A NPSTC Public Safety Communications Report

The National Public Safety Telecommunications Council is a federation of organizations whose mission is to improve public safety communications and interoperability through collaborative leadership.

Public Safety Broadband Console Requirements

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191 Southpark Lane, #205 · Littleton, CO 80120 · Phone 866-807-4755 · Fax 303-649-1844 · Website

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Executive Summary

This report is designed to study the public safety requirements for dispatch center control systems in the context of emerging broadband wireless technologies, specifically the introduction of FirstNet services. The use of LTE [Long Term Evolution] technology to receive and distribute voice, video, and data presents new challenges and opportunities for public safety agencies.

The word "console" in this report refers to any public safety command and control system. While these are primarily located in dispatch centers and Public Safety Answering Points (PSAPs), they may also be located in other facilities, including agency Emergency Operation Centers (EOCs); hospital Emergency Departments, and Trauma Centers. It is further recognized that an LTE console may exist at the scene of a major incident (existing as either a wired or wireless console device).

This report examined the impact of new broadband services and features and did not attempt to document existing public safety requirements for Land Mobile Radio (LMR) dispatch systems, Computer Assisted Dispatch (CAD), or E9-1-1/NG9-1-1 systems. A list of existing standards, requirements, and best practices for each of those areas is listed in Appendixes 3, 4, and 5. It is not the intent of this report to indicate that first responder agencies require a single device to integrate and control all of the various systems, interfaces, and applications. The PSAP size, staffing, services provided, and geography covered will dictate the necessary equipment and console configuration for any given agency.

The Task Group working on this initiative was composed of public safety representatives including field level first responders who worked with industry personnel. These requirements were developed following an extensive review of use case scenarios, examination of existing reports, and discussion on current and future command and control needs.

The Task Group found that console requirements fall into the following general categories:

- Network
- Data Management
- Location
- Security
- Messaging
- Priority
- User Equipment

These requirements have all been cross-linked to parallel requirements in other broadband documents or were identified through analysis of use cases. Information has been provided in the report and the Appendix on the source of each requirement.

Finally, NPSTC would like to acknowledge and thank the U.S. Department of Homeland Security, Office of Emergency Communications (OEC) and Office for Interoperability and Compatibility (OIC), for their support including sponsorship of invitational travel for public safety personnel. This assistance allowed a 2-day face-to-face meeting in Boulder, Colorado, allowing public safety personnel to collaborate and complete major sections of this document.

Introduction

This report defines the public safety requirements for the functionality and interfaces for command and control consoles connected to the LTE network. This document is intended primarily for use by FirstNet to fully understand the mission requirements of the public safety community and to provide guidance on the design and Implementation of the Nationwide Public Safety Broadband Network (NPSBN). It is vitally important that the NPSBN accommodate mission critical communications. The requirements in this document apply solely to dispatch and console operations and should be interpreted in conjunction with other public safety requirements documents.

The best practices and requirements provided in this document are intended to describe the features and functionality for console-based dispatch operations which involve broadband services. They are intended to capture the operational requirements of dispatch and console operator functionality with the objective of fully leveraging the features and functionality of the LTE network.

This report does not restate existing standards and requirements for public safety console devices, including those for CAD, E9-1-1, and LMR radio system operations. It does not include requirements for interfaces to these existing systems. This report is intended to focus on those new features and functionality which will be required during and after the implementation of broadband LTE in the dispatch center.

It is extremely important to acknowledge that the transition from existing public safety radio and data services will likely occur over a period of time and that the NPSBN must fully support interconnection to existing services and functionality during the migration period. This includes the ability to support interconnection and patching functionality between existing mission critical voice and data systems.

The Task Group members reviewed and incorporated information from other operational documents that relate to dispatch and console operations. The Task Group reviewed the following NPSTC public safety broadband reports to identify references to console-based activities:

- NPSTC Broadband Statement of Requirements (SoR) Launch Requirements
- NPSTC Priority and Quality of Service Report
- NPSTC Local Control Report
- NPSTC Multi-Media Emergency Services (MMES) Report

Other requirements and standards documents developed by other organizations, including the National Emergency Number Association (NENA), Association for Public Safety Communications Officials – International (APCO), and the Telecommunications Industry Association (TIA) were also reviewed and a listing of these reports is included in the Appendix 6.

Public safety console and dispatch operations represent an ever-changing environment and it is expected that new requirements will emerge as other technologies are developed. This is especially true of the Next Generation 9-1-1 (NG9-1-1) initiative and the transition from copper-based wireline services to all Internet Protocol (IP) networks.

It should also be noted that the LTE console will need to connect with multiple networks and its primary connection point to a network may vary based on the needs of the local agency. There will be multiple independent and redundant networks in use by public safety agencies. These include the local public

safety agency enterprise network (PSEN); the NG9-1-1 network which provides IP transport of voice and data from telephone networks to, and between PSAPS; and FirstNet. It is likely that the LTE console will sit "in the middle" and perform functions associated with the NG9-1-1 network (receiving and processing incoming call information) while also communicating and sharing data with other local agency devices on the local agency network (PSEN) and while also sending data messages out to emergency responders through the FirstNet network.

Console Definition

For the purpose of this report, the word "console" means a piece of distributed infrastructure connected to several networks, including the LTE network, which is used for dispatch, command, and control activities. A console may include wired equipment located in the PSAP, in the agency's EOC, or a hospital Emergency Department. In some cases, the word "console" may refer to a wireless command and control device that is used at the scene of an emergency incident. A LTE console of the future could encompass the functionality of today's 9-1-1 console, CAD console, and LMR voice dispatch console to support tactical incident command situations. The desired functionality described in this report does not necessarily require, or recommend, that these existing functions be merged into one common product. However, the features and functionality will require access to the NPSBN via new open standard interfaces. As noted earlier in this document, existing 9-1-1, radio console, and CAD system functionality should be preserved as well as proposed functionality and standards for evolving NG9-1-1 systems.

Console requirements are an essential component of the larger LTE enterprise functionality which will allow public safety dispatch personnel to exchange critical voice and data communications with first responders in the field. Console systems must provide the functionality listed in this report, which includes the ability to:

- Interface with existing networks
- Support legacy and future technologies
- Provide robust functionality for voice, video, and data services
- To prioritize users and applications in support of an incident or event
- Provide functionality to manage network priority within an incident
- Allow seamless transfer of synchronized data sets to other locations
- Support the use of analytics to receive, organize, prioritize, and selectively route large amounts of data

The use of SHALL and SHOULD have specific meanings which are defined below:

- **SHALL**: Requirements that include the word SHALL have been identified as mandatory requirements which are essential for public safety operations.

- **SHOULD**: Requirements that include the word SHOULD are optional requirements. They generally indicate areas whereby, if applied, they would result in a more robust solution.

It is recognized that not every requirement can be implemented due to fiscal constraints and it is further acknowledged that not every public safety agency will require all of the functionality described in this report. There are many distinct differences between urban, suburban, and rural public safety agencies' operations.

Process

NPSTC assembled a Console LTE Task Group composed of representatives from public safety, industry, and commercial entities. The Task Group met for 6 months studying existing public safety requirements and standards. These included a large volume of information detailing requirements for CAD, NG9-1-1systems, and radio console systems.

The Group developed detailed use cases which covered a variety of law enforcement, fire, and EMS scenarios. These use cases were closely examined to determine required console functionality. A listing of the use cases is included in Appendix 7.

The resulting requirements were cross-walked with other operational requirements documents to ensure alignment and to ensure that public safety operational needs were met.

A select group of public safety and industry personnel met for 2 days at the Public Safety Communications Research (PSCR) Facility in Boulder, Colorado, to review all of the documentation and to finalize the list of requirements. This report was then updated to reflect the agreed-upon new information and edits. The report was then reviewed by a smaller group of public safety personnel, including first responder representatives who were not previously involved in the project. This Public Safety Review Team conducted a final assessment of the report.

This report was then submitted to the NPSTC Governing Board for review, comment, and approval.

Public Safety Requirements Indicators

To determine what specific public safety console requirements were necessary, the Task Group evaluated activity and other functional actions taken by telecommunicators and first responder personnel. Console-based actions were then extracted from a series of use cases and discussions developed specifically to address system features and multi-disciplinary functionality. Additional requirements were derived from a gap analysis of the existing broadband requirements documents. Each of the recorded actions either occurs today in the dispatch center or will be required following implementation of the NPSBN.

Each use case was also reviewed to identify specific action items. The action items were used in the development of the requirements and priorities were assigned to each action item.

The action items are either functionality required in the console device or are an essential component of network functionality. In many cases both network and console functionality are required.

Example 1:
During an incident, streaming video is being sent over the network to the dispatcher's console by a field unit and that video must be shared with another first responder.

Action Item: Console(s) receives video data.

Requirement: Console must have the capability to receive and transmit video data.

This functionality impacts both the console device and the NPSBN network.

Example 2:
As the incident escalates and user roles change, or additional access is required as part of a field unit's role or assignment, the dispatcher must have the ability to modify existing network and priority configurations (as authorized) to appropriately manage and maintain continuity of communications services.

Action item: Ability to prioritize field unit network access based on role or assignment.

Requirement: Console needs the functionality to dynamically prioritize first responders based on their assignment or function at the scene of an incident or based on an urgent or emergent situation.

This functionality impacts both the console device and the FirstNet network.

Logical assumptions and inferences were made based on operational protocols and functionality that exist today and/or are predicted to occur in the near future. This includes the expected receipt of data from both fixed and mobile devices and sensors, from a variety of networks (including the Internet) and other sources. The data received will likely be in varying formats and the console must have the functionality to accept, manage, and share the data as required by communications center policy or operational need.

The use cases also identified several data sources that would originate from external networks. Connectivity to, and data received from, these external networks may increase security concerns for the NPSBN. The NPSBN will need to have appropriate security measures in place to address the connectivity issue.

The requirements identify that console devices are part of the agency's Public Safety Enterprise Network (PSEN) and that they must link to the FirstNet network, while also connecting with other internal PSAP networks. These include connections to agency databases, third-party databases, agency application services, and other interfaces and systems. Many features and functionality available today may be used differently in a broadband environment and the requirements listed in this report outline the new functionality for console and dispatch operation.

The full list of actions which validated these requirements is listed in Appendix 2.

Public Safety LTE Console Requirements

The following requirements have been identified for public safety LTE consoles. These requirements are organized into seven categories: Network, Data Management, Location, Messaging, Priority, Security, and User Equipment.

Network

The network is an essential component of the LTE ecosystem and one which literally connects various components of the public safety response system together. It connects the dispatch center and first responders with all of the necessary equipment and infrastructure to provide services and functionality. The network is the system which enables multiple operations in order to prompt, retrieve, collect, share, disperse, authorize, decline, initiate, receive, control, open, and close information paths. The default network options shall be the same for all users or as identified in the Service Level Agreement (SLA) between FirstNet and the agency. Local agency personnel may further change network options based

on local control issues and policies. The connectivity options shall be broad enough to support public safety mission requirements listed in this report.

Networks include not only various IP data networks, but other communications networks such as legacy trunked and conventional LMR voice networks.

