

Attachment F - Glossary of Terms

<http://www.infodiv.unimelb.edu.au/knowledgebase/>

<http://www.ietf.org/html.charters/ecrit-charter.html>

[NENA i3 Glossary](#)

[Newton's Telecom Dictionary Revision 22](#)

Class of Service (CoS) - NENA Definition - A designation of the type of telephone service, e.g., residential, business, centrex, coin, PBX, wireless.

Class of Service (CoS) - The definition for packet switched networks used by VoIP and other packet technology. Networks, by design, typically provide best-effort delivery. Networks use CoS and quality of service (QoS) to manage traffic control. In an enterprise the different types of data that will transverse the network have different priorities. In an enterprise network, CoS differentiates high-priority traffic from lower-priority traffic. Tags may be added to the packets to identify such classes, but they do not guarantee delivery as do QoS functions, which are implemented in the network devices.

CoS is a way of managing traffic in a network by grouping similar types of traffic (i.e., e-mail, streaming video, voice, large document file transfer) together and treating each type as a class with its own level of service priority. Unlike QoS traffic management, CoS technologies do not guarantee a level of service in terms of bandwidth and delivery time; they offer a "best-effort." On the other hand, CoS technology is simpler to manage and more scalable as a network grows in structure and traffic volume. One can think of CoS as "coarsely-grained" traffic control and QoS as "finely-grained" traffic control.

As networks have been more complex, managing CoS at the router level has become very complex. MPLS provides the ability to provide finer-grain CoS capabilities at the network level through expanded tagging capabilities.

Emergency Services IP Network (ESInet) - An IP-based inter-network (network of networks).

Geographic Information System (GIS) - 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 has the ability to query and analyze data in order to receive the results in the form of a map. It also can be used to graphically display coordinates on a map, i.e., latitude/longitude from a wireless 9-1-1 call.

Internet Protocol (IP) - The method by which data is sent from one computer to another on the Internet or other networks. IP is the IP part of TCP/IP family of protocols describing software that tracks the internet addresses of nodes, routes outgoing messages, and recognizes incomplete messages. IP is used in gateways to connect networks to the OSI network level 3 and above.

Jitter - Packets arriving at a non consistent rate due to a type of distortion caused by the variation of a signal from its reference that can cause data transmission errors, particularly at high speeds.

In voice over IP (VoIP), jitter is the variation in the time between packets arriving, caused by network congestion, timing drift, or route changes.

Mean Opinion Score (MOS) - A measurement of the subjective quality of human speech, represented as a rating index. MOS is derived by taking the average of numerical scores given by juries to rate quality and using it as a quantitative indicator of system performance. In multimedia (audio, voice telephony, or video) especially when codecs are used to compress the bandwidth requirement (for example, of a digitized voice connection from the standard 64 kilobit/second PCM modulation), the MOS provides a numerical indication of the perceived quality of received media after compression and/or transmission. The MOS is expressed as a single number in the range 1 to 5, where 1 is lowest perceived audio quality, and 5 is the highest perceived audio quality measurement.

The MOS is generated by averaging the results of a set of standard, subjective tests where a number of listeners rate the heard audio quality of test sentences read aloud by both male and female speakers over the communications medium being tested. A listener is required to give each sentence a rating using the following rating scheme:

Mean Opinion Score (MOS)		
MOS	Quality	Impairment
5	Excellent	Imperceptible
4	Good	Perceptible but not annoying
3	Fair	Slightly annoying
2	Poor	Annoying
1	Bad	Very annoying

The MOS is the arithmetic mean of all the individual scores, and can range from 1 (worst) to 5 (best).

A similar process can be used to evaluate subjective video quality. A drawback of obtaining MOS estimations is that it may be more time-consuming and expensive as it requires hiring experts to make estimations. When a voice coding system is under development, or the developer has to test and compare a couple of audio systems, it's very important to have a possibility for a quick check.

Some suitable English-language phrases used for determining a MOS as suggested by ITU-T recommendation P.800 are:

- You will have to be very quiet.
- There was nothing to be seen.
- They worshipped wooden idols.
- I want a minute with the inspector.
- Did he need any money?

Master Street Address Guide (MSAG) - 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.

