



White Paper

# The Impact of FirstNet LTE on Emergency Communications Recording and Quality Assurance

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## WHY DOES BROADBAND LTE MATTER?

Public safety answering points (PSAPs) and first responders are now on a verge of another major transformation in emergency communications as they move towards being on par with commercial standards for multimedia. This will be enabled by the use of LTE (Long Term Evolution, 4G international mobile communications standard) over FirstNet networks specifically designed for reliability, security, and optimal levels of operational capability at all times. Once fully deployed, it is expected to improve the accuracy of emergency response by supplementing incident information with rich data and multimedia, so that more lives can be saved, more crimes solved, and our communities and emergency responders kept safe.

FirstNet is an independent authority within the U.S. Department of Commerce. Authorized by Congress in 2012, its mission is to develop, build and operate the nationwide, broadband network that equips first responders to save lives and protect U.S. communities. In 2017, it selected AT&T as a network operator.

In June of 2017, Motorola [announced](#) that, “it will provide mobile apps, software and services for the FirstNet network as part of its role on the AT&T team selected by the U.S. government to deliver America’s first nationwide wireless broadband public safety network.”

As Motorola’s certified solution partner of 15+ years, NICE has an extensive experience with providing voice communications recording solutions for Motorola platforms in the US and abroad. NICE’s engineering partnership has yielded 20 Motorola Solutions SIT-certified solutions, for SmartZone, Dimetra and ASTRO P25 radio platforms. NICE has completed over 800 successful customer deployments and look forward to cooperating with Motorola on future projects as we collaborate on helping make the vision of Next Generation 911 a reality.

Apart from the FirstNet network itself, public safety devices and apps are being developed to send and receive information over the FirstNet network – approved apps will be available from FirstNet App Store. Specialty smartphones, tablets, laptops, dongles and a variety of other devices are being developed for FirstNet users. These devices must be secure, easy to administer and use under stressful circumstances, as well as rugged enough to withstand the environmental issues encountered by public safety responders.

“While technology has helped officers become more efficient and effective in protecting communities from harm, the full potential of broadband technology without mission critical data limits the ability of law enforcement and others working in public safety to do their jobs.

Now with FirstNet, the first nationwide broadband wireless network for public safety, law enforcement will have mission critical broadband access making it possible for communities across the nation to implement mobile programs that are revolutionizing how we serve and protect our communities.”

– Jeff King, FirstNet area lead and a reserve police officer for the Metropolitan Police Department of the District of Columbia, All Things FirstNet

## FIRSTNET AND LTE IN THE UNITED STATES

Under the law that established FirstNet, governors in all 56 states and territories had the choice of making an “opt-in” decision and accepting the FirstNet deployment plan which entails allowing AT&T to build the LTE radio access network (RAN) within the state’s borders at no cost to the state. Alternately, US states can choose to “opt-out”, which would require the state to be responsible for building and maintaining the RAN for the next 25 years.

FirstNet released its initial state plans on June 19, 2017 and made them actionable, so governors would have the opportunity to “opt-in” to FirstNet from that date on. Governors in 53 states and territories that received the initial state plans are required to make their “opt-in/opt-out” decisions by Dec. 28, 2017. The exceptions include the South Pacific territories of Guam, American Samoa and the Northern Mariana Island. They will have a separate timetable.

As of January 2018, 50 US states had announced their “opt-in” decisions, as did the U.S. Virgin Islands and Puerto Rico territories, Guam, the Northern Mariana Islands, American Samoa and the District of Columbia.

“AT&T will build the FirstNet RAN in “opt-in” states or territories at no cost to each jurisdiction, although local public-safety entities will be responsible for paying subscription costs and end-user devices. However, the law that established FirstNet stipulates that individual public-safety agencies and potential first-responder users are not required to subscribe to the FirstNet service.”

– Urgent Communications, Oct 11, 2017 “FirstNet hits 50% ‘opt-in’ threshold”

## WORLDWIDE USE OF LTE FOR PUBLIC SAFETY COMMUNICATIONS

US adoption trends exist within the broader context of international development of dedicated public safety networks that are based on LTE. In all cases, these networks are intended for data delivery, while LTE voice is pursued only in a handful of countries.

