NICE

Intent. Insight. Impact.

NICE'S NG9-1-1 SOLUTION OVERVIEW

TABLE OF CONTENTS

What is NG9-1-1?

General

NG9-1-1 is an initiative that aims to transform the current PSAPs and Public Safety emergency communications environment to support the widely varied methods of communication that are in use by the public today and will be in use in the future.

The awareness of the limitations of the current 9-1-1 network has grown in recent years as consumer communications technologies outpaced the capabilities of the current 9-1-1 infrastructure and the initiative to build the Next Generation 9-1-1 had started to gain shape in the last two years.

The limitations of the current network are based on the fact that it is built on legacy technology which cannot handle new requirements. Handling of new media, support for VoIP, consolidation requirements, redundancy and other new capabilities cannot be achieved without significant system and engineering modifications.
The building of the NG9-1-1 brings an opportunity to enhance the public safety service with new capabilities that will increase its efficiency.

The new capabilities would help law enforcement, fire departments, and emergency medical services in managing their response to and at the scene of the emergency. An NG9-1-1 system would also be able to quickly reroute emergency calls to another PSAP when the primary answering point is overloaded or experiencing some technical problems. These advanced capabilities would enhance the ability to provide a more efficient, effective and dynamic emergency responses.

Transition to NG9-1-1 is expected to happen gradually and this is why it is important to understand what NG9-1-1 is comprised of so that Public Safety agencies can plan their transition. NG9-1-1 includes the ability to support emergency and non-emergency calls via not only audio but also via text messaging and possibly via other multimedia formats. Furthermore, NG9-1-1 also supports rule-based routing using location, call type, target PSAP status, network status, and other factors.

Location information is critical for call delivery and response. In an NG9-1-1 environment, GIS will be essential for call routing, call handling, call delivery, location validation, and emergency response.

Transition to NG9-1-1 necessitates transition from tabular based routing to one based on geographic data to identify which PSAP will receive the 9-1-1 call.

NG9-1-1 Benefits

NG9-1-1 will:
- Enable the PSAP to process all types of emergency calls including non-voice messages.
- Add flexibility for the PSAPs and 9-1-1 Authorities, including: transfer of calls, messages, and data between any PSAPs on any interconnected NG9-1-1 system anywhere in the country resulting in much faster alternate routing and better control of data flow.
- Enable other emergency related entities to interconnect to the NG9-1-1 system to receive calls and data.
- Enable the PSAP to access a wide range of supportive databases and share new and more robust forms of data.
- Add capabilities to integrate and interoperate with emergency entities beyond the PSAP.
- Provide support for disaster management and intercommunications with and between PSAPs, EOCs, and other emergency management entities.

In essence, NG9-1-1 is an opportunity to improve service to the public and promote interoperability among Public Safety agencies while using resources more efficiently.

NENA i3 standards

General

The expression 'NG9-1-1' has been used in the Public Safety community for some time but has meant different things to different people. NENA has assembled the NG9-1-1 program to define the way forward for PSAPs as the move from current technology to the next generation world.

A significant milestone in this program was reached in 2011 when 'Version 1.0 of NENA Technical Standard 08-003, Detailed Functional and Interface Specification for the NENA i3 Solution – Stage 3' was approved by the NENA executive board. This document defines the operation of an NG9-1-1 network.

This i3 document was the result of collaborative work between members of both the public safety community and equipment suppliers to ensure that all relevant stakeholders were able to represent their views.

What i3 Covers

The i3 document defines all the interfaces and operations between the functional elements of an NG9-1-1 system such as the gateways, routers and loggers. Together these elements make up the ESInet which is the replacement for the existing system of trunks and selective routers.

The i3 document describes the total call flows through the system. Starting with the handover of calls from the public telecommunications operators and ending at the call taker's desk.

Legacy Gateway – All calls within the ESInet must be SIP/VoIP calls. The legacy gateway converts conventional analog or digital calls to SIP/VoIP calls.

ESRP / Router – Incoming calls are routed to the relevant PSAP by one or more Emergency Services Routing Proxies. These extract location information contained in the SIP header and use this to locate the relevant PSAP using the ECRF. The ESRP may also access a policy store to determine special rules such as out-of-hours service or PSAP overflow re-routing.

