session Border Control
<i>SBS</i>	Straight Binary Seconds
<i>SC</i>	Service Consumer
<i>SCCP</i>	Signaling Connection Control Part
<i>SCP</i>	Service Control Point (see ANSI-41) or Switching Control Point
<i>S-CSCF</i>	Serving Call Session Control Function
<i>SCTP</i>	Stream Control Transport Protocol
<i>SDES</i>	Session Description protocol Security Descriptions
<i>SDO</i>	Standards Development Organization
<i>SDP</i>	Session Description Protocol
<i>SDSL</i>	Symmetrical Digital Subscriber Line
<i>SFG</i>	Simulated Facility Group
<i>SFTP</i>	Secure Shell File Transfer Protocol
<i>SHA</i>	Secure Hash Algorithm
<i>SIF</i>	Signaling Information Field, Spatial Information Function
<i>SIO</i>	Service Information Octet
<i>SIP</i>	Session Initiation Protocol
<i>SK</i>	Stop keying
<i>SKSK</i>	Stop keying, stop keying. Officially ends a TDD conversation
<i>SLA</i>	Service Level Agreement
<i>S/MIME</i>	Secure Multipurpose Internet Mail Extensions
<i>SMDPP</i>	SMS Delivery Point to Point INVOKE (see ANSI-41)
<i>SME</i>	Subject Matter Experts
<i>SMS</i>	Short Message Service
<i>SMTP</i>	Simple Mail Transfer Protocol
<i>SNA</i>	System Network Architecture
<i>SNL</i>	Sandia National Laboratories
<i>SNR</i>	Signal to Noise Ratio
<i>SNTP</i>	Simple Network Time Protocol
<i>SOA</i>	Service Oriented Architecture
<i>SOAP</i>	Simple Object Assess Protocol
<i>SOG</i>	Standard Operating Guidelines
<i>SOHO</i>	Small Office/Home Office
<i>SOI</i>	Service Order Input
<i>SONET</i>	Synchronous Optical NETwork
<i>SOP</i>	Standard Operating Procedures
<i>SP</i>	Service Provider
<i>SPCS</i>	State Plane Coordinate Systems
<i>SPID</i>	Service Provider Identifier
<i>SPML</i>	Service Provisioning Markup Language
<i>SPVC</i>	Soft Permanent Virtual Circuit
<i>SR</i>	Selective Routing, Selective Router [a.k.a., E9-1-1 Tandem, or E9-1-1 Control Office]
<i>SRDB</i>	Selective Routing Data Base
<i>SRTP</i>	Secure Real Time Protocol
<i>SRV</i>	Service (a DNS record type)
<i>SS</i>	Serving System
<i>SS-ECR</i>	Serving System – Emergency Call Register
<i>SSH</i>	Secure Shell
<i>SSH-2</i>	Secure Shell, Version 2
<i>SSP</i>	Signal Switching Point
<i>SS7</i>	Signaling System 7

Acronym	Definition
<i>ST</i>	Start
<i>S-TAG</i>	The outermost VLAN tag as defined in IEEE 802.1ad
<i>STCP</i>	Stream Control Transport Protocol
<i>STP</i>	Start Prime or Signal Transfer Point
<i>STUN</i>	Simple Transversal of Universal Datagram Protocol (UDP) Network Address Translations (NATs)
<i>SVC</i>	Switched Virtual Circuit
<i>TA</i>	Technical Advisory (published by Bellcore) or Technical Assistance
<i>TC</i>	Telecommunications Carrier
<i>TCAD</i>	Technical Committee Administrative Document
<i>TCAP</i>	Transaction Capabilities Application Part
<i>TCP</i>	Transport/Transmission Control Protocol
<i>TCP/IP</i>	Transmission Control Protocol/Internet Protocol
<i>TCU</i>	Telematics Control Unit
<i>TDC</i>	Technical Development Conference
<i>TDD</i>	Telecommunications Device for the Deaf or Time Division Duplex Mode
<i>TDD-TTY</i>	Telephone Device for the Deaf-Teletypewriter (Text Telephone)
<i>TDM</i>	Time Division Multiplexing
<i>TDMA</i>	Time Division Multiple Access
<i>TDOA</i>	Time Difference of Arrival
<i>TELCO</i>	Telephone Company
<i>TIA</i>	Telecommunications Industry Association
<i>TID</i>	Technical Information Document (published by NENA) or Technical Issues Director
<i>TLDN</i>	Temporary Long Distance Number
<i>TLS</i>	Transport Layer Security
<i>TLT</i>	Technical Lead Team
<i>TMSI</i>	Temporary Mobile Station Number
<i>TN</i>	Telephone Number
<i>TOPS</i>	Technology and Operations Council
<i>TR</i>	Technical Reference (published by Bellcore)
<i>TR45</i>	TIA Engineering Committee on Mobile and Personal Communications Standards
<i>TR 45.2</i>	Telecommunications Industry Association Subcommittee responsible for “Wireless Intersystem Technology – Mobile and Personal Communications Standards”
<i>TRD</i>	Technical Requirements Document
<i>TRS</i>	Telecommunications Relay Service
<i>TSD</i>	Technical Standards Document
<i>TSP</i>	Telephone Service Priority or Telecommunications Service Provider, Telematics Service Provider
<i>TTA</i>	Telecommunications Technology Association
<i>TTC</i>	Telecommunication Technology Committee, or Time to Completion
<i>TTL</i>	Transistor to Transistor Logic
<i>TTY</i>	Teletypewriter (a.k.a. TDD, Telecommunications Device for the Deaf and Hard-of-Hearing)
<i>TU</i>	Telematics Unit
<i>TVPA</i>	Trafficking Victims Protection Act of 2000
<i>TVPRA</i>	Trafficking Victims Protection Reauthorization Act of 2003
<i>TVSS</i>	Transient Voltage Surge Suppression
<i>TVW</i>	Testing Validation Worksheet
<i>TWC</i>	Three-Way Calling
<i>UA</i>	User Agent
<i>UAC</i>	User Agent Client
<i>UAS</i>	User Agent Service