Region	Country	Data	Voice
Americas	USA	●	●
	Brazil	●	
EMEA	UK	●	●
	Qatar	●	
	UAE	●	
APAC	Australia	●	
	China	●	
	Singapore	●	●
	South Korea	●	●

Figure 1: Regional LTE Strategies, SNS Research: The Public Safety LTE & Mobile Broadband Market: 2016 – 2030

**The UK is moving forward** in this area ahead of the US with government-mandated development of the ESN network for voice and data support nation-wide. The entire TETRA LMR network is being swapped for LTE. The network will be shared with a commercial operator EE. Motorola has been appointed as a software

developer for public safety communications. The main goals are matching the quality of voice communications to Airwave/TETRA and achieving high speed, prioritized data communications.

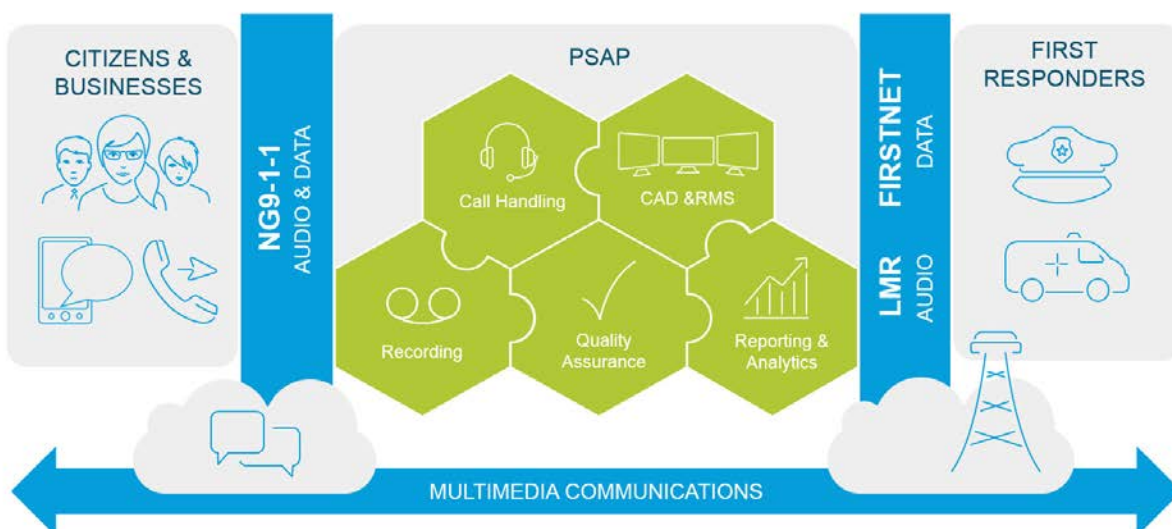
NICE is developing and testing LTE interfaces. It is actively involved in government forums on LTE and stands out as the primary dedicated recording vendor as the ESN launch preparations are underway. Public safety agencies in the UK are preparing to upgrade their NICE recording systems for LTE support, expecting go-live in late 2018 or early 2019.

## BROADBAND TECHNOLOGY TO POWER BOTH FIRSTNET AND NG9-1-1

In the US, the systems required for the delivery and processing of communications from the point of entry into the PSAP to the public safety entities involved in on-site response are changing significantly. This is due to the gap between the existing needs and the available technologies that can bridge that gap where the legacy technologies cannot. The legacy 9-1-1 network is based on analog, circuit-switched technology. Aside from very limited data capabilities and add-on technologies to support SMS text and wireless as well as VoIP communications, the system has not significantly changed in over 40 years. Transitioning to fully IP-based networks will require significant changes for PSAP systems and operations.