ECRF / GIS lookup – The Emergency Call Routing Function provides the route for a call based on location information. Given a street address or GIS coordinate it looks up the correct route to send the call to the proper PSAP.

Voice Logging Service – Voice logging can be achieved in the ESInet in various ways. All items in the ESInet are capable of sending call handling events and voice streams to one or more logging services. The call events and the voice streams can be collected together and stored at the expense of extra network traffic. Alternatively the voice logging service can passively monitor standard call events and voice streams.

Simplified i3 Network (ESInet)
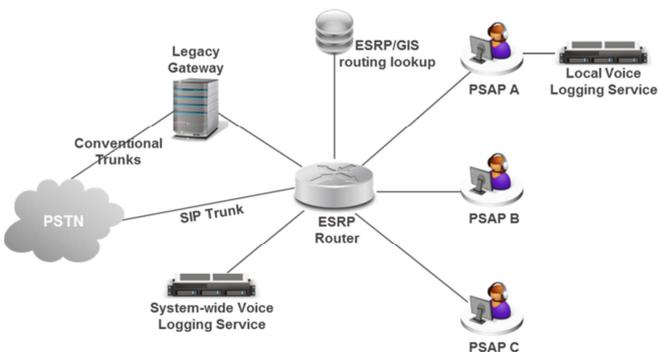
NICE Solution for NG9-1-1

General

NICE Systems is committed to supporting the Public Safety Community in the transition to NG9-1-1 and i3 compliance.

As part of this program NICE has participated in various NENA events and committees to ensure our understanding the NG9-1-1 program and the i3 standards.

NICE has demonstrated i3 compliant logging at industry collaboration events. The NICE i3 logging solution is based on a combination of existing NICE voice loggers and databases used to store the extensive call metadata that is now available via the i3 specification.

NICE will continue to evolve its i3 compliant logging product as future revisions of the specification are approved.

We also understand that initially, full i3 systems may be difficult to specify and install so NICE is also working with VoIP 911 systems suppliers to offer a range of integrations with current 911 VoIP systems.

The NICE solution for NG9-1-1 is centered on the NICE Inform Public Safety multimedia application suite. This application suite is well established with a variety of Public Safety and transportation customers. It offers the ability to view recorded information from a variety of sources including audio, video and text. Recorded information can be collected into incident folders, stored and distributed.

Multi-media integration is a core architectural feature of NICE Inform. So NICE is able to add support for future media types to NICE Inform while maintaining the same simple, single application to operators. This architecture allows NICE to incorporate new media types as they become relevant in the future while preserving investment in previous platforms.

NICE Inform Matrix allows current standalone logging systems to integrate with central, cloud based NG9-1-1 logging systems whilst maintaining existing on-site logging during the initial transition to NG9-1-1. In many cases, even if the main 911 services are recorded centrally, there will be local administration services that need logging. NICE Inform allows a mixture of on-site and cloud logging to be accessed through one application suite.

The NICE NG9-1-1 solution is:
- Ready to start building a system today. The NICE Inform application suite is ready for NG9-1-1.
- Ready to incorporate new media types as they become relevant.
- Ready to handle central logging architectures.

SIP-Based VoIP Logging in NG9-1-1

NG9-1-1 allows voice logging to be performed either passively or actively. The NICE solution supports both options.

Passive Logging

Passive logging sniffs the ESInet for RTP voice communications packets and SIP call control information. The voice logger makes copies of the data and assembles it in to calls for storage. This is the simplest form of logging and can be implemented in most systems without impacting the rest of the NG9-1-1 system.

Active Logging

In active logging the NG9-1-1 system makes a conference call to the voice logger for each call that needs logging. The logger records the voices on the conference call and receives supplementary call routing information.

	Passive	Active
Connection	Voice logger needs access to all network packets. Some network topologies are complex to configure for this.	Simple point to point network connections.
Security	Voice logger may not be able to record encrypted calls.	Encryption is handled using normal procedures.
System Load	No extra load on the NG9-1-1 system.	Each recorded call requires the voice to be copied to the conferenced voice logger. Parallel logging doubles the load.
Resilience	Simple Parallel logging.	Parallel logging, or N+1 with the co-operation of the NG9-1-1 switch.

Call Information

NG9-1-1 provides a uniform way for a voice logging systems to obtain information about a call (meta data).

This meta data contains the usual call number and location information as well as information about the positions that handle a call.