Acronym	Definition
UBR	Unavailable Bit Rate
UDDI	Universal Description, Discovery and Integration
UDP	User Datagram Protocol
UE	User Equipment
UIM	User Identity Model
UL	Underwriters Laboratories
uLPN	Unique Local Public Safety Number
UNI	Unbundled Network Interface
UPS	Uninterruptible Power Supply
URI	Uniform Resource Identifier
URISA	Urban and Regional Information Systems Association
URL	Uniform Resource Locator (location sensitive)
URN	Uniform Resource Name (location insensitive)
USAR	Urban Search and Rescue
USF	Universal Service Fund
USGS	United States Geological Survey
USMC	United States Marine Corps
USNG	United States National Grid
USNO	United States Naval Observatory
USPS	United States Postal Service
USTA	United States Telephone Association
USTSA	United States Telecommunications Suppliers Association
UTC	Universal Coordinated Time
UTRA	Universal Terrestrial Radio Access
VBRnrt	Variable Bit Rate non-real time
VBRrt	Variable Bit Rate real-time
VC	Virtual Circuit
VCI	Virtual Circuit Identifier
VCIN	Violent Crime Information Network
VCO	Voice Carry Over
VDB	Validation Data Base
VDSL	Very high-speed Digital Subscriber Line
VE2	Voice over Internet Protocol E2 Interface
VEDS	Vehicle Emergency Data Sets
VEP	VoIP End Point
VESA	Valid Emergency Services Authority
VF	Validation Function
VFG	Virtual Facility Group
VI	Video Interpreter
VIN	Vehicle Identification Number
VLAN	Virtual LAN
VLR	Visitor Location Register
VoATM	Voice over ATM
VoDSL	Voice over Digital Subscriber Link
VoFR	Voice over Frame Relay
VoIP	Voice over Internet Protocol
VON	Voice over Network
VoP	Voice over Packet
VPC	VoIP Positioning Center
VPI	Virtual Path Identifier
VPN	Virtual Private Network
VRI	Video Remote Interpreting

Acronym	Definition
VRS	Video Relay Service
VSP	VoIP Service Provider
W3C	World Wide Web Consortium
WAENS	Wide Area Emergency Notification System
WAN	Wide Area Network
WAP	Wireless Access Point
WCM	Wireline Compatibility Mode
WFS	Web Feature Service
WG	Working Group
WGS 84	World Geodetic System 1984
WiFi®	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WNC	Wireless Network Controller
WPS	Wireless Priority Service
WSDL	Web Service Definition Language
WSP	Wireless Service Provider
WSS	Web Services Security
WTSC	Wireless Technologies and Systems Committee
WWW	World Wide Web
XACML	eXtensible Access Control Markup Language
XML	eXtensible Markup Language
XMPP	eXtensible Messaging and Presence Protocol
XSD	W3C XML Schema Definition
XXXXX	Indicates an error or mistake in typing (erasing the error)

Appendix B: Glossary

This section contains the glossary associated with this document.

(Source: NENA Master Glossary of 9-1-1 Terminology, <http://www.nena.org/default.asp?page=Glossary>)

Term	Definition
3GPP	The 3 rd Generation Partnership Project (3GPP) is a collaboration agreement that was established in December 1998. The collaboration agreement brings together a number of telecommunications standards bodies which are known as “Organizational Partners”.
9-1-1	A three-digit telephone number to facilitate the reporting of an emergency requiring response by a public safety agency.
Access Provider	An access provider is any organization that arranges for an individual or an organization to have access to the Internet.
Alliance for Telecommunications Industry Solutions (ATIS)	A U.S.-based organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach. http://www.atis.org/
American National Standards Institute (ANSI)	Entity that coordinates the development and use of voluntary consensus standards in the United States and represents the needs and views of U.S. stakeholders in standardization forums around the globe. http://www.ansi.org/
American Sign Language	A visual/gestural, non-written language with its own unique syntax and grammar based on hand shapes, body movements and facial expressions.
American Standard Code for Information Interchange (ASCII)	A standard for defining codes for information exchange between equipment produced by different manufacturers. A code that follows the American Standard Code for Information Interchange.
Association of Public Safety Communications Officials (APCO)	APCO is the world’s oldest and largest not-for-profit professional organization dedicated to the enhancement of public safety communications.
Authentication	A security term referring to the process of reliably identifying an entity requesting access to data or a service.
Automatic Call Distributor (ACD)	Equipment that automatically distributes incoming calls to available PSAP attendants in the order the calls are received, or queues calls until an attendant becomes available.
Automatic Location Identification (ALI)	The automatic display at the PSAP of the caller’s telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates.
Automatic Number Identification (ANI)	Telephone number associated with the access line from which a call originates.