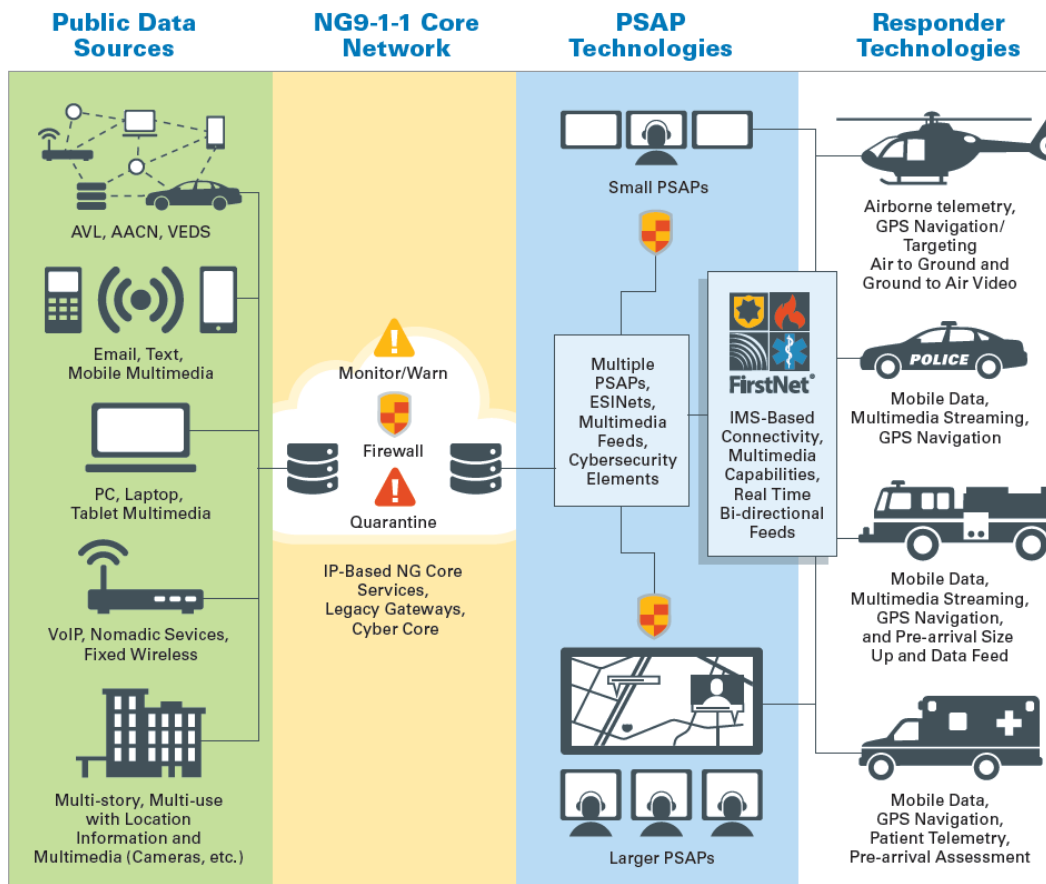
Broadband technology, on the other hand, supports voice, data, text, images, telemetry, video, and multimedia communications, all of which benefit the communications with citizens as well as first responders. Standards-based broadband technologies create opportunities to improve interoperability, resiliency, quality of service, analytics, information sharing across PSAPs and other entities, alignment with advances in the commercial sector (along with associated benefit of economies of scale), and customization. Broadband will significantly enhance PSAPs' ability to respond to emergencies and serve as the nerve center for the emergency response. This will require managing inputs from the public via NG9-1-1, interfacing with first responders through LMR networks and the Nationwide Public Safety Broadband Network (NPSBN), while addressing a variety of challenges introduced by broadband technologies.

FirstNet plans to offer mission-critical voice services over the NPSBN – along with video and data – when voice over LTE quality and functionality meets or exceeds first responders' mission critical needs. Mobile Push-to-talk Communications are expected to be available from March 2019, according to FirstNet's recent announcement.



**Figure 2:** The Future Emergency Communications Technology Ecosystem

One of the greatest advantages of implementing IP-enabled call handling is the opportunity for **hosting or sharing technology that can serve multiple PSAPs**. Because IP based next-generation call handling is easily scalable, PSAPs within a region have an option to share core system equipment and related costs. This will become especially valuable as equipment gains more sophisticated features and functionality, while offering greater configurability and customization to meet specific, localized requirements. By centralizing shared system elements, jurisdictions will be able to implement fewer systems that are more robust and have greater capabilities than could be achieved with isolated, stand-alone solutions. This can also facilitate interoperability which then permits information sharing among jurisdictions in real time, improved situational awareness, and better coordination of first response.