REQ #	Functionality	Requirement
1	NETWORK	Console SHALL interface with approved external networks to share voice, video, and data. (Examples: NG9-1-1 network, NCIC/NLETS network, etc.)
2	NETWORK	Console SHOULD have the ability to discover a newly formed network which has been previously authorized, including the ability to connect to temporary deployable networks.
3	NETWORK	Console SHALL establish and maintain simultaneous connectivity with multiple networks. (Example: ESINet, FirstNet) (*New Requirement)*
4	NETWORK	Console SHALL communicate machine-to-machine and sensor networks. (Example: Facility alarm systems, hazardous materials sensors, body worn biometric sensors worn by first responders, telematics and vehicle crash telemetry, etc.)
5	NETWORK	Console SHALL communicate with third-party external databases, including non-governmental and commercial systems. (Example: AED Registry, hazardous materials look-up systems, etc.).
6	NETWORK	Console SHALL have backwards compatibility to existing networks and technologies.(Example: Connection to legacy 9-1-1 networks which are non-IP based, LMR agency alerting systems, etc.)
7	NETWORK	Console SHALL support automated network monitoring and alerting that will signal expected or actual network degradation based on existing and requested functions.
8	NETWORK	Console SHALL support handoff capability between PSAP console and remote consoles, including transition of incident and status data from one console to another console in the same PSAP, transition to another console in another agency, or transition to a field based tactical console.
9	NETWORK	Console SHALL support handoff capability to an alternate PSAP, to include all incident and status data, in the event of an evacuation of the primary facility.
10	NETWORK	Console SHALL support interfaces to legacy voice and data networks and SHALL allow patching of mission critical communications and data between legacy LMR and LTE networks.
11	NETWORK	Console SHALL support a standardized interface to facilitate data interoperability.
12	NETWORK	Remote wireless console SHALL be able to connect to other LTE devices in direct/off network mode which are in range of the wireless console.

REQ #	Functionality	Requirement
13	NETWORK	Console SHALL notify dispatcher when User Devices change their network status (go into direct mode, lose network connectivity). Based on 3GPP Standards.
14	NETWORK	Console should be able to connect to a remote building network and access authorized applications (Examples: Security cameras, fire alarm systems, door access controls). This is intended to include government and commercial occupancies.

Data Management

LTE consoles, by necessity, must interact with a wide variety of data. In some cases, they access external data and/or become the source of data for other external devices including first responder units. In other cases, data originating from the NG9-1-1 network (including data and video from a caller) flows through the LTE console out to a first responder via the NPSBN. In many cases, the LTE console operator (telecommunicator) also interacts with the data. It is imperative to provide features which do not overload the PSAP operator with too much information. It is anticipated that analytics will be used to sort, prioritize, display, and route information automatically, minimizing or preventing the display of non-relevant information. Many of the requirements in this section speak to this issue (e.g., analytics, meta tags, replay, and geospatial display). In addition, another requirement is to prevent a data "bottleneck" by allowing first responders to directly access data relevant to their incident (and their assigned role at that incident) without involving the console operator.

The following Data Management requirements exist for LTE consoles

REQ #	FUNCTIONALITY	Requirement
15	DATA MGMT	Console SHALL have the capability to receive and transmit voice, video, and data to and from the FirstNet network. This includes a requirement for field users to directly access data and video without dispatcher intervention.
16	DATA MGMT	Console SHALL be capable of utilizing analytics to help manage and prioritize data streams and to support incident management.
17	DATA MGMT	Console SHALL be able to add predefined and ad hoc data meta data tags to incoming data feeds (including Incident ID, image categorization (suspect, witness), biometric category, etc. These meta tags are searchable by other users, including field units. (Example: Adding the assigned operational name of a major incident to a variety of citizen reports and field unit activities which are related.)
18	DATA MGMT	Console SHALL store, export, and access data (locally or in the cloud) to allow users to reconstruct and play back incident timeline.
19	DATA MGMT	Console SHOULD be able to automatically designate incoming and outgoing video quality levels using pre-established algorithms.
20	DATA MGMT	Console SHALL provide the capability to analyze incident and location data to provide real-time analytical reporting. This may

REQ #	FUNCTIONALITY	Requirement
		include recommendations on travel routes (based on assessment of traffic conditions, provision of alternate routes, etc.) as well as identification of geographical clusters of calls and linkages between other incidents that share common attributes.
21	DATA MGMT	Console functionality SHALL support role-based views/displays, allowing the dispatcher to only visualize information necessary for their specific mission and assignment.
22	DATA MGMT	Consoles SHALL maintain a synchronized data set between different console workstations (Example: Field unit location, assignment and status, list of incidents awaiting dispatch, etc.).
23	DATA MGMT MGMT	Console SHALL support both confirmed and non-confirmed data communications. (Which include messages sent which do not result in a confirmation of receipt, and messages sent which do result in a confirmation receipt to the system or operator.)
24	DATA MGMT	Console SHALL be able to review and edit images and video to allow selection of specific target image/video clip for transmission to first responders or for archive.
25	DATA MGMT	Console SHALL support a database of available video cameras and has the ability to select one or more camera feeds based on location of cameras.

Location

Location-based services are another essential component of the NPSBN. These services provide for rapid assignment of the closest appropriate first responder, provide geographic information to support the response of first responder personnel, and provide the ability for the first responder to query GIS data and other information sources in their immediate vicinity. They are a critical component of the first responder safety net.

REQ #	FUNCTIONALITY	Requirement
26	LOCATION	Console SHOULD support a geospatial display of information from multiple sources (Example: NG9-1-1 caller location data, incident location, first responder location, etc.)
27	LOCATION	Console SHALL be capable of receiving or providing a geo-location verified data time stamp and support entry of other meta data initiated by first responder or dispatcher (Example: During a police pursuit the suspect vehicle tosses a large bag off to the side of the road. The pursuing officer needs to attach a geo tag to the event allowing other responders to be directed to that location.)
28	LOCATION	Console SHALL be capable of receiving and displaying the location information of UEs within its purview, whether pulled (requested) by the console, or pushed (initiated) by the UE, and including location information that may accompany multi-media sessions such as audio, video, messaging, data, and status. (Examples: Peril, Emergency)

Messaging

Public safety dispatcher and console operators have a requirement for messaging services for communications between incident command, EOCs, field units, and other PSAPs using non-voice next generation services such as real-time text, video, and other multi-media applications. Consoles and dispatch operations must have the ability to manage the multimedia information based on the operations.

REQ #	FUNCTIONALITY	Requirement
29	MESSAGING	Console SHALL share defined and synchronized incident information data sets between other consoles (including consoles in other agencies) and field units.
30	MESSAGING	First responder LTE devices SHALL be able to pull data from console based on incident role and as authorized.
31	MESSAGING	Console SHALL allow dispatcher to push data to incident participants, based on role or assignment, or other defined parameters (PSAP).
32	MESSAGING	Consoles SHALL allow dispatchers to initiate and receive individual and group voice, data, and multi-media sessions.
33	MESSAGING	All messaging platforms, including media messages, sent from the console SHALL be capable of transmission to an individual UE, a preset, or ad hoc group of UEs which may be as large as all UEs within the agency's control.
34	MESSAGING	Console messaging options SHOULD include the ability to send a message to all UEs in a specific geographic area, without regard to their agency affiliation. (Example: Urgent warning message to all personnel in a particular hazard zone.)

Priority

It is recognized that default priority levels and assignments for users, applications, and services will be programmed into the LTE devices based on local requirements. However, authorized public safety console operators need the ability to modify these default priorities based on incident and network operations. It is not uncommon for public safety units from one jurisdiction to assist an adjoining jurisdiction. The console operator will require functionality to "add" other agency unit(s) to the local incident and thereby convey the appropriate priority access levels for the emergency event. Some users, applications, and situations will occasionally require access levels elevated above what is normally allowed by their default programming. This may be based on the field unit's assignment at the scene of an incident (and the role they are performing) or may result from the development of an urgent situation (for example, in which a field unit has an emergency situation and needs immediate assistance). Therefore, public safety console operators require a very robust prioritization scheme that can be enacted at the local console operator level. This is especially true in large-scale events that have established hierarchy with role-based levels of priority.

Certain situations are of such critical importance that lower level network traffic should be preempted to allow transmission of higher priority voice and data messages.

REQ #	FUNCTIONALITY	Requirement
35	PRIORITY	Console SHALL be able to receive and process credentials and assign authorized roles of incident responders.
36	PRIORITY	Console SHALL have functionality to prioritize users based on roles. Upon request, console SHALL display the default priority of users, their agency affiliation, and whether they are local or roaming onto the network.
37	PRIORITY	Network SHALL notify console of potential system degradation at point of provisional request for additional network resources.
38	PRIORITY	Console SHALL have capability to elevate field user priority when UE cannot initiate action. (imminent peril)
39	PRIORITY	Console SHALL allow dispatchers with appropriate permissions to dynamically and manually override automatic network traffic priority schemes of media and data traffic based on the traffic source's and/or destination's incident membership, role, individual ID, or media type. (Example: Priorities may be associated with an incident, a role, a user, or a media type and dispatchers must be able to dynamically change the normal priority assigned to each of those profiles.)
40	PRIORITY	Console SHALL allow dispatchers with appropriate permissions to restore network traffic priority of profiles within its purview to their normal default prioritization scheme.
41	PRIORITY	Console SHALL be informed whenever the traffic priority of an incident, role, user, or media type within its purview has changed.
42	PRIORITY	Console SHALL be able to pull (request) and receive network pushes of these changes.

Security

Security measures for console and dispatch operations are an integral part of public safety operations and involve a complex set of agency security and cyber security processes. Public safety processes sensitive information on a daily basis, which requires robust security measures to ensure integrity, confidentially, privacy protection and information assurance. A nationwide public safety broadband network would be an obvious target for cyber-attack. This fact requires that extensive security measures be enacted to prevent attacks on the network to include but not be limited to cyber-attacks, physical site security, and denial of service. The majority of the security requirements for the NPSBN are contained in other NPSTC documents. Only unique security issues relating to LTE consoles are identified in this report.

REQ #	FUNCTIONALITY	Requirement
43	SECURITY	Console SHALL have appropriate security capability and authorization to manage traffic between the public safety network and other networks.
44	SECURITY	Console SHALL support interfaces to allow appropriately authorized remote users, including field users, to access video of the PSAP and to access security control systems that manage compound, gate, and door controls.
45	SECURITY	Console SHALL include standards-based hierarchy supervisor and user permissions, profiles, and controls.

User Equipment (UE)

Consoles must have the capability to modify UEs that are operating within the console's or agency's jurisdiction. Access to a field unit UE would be necessary to affect remote control of the device in an emergency situation. This may include the need to activate the installed camera on a first responder's device to determine their status following a call for help. The console operator or administrator must also be able to re-assign roles and priorities for individual users dynamically.

REQ #	FUNCTIONALITY	Requirement
46	UE	Console SHALL be aware of, and display information about, FirstNet UEs that have roamed into the agency's jurisdiction, (based on agency and security profiles).
47	UE	Console SHALL allow dispatchers with appropriate permissions to add and remove UEs to/from incidents in their jurisdiction or area of control, including roaming UEs.
48	UE	Console SHALL allow dispatchers (and/or administrators) with appropriate permissions to activate and deactivate users on the system. (Example: Ability to deactivate and wipe a stolen UE.) Consoles SHALL be able to associate UEs with the assigned field unit personnel identification The console SHALL support a display which may show the UE ID and/or personnel ID.
49	UE	Console SHOULD allow dispatch supervisors and others with appropriate permissions to discreetly monitor field unit one-to-one (e.g., individual call) sessions between UEs within their purview, (including voice, video, and messaging media) even if the dispatcher is not a participant in the session.
50	UE	Console SHALL be able to receive and display the status of UEs within their purview, including Emergency and Imminent Peril status, and network status (e.g., on-network, in Direct Mode). This must be accomplished both by console pulling (requesting) the data, and by UEs pushing (initiating) the data. It is expected that Imminent Peril and Emergency status can be appended to all media types.