Term	Definition
<i>Call</i>	A session established by signaling with two-way, real-time media and involves a human making a request for help. We sometimes use “voice call”, “video call” or “text call” when specific media is of primary importance. The term “non-human-initiated call” refers to a one-time notification or series of data exchanges established by signaling with at most one way media, and typically does not involve a human at the “calling” end. The term “call” can also be used to refer to either a “Voice Call”, “Video Call”, “Text Call” or “Data-only call”, since they are handled the same way through most of NG9-1-1.
<i>Call Routing</i>	The capability to selectively route the 9-1-1 call to the appropriate PSAP.
<i>Call Session Control Function (CSCF)</i>	General term for a functional entity within a IMS core network that can act as Proxy CSCF (P-CSCF), Serving CSCF (S-CSCF), Emergency CSCF (E-CSCF), or Interrogating CSCF (I-CSCF).
<i>Carrier</i>	A function provided by a business entity to a customer base, typically for a fee. Examples of carriers and associated services are; PSTN service by a Local Exchange Carrier, VoIP service by a VoIP Service Provider, email service provided by an Internet Service Provider.
<i>Catypes</i>	A component of a civic address in a PIDF-LO such as a Street Name or House Number, which has a code used to identify what kind of component.
<i>Domain (or Domain Name)</i>	The domain name (hostname) of an agency or element in an ESInet.
<i>Emergency Call Routing Function (ECRF)</i>	A functional element in an ESInet which is a LoST protocol server where location information (either civic address or geo-coordinates) and a Service URN serve as input to a mapping function that returns a URI used to route an emergency call toward the appropriate PSAP for the caller’s location or towards a responder agency.
<i>Emergency Call Session Control Function (E-CSCF)</i>	The entity in the IMS core network that handles certain aspects of emergency sessions, e.g. routing of emergency requests to the correct emergency center or PSAP.
<i>Emergency Routing Data Base (ERDB)</i>	The ERDB contains routing information associated with each Emergency Service Zone (ESZ) in a serving area. It supports the boundary definitions for ESZs and the mapping of civic address or geo-spatial coordinate location information to a particular ESZ.
<i>Emergency Service Zone Routing Data Base (ERDB)</i>	The ERDB contains routing information associated with each Emergency Service Zone (ESZ) in a serving area. It supports the boundary definitions for ESZs and the mapping of civic address or geo-spatial coordinate location information to a particular ESZ.
<i>Emergency Services Interconnection Forum (ESIF)</i>	An open, technical/operational forum, under the auspices of the Alliance For Telecommunications Industry Solutions, with the voluntary participation of interested parties to identify and resolve recognized 9-1-1 interconnection issues.
<i>Emergency Services IP Network (ESInet)</i>	An ESInet is a managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core functional processes can be deployed, including, but not restricted to, those necessary for providing NG9-1-1 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national and international levels to form an IP-based inter-network (network of networks).

Term	Definition
<i>Emergency Services Query Key (ESQK)</i>	The ESQK identifies a call instance at a VPC, and is associated with a particular SR/ESN combination. The ESQK is delivered to the E9-1-1 SR and as the calling number/ANI for the call to the PSAP. The ESQK is used by the SR as the key to the Selective Routing data associated with the call. The ESQK is delivered by the SR to the PSAP as the calling number/ANI for the call, and is subsequently used by the PSAP to request ALI information for the call. The ALI database includes the ESQK in location requests sent to the VPC. The ESQK is used by the VPC as a key to look up the location object and other call information associated with an emergency call instance.
<i>Emergency Services Routing Digit (ESRD)</i>	Either a 10-digit North American Numbering plan or non-NANPA number that uniquely identifies a base station, cell site, or sector that is used to route wireless emergency calls through the network. The ESRD may also be used to retrieve the associated ALI data with the call. These numbers can be dialable or non-dialable.
<i>Emergency Services Routing Key (ESRK)</i>	Either a 10-digit North American Numbering plan or non-NANPA number that uniquely identifies a wireless emergency call, is used to route the call through the network, and used to retrieve the associated ALI data. These numbers can be dialable or non-dialable.
<i>Emergency Services Routing Number (ESRN)</i>	The ESRN is used by the Call Server/Routing Proxy to route an emergency call to the correct ESGW, and by the ESGW to select the desired path to the appropriate SR for the call.
<i>Emergency Services Routing Proxy (ESRP)</i>	An i3 functional element which is a SIP proxy server that selects the next hop routing within the ESInet based on location and policy. There is an ESRP on the edge of the ESInet. There is usually an ESRP at the entrance to an NG9-1-1 PSAP. There may be one or more intermediate ESRPs between them.
<i>Enhanced 9-1-1 (E9-1-1)</i>	A telephone system which includes network switching, data base and Public Safety Answering Point premise elements capable of providing automatic location identification data, selective routing, selective transfer, fixed transfer, and a call back number. The term also includes any enhanced 9-1-1 service so designated by the Federal Communications Commission in its Report and Order in WC Docket Nos. 04-36 and 05-196, or any successor proceeding.
<i>Gateway</i>	The Point at which a circuit-switched call is encoded and repackaged into IP packets – Equipment that provides interconnection between two networks with different communications protocols.
<i>Geocoding</i>	Translation of one form of location into another, typically a civic address into an x, y coordinate.
<i>Geographic Information System (GIS)</i>	A computer software system that enables one to visualize geographic aspects of a body of data. It contains the ability to translate implicit geographic data (such as a street address) into an explicit map location. It also can be used to graphically display coordinates on a map i.e. Latitude/Longitude.
<i>Geo Location</i>	Latitude, longitude, elevation, and the datum which identifies the coordinate system used.
<i>Geospatial</i>	Data accurately referenced to a precise location on the earth's surface.
<i>GIS (Geographic Information System)</i>	A system for capturing, storing, displaying, analyzing and managing data and associated attributes which are spatially referenced.
<i>Global Positioning System (GPS)</i>	A satellite based Location Determination Technology (LDT).