**Figure 3:** Interconnected NG9-1-1 and FirstNet Networks- hosted, shared technology can serve multiple PSAPs. PROJECT 4 3™ | BROADBAND IMPLICATIONS FOR THE PSAP, APCO International

## NEXT-GENERATION RADIO NETWORKS

Transition to the next-generation of radio networks in the US will be gradual, due to the current widespread use of Land Mobile Radio (LMR) and the broad geographic reach of the existing infrastructure. LMR systems are advantageous for multicast communications (one-to-many) and are predominantly used in this manner, with occasional broadcast (one-to-all) only when needed. Some are even configured to prohibit unicast (one-to-one) calls due to their inefficiency in the use of the resources. LMR data is, however, limited to one-to-one.

“The primary means of instant communications with field personnel has been narrowband Land Mobile Radio or simply LMR for the last 60 years with a subscriptions base of over 46 Million users, which is expected to reach over 52 Million subscriptions by the end of 2020.”

– The Public Safety LTE & Mobile Broadband Market: 2016 - 2030 Opportunities, Challenges, Strategies & Forecasts, SNS Research

Traditional voice-centric LMR (Land Mobile Radio) networks suffer from inherent bandwidth limitations. This is one of the reasons for public safety agencies to plan leveraging commercial cellular network technology to support their growing broadband application needs. LTE has emerged as the leading contender for public safety mobile broadband networks.

With the recent approval of the Mission Critical Push to Talk (MCPTT) voice standard as part of 3GPP Release 13, LTE has also become an attractive substitute for providing LMR-like voice services. According to APCO International, several early adopter LTE deployments are already operational in the United States, as part of the planned FirstNet nationwide public safety broadband network.

The future of next-generation public safety radio networks looks promising, indeed. In the meantime, nearly all Public Safety agencies in the USA have P25 radio systems. For many years these will co-exist with FirstNet. From a voice communications point of view, this could lead to two isolated communications systems. To combat this and ease the transition, FirstNet plans to offer a LTE MCPTT to P25 gateway to agencies to communicate between their FirstNet and P25 voice systems. Calls on P25 talk groups may be mirrored onto equivalent LTE MCPTT groups and vice versa.

## FEATURE HIGHLIGHTS OF PLANNED LTE FOR PUBLIC SAFETY COMMUNICATIONS

**Voice and Data (All IP, VoIP)** – LTE already supports IP based voice and data, which is predominantly used for personal and commercial purposes. Mobile 4G-based systems are also used in public safety vehicles, utilizing commercially available devices, such as tablets.

**Mission Critical Push To Talk (like P25)** – as 4G/LTE networks are deployed, specialty devices are developed as well, such as MCPTT devices, similar in end-user functionality to P25 or TETRA radios.



### FirstNet Radio Devices Developed by Motorola

- Ruggedized LTE phone running Android Operating System
- No support for P25 radio connection, only intended for LTE network
- Already AT&T network certified

**Prioritized Public Safety Users (like QoS in IP networks)** – this refers to the ability to prioritize specific groups of users for network use. In this case, communications of first responders and emergency communications centers (PSAPs) would enjoy a high priority or even complete dominance when needed over general public communications when both communicate over the same network.

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## SERVICE DELIVERY MODELS

Currently, there are two accepted ways to provide a public safety broadband network:

1. **Build a Dedicated Public Safety Network** Like P25 or TETRA. **This model is pursued in Singapore. In the US, it is planned in combination with the Piggyback approach (below).** AT&T is building a dedicated network in the US and will provide dedicated frequencies for public safety communications. In the meantime until LTE voice infrastructure is developed, priority data access is available to public safety agencies via the “piggyback” method already available in 2017, such as for use with in-vehicle tablets.

The approach of a dedicated public safety network is more expensive, because LTE cells are much smaller than P25. Net cost and operational complexities can slow down the development and operational rollout. One benefit is that there is no need to build dedicated towers except for the sparsely populated areas that require infrastructure buildout. Existing towers may be shared with commercial systems.