SIP Header

The meta data can be extracted from the SIP headers used to setup each call within the ESInet. This method is often combined with passive voice logging. The main advantage of combining these methods is that there is no need to setup special configurations of the voice and call routing systems to forward information to the voice logging system.

Logging Interface

NG9-1-1 defines a new call logging service that can forward events to a voice logging system every time a call arrives, is transferred, hung up, conferenced etc. This method of obtaining meta data is usually paired with active voice logging. The advantage of the call logging interface is that the call history contains more detailed information about call routing. The history will show how a call was routed. So for instance, if a call is diverted to an alternate PSAP because of overflow at the local PSAP, this can be seen. However, it relies on all the ESInet elements being configured to send information to the voice logging system. This may be more complex for a local PSAP to organize in a large shared ESInet.

Multimedia Management

NG9-1-1 is being designed to enable processing of multimedia calls in forms of text messages as well as sharing of video based information, and other non-audio call formats. NICE Inform is a suite of applications that provides a platform for multimedia capture and management from multimedia sources including audio, video, text and data. In addition to traditional means of communications, communication over IP-based and wireless technologies, both for voice and video can be managed in a synchronized manner with NICE Inform. This is important especially during the transition phase from legacy PSAP to i3 PSAP.

With NICE Inform, the process of reconstruction, investigation and information-sharing is more complete and efficient. There is a single interface for users to manage the information of the incident including

search and retrieval, investigation, creation of an incident package, enriching the incident package with additional information available post incident, and sharing the information with others.

NICE Inform is an NG9-1-1-ready solution, providing the capability to manage multimedia that will travel on the ESInet, in a secure and efficient manner. NICE Inform offers unique capabilities aligned with the concept of NG9-1-1:

- **Consolidated multimedia information**. NICE Inform provides a single interface for the user to retrieve information from multiple sources of data and geographic locations. The information is synchronized and organized in a chronological manner allowing a complete and authentic incident reconstruction.
- **Multimedia management**. Incident information is captured from multiple sources, regardless of its type and format of the source system. These systems include: telephony, radio, CCTV, GIS and AVL information, CAD information, photos taken by cell phones or any other camera, video clips, text messages and documents, any other information in digital format. Moreover, multimedia information management by NICE Inform is location independent. Each of the sources mentioned, can be integrated into the NICE Inform system regardless of its location.
- **Secure quarantine of sensitive incident information**. Each incident has a dedicated incident folder in which only users with granted access can view, modify or transfer information.
- **Improved interoperability**. Easy and secure information-sharing within the agency and between agencies. NICE Inform is a browser-based application, so any authorized user with the right level of privileges can access the incident folder assigned for them. For example, a police investigator can access a specific incident folder, review information – playback voice and video, add additional information he or she finds relevant or might have produced during their investigation, such as an incident report. Information sharing can also be accomplished using NICE Inform Media Player, which enables a non-NICE Inform recipient to view the event in a graphical, consolidated and organized manner.

- **Secured and authenticated incident information**. Once centralized in the incident folder, one or more data items from the collection can be authenticated. NICE Inform applies a digital signature and will detect tampering with any of the incident folder items.
- **Traceability of actions**. This adds to the security that NICE Inform provides – every action taken with the data is recorded and available for review to monitor the interactions with critical incident data.

GIS / AVL   Phone & Radio   Video Surveillance   Screen Capture   E-mail / Web

Hosted Solution Support

NG9-1-1 makes a hosted call logging solution a viable option for the PSAP. In a hosted solution, the call logging is provided as a central service operated within the ESInet. The call logging equipment is maintained centrally and shared between many PSAPs.

This reduces the capital investment and ongoing maintenance costs for individual PSAPs by allowing them to be shared.

NICE Inform can be deployed in a hosted environment allowing each PSAP to access their own recordings using a feature known as agency partitioning. NICE is ready for hosted NG9-1-1 logging solutions and has experience with installing hosted solutions already for its well-known trunked radio logging solutions.