Term	Definition
<i>Global Standard for Mobile Communications (GSM)</i>	International standard digital radio interface utilized by some North American PCS carriers.
<i>IP Public Safety Answering Point (i3 PSAP)</i>	A PSAP that is capable of receiving IP-based signaling for delivery of emergency calls and for originating calls and is conformant to NENA specifications for such PSAPs.
<i>Implementation and Coordination Office (ICO)</i>	National 9-1-1 Implementation Coordination Office, also known as the National 9-1-1, jointly operated by NHTSA and the National Telecommunication Information Administration which was created and funded by the ENHANCE 9-1-1 Act of 2004. (http://www.e-911ico.gov)
<i>Instant Messaging (IM)</i>	A method of communication generally using text where more than a character at a time is sent between parties nearly instantaneously
<i>Institute of Electrical and Electronic Engineers (IEEE)</i>	A publishing and standards making body responsible for many telecom and computing standards.
<i>Integrated Services Digital Network (ISDN)</i>	International standard for a public communication network to handle circuit-switched digital voice, circuit-switched data, and packet-switched data.
<i>Internet Engineering Task Force (IETF)</i>	Lead standard setting authority for internet protocols.
<i>Internet Protocol (IP)</i>	The method by which data is sent from one computer to another on the Internet or other networks.
<i>Internet Protocol Access Network (IP Access Network)</i>	The network in which the first IP address is assigned to an end-point. For residential networks the creation and supply of an access network may require the cooperation of several different providers.
<i>Internet Protocol Address (IP Address)</i>	A 32-bit address assigned to hosts using TCP/IP. An IP address belongs to one of five classes (A, B, C, D, or E) and is written as 4 octets separated by periods (dotted decimal format). Each address consists of a network number, an optional sub network number, and a host number. The network and sub network numbers together are used for routing, while the host number is used to address an individual host within the network or sub network.
<i>Internet Protocol-Connectivity Access Network (IP-CAN)</i>	The collection of network entities and interfaces that provides the underlying IP transport connectivity between the user endpoint and the IMS entities.
<i>Internet Protocol Multimedia Subsystem (IMS)</i>	The IP Multimedia Subsystem comprises all 3GPP/3GPP2 core network elements providing IP multimedia services comprising audio, video, text, chat, etc. and a combination of any or all of them delivered over the packet switched domain.
<i>Internet Protocol Relay Service (IP Relay Service)</i>	A call center service similar to VRS that provides a third party communications relay between Internet texting users (mobile or stationary) and voice telephone users.
<i>Internet Protocol Telephony (IP Telephony)</i>	A general term for the technologies that use the IP's packet-switched connections to exchange voice, fax, and other forms of information that have traditionally been carried over the dedicated Circuit-Switched (CS) connections of the PSTN. The IP address may change each time the user logs on.
<i>Internet Service Provider (ISP)</i>	Company that provides Internet access to other companies and individuals
<i>Jurisdiction</i>	A government agency that has contracted for Enhanced 9-1-1 service. This may be a county, a city, a COG, or a 9-1-1 Area.

Term	Definition
<i>Legacy Gateway</i>	A signaling and media interconnection point between callers in legacy wireline/wireless origination networks and the i3 architecture, so that i3 PSAPs are able to receive emergency calls from such legacy networks.
<i>Legacy PSAP</i>	A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of CAMA or ISDN trunk technology for delivery of 9-1-1 emergency calls
<i>Legacy PSAP Gateway (LPG)</i>	An NG9-1-1 Functional Element which provides an interface between an ESInet and an un-upgraded PSAP
<i>Local Access and Transport Area (LATA)</i>	The geographical areas within which a local telephone company offers telecommunications services.
<i>Local Area Network (LAN)</i>	A transmission network encompassing a limited area, such as a single building or several buildings in close proximity.
<i>Local Exchange Carrier (LEC)</i>	A Telecommunications Carrier (TC) under the state/local Public Utilities Act that provide local exchange telecommunications services. Also known as Incumbent Local Exchange Carriers (ILECs), Alternate Local Exchange Carriers (ALECs), Competitive Local Exchange Carriers (CLECs), Competitive Access Providers (CAPs), Certified Local Exchange Carriers (CLECs), and Local Service Providers (LSPs).
<i>Location</i>	In the context of location information to support IP based emergency services: The physical position of VoIP end-point expressed in either civic or geodetic form. A spot on the planet where something is; a particular place or position. Oxford Dictionary, Oxford University Press, 2009.
<i>Location Information Server (LIS)</i>	A Location Information Server (LIS) is a functional entity that provides locations of endpoints. A LIS can provide Location-by-Reference, or Location-by-Value, and, if the latter, in geo or civic forms. A LIS can be queried by an endpoint for its own location, or by another entity for the location of an endpoint. In either case, the LIS receives a unique identifier that represents the endpoint, for example an IP address, circuit-ID or MAC address, and returns the location (value or reference) associated with that identifier. The LIS is also the entity that provides the dereferencing service, exchanging a location reference for a location value.
<i>Location Interwork Function (LIF)</i>	The functional component of a Legacy Network Gateway which is responsible for taking the appropriate information from the incoming signaling (i.e., calling number/ANI, ESRK, cell site/sector) and using it to acquire location information that can be used to route the emergency call and to provide location information to the PSAP. In a Legacy PSAP Gateway, this functional component takes the information from an ALI query and uses it to obtain location from a LIS.
<i>Location to Service Translation (LoST) Protocol</i>	A protocol that takes location information and a Service URN and returns a URI. Used generally for location-based call routing. In NG9-1-1, used as the protocol for the ECRF and LVF.
<i>Location URI</i>	A URI which, when de-referenced, yields a location value in the form of a PIDF-LO. Location-by-reference in NG9-1-1 is represented by a Location URI.
<i>Location Validation</i>	Refers to the action of ensuring that a civic address can be used to discern a route to a PSAP.
<i>Mapping</i>	The act of determining a value in one domain from a value in another domain. For example, mapping a location to the URI of a PSAP that serves that location using the LoST protocol.

Term	Definition
<i>Master Street Address Guide (MSAG)</i>	A data base of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.
<i>Media Gateway Control Protocol (MGCP)</i>	In computing, MGCP is a protocol used within a Voice over IP system. MGCP is an internal protocol used within a distributed system that can appear to the outside world as a single VoIP gateway. This system is composed of a Call Agent, at least one “media gateway” (MG) that performs the conversion of media signals between circuits and packets, and at least one “signaling gateway” (SG) when connected to the PSTN.
<i>MESSAGE</i>	A SIP method which passes information, often an Instant Message, between endpoints in the body of the SIP message
<i>Mobile</i>	In the context of location information to support IP based emergency services: A user is said to be mobile if they are able to change access points while preserving all existing sessions and services regardless of who is providing the access network, and their location may be definitively represented by a geographic co-ordinates but only indicatively represented by a civic address.
<i>Mobile Position Center (MPC)</i>	The MPC serves as the point of interface to the ANSI wireless network for the Emergency Services Network. The MPC serves as the entity which retrieves, forwards, stores and controls position data within the location network.
<i>Mobile Switching Center (MSC)</i>	The wireless equivalent of a Central Office, which provides switching functions from wireless calls.
<i>National Emergency Number Association (NENA)</i>	The National Emergency Number Association is a not-for-profit corporation established in 1982 to further the goal of “One Nation-One Number.” NENA is a networking source and promotes research, planning and training. NENA strives to educate, set standards and provide certification programs, legislative representation and technical assistance for implementing and managing 9-1-1 systems.
<i>Network Layers Model</i>	The OSI, or Open System Interconnection, model defines a networking framework for implementing protocols in seven layers. Control is passed from one layer to the next, starting at the application layer in one station, and proceeding to the bottom layer, over the channel to the next station and back up the hierarchy. In ascending order the layers are: physical, data link, network, transport, session, presentation, and application.
<i>Network Layer Security</i>	This is security deployed by layer 3 devices that prevent attacks aimed at terminating network services. This includes firewalls, ACL’s and other network related devices and techniques for threat mitigation.
<i>Network Location Determination</i>	In the context of location information to support IP based emergency services: Refers to the mechanism and data that a network entity can use to ascertain the whereabouts of a terminal in the access network such that the location can be specified in a valid PPDF-LO.
<i>Next Generation 9-1-1 (NG9-1-1)</i>	NG9-1-1 is an IP-based system comprised of managed IP-based networks (ESInets), functional elements (applications), and databases that replicate traditional E9-1-1 features and functions and provide additional capabilities. NG9-1-1 is designed to provide access to emergency services from all connected communications sources, and provide multimedia data capabilities for PSAPs and other emergency service organizations.