51	UE	Dispatchers with appropriate permissions SHALL be able to remotely change the status of the UEs under their purview, including but not limited to setting the UEs status to Imminent Peril or Emergency, and clearing Peril/Emergency statues on behalf of the UE user.
52	UE	Console SHALL allow dispatchers with appropriate permissions to remotely enable streaming audio and video from UEs within their purview and monitor those streams. This is especially important for UEs which are in a Peril or Emergency state.
53	UE	Console SHOULD be able to remotely access and control UEs that are operating within its jurisdiction (based on agency, user, and security profile). Note: Specific functionality for each UE would be developed in another document and is out of scope for this report.
54	UE	Console SHALL be able to receive biometric data feeds from UE devices, including biometric alarms and warning messages.

Appendix 1 Task Team Members

NPSTC wishes to thank and acknowledge the following members of the Console LTE Task Group:

Karen Allen
Austin Blake
Patti Broderick
Mary Borst
Rick Burke
Ian Carpenter
John Contestabile
Timothy Dailey
Donald Denning
Crista Dexter
James Downes
Jerry Drobka
David Eierman
Alan Harker
Warren Izumigawa
Vonda Jones
Frank Korinek
Bonnie Maney
Jason Matthews
Timothy Mayer
Justin McAteer
Kathy McMahon
Mick McQuilton
Evens Michel
Paul Middleton
Christian Militeau
Pam Montanari
Mark Nylander
Dan O'Malley
Nicole Parrish
Tim Pierce
Rolf Preuss
Randy Richmond
Glenn Roach
Toivo Sari
Michael Sasuta
Glenn Shirley
Brandon Smith
Scot Smith
Danae Stewart
Richard "Dick" Tenney
Rodney West

Appendix 2: Public Safety Requirements Indicators

This appendix displays a listing of sample actions taken by public safety telecommunicators while working at a console. Some of these actions are also applicable to console type devices which might be used in a hospital emergency department, an Emergency Operations Center, or in another type of command and control environment. All of these Public Safety Requirement Indicators are incorporated into the requirements tables listed in the main section of the report.

Number	Public Safety Action
1	Video is monitored at the facility.
2	Receiving voice, video data to the PSAP.
3	Alert to dispatcher that it's a high-risk facility.
4	Process to filter or select data to send only relevant data.
5	Other data flows will come to the PSAP, including sensors (fire alarms).
6	Process to organize and prioritize data/information; need to avoid overwhelming PSAP with information.
7	Situational awareness of where calls are coming from.
8	Coordinate among PSAPs that will start to get diverted calls.
9	Automated way to off-load calls via geo-fencing (Covered in NG9-1-1).
10	Dispatcher to record automated overcall message management to inform people calling in that PSAP is aware of event. Get a call-back number for new information. Message could be via text. (Covered in NG9-1-1).
11	Data automatically pushed to appropriate first responders based on predefined needs and requirements and certifications.
12	Some data shared automatically with other PSAPs/disciplines. Need sharing capability so that one person is not overwhelmed. (Covered in analytics).
13	Data must be sorted and forwarded to the correct people.
14	Organize data into "buckets" and, by protocol, certain buckets are available to relevant responders. Allows first responders to "pull" data based on what's available.
15	Console must be able to add meta data tags to incoming data feeds which should then be searchable. Need switchboard/analysis beyond automated categorization.
16	Automatic notification to COMU personnel (COML) and request for scene based resources such as COW/COLT, MCV, etc.
17	Ability to prioritize access based on need/role. (Covered in network standards).
18	CAD needs to inform the LTE network of what is needed for the response to incident. (Example: Access to incident data based on role.)
19	Dispatcher must be able to receive data from IC either automatically or by request.
20	Allow capability and flexibility for PSAP to pull needed data from other sources, databases, and devices.
21	Process of transitioning certain functions to appropriate on scene management from dispatcher to IC.
22	Process of transitioning functions from dispatcher to other organizations (Example: To another agency in the event of an evacuation of the PSAP and to other agencies including hospitals, trauma centers, other public safety agencies).
23	Console must be able to receive video/data feeds as appropriate or needed from incident.

Number	Public Safety Action
24	Console will notify user of network overload and lack of availability at the point at which data request is made.
25	Capability for tactical supervisor to request additional bandwidth. Console ability to assign roles and needs to communicate with LTE Network.
26	Console communicates user role and resources they receive based on role and communicates that back to the LTE system.
27	Console communicates need for elevated priority and role based on need.
28	Console can preview, grab, edit, or tag video data within specific parameters.
29	Console has database of available video cameras and has the ability to choose what camera feeds to watch based on location of cameras.
30	Console needs capability to discover video streams in area and in building.
31	Console can access and review stored video and incident data as needed for investigative purposes.
32	Dispatcher has ability to prioritize and distribute video.
33	Console will view status of incident area network performance.
34	Ability to store incident records.
35	Vehicle and any UE device so equipped should be able to send video and data to console. (Example: Video is automatically turned on if the field unit activates their emergency feature.)
36	Variety of standard frames/settings should be available.
37	Console can control video and data feeds.
38	Console warns dispatcher there is a high probability that a moving incident will go into neighboring jurisdiction. (Example: Police pursuit) (Covered in analytics.)
39	Console has capability to control UE data feeds. (Example: Field user left vehicle camera activated by accident and is out of the vehicle.)
40	Console must have voice, video, and data connection between PSAPs.
41	Console needs to support legacy voice and data networks and allow mission critical patching between legacy and LTE networks.
42	Stop stick sensor sends data to console and pushes location information out to other responders.
43	Ability to dynamically share data as units join the incident based on preconfigured rules.
44	Console should be able to display and filter location information for resources (vehicle, person, animal).
45	Console should be able to receive location-data time stamp and other meta data initiated by first responder or dispatcher. (Example: Gun buried at X location).
46	Console API should be able to interface with multiple systems.
47	Console should register incident command whiteboard plan.
48	Role-based console view. Console-to-console synchronized data set.
49	Console should register when devices go into direct mode.
50	Console receives emergency alerts from UE devices.
51	Remote console should be able to connect to D2D communications.
52	Console must be able to accept biometric information alerts.
53	Console should support and export incident information for reporting purposes.
54	Console should remind dispatcher to check on responder based on a series of parameters. (Existing CAD functionality)

Number	Public Safety Action
55	Console user should be able to activate emergency alert on behalf of a first responder in distress and share information about alert with responding team.
56	Monitor biometric and other personnel-related alerts for first responder.
57	Console should be able to connect to a building automation system and control it.
58	Console must have the ability to integrate with third party applications.
59	Console must support features and functionality for CAD systems, LMR systems, 9-1-1 systems, and new NG9-1-1 systems.
60	Console must receive and capture data from predefined sensors.
61	Console must be able to accept reliable feeds and provide confirmation of receiving complete and uncorrupted data.
62	Console needs to be able to go backward and forward through data.
63	Console needs to support building security access control and auxiliary I/O device connections.
64	Console needs to have a capability to securely manage traffic between the NPSBN and other networks.

Appendix 3 Existing Public Safety Radio Console Functionality

This document was developed and approved by the radio dispatch console manufacturers participating in the NPSTC LTE Console Requirements Task Group (Harris, Motorola, and Zetron) for the purpose of identifying legacy LMR radio dispatch console functionality. This list is not intended to specify mandatory functionality, but rather to describe what is commonly available from several manufacturers of LMR radio dispatch consoles.

The only known independent LMR radio dispatch console functionality reference document is the Project 25 Console Subsystem Interface (CSSI) Overview developed by the Telecommunications Industry Association (TIA) as TSB-102.BAGA. The CSSI Overview is focused purely on Project 25 functionality, whereas this document describes generic LMR radio dispatch console capabilities.

The names of these features may differ from one manufacturer to the next.

The term “talk group” used in the descriptions below can be interchangeable with the term “radio channel.” “Talk group” is generally used for trunked LMR systems, and “radio channel” is generally used for conventional LMR systems.

CONTROL FEATURES

- **Outgoing Call/Busy Indicator.** Allows dispatchers to see which talk groups are busy with outgoing traffic.
- **Incoming Call Indicator.** Allows dispatchers to visually see which talk groups have incoming traffic on them.
- **Talker ID.** Allows dispatchers to see the source ID of the incoming traffic.
- **Cross Busy.** Prevents one dispatcher from inadvertently transmitting over the top of another.
- **Encryption Status/Control** (**aka Coded/Clear**). Allows dispatchers to see the encryption state and/or Key ID of incoming calls, and allows dispatchers to control the encryption state and/or Key ID of outgoing calls.
- **Main/Standby.** Allows dispatchers to use an alternate radio resource in the event of a failure of the primary resource.
- **Fixed Station Control.** Allows dispatchers to control attributes of a control station (e.g., frequency, talk group assignment).
- **Voter Status/Control.** Allows dispatchers to see the radio site through which an incoming call is being received. Allows dispatchers to control the radio site through which an outgoing call is sent. Typically used in wide area systems using a common radio frequency.
- **Auxiliary I/O.** Used by dispatchers to monitor and control auxiliary equipment, such as devices at the communications center (door access, TV monitors) or radio sites.

VOICE FEATURES

- **Priority Marker.** Sends periodic tones to a talk group notifying users of a special incident, usually reserving the talk group for only priority traffic.
- **Alert Tones.** Audible tones sent to a talk group indicating the type of incident that is being dispatched. Usually followed by voice containing the details.
- **Monitor.** Allows dispatchers to listen to all traffic on the channel without any filtering based on privacy code. Typically only applies to conventional systems.

- **Transmit Monitor.** Allows dispatcher to hear the transmissions of other dispatchers.
- **Console Cross Mute.** Prevents the transmission of one dispatcher from being heard at the dispatch console of another dispatcher whose speakers are within earshot of the transmitting dispatcher. Prevents acoustic feedback.
- **Channel Cross Mute.** In the case where radio channels are shared or talk groups are patched, this prevents a dispatcher's outgoing call from being simultaneously played at their console speakers thus potentially causing acoustic feedback.
- **Multiple Receive Speakers (e.g., Select & Unselect).** Allows dispatchers to simultaneously monitor the traffic from multiple talk groups, flexibly assigning talk groups between speakers on-the-fly, as needed. Allows dispatchers to assign listening priority by giving each talk-group a different volume level.
- **All Mute.** Allows the dispatcher to quickly mute the incoming audio from all non-important talk groups, so that they can focus on an urgent situation. Often All-Mute is automatically timed to prevent a dispatcher from forgetting to re-enable audio afterwards.
- **Supervisory Control & Takeover.** Allows a dispatch supervisor to disable or over-ride the transmit capability of a dispatcher. Typically used in training scenarios.
- **Priority Transmit.** Allows a dispatcher (typically a supervisor) to increase their priority so as to pre-empt and over-ride the transmission of another dispatcher.
- **Dispatcher Interrupt.** Allows a dispatcher to pre-empt and over-ride the transmission of a field unit such that everyone else in the talk group (except the transmitting field unit) hears only the dispatcher's transmission. Dispatcher priority is typically higher than field units.
- **Lost Audio.** When a dispatcher transmits over an incoming call, all other field units in the talk group hear the dispatcher instead of the transmitting field unit. Lost Audio allows dispatchers to hear the traffic from the transmitting field unit.
- **Channel-to-Channel Patch.** Patching one talk group to another such that two groups of users can talk to one another.
- **Telephone-to-Channel Patch.** Patching a telephone line to a talk group.
- **Site Intercom.** Allows dispatchers to talk to maintenance personnel at a radio site.
- **Console Intercom.** Allows dispatchers to call or text other dispatchers.
- **Voice Recording.** Records voice (and sometimes associated IDs/status/text) of traffic flowing through the console. Voice recordings are often archived for legal purposes.