While a hosted logging solution has advantages in reduced costs, many PSAPs will have local administration lines or radio consoles that need logging on site. NICE Inform Matrix offers a solution for such customers by seamlessly blending on site and shared hosted logging solutions into one system.
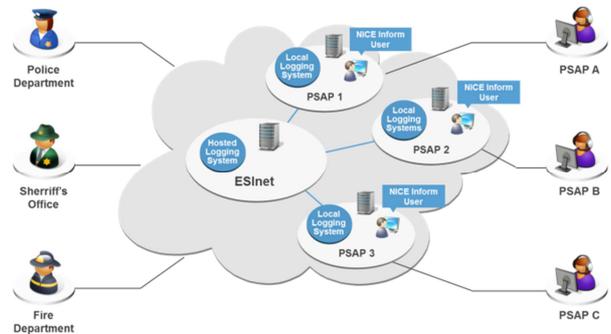
Transition to NG9-1-1

The full NG9-1-1 vision allows the public to contact PSAPs using multiple technologies not just telephone calls as we know today. Even today's telephone calls are to be delivered via IP with integrated location information rather than separate ALI.

So to realize this vision the public communications operators need to provide the public safety community calls in the i3 format.

Also all the functional elements need to be available in an i3 compliant version.

It will take some time for all suppliers to have these available. In the intervening period various partial transition systems will be built taking advantage of some NG9-1-1 technology as a route to full i3 compliance.

Each jurisdiction will take its own route forward based on local facilities and the partners chosen.

Many NG9-1-1 transitions will happen in a series of stages. A number of jurisdictions have rolled out secure IP networks between PSAPs. Some have moved to internal VoIP within the PSAP. Others are evaluating SMS and social media communications.
What we can see is that each jurisdiction will find its own way to NG9-1-1. NICE is making sure it can offer flexible solutions that can change technology over time while preserving investment in operating procedure and training through consistent interfaces.

9-1-1 call taking is a critical facility and so it is important to ensure that as new technology is introduced, fallback plans are in place. During the transition, if any part of the system does not offer the correct service level, there must be a way to continue to provide a service using the old technology.

NICE has worked with a number of large facilities during such transitions. PSAP operational staff do not need to concern themselves about which system was active at what time as NICE Inform offers a single point of access to the logging system right through the change.

Transition to NG9-1-1 is also expected to be an evolutionary process involving technological, economic, and institutional change. In some cases, the path to NG9-1-1 implementation will depend on the underlying infrastructure involved and the nature of 9-1-1 systems in a defined geographic area. In other cases, the transition to NG9-1-1 may depend more on the ability of originating service networks to deliver NG9-1-1 calls via native IP-based networks to jurisdictions that are prepared to receive those calls.
Regardless of the specific evolutionary steps, it is expected that NG9-1-1 system implementation within the public sector will stem from one of the two general deployment environments described below, which largely reflect existing institutional and service delivery arrangements around the country:

- *Coordinated, Intergovernmental Implementation. System services generally reflect planned and coordinated deployments of 9-1-1 capabilities, facilitated by state-wide 9-1-1 authorities, regional authorities, or informal mechanisms that enable a cooperative environment.*
- *Independent, Unilateral Implementation. System services generally reflect a starting point that features decentralized deployments of 9-1-1 capabilities by local jurisdictions through an environment featuring piloting independent initiatives.*

(US DOT NG9-1-1 Transition Plan)

NICE Experience with IP and NG9-1-1

NICE is experienced in VoIP and involved with NENA's planning and standard definition for NG9-1-1. NICE has deployed over 1,000,000 channels of VoIP and 25,000 channels of IP-based radio logging.

NICE takes pride in its VoIP patent portfolio. NICE has invented, pioneered and patented VoIP logging and to date has 42 VoIP granted patents and additional 10 pending. NICE is an active member of the Internet Engineering Task Force (IETF) and has established, organized and regularly participated in IETF's SIPREC workgroup. This working group is chartered to define a SIP-based protocol for controlling a session (media) recorder which is a critical requirement in many business communications environments, such as call centers and financial trading floors as well as public safety communication centers – 9-1-1 centers.

NICE is an active member of NENA's Next Generation Partner Program and is involved in the work related to both defining multimedia logging standards and interfaces as well as interoperability testing. NICE has successfully completed the Industry Collaboration Event that took place in May 2010 (ICE2) in which transitional elements of the NG9-1-1 network (ESInet) were tested. NICE also completed ICE3 in December 2010, testing of location information, and as well as ICE4, Call Routing Based on LoST Hierarchy, in November 2011. NICE is an active member in ICE5 and ICE8 planning committees. ICE5 deals with accessibility to emergency services for the individuals who are deaf, deaf-blind, hard of hearing or have a speech disability. ICE8 is a dedicated on-going event for logging and interoperability testing of calls, events and data.