Term	Definition
<i>NG9-1-1 Specific Interwork Function (NIF)</i>	The functional component of a Legacy Network Gateway or Legacy PSAP Gateway which provides NG9-1-1-specific processing of the call not provided by an off-the-shelf protocol interwork gateway.
<i>Nomadic</i>	In the context of location information to support IP based emergency services: A user is said to be nomadic if they are constrained within an access network such that their location can be represented as a definitive civic address for that network attachment. The user may move from one network attachment to another but cannot maintain a session during that move. If the user is able to move outside the definitive civic address without losing network attachment then the user is considered to be mobile, not nomadic.
<i>Nomadic VoIP Call</i>	Call generated by a VoIP user other than their originally provisioned fixed location using the terminal equipment from that location (i.e.: VoIP handset, laptop, VoIP terminal, PC).
<i>Origination Network</i>	The network which originates a 9-1-1 call. Includes the access network and the calling network. Typically operated by carriers or other service providers.
<i>Packet</i>	Logical grouping of information that includes a header containing control information and (usually) user data. Packets are most often used to refer to network layer units of data.
<i>Packet-Switched Data Networks</i>	In telecommunications, packet-switching is now-dominant communications paradigm, in which packets (units of information carriage) are individually routed between nodes over data links which might be shared by many other nodes. In packet switched networks, such as the Internet, the data is split up into packets, each labeled with the complete destination address and routed individually.
<i>Presence Information Data Format (PIDF)</i>	The Presence Information Data Format is specified in IETF RFC 3863; it provides a common presence data format for Presence protocols, and also defines a new media type. A presence protocol is a protocol for providing a presence service over the Internet or any IP network.
<i>Presence Information Data Format – Location Object (PIDF-LO)</i>	Provides a flexible and versatile means to represent location information in a SIP header using an XML schema.
<i>Protocol</i>	A set of rules or conventions that govern the format and relative timing of data in a communications network. There are three basic types of protocols: character-oriented, byte-oriented, and bit-oriented.
<i>Protocol Interworking Function (PIF)</i>	That functional component of a Legacy Network Gateway or Legacy PSAP Gateway that interworks legacy PSTN signaling such as ISUP or CAMA with SIP signaling.
<i>Provisioning Service provider (PSP)</i>	The component in an ESI-net functional element that implements the provider side of a SPML interface used for provisioning
<i>Proxy</i>	An entity in a call path that is an intermediary, and not an endpoint.
<i>Proxy Call Session Control Function (P-CSCF)</i>	The P-CSCF is the first contact point for the user equipment (UE) within the IMS core network. For an IMS-based emergency call, the P-CSCF detects the emergency call and forwards it to an E-CSCF.

Term	Definition
<i>Proxy or Proxy Server/Policy and Routing Server</i>	“A policy and routing server in the context of SIP is a proxy server, an intermediary entity that acts as both a server and a client for the purpose of making requests on behalf of other clients. A proxy server primarily plays the role of routing, which means its job is to ensure that a request is sent to another entity “closer” to the targeted user. Proxies are also useful for enforcing policy (for example, making sure a user is allowed to make a call). A proxy interprets, and, if necessary, rewrites specific parts of a request message before forwarding it.” (Refer to IETF RFC 3261[5].) It can be a policy/routing element in other protocols.
<i>Public Agency</i>	A state or any unit of local government or special purpose district located in whole or in part within a state, which provides police, fire-fighting, medical or other emergency services or has authority to do so.
<i>Public Safety Agency</i>	An entity that provides fire fighting, law enforcement, emergency medical or other emergency service.
<i>Public Safety Answering Point (PSAP)</i>	Public Safety Answering Point (PSAP): An entity operating under common management which receives 9-1-1 calls from a defined geographic area and processes those calls according to a specific operational policy.
<i>Quality of Service (QoS)</i>	As related to data transmission a measurement of latency, packet loss and jitter.
<i>Real Time Protocol (RTP)</i>	An IP protocol used to transport media (voice, video, text) which has a real time constraint.
<i>Real Time Text (RTT)</i>	Text transmission that is character at a time, as in TTY.
<i>Real-time Transport Control Protocol (RTCP)</i>	RTCP is a sister protocol of RTP and provides out-of-band control information for an RTP flow. It partners RTP in the delivery and packaging of multimedia data, but does not transport any data itself. It is used periodically to transmit control packets to participants in a streaming multimedia session. The primary function of RTCP is to provide feedback on the quality of service being provided by RTP.
<i>Real-Time Transport Protocol (RTP)</i>	A network protocol used to carry packetized audio and video traffic over an IP network that helps ensure that packets get delivered in a timely way.
<i>Router</i>	An intelligent device that forwards data packets from one local area network (LAN) to another and that selects the most expedient route based on traffic load, line speeds, costs, or network failures to complete the call
<i>Selective Router</i>	(see Enhanced 9-1-1 Control Office)
<i>Selective Routing (SR)</i>	The process by which 9-1-1 calls/messages are routed to the appropriate PSAP or other designated destination, based on the caller’s location information, and may also be impacted by other factors, such as time of day, call type, etc. Location may be provided in the form of an MSAG-valid civic address or in the form of geo coordinates (longitude and latitude).
<i>Selective Routing Data Base (SRDB)</i>	The routing table that contains telephone number to ESN relationships which determines the routing of 9-1-1 calls.
<i>Session Border Control</i>	A commonly available functional element that provides security, NAT traversal, protocol repair and other functions to VoIP signaling such as SIP. A component of a Border Control Function