VOICE CALLS

- **Broadcast Call.** Allows dispatchers to transmit a call to all system users (all talk groups and individuals).
- **Group Call.** Allows dispatchers to transmit to and receive from a pre-determined group of users (talk group).
- **Simul-Select.** Allows dispatchers to free-form select multiple talk groups in preparation for transmitting to the flexible super-group.
- **Group-Select.** Allows dispatchers to select a pre-determined super-group of multiple talk groups in preparation for transmitting to the fixed super-group.
- **Group-Regroup (aka Dynamic Regrouping).** Allows dispatchers to create a temporary super-group made up of multiple fixed talk groups. Dynamic Regrouping regroups the field radios such that no additional network resources are used when transmitting to the super-group (whereas Simul and Group select will use additional network resources).

- **Individual Call.** Allows dispatcher to privately call an individual field unit (aka Selective Call). Also allows a field user to privately call dispatchers (aka Reverse Selective Call).
- **Emergency Call.** Allows dispatchers to know when an incoming voice call is present from a field unit in distress. Emergency calls typically are the highest priority type of call. This typically gives special aural and visual indication to the dispatcher.

SUPPLEMENTAL (NON-VOICE) FIELD-UNIT SIGNALING

- **Call Alert.** Allows dispatchers to leave an indication on a specific field radio that the user has been called. The user will typically call back when convenient.
- **Radio Check.** Allows the dispatcher to check to see if a specific field radio is on and within network coverage.
- **Radio Monitor.** Allows the dispatcher to cause a specific field radio to transmit its microphone audio for a few seconds. This is typically used if a user does not respond to calls.
- **Radio Inhibit.** Allows the dispatcher to disable the functionality of a specific field radio. Typically used when a field radio is lost or stolen.
- **Text Message.** Allows the dispatcher to send free-form or pre-set short text messages to a specific field radio. Field radios can also send text messages to dispatcher.
- **Unit Status.** Allows dispatchers to see the status of field units without using voice transmissions. This is accomplished by short data messages being sent from field units to the dispatch center.
- **Emergency Status.** A high-priority status from a field unit indicating they have an emergency situation. This typically causes the dispatch console to give special aural and visual indication to the dispatcher.
- **Automatic Vehicle Location (AVL).** Allows dispatchers to know the location of their field units. This is typically accomplished by GPS in the field radios sending a short data message to the dispatch center.

Appendix 4 Existing CAD System Functionality

Computer Aided Dispatch (CAD) systems are used in public safety agencies throughout the United Sates to track the transactions involved in citizen's calls for service, public safety activity, as well as special events and incidents occurring within the assigned jurisdiction(s). While developing the requirements section of this document the expectation was set that current CAD functionality would be maintained. FirstNet's direction to provide a public safety nationwide broadband network allows additional interoperability opportunities between disparate CAD systems that should be included in all aspects of current and future functionality.

This appendix lists documents that outline and explain the functionality that current CAD systems should and could include. Also included in the list are documents identifying methods for data exchange and sharing, as well as documents identifying current interfaces with alarm companies and telematics. The APCO ASAP program is only available for law enforcement agencies at this time due to the current transport method. Moving to FirstNet would allow fire agencies to also benefit from this program.

CAD Function Document:

- APCO/IJIS - Unified CAD Functional Requirements (UCADFR)

CAD Data Exchange Documents:

- NENA/APCO Emergency Incident Data Document (EIDD) (NENA-INF-005)
- IJIS Institute – Priority Data Exchange

Specialty Data Exchange Documents:

- APCO - Alarm Monitoring Company to Public Safety Answering Point (ASAP) Computer-Aided Dispatch (CAD) External Alarm Interface Exchange (APCO/CSAA!ANS!2.101.182008)
- Automatic Collision Notification and Vehicle Telematics Technical Information (NENA 07-504 v1)

Appendix 5 Existing & Proposed 9-1-1 & NG9-1-1 System Functionality

This appendix lists reference documents which contain standards and requirements for Next Generation 9-1-1 system features and functionality. Existing console features, functionality, and requirements, including those for radio system, CAD, and E9-1-1 are not listed in this report. This report also excludes existing standards and requirements for NG9-1-1 systems which are currently being implemented.

The first document listed, "Next Generation (NG9-1-1) Standards Identification and Review" provides a comprehensive overview of all NG9-1-1 requirements and standards. The remaining reports provide significant detail of the interfaces and capabilities of NG9-1-1.

NG9-1-1 Documents

- Next Generation (NG9-1-1) Standards Identification and Review (911.gov)
- Detailed Functional and Interface Specifications for the NENA i3 Solution- Stage 3 (NENA 08-003
- NENA i3 Technical Requirements Document (NENA 08-751)
- NG9-1-1 System and PSAP Operational Features and Capabilities Report (NENA57-750)
- Use Cases and Suggested Requirements for Non Voice Centric Emergency Services (NENA 73-501)
- E9-1-1 PSAP Equipment (NENA 04-001v2)

Additional existing standards and references:

- ATIS-0500019: Request for Assistance Interface (RFAI) Specification
- ATIS-0500023: Applying 3GPP Common IMS to NG9-1-1 Networks
- J-STD-110: Joint ATIS/TIA Native SMS to 9-1-1 Requirements & Architecture Specification
- J-STD-110.01: Joint ATIS/TIA Implementation Guideline for J-STD-110, Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification
- J-STD-110.a: Joint ATIS/TIA Supplement A to J-STD-110, Joint ATIS/TIA Native SMS to 9-1-1 Requirements and Architecture Specification
- ATIS-0700015: ATIS Standard for Implementation of 3GPP Common IMS Emergency Procedures
- 3GPP TS 23.167: 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions

Appendix 6: Broadband Document Report Review

This section examined several existing NPSTC broadband reports to determine where console requirements, features, and functionality are referenced. This chart cross references information from the following reports: *NPSTC Priority & Quality of Service, Local Control, Broadband SoR Launch*, and *Multi-Media Emergency Services*. This chart was used to verify that the developed console requirements included all references made in associated reports.

The REPORT column refers to the NPSTC document being cited:

- PQOS – *2012 NPSTC Priority and Quality of Service Report*
- LC – *2012 NPSTC Local Control Report*
- BBL – *2012 NPSTC Broadband Launch Requirements Report*
- MMES – *2012 NPSTC Multi-Media Emergency Services Report*

The PAGE and SECTION columns refer to the page number and document section number. The "P" column refers to the paragraph on the cited page. The WORDING column represents either the specific text cited or an abbreviated version of the listed text. The CATEGORY column refers to a grouping assigned by the Task Group to help organize the data. Items in this table which are highlighted refer to these new requirements which have been carried over to the Console LTE Requirements Table.

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
PQOS	6	1.2	4	"...must allow agencies to adjust their operations"	Administration
PQOS	16	2.2.2.2	4	"In an effort to limit technology distractions to dispatchers and command staff, it is desirable that the act of assigning a responder to an ICS role automatically adjust the responder's admission priority on the PSBBN."	Administration
PQOS	19	2.2.2.4	2	"The PSBBN MUST allow responder UEs to be treated as 'High Priority Itinerant Users.' This can be accomplished in ways that do not require PS to manually modify PSBBN parameters. For example, the act of assigning a responder to an incident via the CAD terminal or ICS app can automatically	Administration

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
				designate the responder as “incident-assigned."	
LC	9	2.1.1.5	1	"...the User Entity must have the ability to deactivate the device from the PS LTE network. This is similar to the function of radio inhibit in today's radio systems.”	Administration
LC	12	2.3.1	1	"...it is critical that the BBNO NOC have facilities for relaying appropriate information to local agency operations. Such 'read-only' information might include operational status of equipment, and accounting data for their specific users for auditing purposes."	Administration
BBL	74	4.6.3 User Setup	2	Local operations PSE administrator shall be able to perform the initial setup required to add a user to the NPSBN system and to change attributes once added.	Administration
BBL	74	4.6.4 User Change	3	The PSE administrator will need to define the types of devices the user is authorized to use.	Administration
BBL	75	4.6.5 App Setup	1	The PSE administrator will need to configure the allowable set of apps for the user and to establish specific role parameters for the apps.	Administration
BBL	76	4.6.8 Dynamic Role Re-Assignment	last	The PSE administrator must be able to re-assign roles for individual users dynamically.	Administration
BBL	111	6.2 Pre-emption	Table 118, #2	It shall be possible for a [PSEN administrator] to configure which applications can utilize resources previously assigned to other applications.	Administration
		NEW, ITEM #1		**Consoles shall be made aware of FirstNet UEs that have roamed into the agency's jurisdiction, and allow dispatchers with appropriate permissions to be made aware**	

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
				of their local presence.	
		NEW, ITEM #2		**Consoles shall allow dispatchers with appropriate permissions to add and remove roaming UEs to their purview, and to assign and un-assign both home and roaming UEs to incidents and roles (thus imparting incident and role-based prioritization and data access to those UEs).**	
		NEW, ITEM #3		**Consoles shall allow dispatchers (or administrators) with appropriate permissions to activate and deactivate UEs on the system, and associate UEs with designated user personnel (automatically assigning the user's Talker ID alias to the UE's unit ID).**	
BBL	27	4.1.5 Cellular Telephony	last	Call monitoring (discrete listening) by dispatcher for telephony service should be considered.	Audio (Voice)
MMES	68	6.7	40	MMES shall allow an authorized user to remotely enable voice transmission from a capable end user device to the Dispatch Command Center.	Voice, Status
MMES	60	6.3	3	A PS MMES Network shall be able to transport and distribute MMES supplementary audio and or video messaging from a PS MMES User device to a Dispatch Command Center and other Subscriber Group members, in the same session or different session.	Audio, Video
MMES	60	6.3	4	A PS MMES Network shall be able to transport and distribute MMES supplementary audio and or video messaging sent from a PS Dispatch Command Center to the members of a dispatch response team.	Audio, Video

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	60	6.2	19	PS MMES Supplementary Audio and or Video messaging shall have high priority access capability to ensure that life threatening emergency messaging can be successfully sent and received by all group members and the Dispatch Command Center.	
MMES	62	6.4	1	A PS MMES Network shall be capable of supporting prioritized operation, which once invoked would allow voice, text and data to be sent to/from PS MMES User device to/from a Dispatch Command Center and all other active members of an MMES Subscriber Group within two seconds, despite traffic congestion on PS LTE sectors(s) supporting target PS User operation.	
MMES	66	6.7	13	A PS MMES User Device shall be capable of enabling the addition of a supplementary audio and or video feed by a Dispatch Operator in an emergency situation, in the same session or different session.	Audio, Video, Status
		NEW, ITEM #4		**Consoles should allow dispatchers with appropriate permissions to discreetly monitor one-to-one (e.g., individual call) sessions between UEs within their purview, (including voice, video, and messaging media) even if the dispatcher is not a participant in the session.**	

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
		NEW, ITEM #5		**Consoles shall allow dispatchers to participate in (send and receive) individual and group media sessions, including voice, video, data, status and messaging media. Media sent by dispatch shall be capable of being sent to a single individual UE, or a group of UEs that may be as large as all UEs within the agency's purview.**	
MMES	65	6.7	2	A PS MMES User Device shall be able to receive a CAD incident record and related attachments.	CAD
MMES	65	6.7	3	A PS MMES User Device shall be able to update a CAD incident record and have the updates automatically shared with other users assigned to the call (on other PS MMES User Devices and at dispatch positions in the Dispatch Command Center) viewing the incident record.	CAD
MMES	66	6.7	19	A PS MMES User Device shall be capable of receiving a CAD incident record.	CAD
MMES	67	6.7	29	A PS MMES User Device shall be capable of updating a CAD incident record.	CAD
MMES	73	6.9	4	The agencies CAD system detects a Stolen Vehicle and automatically sends a notification to the responding officer, the affiliated Dispatcher, and any other support entities (such as the Stolen Vehicle Unit) as determined by the agency's SOP.	CAD