Summary

It seems there is an understanding across all stakeholders that transition to NG9-1-1 is not going to happen overnight, but rather will be gradual. This means Public Safety agencies will need to prepare for managing both legacy and i3 calls.

Implantation of GIS is also part of the transition to NG9-1-1 planning. GIS-based location information provides greater accuracy for all media types of calls, compared to ALI or MSAG-based information. This is true once GIS is aligned with MSGA database. GIS information will be used by ECRF and LVF to route and validate location and thus will critical in NG9-1-1. Today, GIS information is used to reference the location of the call after the call has already arrived at the PSAP.

NENA i3 requirements (standards) aim to provide structure to the NG9-1-1 IP network, as well as clear definitions to the functional requirements of the various elements comprising the ESInet. There are still open questions as to how a Public Safety agency make its transition and operate as an NG9-1-1 agency.

Many agencies collaborate on planning and implementation of their transition to NG9-1-1. This makes perfect sense from operational and financial perspectives. A number of agencies located in the same region would share the same ESInet and could operate jointly or load-share answering emergency calls and in response to incidents.

NG9-1-1 is an opportunity to improve service to the public and promote interoperability among Public Safety agencies while using resources more efficiently.

NICE Systems is committed to supporting the Public Safety Community in the transition to NG9-1-1 and i3 compliance and will continue to evolve its i3 compliant logging product as future revisions of the i3 specification are approved.

NICE offers an NG9-1-1-Ready solution to support customer needs in the transition phase and thereafter.

NICE's NG9-1-1-Ready solution includes:
- **Logging** – both active SIP and Passive VoIP are supported.
- **Multimedia Management**: NICE Inform is a suite of applications that provides a platform for multimedia capture and management from various sources and formats including audio, video, screen text and data.
- **Central logging and storage**: NICE Inform Matrix allows cloud based logging of multiple sites as well as integrate remote/local logging systems with the central logging system.
- **3rd Party Integration**: ability to integrate to 3rd party security systems such as telematics, gunshot detection, access control, license plate readers, and others, expanding the information availability for the emergency operator and enhancing their situational awareness. This is essentially taking NG9-1-1 multimedia a step further.

NICE's NG9-1-1-Ready solution offers:
- The flexibility to incorporate new media types as they become relevant.
- The versatility in implementation as either CPE, Hosted solution, or the combination of the two.
- Confidence in successful implementation based on over 1000 sites already using NICE Inform.

NICE's experience with VoIP is vast; over 1,000,000 VoIP channels recorded worldwide and over 25,000 RoIP channels implemented. This coupled with NICE's financial stability, evident with its $798 in revenues for 2011, total cash and cash equivalents of $562.6 million as of 12/31/11 and with no debt. Moreover, NICE has more than 30 industry leading partners, like: Motorola, Intrado, Cassidian, AT&T, and others. This puts NICE at the forefront to lead the implementation of NG9-1-1Ready solution and support the transition to NG9-1-1.

ABOUT NICE SYSTEMS

NICE (NASDAQ: NICE) is the worldwide leader of software solutions that deliver strategic insights by capturing and analyzing mass quantities of structured and unstructured data in real time from multiple sources, including, phone calls, mobile apps, emails, chat, social media, and video. NICE solutions enable organizations to take the Next-Best-Action to improve customer experience and business results, ensure compliance, fight financial crime, and safeguard people and assets. NICE solutions are used by over 25,000 organizations in more than 150 countries, including over 80 of the Fortune 100 companies.   www.nice.com

ABOUT NICEVISION

NiceVision helps leading organizations enhance their security operations and improve performance using intelligent digital video solutions. NiceVision integrates real-time analysis, IP networking, recording and management to enable automatic threat detection, instant verification, event resolution and effective investigation.

CONTACTS

Global International HQ, Israel,
T +972 9 775 3777
F +972 9 743 4282

Americas, North America,
T +1 201 964 2600
F +1 201 964 2610

EMEA, Europe & Middle East,
T +44 0 1489 771 200
F +44 0 1489 771 665

Asia Pacific, Singapore Office
T + 65 6222 5123
F +65 6222 5459

nice.com