Term	Definition
<i>Session Initiation Protocol (SIP)</i>	An IETF defined protocol (RFC3261) that defines a method for establishing multimedia sessions over the Internet. Used as the call signaling protocol in VoIP, i2 and i3
<i>Short Message Service (SMS)</i>	A service typically provided by mobile carriers that sends short (160 characters or fewer) messages to an endpoint. SMS is often fast, but is not real time.
<i>Simple Network Management protocol (SNMP)</i>	A protocol defined by the IETF used for managing devices on an IP network.
<i>Simple Network Time Protocol (SNTP)</i>	A utility for synchronizing system clocks over a TCP/IP network. This protocol is similar to NTP and is used when the ultimate performance of the full NTP implementation is not needed.
<i>Spatial</i>	Relating to, occupying, or having the character of space. Geographic Information Systems store spatial data in regional databases. See Geospatial.
<i>Standards Development Organization (SDO)</i>	An entity whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting, or otherwise maintaining standards that address the interests of a wide base of users outside the standards development organization.
<i>Stream Control Transport Protocol (SCTP)</i>	SCTP is defined by IETF RFC2960 as the transport layer to carry signaling messages over IP networks.
<i>Synchronous Optical NETWORK (SONET)</i>	High speed digital transport over fiber optic networks using synchronous protocol.
<i>TDD/TTY Detector</i>	Any device that automatically detects TDD/TTY tones and audibly and/or visually notifies the call-taker.
<i>Telecommunications Device for the Deaf (TDD)</i>	Also known as TTY. (see Teletypewriter (TTY))
<i>Telecommunications Industry Association (TIA)</i>	A lobbying and trade association, the result of the merger of the USTA (United States Telephone Association) and the EIA (Electronic Industries Association).
<i>Telecommunications Relay Service (TRS)</i>	A federally mandated service provided by states that provides communication relay between TTY users and voice telephone users, via a third party, for communications assistance.
<i>Telecommunications Service Provider (TSP)</i>	A business that provides voice or data transmission services. These services are provided over a telecommunications network that transmits any combination of voice, video and/or data between users. A TSP could be, but is not limited to, a Local Exchange Carrier (LEC), a wireless telecommunications provider, a Commercial Mobile Radio Service provider, or a PBX service provider.
<i>Teletypewriter (TTY)</i>	Also known as TDD. A device capable of information interchange between compatible units using a dial up or private-line telephone network connections as the transmission medium. ASCII or Baudot codes are used by these units. (per EIA PN-1663)
<i>Text Telephone</i>	Another term for TDD/TTY

Term	Definition
<i>Third Generation Partnership Project 2 (3GPP2)</i>	A collaborative third generation (3G) telecommunications specifications-setting project comprised of interests from the Americas and Asia developing global specifications for Mobile Application Protocol (MAP) “Wireless Radio-telecommunication Intersystem Operations” network evolution to 3G. The project is focused on global specifications for the radio transmission technologies supported by MAP and the wireless IP core networks, together known as the cdma2000® family of standards.
<i>Transmission Control Protocol (TCP)</i>	A communications protocol linking different computer platforms across networks. TCP/IP functions at the 3 rd and 4 th levels of the open system integration model.
<i>Transmission Control Protocol/Internet Protocol (TCP/IP)</i>	A layered set of protocols used to connect dissimilar computers together. The TCP part of this provides the transport service required by the application layer. The IP part of this provides the service user to deliver the datagram to its destination.
<i>Transport Control Protocol (TCP)</i>	The end-to-end reliability protocol that recognizes and corrects lower layer errors caused by connectionless networks.
<i>Video Relay Service (VRS)</i>	A service provided by common carriers and other vendors that provides third party communication relay between video telephone users using Internet connections and videophone or webcam and voice telephone users.
<i>Voice over Internet Protocol, Voice over IP (VoIP)</i>	Provides distinct packetized voice information in digital format using the Internet Protocol. The IP address assigned to the user’s telephone number may be static or dynamic.
<i>Voice over the Internet</i>	Transmit voice with varying consistency depending on overall traffic and engineering of the Internet circuits.
<i>Voice Service Provider (VSP)</i>	Operates the network equipment that provides call processing for Voice over Internet Protocol subscribers.
<i>VoIP Positioning Center (VPC)</i>	The VoIP Positioning Center (VPC) is the element that provides routing information to support the routing of VoIP emergency calls, and cooperates in delivering location information to the PSAP over the existing ALI DB infrastructure.
<i>Wide Area Network (WAN)</i>	Network using common carrier-provided lines that covers and extended geographical area.
<i>Wireless Service Provider (WSP)</i>	Cellular, satellite or other radio based telephony or data transport commercial entity.
<i>Working Group (WG)</i>	A group of people formed to discuss and develop a response to a particular issue. The response may result in a Standard, an Information Document, Technical Requirements Document or Liaison.
<i>X,y</i>	Shorthand expression for coordinates that identify a specific location in two dimensions representing latitude and longitude.