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
		NEW, ITEM #6		**Consoles (inclusive of CAD functionality) shall allow dispatchers and designated UE users to assign themselves and other UE users to an incident, thereby giving all members of the incident access to incident data. Consoles shall be capable of pushing (initiating) and UEs shall be capable of pulling (requesting) synchronized updates of CAD incident data from the Console (CAD system) to all members of the incident. The level of access (read-only or updating allowed) will depend on the member's permission level.**	
LC	11	2.2.3	2	"the network must support interconnection between existing PS data sources and application services and the nationwide broadband PS LTE network."	Data
BBL	45	4.2.5.1 DNS	Table 43, #2	[PSAPs shall be able to access the NPSBN DNS services.]	Data (Network)
MMES	61	6.3	18	MMES shall support high-priority transmission of application data to the Dispatch Command Center.	Data, Prioritization
MMES	67	6.7	35	MMES shall allow an authorized user to remotely enable application data transmission from a capable end user device on a subscriber group, to the Dispatch Command Center, or to an authorized user who may be on the fixed network or mobile network.	Data, Status
MMES	60	6.3	7	A PS MMES Network shall be capable of transporting and distributing incident scene information from a dispatch command center to a dispatch response team, on scene or in transit.	Data

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	59	6.2	7	PS MMES Emergency Alarm messaging shall carry location information for the Dispatch Command Center and other members of an MMES Subscriber Group.	Location
MMES	73	6.9	11	Real time GPS-based location information for the pursuing vehicle would be sent back to dispatch which could then be viewed on a mapping application to assist responding units and the dispatcher coordinating them. This application should be viewable in real time by any supporting entities as determined by the Incident Commander.	Location
BBL	39	4.2.1 Location Services	7	By querying the network of location-enabled UEs an IC can locate resources…without the need to speak.	Location
BBL	29	4.1.6 NG9-1-1 Services	1	Appropriate NG9-1-1 content can be delivered to dispatchers from the PSAP call-taker.	Location, Data
MMES	61	6.3	15	MMES shall support high-priority transmission of an individual's location information to the Dispatch Command Center.	Location, Prioritization
MMES	61	6.3	12	For a mobile first responder in an emergency situation, a PS MMES Network shall be capable of providing periodic location updates, and/or as requested by a PS Dispatch Command Center or Dispatch Response Team.	Location, Status
MMES	67	6.7	36	MMES shall allow an authorized user to remotely enable location updates from a capable end user device on a subscriber group to the Dispatch Command Center or to an authorized user who may be on the fixed network or mobile network.	Location, Status

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	59	6.2	10	PS MMES Emergency Group data transmissions shall carry location information for the dispatch command center and other members of an MMES Subscriber Group.	Location, Status, Data
MMES	60	6.2	18	PS MMES Supplementary Audio and or Video messaging shall carry UE location information for the Dispatch Command Center and other members of an MMES Subscriber Group.	Location, Audio, Video
MMES	59	6.2	13	PS MMES Non-Emergency Group text messaging shall carry location information for the Dispatch Command Center and other members of an MMES subscriber group.	Location, Messaging
		NEW, ITEM #7		**Consoles shall be capable of receiving and displaying the location information of UEs within its purview, whether pulled (requested) by the console, or pushed (initiated) by the UE, and including location information that may accompany multi-media sessions such as audio, video, messaging, data and status (e.g.,Peril, Emergency)**	
MMES	59	6.2	15	PS MMES Predefined Emergency Text messaging shall carry location information for the dispatch command center and other members of an MMES Subscriber Group.	Messaging
MMES	60	6.3	5	A PS MMES Network shall be capable of transporting and distributing group multi-media messaging among group members, using a User Devices, dispatch command centers, or other subscriber group members, in Emergency mode.	Messaging

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	60	6.3	6	A PS MMES Network shall be capable of transporting and distributing group multi-media messaging among group members, using a User Devices, dispatch command centers, or other subscriber group members, in Non-Emergency mode.	Messaging
MMES	66	6.7	20	A PS MMES User Device shall be capable of receiving a Group Text message response back from a Dispatch Command Center (DCC) or other active Group members in response to Emergency or Non-Emergency Group Text messaging.	Messaging
MMES	59	6.2	11	PS MMES Emergency Group data transmissions shall have high priority access capability to ensure that life-threatening emergency messaging can be successfully sent and received by all group members and Dispatch Command Center.	Messaging, Data
MMES	61	6.3	10	A PS MMES Network shall transport and distribute MMES predefined emergency group text messaging or emergency sensor data and GPS tracking information sent automatically from a PS MMES User device to a Dispatch Command Center and all other active members of an MMES Subscriber Group.	Messaging, Sensors
MMES	60	6.3	8	A PS MMES Network shall transport and distribute an MMES Group Text message response back (from a Dispatch Command Center or other active members of an MMES Subscriber Group) a PS MMES User in a life-threatening situation, and other active members of an MMES Subscriber Group.	Messaging, Status

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	61	6.3	9	A PS MMES Network shall transport and distribute MMES emergency alarm and emergency group text messaging from a PS MMES User device to a Dispatch Command Center and all other active members of an MMES Subscriber Group.	Messaging, Status
MMES	65	6.7	7	A PS MMES User Device shall be capable of automatically transmitting a pre-defined emergency text message indicating a life-threatening situation to Dispatch Command Center and other members of an MMES Subscriber Group.	Messaging, Status
MMES	69	6.7	54	A PS MMES User Device shall be capable of automatically transmitting a pre-defined emergency text message indicating a life-threatening situation to Dispatch Command Center and other members of an MMES Subscriber Group.	Messaging, Status
MMES	70	6.8	22	A PS MMES User Device in Direct Mode shall be capable of automatically transmitting a pre-defined emergency text message indicating a life-threatening situation to Dispatch Command Center and other members of an MMES Subscriber Group.	Messaging, Status
BBL	29	4.1.6	Table 30	NPSBN-UE shall be able to originate NG9-1-1 sessions including the ability to send and receive text, images, audio clips, voice streams, and full duplex telephony sessions.	Multi-Media
PQOS	7	1.4.1	2	"User Entities have further identified the need to control dynamic priority for specialized incidents. Many user entities want to directly perform these system changes themselves."	Prioritization

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
PQOS	11	2.1	3	"Using an administrative terminal…PS MUST be further able to dynamically control which Access Classes are able to utilize the PSBBN in the event of congestion."	Prioritization
PQOS	19	2.2.2.5	1	"Responders and administrators SHOULD not be encumbered with LTE prioritization details and prioritization methods, especially during time-sensitive incidents. For example, rather than an Incident Commander having to directly program LTE admission priority, it may be adjusted automatically by a dispatch application assigning a responder to an ICS role."	Prioritization
PQOS	19	2.2.2.5	3	"For usage of ICS, the authorized administrator, dispatcher, or Incident Commander are typically the roles that MUST be allowed to trigger dynamic priority."	Prioritization
LC	12	2.3.1	3	"Local organizations should also have the capability to monitor traffic volumes or perhaps be notified when network congestion could affect overall system performance. Again, such monitoring need only be read-only through BBNO NOC, and may be subject to appropriate access control and other security restrictions."	Prioritization
LC	12/13	2.3.3	1	"User Entities must have the ability to trigger, in real-time, changes to quality of service to meet the needs of the situation."	Prioritization
LC	13	2.3.3	1	"..mechanisms will be needed to allow local Incident Commanders and User Entity administrators to trigger dynamic priority control without losing valuable time getting approvals."	Prioritization

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
LC	13	2.3.3	3	"Also during periods of congestion, the local agency must have the ability to trigger changes to priority and QoS settings for users arriving to assist an agency and operating outside their normal area of control."	Prioritization
LC	14	2.4.1	3	"...because of the variable nature of the mission, dynamic prioritization of resources on the PS LTE network may become a necessity. The User Entity must … (have) the ability to dynamically modify priority and QoS settings as incidents unfold."	Prioritization
MMES	63	6.4	13	The PS MMES Network shall be capable of supporting the dispatcher or Incident Commander to have the capability to dynamically change the priority of the PS MMES unit(s) in the pursuing vehicle(s). Once invoked, the MMES Service would allow voice, text, and data to be sent to/from PS MMES User device to/from a Dispatch Command Center and all other active members of an MMES Subscriber Group within 2 seconds, despite traffic congestion on PS LTE sectors(s) supporting target PS User operation.	Prioritization
BBL	9	3.1 User Prioritization	1	PS apps such as CAD, ICS, NG9-1-1 will require standardized mechanisms to inform the network of the prioritization and QoS attributes of IP packet streams	Prioritization
BBL	9	3.1	Table 6, #3	FN shall establish a policy whereby PS apps such as CAD & ICS that require QoS for their proper operation will utilize standardized mechanisms to inform the network of the prioritization & QoS attributes of their IP packet streams.	Prioritization

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
BBL	43	4.2.4 ICS Incident Priority	3	In some incidents, CAD performs the initial incident classification. Once the IC arrives on scene, a formal incident classification is made. Once made, an association with NPSBN priority and QoS can be made.	Prioritization
BBL	108	6.1.4	Table 116, #2.2	The NPSBN shall support the following relative application priorities when computing the NPSBN-U's default admission priority: 2. Data applications (e.g., dispatch data).	Prioritization
BBL	110	6.1.5 Dynamic Priority & QoS	Table 117, #9	The intent… is for a… dispatcher to be able to see that a dynamic priority and QoS setting has been activated for a particular user.	Prioritization
MMES	59	6.2	16	PS MMES Predefined Emergency Text messaging shall have high-priority access capability to ensure that life threatening emergency messaging can be successfully sent and received by all group members and Dispatch Command Center.	
MMES	59	6.2	8	PS MMES Emergency Alarm messaging shall have high priority access capability to ensure that life-threatening emergency messaging can be successfully sent and received by all group members and Dispatch Command Center.	Prioritization, Status
MMES	61	6.3	20	MMES shall support high-priority transport of unit emergency alerts to the Dispatch Command Center.	Prioritization, Status

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
BBL	113	6.3.1.4 QoS Control for O&M Users	3	It is sometimes the case that operational personnel, such as dispatchers, are less than diligent in "cleaning up" afterwards. Historically, PS has relied on O&M users to be able to restore normal operating priorities of their systems following such events.	Prioritization
		NEW, ITEM #8		**Consoles shall allow dispatchers with appropriate permissions to dynamically and manually override automatic network traffic priority schemes of media and data traffic based on the traffic source's and/or destination's incident membership, role, individual ID or media type. E.g., priorities may be associated with an incident, a role, a user, or a media type. Dispatchers must be able to dynamically change the normal priority assigned to each of those profiles.**	
		NEW, ITEM #9		**Consoles shall allow dispatchers with appropriate permissions to restore network traffic priority of profiles within its purview to their normal automatic prioritization scheme.**	
		NEW, ITEM #10		**Consoles shall be informed whenever the traffic priority of an incident, role, user, or media type within its purview has changed. Consoles shall be able to pull (request) and receive network pushes of these changes.**	
PQOS	25	2.9		Usage Records; Post processed MUST be supported, real-time SHOULD be supported.	Recording
MMES	73	6.9	12	All video of the incident shall be capable of being recorded.	Recording

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	60	6.2	20	PS MMES User Device may be capable of automatically transmitting Emergency Group Data to the Dispatch Command Center and other members of one or more MMES Subscriber Groups directly (without generating a pre-defined emergency text message) for a first responder in a life threatening situation. Emergency Group Data may include critical sensor data, GPS tracking data, device identification, and other vital information, such as that related to physical well-being.	Sensors
MMES	65	6.7	8	A PS MMES User Device shall be capable of automatically transmitting critical sensor data, GPS tracking data, device identification, and other vital information (related to physical well-being-condition) directly (without generating a pre-defined emergency text message) for a first responder in a life-threatening situation to Dispatch Command Center and other members of an MMES Subscriber Group	Sensors, Location, Status
MMES	73	6.9	5	The vehicle is equipped with a “Pursuit” button which automatically contacts, via CAD apps over the PS LTE network, all support entities in surrounding areas, and also activates appropriate vehicular subsystems such as the light bar, on-board video, and GPS tracking.	Sensors, CAD, Location