Mean Time Between Failure (MTBF) - MTBF is the arithmetic mean (average) time between failures of a system. The MTBF is typically part of a model that assumes the failed system is immediately repaired (zero elapsed time), as a part of a renewal process. This is in contrast to the mean time to failure (MTTF), which measures average time between failure with the modeling assumption that the failed system is not repaired.

Mean Time to Repair (MTTR) Rating - Basic measure of the maintainability of repairable items, it represents the arithmetic mean (average) time required to repair a failed component or device.

Multi-Protocol Label Switching (MPLS) - A mechanism that allows network administrators to perform a measure of traffic engineering within their networks.

MPLS is a data packet forwarding technology with improved forwarding speed of routers by using labels to make data forwarding decisions. When the data enters the first MPLS router, header analysis is done just once and a label is attached to the data packet. Subsequent routers forwards the packet by just inspecting the label and so it decreases the forwarding overhead on the subsequent core routers. IP packets have a field in their header that contains the address to which the packet is to be routed. Traditional routed networks process this information at every router in a packet's path through the network. This is not so in MPLS, where a label acts as a shorthand representation of an IP packet's header and carries the information that determines which path a packet should take. Nodes in the core MPLS network need not examine the packets header to perform next routing tasks.

Network Access Point (NAP). - One of several major Internet interconnection points in the United States that serve to tie all the Internet access providers together.

NAPs were created and supported by the National Science Foundation as part of the transition from the original U.S. government-financed Internet to a commercially operated Internet. Companies apply to use the NAP facilities and make their own inter-company peering

arrangements. Much Internet traffic is handled without involving NAPs, using peering arrangements and interconnections within geographic regions.

National Emergency Number Association (NENA) - 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.

Network Management System (NMS) – The system responsible for managing a portion of the network. The NMS talks to network management agents, which reside in the managed nodes, via a network management protocol. The NMS is the entry that implements functions at the Network Management layer. It may also include Network Management layer functions. A Network Management System may manage one or more other Network Management Systems.

Network Operations Center (NOC) – NOC is one or more locations from which control is exercised over a computer, television broadcast, or telecommunications network.

Large organizations may operate more than one NOC, either to manage different networks or to provide geographic redundancy in the event of one site being unavailable or offline.

NOCs are responsible for monitoring the network for alarms or certain conditions that may require special attention to avoid impact on the network's performance. For example, in a telecommunications environment, NOCs are responsible for monitoring for power failures, communication line alarms (such as bit errors, framing errors, line coding errors, and circuits down) and other performance issues that may affect the network. NOCs analyze problems, perform troubleshooting, communicate with site technicians and other NOCs, and track problems through resolution. If necessary, NOCs escalate problems to the appropriate personnel. For severe conditions that are impossible to anticipate – such as a power failure or optical fiber cable cut – NOCs have procedures in place to immediately contact technicians to remedy the problem.

NOCs often escalate issues in a hierarchic manner, so if an issue is not resolved in a specific time frame, the next level is informed to speed up problem remediation. Many NOCs have multiple "tiers", which define how experienced/skilled a NOC technician is. A newly-hired NOC technician might be considered a "tier 1", whereas a technician that has been there for several years may be considered a "tier 3" or "tier 4". As such, some problems are escalated within a NOC before a site technician or other network engineer is contacted.

The term NOC is normally used when referring to telecommunications and data services providers, although a growing number of other organizations such as public utilities (e.g., SCADA) and private companies also have such centers, both to manage their internal networks and to provide monitoring services.

The location housing a NOC may also contain many or all of the primary servers and other equipment essential to running the network, although it is not uncommon for a single NOC to monitor and control a number of geographically dispersed sites.

NOC locations can often house Security Operation Centers (SOCs).

NRIC Best Practices - the NRIC is an acronym for Network Reliability and Interoperability Council. A NRIC Best Practice is a technique, method, process, activity, incentive, or reward that is believed to be more effective at delivering a particular outcome than any other technique, method, process, etc. The idea is that with proper processes, checks, and testing, a desired outcome can be delivered with fewer problems and unforeseen complications. Best practices can also be defined as the most efficient (least amount of effort) and effective (best results) way of accomplishing a task, based on repeatable procedures that have proven themselves over time for large numbers of people.