2. **Piggyback on a Commercial Network** - less expensive and faster to deploy, as costs are shared with general public, leveraging economies of scale. **This model is pursued in the UK.**

When deployed in this manner, public safety communications would leverage the feature of prioritized access by Public Safety users over general public users. In extreme cases such as during the time of crisis, the prioritization would be up to the point of dedicating the whole network to public safety. This would, of course, severely limit or remove the ability of citizens to call home during the time of such crisis. Another disadvantage is that network service in low-population areas provides inadequate coverage due to fewer towers in place and infrastructure buildout would be required to bridge this gap.

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## NICE IS READY FOR LTE

NICE has a vast experience with recording, consolidating and synchronizing PSAP multi-media communications including text-to-911, console screens, camera video feeds, radar recording, tracking locations of radio handsets, GIS data and imaging, and much more. Recording of LTE-based communications uses the same solution framework and delivers recordings to one, unified user interface.

NICE’s strategic partnership with Motorola and its track record with seamlessly integrated, certified recording is very relevant to LTE, due to Motorola’s role in this project.

At this time, NICE is the only logging vendor in the UK market actively engaged with ESN/Motorola working groups, developing LTE recording prototypes. This early insight into the operation of LTE logging in the UK provides NICE with a unique competitive differentiator in the US as well.

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## NICE RECORDING OF FIRSTNET/ESN BASED MULTIMEDIA

**Data-driven Communications** – NICE is ready once the interfaces are defined. It can already record a variety of data such as text, chat, video and optionally also Web browsing, social media and custom applications.

Apart from Public Safety LTE, agencies also intend to use non mission-critical mobile data over commercial 4G for routine work, which is more cost effective. NICE is capable of recording both as needed.



**Voice Communications (Audio)** – NICE will record LTE audio communications as soon as the new networks are ready to support them, using the methodology that is very similar to recording in P25 and TETRA environments. This includes Push-to-Talk communications, Group Calls, Private Calls, and Telephone calls over LTE.

To record FirstNet communications in the US, NICE is developing the recording solution based on its extensive experience with Motorola technologies and leveraging the UK design experience. While recording the LTE IP inputs will present a change for PSAPs and will require a recording system upgrade, console recording remains largely the same as it is now with the improved ability to capture all call types, such as a combination of private and console calls. Recording FirstNet audio requires pure VoIP connection from the central FirstNet data center via the software interface that can be virtualized.

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## GROWING LOAD ON PSAP CENTERS REQUIRES NEW PROCESSES AND CONTROLS

Multimedia introduces new processes that are far more complex than what is in use with voice-based communications. Call takers are moving from just talking to reading text communications and looking at images and video, often with graphic, disturbing content. This is not only more complicated and stressful for call takers but also for their managers. In most cases, processes for managing these new methods of communications and new types of information are yet to be developed. Additionally, development of new training and coaching methods is a must as requirements change and variation increases.

NICE has experienced a comparable explosion of multimedia in commercial call centers for several years now and intend to apply that experience to helping PSAPs to adapt.

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## QUALITY ASSURANCE BECOMES A MUST HAVE

According to the [APCO Project 43 Report](#), public safety telecommunicators (PSTs) will continue to face pressure to keep call processing times to a minimum, regardless of the greater volume and variety of information they will need to contend with. The need to comprehend and balance the value of primary and supplemental information will require more sophisticated skills. This means the ability to rapidly identify the right baseline information and use it to trigger a dispatch, then possibly modify the response based on additional information received that contains further clarification. The increased scope of broadband-based information will enable a more effective response, but is also likely to claim more time to process. Agency quality assurance programs need to take this into consideration as they revise processes and quality standards.

Quality Assurance monitoring has become even more vital than it was in the past, due to its ability to provide objective feedback on the impact of new technologies on PSAP operation. It offers a valuable method of monitoring and reviewing the work of next-gen communicators as new processes and training methods are being shaped. The results—visualized in reports, charts and dashboards—present a crucial part of the puzzle. This consistent feedback loop shows how and whether the new processes and training methods are working and exposes bottlenecks in software interfaces and operational processes. It also provides insights into personnel issues including new fatigue and burnout patterns, need for shift adjustments due to new levels of stress, and much more. It also pinpoints exceptional performance during the time of transition, which is just as important. Quickly identifying when job was well done and rewarding it with praise and recognition will go a long way in helping everyone to adapt.