Appendix C: System Management Impacts and Interdependencies

Checklist

<u>Matters</u>	<u>E9-1-1 to NG9-1-1</u>
<input type="checkbox"/> Inbound PSTN emergency 10-digit lines	No change or modified
<input type="checkbox"/> Inbound PSTN non-emergency 10-digit lines	No change or modified
<input type="checkbox"/> Outbound PSTN lines	No change or modified
<input type="checkbox"/> 9-1-1 Network	SR tandem, IPSR, ESInet; tariffs, contracts, and applicable regulations
<input type="checkbox"/> Connection to 9-1-1 Network	CAMA, SS7, ISDN, MPLS, SIP; tariffs, contracts, and applicable regulations
<input type="checkbox"/> Database Management	Legacy MSAG & ALI, GIS, ESRP, ECRF, LVF; tariffs, contracts, and regulations
<input type="checkbox"/> Mapping/GIS	Local, Regional, Statewide, Sharing and Distribution; public information and retention
<input type="checkbox"/> Connection to Database Management	Legacy MSAG & ALI, GIS, ESRP, ECRF, LVF; tariffs, contracts, and regulations
<input type="checkbox"/> Automatic Call Distribution	Stand-alone, Hosted, ESInet
<input type="checkbox"/> Customer Premise Equipment	Stand-alone, Hosted, ESInet
<input type="checkbox"/> Computer Aided Dispatch	Stand-alone, Hosted, ESInet
<input type="checkbox"/> Local Gov't PSAPs	Training, equipment, personnel, funding
<input type="checkbox"/> Regional Gov't PSAPs	Training, equipment, personnel, funding
<input type="checkbox"/> Federal Gov't and Military Base PSAPs	Training, equipment, personnel, funding
<input type="checkbox"/> Private PSAPs	Training, equipment, personnel, funding
<input type="checkbox"/> Management and Coordination Entities	World and national, federal, state, regional, local,
<input type="checkbox"/> Sources of Policy Rules	Standards, best practices, contracts, regulations, laws
<input type="checkbox"/> Personnel Selection and Hiring	Standards, best practices, contracts, regulations, laws
<input type="checkbox"/> Operations and Call-Taker Training	Standards, best practices, contracts, regulations, laws
<input type="checkbox"/> Public Education	Standards, best practices, contracts, regulations, laws
<input type="checkbox"/> Incoming Certification Authorization Process	PUC, FCC, state, region, local, standards
<input type="checkbox"/> Across Certification Authorization Process	Statutes, ordinances, Interlocals, practices, standards
<input type="checkbox"/> Outgoing Certification Authorization Process	Statutes, ordinances, Interlocals, practices, standards
<input type="checkbox"/> Special IP Security and Access Issues	Special procedures to handle potentially dangerous requests
<input type="checkbox"/> Incoming Requirements Process	PUC, FCC, state, region, local, standards
<input type="checkbox"/> Across Requirements Process	PUC, FCC, state, region, local, standards
<input type="checkbox"/> Outgoing Requirements Process	statutes, ordinances, Interlocals, practices, standards
<input type="checkbox"/> Wireline Access (including PBX)	Point(s) of Interconnection
<input type="checkbox"/> Wireless Access	Point(s) of Interconnection
<input type="checkbox"/> VoIP Access (including PBX)	Point(s) of Interconnection
<input type="checkbox"/> Telematics Access	Point(s) of Interconnection
<input type="checkbox"/> Voice Calls	TDM, SIP

<u>Matters</u>	<u>E9-1-1 to NG9-1-1</u>
<input type="checkbox"/> Text Messaging	SMS, RTT, primary, supplemental, downstream
<input type="checkbox"/> Image	Primary, supplemental, downstream, interoperability
<input type="checkbox"/> Video	Primary, supplemental, downstream, interoperability
<input type="checkbox"/> Dispatch	Stand-alone, ESInet, downstream, Interoperability
<input type="checkbox"/> Radio	Stand-alone, ESInet, downstream, Interoperability
<input type="checkbox"/> Police, Fire, EMS	Stand-alone, ESInet, downstream, Interoperability
<input type="checkbox"/> Response Vehicles	Stand-alone, ESInet, downstream, Interoperability
<input type="checkbox"/> Emergency Notification Systems	Stand-alone, ESInet, downstream, Interoperability
<input type="checkbox"/> Sensors & Alarms	Stand-alone, ESInet, downstream, Interoperability
<input type="checkbox"/> Human-machine interface (HMI)	Primary, supplemental, downstream, interoperability
<input type="checkbox"/> Recording System	New laws and issues to consider
<input type="checkbox"/> Record Retention	New laws and issues to consider
<input type="checkbox"/> Highly Sensitive Medical or other Data	New laws and issues to consider
<input type="checkbox"/> Confidentiality & Public Information Requests	New laws and issues to consider
<input type="checkbox"/> Disaster and Contingency Planning	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Operational Changes	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Interoperability Changes	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Demarcation Changes	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Responsibility Changes	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Accountability Changes	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Coordination Changes	Contractual, functional, operational, regulatory, statutory
<input type="checkbox"/> Vendor Changes	ILEC, LEC, deregulated, non-regulated, government contracts
<input type="checkbox"/> Funding Process Changes	Federal, state, regional, local, private parties
<input type="checkbox"/> Payment Process Changes	Federal, state, regional, local, private parties
<input type="checkbox"/> Contractual Process Changes	Federal, state, regional, local, private parties
<input type="checkbox"/> Escalation Process Changes	Federal, state, regional, local, private parties
<input type="checkbox"/> Dispute Resolution Changes	Standards, mediator, arbitration, regulatory courthouse
<input type="checkbox"/> Regulatory Changes	Tariff & Interconnection, Commercial & Contract, Fed or State
<input type="checkbox"/> Legal Changes	Authorities, entities, responsibilities, requirements, attorneys
<input type="checkbox"/> Moot Issues	
<input type="checkbox"/> New Issues	

Appendix D: System Functional Requirements

NG9-1-1 is a large and complex undertaking with many functional elements compared to traditional 9-1-1 call processing. There are several distinct approaches to establishing an NG9-1-1 system and it is expected that each state, region, county and agency will take a path based on their readiness, needs, available solutions, budget, perceived value, governance, and business environment. Various functions are required to implement an NG9-1-1 system as currently envisioned. The Functional Elements are primarily linked together by an IP network transport foundation that stretches between Ingress traffic points, egress traffic points and application processing elements. Ingress and egress traffic points exist for call traffic but can also be established for supporting data and enhanced services.