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
		NEW, ITEM #11		**Consoles shall allow dispatchers with appropriate permissions the ability to monitor and control first responder vehicle devices, such as ignition, occupancy sensors, gun rack sensor, light-bar, siren, on-board video, and GPS tracking.**	
		NEW, ITEM #12		**Consoles shall allow dispatchers with appropriate permissions the ability to monitor and control first responder on-person sensors, such as motion/position sensors, impact sensors, biometrics, and GPS tracking. The console shall be able to receive the data either by pulling (requesting) the data, or by the user's UE pushing (initiating) the data.**	
PQOS	17	2.2.2.3	Table 1	"Triggered/Cleared By: Responder Emergency; 3rd person (e.g., video dispatcher). Immediate Peril; 3rd person (e.g., EMS dispatcher)"	Status
PQOS	18	2.2.2.3	Table 1	"How Do You Prevent Abuse? Alarms to dispatcher/incident command"	Status
MMES	58	6.1	9	MMES shall support the notification of an individual's cleared emergency state to users on a subscriber group and to the Dispatch Command Center.	Status
MMES	65	6.7	1	A PS MMES User Device shall be able to display the status (e.g. emergency) of other users and updates of the status from the PS MMES Dispatch Command Center.	Status
MMES	69	6.8	1	A Dispatch Command Center shall be capable of being informed of an incident where direct mode communication is taking place.	Status

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
MMES	74	6.9	14	The PS BB LTE UE shall have an automatic "officer down" detection system, which activates anytime the unit experiences rapid and specific gravitational and orientation changes OR if the vehicle itself becomes incapacitated. Notifications to dispatch or others occur if the officer does not promptly reset the local alert.	Status
BBL	37	4.1.10 Status Web Page	2	Dispatchers, CAD operators… are all envisioned to require the ability to post operational info to a given Status Web Page.	Status
BBL	36	4.1.10.1 Accessing Status Web Pages	Table 36, #4	An… NPSBN-UE… shall be able to access any Status Web Page from [including] a PSAP	Status
BBL	41	4.2.2 Responder Emergency	1	Similar to an emergency button on today's LMR radios, activation of [Emergency]…notifies dispatchers…of the life-threatening condition… The definition of Responder Emergency must account for all applications, including video.	Status
BBL	42	4.2.2	Table 40, #3	The administrator can elect the responder, the dispatcher, or both to clear the emergency condition	Status
BBL	42	4.2.3 Immediate Peril	4, 1st bullet	A standard mechanism to activate and clear Immediate Peril by [including]… a dispatch terminal.	Status
BBL	43	4.2.3	Table 41, #3	The administrator can elect the responder, the dispatcher, or both to clear the immediate peril condition	Status

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
		NEW, ITEM #13		**Consoles shall be able to receive and display the status of UEs within their purview, including Emergency and Imminent Peril status, and network status (e.g. on-network, in Direct Mode). This must be accomplished both by Consoles pulling (requesting) the data, and by UEs pushing (initiating) the data. It is expected that Peril and Emergency status can be appended to all media types.**	
		NEW, ITEM #14		**Dispatchers with appropriate permissions shall be able to remotely change the status of the UEs under their purview, including but not limited to setting the UEs state to Imminent Peril or Emergency, and clearing Peril/Emergency statues on behalf of the UE user.**	
MMES	60	6.3	2	A PS MME Network shall be capable of transmitting streaming video to/from the Dispatch Center at appropriate quality for the task.	Video
MMES	67	6.7	37	MMES shall allow an authorized user to remotely enable video transmission from a capable end user device, on a subscriber group, to the Dispatch Command Center or to an authorized user may be on the fixed network or mobile network.	Video, Status
MMES	68	6.7	42	PS MMES End User shall be capable of utilizing camera on device and quickly and easily forward them to the MMES Dispatch command center and/or to other responders in the group.	Video, Status

REPORT	PAGE	SECTION	P	WORDING	CATEGORY
		NEW, ITEM #15		**Consoles shall allow dispatchers with appropriate permissions to remotely enable streaming audio and video from UEs within their purview and monitor those streams. This is especially important for UEs which are in a Peril or Emergency state.**	

Appendix 7: Use Cases

The following use cases were developed by the Console LTE Task Group as the first step in identifying the current and future state of public safety communications. Console-based and dispatcher-based actions were identified through review of these use case scenarios.

NPSTC Console LTE Task Group
Use Case #1: Traffic Stop

Actors:

Officer initiating stop: Bob Simpson, using LTE device for voice communications

Initiating agency dispatcher: Sandy, using LTE dispatch console for communications

Officer in neighboring jurisdiction: Joseph Decker, using a LMR device for voice communications

Neighboring jurisdiction dispatcher: Alice, using LMR dispatch console for voice communications

Air Support from neighboring jurisdiction: John Tucker, using a LTE device for video support

Scenario

Officer Bob Simpson initiates a traffic stop, notifying Sandy, the on-duty dispatcher. Bob voices pertinent details: Location, license plate and state, through his LTE device. Bob's in-car video was activated with the stop. As Bob approaches the vehicle it drives away and shots are fired towards Officer Bob. Bob was not hit and he notifies Sandy that the vehicle is failing to yield, voices the vehicle description, reason for the stop, and pursues the vehicle. Bob voices direction of travel, traffic conditions, speed, and other pertinent details as they arise on his LTE device. Bob's in-car video is still recording and Sandy is able to push this video out to other responders.

Bob notifies Sandy that he is approaching a neighboring jurisdiction and asks her to notify them. Additional units from Bob's agency have joined the pursuit, listening for details through their LTE devices. Officers are able to monitor Bob's location through their LTE devices. Officers begin to talk over each other while providing details on the pursuit. Sandy is able to hear and understand each of them. When Sandy provides updates to the involved units, she has priority and they are all able to hear each other and not the officers that are speaking at the same time.

Sandy contacts the neighboring agency dispatcher, Alice, providing her with the vehicle description, Bob's updated location, and other pertinent details. Sandy notifies Alice that she is going to patch the two systems together, based on governance that is already in place, to allow officers from both agencies to talk to each other. Sandy announces that the two systems are patched and that officers should be able to hear each other. Sandy pushes the in-car video to Alice to allow her to share it with her units. Sandy maintains control of the channels.

Officer Joseph Decker voices that he has deployed stop sticks ahead of the vehicle pursuit, which Bob acknowledges. Prior to Bob arriving at the stop stick deployment location the suspect vehicle crashes into a tree and the occupant jumps out and starts running into a heavily wooded area. Alice with the neighboring agency informs Sandy that Air Support has been notified and is en route to the area.

Once Air Support arrives at the scene they are able to light up the heavily wooded area and provide video footage to the commander on the scene. As K9 units deploy into the wooded area, Air Support captures their location on video and from their view they can see an encompassed area of approximately 20 feet in radius. The K9 track begins on the north side of the wooded area. Five minutes into the K9 track, Air Support captures the suspect on video hiding behind what appears to be an old shed about 15 feet north of the K9 unit. Air Support can see the suspect removing the gun from his waist band and also sees the suspect digging a hole and putting the gun in it then covering it up. They relay that information via video and voice to the command units.

Bob who is in the direct area of where the suspect is sees the suspect attempt to exit the wooded area and is able to grab the suspect, but not without a fight. Bob activates the emergency button on his LTE device, which notifies all units on both systems that he has activated it and it immediately provides his location to responding units from his agency, as well as the two dispatch centers. The suspect gets away from Bob and begins to run. At this point Air Support zooms in to give direct light to the area, as video caption continues to be relayed to the command units. As Bob chases the suspect on foot, Sandy is able to see his exact location with details provided by his LTE device. Bob is finally able to subdue the suspect with help from Joseph and his fellow officers. Bob notifies Sandy that he no longer needs to interoperate with the neighboring jurisdiction, so she announces the patch will be dropped and drops the patch between the two agencies.

NPSTC Console LTE Task Group
Use Case #2: Traffic Prioritization & Management

Short Description

The dispatch center handles multiple agencies and disciplines. A terrorist incident occurs which turns into a significant event for fire, EMS, and law enforcement personnel at the same scene. All disciplines wish to make use of situational awareness by sharing information within their disciplines, not only voice communications, but also video and telemetry. However, the local LTE network resources covering the area of the scene do not have enough bandwidth to handle all of the desired data. Dispatch personnel are therefore called upon to manage and prioritize voice/video traffic until a portable LTE Cell-On-Wheels (COW) is deployed to increase the bandwidth.

Actors

Lee: A law-enforcement captain/incident commander

Frank: A fire-department chief/incident commander

Team: Tactical response personnel (from all disciplines) and their supervisors

Daffni: A dispatcher assigned to fire department communications

Dale: A dispatcher assigned to law-enforcement communications

Charlie: A multi-agency COML

Pre-Conditions

The FirstNet Network has been in place and in use for over a year with full coverage of the jurisdiction. All telecommunications systems are functional. First responder, dispatcher, and COML personnel are at normal staffing levels. A portable LTE COW is ready and stationed at a central location within the jurisdiction.

Terrorists have been scheming to sabotage a gas plant within the jurisdiction.

Post-Conditions

As the incident matures, an LTE COW is deployed to help unburden the data traffic on the fixed LTE resources covering the area of the incident. The increased bandwidth allows dispatchers to terminate their traffic management and prioritization intervention. The incident comes to a successful conclusion because the dispatchers maintained overall situational awareness and were able to ensure that the Incident Commanders received the most important information in a timely manner.

Normal Flow (of events)

1. A band of a dozen terrorists storm the local gas plant, shooting several plant employees so that they gain access to the plant to place explosives where they can be most destructive.

2. Plant personnel call 9-1-1. Along with their voice, the personnel forwards to the call-taker photos and videos from their video surveillance system showing some of the terrorists at work planting bombs.
3. As plant personnel are notifying 9-1-1, the first of several explosions occur, injuring several more people, and starting a fire which threatens to trigger more explosions. These events, too, are conveyed to the 9-1-1 call taker.
4. Dispatchers initiate their terrorist scenario SOP, which includes dispatching all three disciplines (law, fire, EMS) to the scene, and instructing the jurisdiction's COML to deliver the local COW to the scene.
5. The scene is located far from the present location of the COW and weather/traffic conditions will not allow it to arrive for 30 minutes.
6. Dispatchers share the images received from the plant personnel with first responders en route to the scene. This, along with verbal information passed on by the dispatchers, help the first responders to properly prepare.
7. Among the responders first on the scene are the Incident Commanders (ICs) for the police and fire departments. They begin to deploy cameras around the perimeter of the plant to gain better situational awareness. The vastness of the plant and extent of the threat requires numerous cameras to see details. In addition, an agency helicopter is hovering overhead providing wide-angle video of the entire scene. The helicopter camera's pan-tilt-zoom (PTZ) is remotely controlled by the ICs [and/or dispatchers] so that it can zoom in on selected areas of the scene.
8. Video from the cameras begins to be delivered to the ICs via the local LTE network.
9. As tactical personnel are situated, the ICs make the decision to start sharing all camera video with all tactical supervisors. [Note: Perhaps the ICs themselves have the tools with which to enable the sharing or perhaps they coordinate with their respective dispatchers].
10. As ICs [or dispatchers] use their console to enable the video sharing, those requesting the video distribution are informed by their console that the requests will exceed the available bandwidth. The ICs being busy with deployment decisions, decide to let the system's pre-determined QoS configuration determine which video sources and destinations will be given higher-priority treatment.
11. As automatic traffic prioritization occurs, some of the tactical supervisors realize that their video quality is reduced to the point of impairing their situational awareness. These tactical supervisors inform their ICs via voice transmission, which due to the pre-set high-voice priority, have no problem getting through the clogged LTE system.
12. An IC contacts his respective dispatcher via LTE voice (again, no impairment due to high-voice priority) and requests that the dispatch center take over prioritization, distribution, and management of video traffic at the incident.
13. The dispatchers [or perhaps specialty staff at the dispatch center], monitoring their respective disciplines, monitor the voice and video traffic, and jointly determine which cameras are capturing important video, and distributes the appropriate camera video to the appropriate ICs and tactical supervisors. This results in temporarily reducing traffic to fit the available bandwidth.