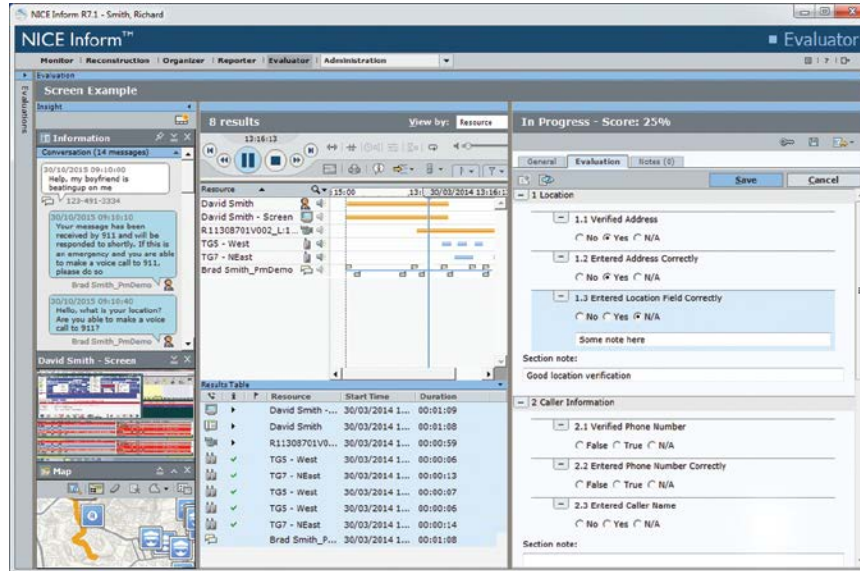
## 12 Tips for Updating Your Quality Assurance Program

The [APCO Project 43 Report](#) offers the following recommended updates to your QA/QI program.

1. Set clearly defined minimum standards and expectations for processing SMS/text-to-911 and multimedia/MMS calls. The QA/QI program must be understood by PSTs.
2. Update pre-scripted “interview” questions for each public safety discipline (police, fire, EMS).
3. Set minimum expectations for gathering critical criteria particularly for callers sending multimedia information (address, callback telephone number, nature of emergency, etc.).
4. Establish new requirements for objective scoring categories and supporting standard evaluation guidelines for the handling of broadband information (below expectations, meets expectations, exceeds expectations, etc.).
5. Maintain a log of all incoming SMS/text-to-911 and multimedia/MMS calls which are subject to random or requested/special review in the QA program.
6. Access and print transcripts of SMS/text-to-911 and record and store multimedia/MMS calls along with other associated information (CAD event, ANI/ALI data, etc.).
7. Review data, photos, videos, etc. associated with incidents to assess how this information was utilized by the PST.
8. Provide appropriate training for conducting reviews on SMS/text-to-911 and multimedia/MMS calls to QA evaluators.
9. Establish timeline benchmarks for conducting QA reviews on SMS/text-to-911 calls and multimedia/MMS calls (e.g., weekly, monthly, etc.).
10. Establish an accountability process, training, performance improvement plans, and/or corrective action specific to SMS/text-to-911 and multimedia/MMS calls as required.
11. Align standard operating procedures (SOPs) with those areas identified for improvement so that the SOPs can be used in future training related to use of broadband technologies (in-service training, remedial training, training bulletins, etc.).
12. Implement or expand Critical Incident Stress Debriefing to address Post Traumatic Stress Disorder experienced by PSTs exposed to disturbing multimedia/MMS data.

## Put Technology to Work for You

NICE Inform Evaluator can help you with collecting, storing and evaluating virtually all that APCO recommends in the above list of 12 tips.



**Figure 5: Evaluating Multimedia Communications** – NICE Inform consolidates all forms of communications into synchronized playback, which is presented alongside the evaluation form.