Original Equipment Manufacturer (OEM) - An OEM manufactures products or components which are purchased by a second company and retailed under the second company's brand name. It is a form of outsourcing.

This term once meant "original equipment manufacturer" or the company that created and assembled the components of a computer that could be part of a larger solution. However, for many end product providers most components are now commodities, so OEMs like Dell don't actually manufacture components. In the real economic model they are middle marketers, assembling components and selling complete computers to customers or vendors. But since few people assemble their own computers, the label is still used.

Private Branch Exchange (PBX) - A private telephone switch that is connected to the Public Switched Telephone Network.

Protocol - 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. The protocols for data communications cover such things as framing, error handling, transparency, and line control.

Quality of Service (QoS), - As related to data transmission a measurement of latency, packet loss and jitter.

QoS refers to a broad collection of networking technologies and techniques. The goal of QoS is to provide guarantees on the ability of a network to deliver predictable results. Elements of network performance within the scope of QoS often include availability (uptime), bandwidth (throughput), latency (delay), and error rate.

QoS involves prioritization of network traffic. QoS can be targeted at a network interface, toward a given server or router's performance, or in terms of specific applications. A network monitoring system must typically be deployed as part of QoS, to insure that networks are performing at the desired level.

QoS is especially important for the new generation of Internet applications such as VoIP, video-on-demand, and other consumer services. Some core networking technologies like Ethernet were not designed to support prioritized traffic or guaranteed performance levels, making it much more difficult to implement QoS solutions across the Internet.

Using the Internet's Resource Reservation Protocol (RSVP), packets passing through a gateway host can be expedited based on policy and reservation criteria arranged in advance.

The Common Open Policy Service (COPS) is a relatively new protocol that allows router and layer 3 switches to get QoS policy information from the network policy server.

Service Level Agreements (SLAs) - A contract between a service provider and the end user, which stipulates and commits the service provider to a required level of service.

A SLA is a negotiated agreement between two parties where one is the customer and the other is the service provider. This can be a legally binding formal or informal 'contract'

The SLA records a common understanding about services, priorities, responsibilities, guarantees, and warranties. Each area of service scope should have the 'level of service' defined. The SLA may specify the levels of availability, serviceability, performance, operation, or other attributes of the service such as billing. The 'level of service' can also be specified as 'target' and 'minimum', which allows customers to be informed of what to expect (the minimum), whilst providing a measurable (average) target value that shows the level of organization performance. In some contracts penalties may be agreed in the case of non compliance of the SLA (but see 'internal' customers below). It is important to note that the 'agreement' relates to the services the customer receives, and not how the service provider delivers that service. Typical SLAs include statements about:

- System/service availability
- Time to identify the cause of a customer related notification
- Time to repair a customer related malfunction
- Service provisioning times
- Quality of service targets

Service Providers (SP) - An entity providing one or more of the following 9-1-1 elements: network, CPE, or data base service.

A service provider is an entity that provides services to other entities. Often, this refers to a business that provides subscription or web service to other businesses or individuals. Examples of these services include:

- Internet access
- Mobile phone operator
- web application hosting

Session Initiation Protocol (SIP) - An Internet Engineering Task Force (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.

SIP is a signaling protocol, widely used for setting up and tearing down multimedia communication sessions such as voice and video calls over IP. Other feasible application examples include video conferencing, streaming multimedia distribution, instant messaging, presence information, and online games. The protocol can be used for creating, modifying, and terminating two-party (unicast) or multiparty (multicast) sessions consisting of one or several media streams. The modification can involve changing addresses or ports, inviting more participants, adding or deleting media streams, etc.

The SIP protocol is a TCP/IP-based application layer protocol. Within the OSI model it is sometimes placed in the session layer. SIP is designed to be independent of the underlying transport layer; it can run on TCP, UDP, or SCTP. It is a text-based protocol, incorporating many elements of the Hypertext Transfer Protocol (HTTP) and the Simple Mail Transfer Protocol (SMTP)^[3], allowing for easy inspection by administrators.

Short Message Service (SMS) - 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.