14. As the responders engage various aspects of the incident, the data loading ebbs and flows. The dispatcher actively monitors the LTE network loading and whenever traffic spikes again consuming available bandwidth, they make on-the-fly priority adjustments, manually overriding the normal, pre-set traffic prioritization plan.
15. The COW now arrives on the scene and the COML completes its deployment, making it available.
16. Dispatchers are informed by their console of the on-line status of additional LTE resources, and begin to re-adjust their traffic management, giving more and different video feeds to more and different first responders.
17. As the incident winds down (with the successful capture and/or termination of the terrorists, putting out the fires, and treating the wounded), and the traffic volume decreases, dispatchers are able to give less of their attention to traffic management, allowing the normal pre-set prioritization to resume.

Alternative #1 – Direct Mode (off-network) is used on the scene to reduce LTE network traffic

Pre-Condition & Assumptions

1. It is assumed that Direct Mode accommodates all forms of LTE traffic, including voice, video, and other types of data.

2. It is assumed that on scene equipment can accommodate a virtual network of Direct Mode devices.

3. It is assumed that traffic received by Incident Commanders is also sent over the LTE network to the dispatch center, so that dispatchers can stay informed, and so that all traffic can be recorded. Either the ICs and/or dispatchers also have available analytics systems and expert engines to help filter through the situational awareness data.

Alternate Flow

1. The size of the incident gives the ICs an intuitive feel that their LTE network traffic needs will likely exceed the normal available bandwidth, at least until the COW shows up. For this reason, they choose to operate in Direct Mode.

NPSTC Console LTE Task Group
Use Case #3: Interoperability between LMR & LTE Users---Law Enforcement

Assumptions

PSAP equipped to interface with an LTE communications system and an LMR communications system.

Communication Center will be equipped with a radio console, CAD system, wireless broadband capability, access to NCIC/FCIC through eAgent, D.A.V.I.D, other important daily access websites, and ability to receive and store video feeds. The radio console can access both the LTE radio users and the LMR radio users.

Scenario

A PSAP agency has implemented the new LTE radio network and is the first agency to do so. A task force with the agency is working close to the border of their jurisdiction and because of that they are involving multiple agencies in case the suspect flees. This will be in reference to attempting to locate a high-priority felony warrant suspect with a violent history involving L.E.O., so the need to communicate is paramount. The initiating agency using the LTE radio network has access to the mutual aid channels as well as other interagency channels. So the initiating agency will be able to advise the other agencies involved to switch to either a mutual aid channel with the repeater activated or a shared channel that everyone can access. Once the radio channel has been decided then dispatch can make all agencies involved aware.

All units involved have the ability to switch to the coordinated channel via their radio portable and dispatch is able to monitor traffic via the radio console. On the LTE radio network the dispatchers have the ability to monitor what is going on via a video feed they receive from their LTE radio users involved from a camera on their uniform. The video will come up on one of PSAPs designated computer monitor screens and the dispatcher working the coordinating radio will have the ability to maximize, minimize or even move the video completely if it interferes with what he/she has going on with that screen. The video received can be stored for evidence and tracking purposes. For a short time, 6 to 12 hours, the video can be replayed at any position, and once that time lapses it will continue to be retained in the third-party archive system for 6months thereafter. The units involved have the ability to look up the suspect in question prior to going to the house using D.A.V.I.D., as well as other in-house resources which will filter the information into the CAD system so it is all documented in the same call via wireless LTE broadband capability. The photo and other information will be attached in the appropriate tab within the CAD system for easy access as needed for both the units and dispatch.

When the units involved all check in at the command post/staging area the users that are on the LTE radio network will be paired with the LMR units so everyone can be on the same page from a tactical standpoint because of the video feed and/or data information that can be relayed to the LTE users. The LTE radio users all have access to receiving the video feeds and/or other data information on their MDTs, smartphones, and tablets, depending on what they have been issued. Before all units involved actually make contact at the house, one unit with LTE video capabilities could scope out the house using camera surveillance to see if they can catch a glimpse of the high-priority felony warrant suspect and to see if he/she has easy access to any weapons. That information would be immediately relayed back to the other units standing by and dispatch simultaneously.

Once that has been completed units will approach the residence while making dispatch aware. The primary unit will be one that has LTE video capabilities and will be streaming the feed to the communications center so they can see what is occurring in real time. The communications center will have the ability to play, stop, rewind, fast forward, and print freeze frames when required. After they make entry to the house and apprehend the high-priority felony warrant suspect, he/she will be transported to the nearest jail facility. If a mutual aid channel was utilized then the repeater can be disabled once communication between the agencies is no longer needed. If LTE/LMR radio users had integrated to one common radio channel then they can just switch back to their primary radio resources.

A side note in reference to the LTE and LMR radio users in regards to getting pictures, videos, or other information received via the LTE network could be placed by the communication center personnel on a secured website that only PSAP agencies can access to get a better understanding of what is going on for emergency situations, i.e., robbery suspect, pursuit, or other high-priority incidents. This could greatly assist in helping identify suspects on foot or in vehicles along with the usual BOLO information that we issue.

Another method of communication for interoperability that could be utilized is that a console would have access to the LTE radio network and the LMR radio network. This console could set up a patch between the two different systems. There could be a separate tab on the console that houses the different channels for the LTE and LMR radio network for the bordering agencies. As assistance is requested the requesting agency can advise which channel to use and those channels can be patched together for seamless communication.

Conclusion

Due to the complexity of the new LTE radio network coming online and the LMR radio network still being utilized at this time, there must be a way to communicate effectively so officer safety is not jeopardized. On the LTE network videos and pictures can be provided to the units so they have the same visual information they need to know exactly who or what they are attempting to locate. All of the information is securely streamed and captured in the CAD system and a third-party storage location. Everything from start to finish is maintained for the appropriate time frame for evidence, further investigation, and prosecution. It seems to make more sense to have more than one option available for connecting the LTE and LMR radio users. As a first option in the PSAP agency on the radio console, there should be a tab with the channels needed for the LMR radio users to be patched with the LTE radio network. As a backup the PSAP agencies should have access to the mutual aid channels available now and the initiating agency can assign which mutual aid channel to utilize.

NPSTC Console LTE Task Group
Use Case #4: Mayday Alert from a Firefighter during a Fireground Incident Operation

(Adapted from the NPTSC report *Use Cases & Requirements for Public Safety Multimedia Emergency Services (MMES),* Rev B. May 1012: Use Case #5 – Mayday Alert from a Firefighter During a Fireground Incident Operation)

Short Description

Bob: A first responder firefighter is a member of a fire team.

Each member of the team wears a firefighting vest equipped with:

- An LTE mobile device with MMES capability.
- Sensors to monitor heart rate, blood pressure, and air tank capacity.
- GPS tracking to provide accurate position, time, date, and direction (speed and heading) of firefighter.

Each member is equipped with a helmet cam connected to their LTE device.

During an incident operation, Bob is trapped and asserts a button on the LTE device in his vest to send a pre-defined "mayday alert" text message to his Incident Commander, Fire Team, and standby EMS.

Bob then initiates a group voice message to his incident talk group describing the situation.

Bob can activate his helmet cam to visually show others his predicament.

Actors

A fire team comprised of Bob, Dave, Tim, Mark, and Ed (team leader):UE Device users and first responders (firefighters).

John: UE device user and Incident Commander (positioned outside) at sight of incident.

Bill: EMS first responder on standby (positioned outside) at sight of incident.

Carol: Dispatch Command Center operator

Pre-Conditions

MMES pre-defined text messaging and group voice messaging using device-to-device (D2D) communication is supported by:

- The LTE Device in Bob's vest. Helmet cam connected through LTE device
- The LTE Device for each member of Bob's fire team. The LTE Device for the Incident Commander and standby EMS first responder.

Post-Conditions

The pre-defined "mayday alert" text message originated by Bob was delivered to the Incident Commander, Bob's fire team and standby EMS (Using D2D communication).

The group voice message originated by Bob was delivered to his incident talk group (using D2D communication).

Normal Flow (of events)

1. After arriving at the scene of a fireground incident, Bob's fire team and Bill (standby EMS) are briefed by the Incident Commander and review a schematic detailing the interior structure of a building on fire.
2. The team leader Ed determines a preliminary positioning of his fire team within the building.
3. Before the fire team enters the building where the fire is, the fire team, Incident Commander and standby EMS first responder switch over their LTE devices for D2D communication [1]using a pre-determined talk group.
4. Each talk group member checks ability to transmit and receive on the talk group. Check helmet cam operation.
5. Once inside the building, the fire team distributes themselves according to plan.
6. While maneuvering to stop the fire, Bob loses track of his surroundings in dense smoke and becomes trapped.
7. Bob asserts a button on the LTE device in his vest to send a pre-defined "mayday alert" text message to his incident talk group.
8. The pre-defined "mayday alert" text message includes biometric data, air tank capacity indicator, and GPS tracking information.
9. Bob then initiates a group voice message to his incident talk group describing the situation. Bob also send video of his location and predicament to the team via his helmet cam.
10. Bob's horizontal and vertical position within the building is determined by the incident commander (positioned outside).
11. The Incident Commander and the fire team leader guide Dave and Tim (Bob's teammates) to Bob's location. Special instructions regarding information from Bob's video presentation is used to augment instructions from incident commander.
12. Bob is freed and extracted from the building by his teammates.
13. Once outside, Bob is escorted to the standby EMS ambulance where Bill (standby EMS first responder) monitors Bob's condition and sends Bob's biometrics to a hospital for evaluation using a fixed LTE device in the EMS ambulance.
14. John (Incident Commander) provides Carol in the Dispatch Command Center with information regarding Bob's "mayday alert" transmission and his current condition.

[1] For fireground incident operations, device-to-device (talk around) communications is a reliable form of communication. Radios can communicate directly with one another without having to overcome the resistance of a building and the distance to the nearest base station. Firefighters are not reliant on the system for assignment of resources and not affected by failure of system infrastructure or system induced delays. (See Phoenix Fire Department Radio System Safety Project, Final Report, Version 1.7, October 8, 2004 (Conclusions and Recommendations, p.14-17), http://phoenix.gov/FIRE/radioreport.pdf last viewed September 30, 2011).
[1]

15. The fire team remains at the scene and continues to battle the fire until the fire is extinguished.

Alternative Flows

Automatic Panic Alarm
Substitute for steps 6 and 7.

1. While maneuvering to stop the fire, a piece of office furniture topples and pins Bob.
2. Bob is unable to reach the 'panic' button on his LTE device.
3. The motion and position sensors include with the LTE device in Bob's vest trigger an automatic alarm once Bob fails to move for 45 seconds.

Building System Integration
Substitute for step 9.

1. The Incident Commander requests Dispatch patch into the building automation system.
2. The dispatcher connects to the building automation system and finds there is an integrated video security system. The dispatcher connects the Incident Commander to the video security system via the LTE network.
3. The Incident Commander is able to locate a video feed from the area where Bob is trapped.
4. The video feed is used to assess the situation and plan a rescue route to retrieve Bob.