The NICE Inform solution’s automated selection of recordings for evaluation based on pre-defined parameters dramatically improves evaluator productivity, so that more coachable recordings can be identified and reviewed.

i	Evaluation name	Form	Operator	Assigned to	Created by	Evaluated by	Completed by
	Brian Gibbons eval...	Call Center	Gibbons, Brian	Davis, Fred	Davis, Fred	Davis, Fred	
	Dave Jones evalua...	new form	Jones, Dave	Davis, Fred	Davis, Fred		
	Dave Jones evalua...	Call Center	Jones, Dave	Gibbons, Brian	Gibbons, Brian		
	Fred Davis evaluati...	Call Center	Davis, Fred	Gibbons, Brian	Gibbons, Brian		

**Figure 6: Evaluator to-do list** is automatically assembled based on pre-defined criteria

Recordings along with the most appropriate evaluation form (based on call type and content) can be automatically selected, matched, and presented to the evaluator, which substantially cuts back on time previously invested into manual call searches and matching of recordings to feedback forms. This in turn enables evaluators to review more communications and get more realistic insights into operations as a whole.

## RECREATING COMPLETE MULTIMEDIA INCIDENTS

“On the NG9-1-1 and FirstNet fronts, there are no doubt organizational, technical, and legislative challenges to be expected. Nevertheless, progress is definitely being made! NG9-1-1 and FirstNet are the two halves of the Public Safety request and response activities, with the nerve center being the PSAP.

NG9-1-1 and FirstNet will produce an entirely new landscape for dealing with emergency calls. The secret to success will be in the ability to securely coalesce the wide array of new, life-critical information into an easily digestible format that can be absorbed in emergency situations.”

- Clive Wall, Sr. Product Manager, NICE Public Safety

With the influx of many new forms of information, multimedia incident management is becoming far more important than it was in the days of just voice and text-to-911 communications between citizens and PSAP telecommunicators. First responders in the field are now becoming engaged in the multimedia communications as well, which adds still more records for incident investigations. NICE is ready to help agencies not only record but also connect and synchronize all these audio and data communications regardless of how many people, devices, locations, and channels of communications are involved.

The NICE Inform solution has been developed to capture, integrate, and put into context all forms of communications including digital, analog and VoIP calls, conventional, P25 and LTE radio transmissions, text-to-911/112/999 interactions, video, images, console screens, ICCS and CAD data, and still more. With NICE Inform, agencies have an unmatched flexibility to record, log, share, and collaborate on local and multi-site communications.