The following functional capabilities are realized through one or more functional processing elements:

- Functional elements that handle foundation data that enables NG9-1-1 processing logic and often provision real time call processing elements. Foundation data includes, but is not limited to, GIS with additional data elements specific to public safety services.
- Accept IP ingress traffic
- Accept Legacy TDM ingress traffic
- Call control including determining and routing to the appropriate call handling destination
- Manage destination readiness and status through policy functions and determine alternate destinations as appropriate
- Deliver calls to IP PSAPs
- Deliver calls to legacy PSAPs
- Interoperate (call hand-off and transfer) with legacy Selective Routers (ingress and egress) serving neighboring PSAPs
- Interoperate with legacy ALI (ingress and egress) serving neighboring 9-1-1 PSAPs
- Determine emergency service providers such as Police, Fire, and Medical emergency responders
- Interoperate with other ESInets and NG9-1-1 systems (ingress and egress)
- A service that allows originating service providers to validate their own location information.
- A service that allows originating service providers to determine the geographic area (e.g., appropriate ESInet) that should receive their 9-1-1 request for assistance traffic
- Provide additional data from data sources to data consumers. The Additional Data Sources can exist either within or external to the NG9-1-1 related network itself.
- There can be numerous functional elements that contribute to solution management, logging, provisioning, alarms, security, trouble shooting, and reports.
- Agencies can prepare to realize a full NG9-1-1 system by starting on one or more of the four foundation elements:
 - 1 Establish the foundation IP transport network
 - 2 Convert legacy PSAPs to IP enabled PSAPs
 - 3 Convert legacy selective routing to an IP application server environment
 - 4 Prepare GIS based data as a basis to perform call routing and retire current

SRDB/ESN/MSAG approaches

After establishing one or more of the above foundation elements, or in parallel with one or more of the foundation elements, the agency can implement either the initial approach below, followed by the i3 based system, or move directly to the NENA i3 based system:

- An IP Selective Router (IPSR) which utilizes the IP transport network and an IP application server environment but continues to utilize a legacy SRDB and ESNs for routing and selective transfer functions. This step is often combined with transporting legacy ALI information to PSAPs over the high speed network transport versus legacy data communication links. This step requires implementation of the i3 LNG PIF and LNG NIF functions to perform protocol conversion of ingress traffic from TDM to IP protocols. This step can be combined with either CAMA PSAPs or IP PSAPs via the RFAI protocol.
- Geographic-based routing utilizing i3 ESRP and ECRF functional elements utilizing the IP transport network and an IP application server environment. This step requires the implementation of i3 LNG and LSRG functions. This step can be implemented with either CAMA PSAPs via the i3 LPG or IP PSAPs.
 - Agencies should consider a two step approach where they implement wireline and fixed location VoIP calls followed by wireless.
 - Wireline has straightforward location information that can be used within the ECRF to determine routing. There are on-going discussions regarding MSAG valid addresses versus Civic addresses that must be considered on a regional basis depending on local addressing standards.
 - Wireless calls are still problematic in terms of the timing of location information availability and the gross location information that is provisioned and maintained in legacy databases. Wireless location information for call routing and NG9-1-1 is a current topic in standards forums.
- Policy Routing functions where rules can be setup based on the determined call handling destination to override or further determine call routing treatment can be implemented with either an ESRP or IPSR.
- Agencies need to consider their transitional strategies from legacy approaches to NG9-1-1 based on their scope, number of PSAPs and data readiness to derive a dual operating model or flash cut-over.
- Deliver additional data and services. Once the IP network transport is established to IP PSAPs additional protocols can be deployed that enable a wide range of information sources and collaboration based services.
- Neighboring NG9-1-1 or legacy Selective Router interoperability to hand-off call traffic for routing and call transfer between neighboring PSAPs supported by different 9-1-1 systems. An NG9-1-1 deployment usually requires interoperability with a neighboring agency to get certain calls to the agency that can dispatch emergency services.
- IP PSAP eliminating legacy PSAP CAMA TDM trunks with IP protocols. This step can be combined with an IPSR if the agency wishes to continue implementing ESN based routing and selective transfer or with an ESRP/ECRF if the agency is ready to implement GIS based functions.
- An IP PSAP's ability to determine emergency service responders such as Police, Fire, Medical emergency responders and Poison Control based on call location and geographic

service boundaries utilizing an i3 ECRF and a LoST protocol interface.

- A location validation function for originating service providers to validate their location information should be made available by an agency as soon as carriers indicate their commitment to utilize such services. An LVF is dependent on suitable GIS information and enables retirement of legacy MSAG techniques.
- An agency can begin accepting ingress IP traffic when one or more originating service providers serving their area are prepared to deliver Ingress IP traffic. The NENA i3 post-transition model expects the originating service provider will deliver the caller's location information at call setup time, enable the retirement of the LNG function(s) and enable routing based on location.

Functional elements can reside in various places depending on the implementation approach and business dynamic. It is generally accepted that the ESRP and ECRF that replace legacy call processing Selective Routers will reside within the NG9-1-1 network supporting multiple agencies. The i3 model also defines ECRF elements that are public internet accessible to allow for originating service providers to determine the geographically appropriate ESInet and NG9-1-1 system to send calls to, for NG9-1-1 routing to the appropriate PSAP.

- Gateway functions
The LNG and LSRG functions can reside in either the origination network or the NG9-1-1 Network depending on various factors. The LPG can reside in either the NG9-1-1 Network or the IP PSAP local network.
- Location information data stores are assumed to reside within the Access Networks but location information is also assumed to reside within the NG9-1-1 system during transition periods to a pure i3 model.
- The location validation function is assumed to exist within the NG9-1-1 network. However the i3 model assumes the GIS data used to perform validation can be distributed to ECRFs and LVFs outside the agencies NG9-1-1 network domain and therefore the LVF function could also reside in an origination network or a public network.
- Logging, security, provisioning, trouble shooting, monitoring and related management platforms are expected to reside in all NG9-1-1 networks and associated networks.