SMS is a communication service standardized in the GSM mobile communication system, using standardized communications protocols allowing the interchange of short text messages between mobile telephone devices. SMS text messaging is the most widely used data application on the planet, with 2.4 billion active users, or 74 percent of all mobile phone subscribers sending and receiving text messages on their phones. The SMS technology has facilitated the development and growth of text messaging. The connection between the phenomenon of text messaging and the underlying technology is so great that in parts of the world the term "SMS" is used as a synonym for a text message or the act of sending a text message, even when a different protocol is being used.

Most SMS messages are mobile-to-mobile text messages, though the standard supports other types of broadcast messaging as well.

Simple Network Management Protocol (SNMP) – A protocol defined by the IETF used for managing devices on an IP network.

SNMP is used in network management systems to monitor network-attached devices for conditions that warrant administrative attention. SNMP is a component of the Internet Protocol Suite as defined by the IETF. It consists of a set of standards for network management, including an application layer protocol, a database schema, and a set of data objects.

SNMP exposes management data in the form of variables on the managed systems, which describe the system configuration. These variables can then be queried (and sometimes set) by managing applications.

Signaling System 7 (SS7) - An out-of-band signaling system used to provide basic routing information, call set-up, and other call termination functions. Signaling is removed from the voice channel itself and put on a separate data network. Also known as Common Channel Signaling No. 7 (CCS7).

SS7 is a telecommunications protocol defined by the International Telecommunication Union (ITU) as a way to offload PSTN data traffic congestion onto a wireless or wireline digital broadband network.

SS7 is characterized by high-speed circuit switching and out-of-band signaling using Service Switching (SSPs), Signal Transfer Points (STPs), and Service Control Points (SCPs) (collectively referred to as signaling points, or SS7 nodes). Out-of-band signaling is signaling that does not take place over the same path as the data transfer (or conversation)--a separate digital channel is created (called a signaling link), where messages are exchanged between network elements at 56 or 64 kilobit per second.

SS7 architecture is set up in a way so that any node could exchange signaling with any other SS7-capable node, not just signaling between switches that are directly connected.

The SS7 network and protocol are used for:

- basic call setup, management, and tear down
- wireless services such as personal communications services (PCS), wireless roaming, and mobile subscriber authentication
- local number portability (LNP)
- toll-free (800/888) and toll (900) wireline services
- enhanced call features such as call forwarding, calling party name/number display, and three-way calling
- efficient and secure worldwide telecommunications

Security Operation Center (SOC) - A (SOC is a centralized unit in an organization that deals with security issues, on an organizational and technical level. An SOC within a building or facility is a central location from where staff supervises the site, using data-processing technology. A purpose of a SOC is to provide real-time detection of cyber-attacks and security intrusions.

Because both NOC and SOC operation have very high reliability and security requirements, a SOC will often be part of a NOC operation.

Virtual Private Network (VPN) - A VPN is a network that uses a public telecommunication infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network.

A VPN has the look and feel of a private network to a user. But it's really part of the internet with heavy security – so no one on the internet can see what's going on in the VPN. A VPN is not a private network, but virtually so. VPN technology was originally developed for voice networking, but subsequently was developed for use in data networking, as well.

Voice over Internet Protocol, Voice over IP (VoIP) – 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.

VoIP is a general term for a family of transmission technologies for delivery of voice communications over IP networks such as the Internet or other packet-switched networks. Other terms frequently encountered and synonymous with VoIP are IP telephony, Internet telephony, voice over broadband (VoBB), broadband telephony, and broadband phone.

Internet telephony refers to communications services-voice, facsimile, and/or voice-messaging applications-that are transported via the Internet, rather than the public switched telephone network (PSTN). The basic steps involved in originating an Internet telephone call are conversion of the analog voice signal to digital format and compression/translation of the signal into IP packets for transmission over the Internet; the process is reversed at the receiving end.

VoIP systems employ session control protocols to control the set-up and tear-down of calls as well as audio codecs which encode speech allowing transmission over an IP network as digital

audio via an audio stream. Codec use is varied between different implementations of VoIP (and often a range of codecs are used).

Wide Area Network (WAN) – Network using common carrier-provided lines that covers an extended geographical area. WANs usually connect many Local Area Networks (LANs). The most commonly recognized WAN is the Internet.