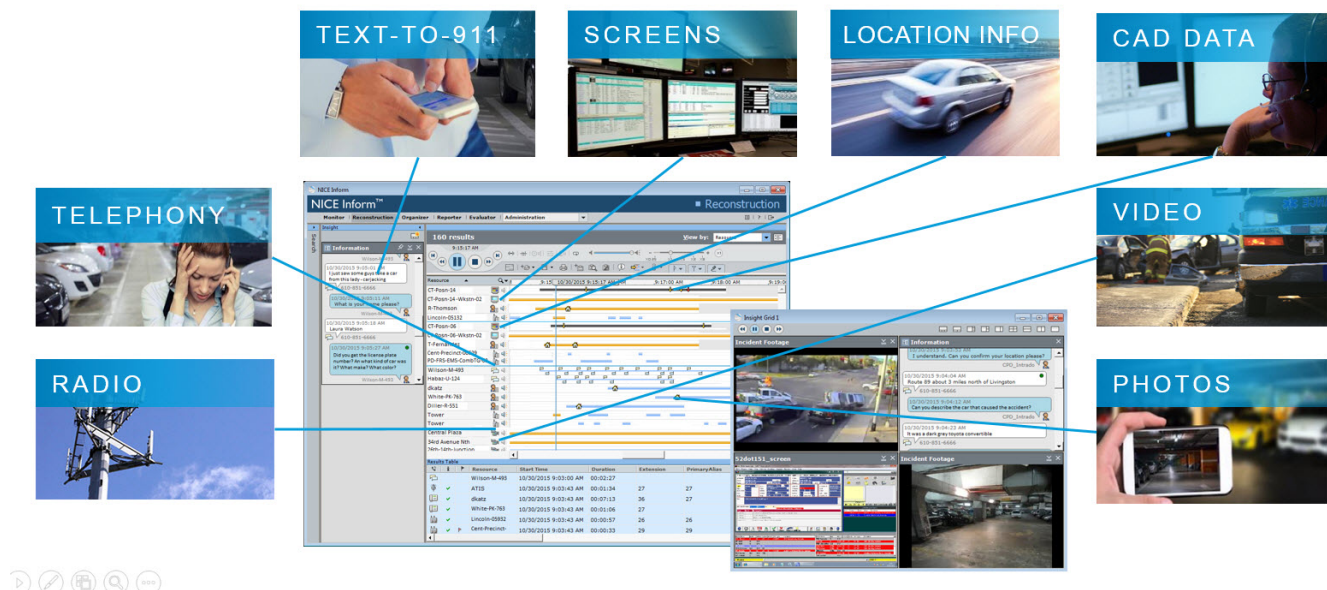
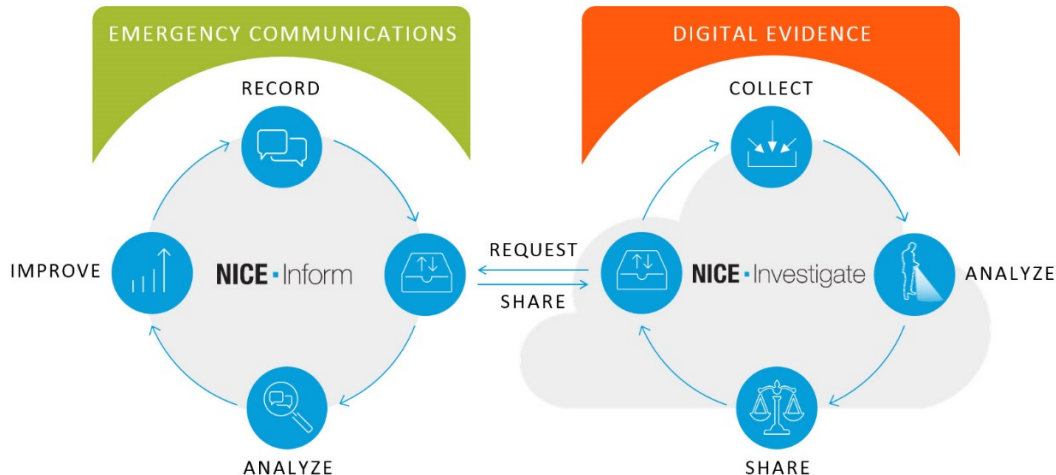


Figure 7: NICE Inform makes multimedia incident reconstruction easy

## END-TO-END DIGITAL EVIDENCE MANAGEMENT AND INVESTIGATION

Recording of FirstNet communications also brings more data as digital evidence for criminal investigations.

NICE provides comprehensive digital evidence management solutions and services that help improve emergency communications, streamline investigations and improve public safety around the world. **NICE Inform**, the market-leading recording and incident intelligence solution suite, is now complemented with **NICE Investigate**, the world's first cloud-based investigation software for detectives and prosecutors.



**Figure 8:** NICE unifies the reconstruction of emergency incidents and investigation of criminal cases.

## WHY NICE IS THE RIGHT PARTNER

NICE is the most experienced multimedia recording vendor in the industry, uniquely positioned for recording of LTE communications over FirstNet, along with all other forms of communications. In Summary:

- NICE has an in-depth understanding of the LTE infrastructure
- Is ready to connect to new interfaces as they become available
- Offers unique international experience with first movers (UK)
- Is inherently multimedia ready, building on the many years of experience with delivering recording and incident reconstruction solutions spanning digital, analog, and IP voice, conventional and P25 radio, text-to-911, surveillance video, computer screens, data, images, documents and more
- Offers flexible upgrades for new services
- Has road map for future as the vision of NG9-1-1, FirstNet and ESN evolves
- Can provide powerful quality monitoring for communications as a valuable feedback mechanism to help with the development of new processes and training methods
- Provides support for your entire digital evidence strategy