NPSTC Console LTE Task Group
Use Case #4: Airport Incident Use Case

Monday morning at the Gotham International Airport. Adjacent Robin Highway traffic is gridlocked from normal rush hour traffic compounded by major roadway resurfacing projects in the area.

An airliner with 100 persons on board begins takeoff departing on runway 7. Minutes later the airliner reports to the airport tower it is experiencing altitude control problems. The airport is place under an Alert 2 condition; Emergency Communications Dispatch (ED/9-1-1) is notified of this situation at the airport.

- ED/9-1-1 alerts local agencies to the situation at the airport.
- ED/9-1-1 dispatches a unit from the Sheriff's Office to Gotham Airport for security activities associated with this Alert 2 condition.
- ED/9-1-1 notifies local township Fire Departments to have equipment on standby for this potential situation.

Airliner reports to airport tower that it has lost operation of flight control surfaces, *a*irliner requests and is granted emergency return to airport on runway 7. Airliner makes emergency approach to land on runway 7. No flight control surfaces are operational. Airliner fails to reach the paved end of runway 7, crashing onto the ground and highway jammed with morning traffic adjacent to the airport. Multiple vehicles on the road are involved in the crash.

Airport Incident Command (IC) raises the emergency condition to Alert 3, resulting in closing the airport. All local agencies (Police, Fire, EMS, Ambulance, State Police, etc.) are alerted to the upgrade of the condition at the airport.

- ED/9-1-1 dispatches fire equipment for the incident: Dispatches Gotham Fire Department equipment (Engine and Quint) with a Battalion Chief to the incident. Dispatches City 2 Fire Department equipment (Midi and Rescue Vehicle) to the incident. Dispatches Town 3 Fire Department equipment (Foam Pumper) to the incident.
- ED/9-1-1 accesses hydrant/water supply location information and provides appropriate maps and location information to the responding units.
- ED/9-1-1 dispatches county EMS teams and ambulance services to the incident.

Local hospitals are paged by ED/9-1-1 to learn their patient capacity and inform them of possible incoming patients from the incident.

Numerous calls of large crashing noise and smoke emanating from the vicinity of airport are received from the public by ED/9-1-1. Automated collision reports are coming in from OnStar services on some of the affected vehicles. There are numerous calls being received reporting traffic accidents on highway in the vicinity of the airport. There have been reports of a tanker trunk overturning and leaking a liquid on the roadway in the vicinity of the airport. Some reports include photographs and video streams of the incident.

The Gotham Fire Department and Sheriff's Office, and other *f*ire *d*epartments arrive at the scene and report the airliner fuselage has broken up across the highway and the area leading to the runway pavement. Multiple severely damaged vehicles are visible presumably with passengers trapped inside, and multiple fires are visible (vehicle and surrounding area). A trauma center is set up at the airport for the incident.

Streaming video from the scene is sent back to ED/9-1-1. The on-scene video is shared with Emergency Management Center.

ED/9-1-1 dispatches additional rescue teams from Gotham Fire Department to address the needs assessed from the video feed.

From the OnStar, photo, and video information, it is determined multiple unique vehicles are involved in the incident. At least one Quantum 4000 electric vehicle and multiple alternative fuel vehicles are involved and may need passenger extraction.

Special instructions regarding how to handle these vehicles are downloaded by the ED/9-1-1 for sharing with the Rescue teams at the incident.

The public supplied photos and videos also indicate the airline fuselage has broken up and is spread from the highway to the runway, with multiple highway vehicles damaged and/or on fire.

- ED/9-1-1- dispatches a Mobile Communication Unit to the scene to assist coordinating communications.
- ED/9-1-1 notifies the Fire Training Academy to prepare to be the primary staging area for the incident.
- ED/9-1-1 dispatches traffic equipment to Robin Highway to determine disposition of the affected vehicles.
- ED/9-1-1 dispatches a HazMat team to address the oil tanker spill.

Responding County Sheriff's Office, State Police, and Gotham Police Department begin to set up their assigned roadblocks and coordinate traffic flow.

- ED/9-1-1 receives communications from ambulance units meeting traffic conditions that are hampering their transport to and from the scene.
- ED/9-1-1 alerts police at the scene of this report.
- Police begin rerouting local traffic to affect more efficient emergency vehicle travel.
- ED/9-1-1 forwards traffic maps showing the new traffic flows to responding emergency vehicles to facilitate their travel.

The HazMat team performs treatment of the hazardous material on Robin Highway.

Hospitals begin accepting injured patients. Medical Operations notifies all the hospitals that all casualties have been transported from the scene.

Traffic and fire conditions are under control. The dispatched personnel and equipment begins to leave the incident.

Roadways are reopened to local traffic. Robin Highway is reopened to traffic.

The IC cancels the Alert 3 condition and returns to normal operational condition at the airport. The Gotham Airport is reopened.

NPSTC Console LTE Task Group
Use Case #6: Emergency Medical Services (EMS)

The generic use case below describes the EMS *physical flows* involved in incident *detection, response/assessment, transport, arrival, and transfer.* These physical flows require corresponding data *flows*, elements that would include: *discovery, access, sharing, interpreting, and storing.* The Alternative Flows, which follow the generic use case, illustrate different elements of either the physical or data flows from the generic use case.

Routine Medical Emergency involving the dispatch of medical assets

Short Description

John Doe, a patient of Dr Z, has an Electronic Medical Record (EMR). When John Doe calls 9-1-1 due to a health emergency he is sent to a Public Safety Answering Point (PSAP) and based on his emergency, the Emergency Medical System (EMS) system is initiated.

Actors

This section describes the actors and the roles they play in the following use cases.

Patient or victim: Individual with a medical emergency.

Bystander: Individual with the patient that can provide information such as video from a cell phone.

Call Taker: PSAP staff receiving the initial 9-1-1 call reporting the medical emergency.

Dispatcher: PSAP staff directing the first responders typically via voice over LMR or data via mobile data terminal.

First Responder or EMS Unit: EMS field personnel that treat the patient on scene.

Hospital: Hospital staff that interface with the first responders to provide direction and receive information in preparation for the patient arrival.

Pre-Conditions

The PSAP jurisdiction where John Doe lives has a system for discovery of 'event' data and both automatic and dispatcher based EMS system initiation.

Post-Conditions

John Doe's medical event data was automatically delivered to the area PSAP, responding EMS unit, receiving Emergency Department, and his Primary Care Provider (PCP) through his EMR.

Normal (physical) Flow of the event

John Doe has a medical *'event' that he feels meets criteria* for activating the EMS system.

1. The area PSAP receives the 9-1-1 call and confirms the medical event.
2. The dispatcher restates the information received from John Doe and begins a standardized, best practice, series of questions.

3. First responders are dispatched to the scene based on the closest available unit with the appropriate level of care.
4. The data collected from John Doe is automatically transferred to the responding EMS units' devices for EMT situational awareness.
5. The responding EMS unit is able to ask John Doe additional questions regarding the medical event. Data collected on scene is added to the EMR.
6. Medical event data continues to be transmitted to the responding EMS unit as well as to John Doe's EMR for the PCP to review.
7. When the responding EMS unit connects John Doe to their medical equipment (12 Lead EKG, pulse ox, capnography, etc.) this data is also automatically transmitted and placed in the patients EMR.
8. As the EMS unit begins transporting to the destination hospital the data from the beginning of the event until real time is automatically transmitted to the receiving hospital.
9. Data continues to be transmitted to the receiving hospital during the duration of the transport time.
10. The receiving physician is able to visually see and communicate with the patient in the transporting ambulance.
11. Upon *arrival* at the receiving hospital the data is transferred to the Emergency Department (ED) medical monitoring equipment.

During this entire event all data collected is *transferred* to the patients EMR for PCP review.

Alternative Flow #1

Detection of the incident due to an implanted medical device (such as a Pacemaker or AICD)

i. John Doe has an implanted Pacemaker or AICD.
ii. This device automatically sends data to the patients EMR/PCP.
iii. A series of events are 'pre-defined' that automatically activate the EMS system and send the data to the jurisdictional PSAP .
iv. The PSAP contacts John Doe.
v. The medical data gathered (including data from the device) is automatically transferred to the responding EMS unit and is ultimately added to the EMR.

Alternative Flow #2

Detection of the incident due to a third party (such as Onstar or a DOT Traffic Management Center)

i. Onstar operator receives an indication of a crash with air bags deployed.
ii. The Onstar system provides the operator with GPS location and address cross reference.
iii. The Onstar operator contacts the victims and determines that local first responders are needed.
iv. Onstar calls the appropriate PSAP based on the incident location. Assumption: Onstar knows how to pick the proper PSAP.

v. PSAP call taker handles the call as any other 9-1-1 call except that Onstar should be able to electronically share the data collected by the Onstar operator (geographic location/address, crash details, information collected from the victims such as medical information, any hazards in the vicinity of which responders should be aware, etc).
vi. Onstar connects PSAP call taker with victims via Onstar voice system.
vii. Call taker handles call as a standard 9-1-1 call at this point.

Alternative Flow #3

Transport from the scene, to involve airborne assets

i. As noted in Normal flow of events through #6.
ii. First Responder requests Air Medical Response.
iii. New caveat since Landing Zone information will need to be shared to incoming aircraft from dispatchers and first responders at the scene that will be responsible for securing the LZ.
iv. AVL data from responding Ground units is passed to Air Unit and vice versa so ground units know when the air unit will arrive.
v. Radio system communication for safe landing of aircraft.
vi. EMR be transferred to the air unit.

Alternative Flow #4

Information sharing between primary/secondary PSAP's and other third parties as appropriate.

One example of information sharing would be the Automatic External Defibrillator registry that would be activated by a trigger from the primary service answering point with a term like Cardiac Arrest or Heart Attack. The registry data would be configured to send a text or page to the location of the AED on file with the registry. It would not take any extra effort or steps from the PSAP but could be helpful in the response to the patient. The data cards are/could be shared with the ED or hospitals. This would require standardization of AED products but it is information hospitals and ambulance services would/should receive.

Alternative Flow #5

Information sharing in the form of video

i. Due to worst snow storm in a decade, EMS units are severely limited in their capability to respond.
ii. Sally Doe is 9 months pregnant and begins to have contractions. Sally has a history of short deliveries. A bystander (Sally's husband) calls 9-1-1.
iii. The call taker collects the information as usual, but determines an EMS unit cannot reach Sally in time.
iv. The call taker instructs the husband to put his phone on speaker and have another family member video the delivery and somehow send the video live to the PSAP.
v. The call taker transfers the call and EMR to an expert (PSAP staff, doctor, hospital, etc.) to manage the incident.
vi. The expert has access to the video and talks the husband through the delivery

vii. In the mean time, the dispatcher deployed a snow plow and EMS unit.
viii. The EMR is transferred to the EMS unit and the call proceeds as described in the main use case.

Alternative Flow #6

Transport from the scene to a different Destination Hospital.

ix. Insert in #11 – If the patient is in his home residence the information accessed from the medical device gives the responding EMS unit the destination hospital based on the patients insurance/PCP affiliation.
x. The EMS system is also monitoring Emergency Department bed capacity and when a hospital meets a preset algorithm of acuity/bed count/other factors will divert the transporting ambulance to the next most appropriate Emergency Department.
xi. If the patient is not from the area, based on data collected, the algorithm in the EMS system will provide the best recommended destination hospital.

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Use Case #7: PSAP 911 Call- Law Enforcement

Assumptions

PSAP equipped with NG911 capabilities.

Assuming there are no operational differences between 9-1-1 data, voice, or video capabilities for call-taker (CT) or dispatch regardless of discipline.

As the cell call is received the (CT), now equipped with knowledge that warrants the use of LTE capabilities, engages its use by a link that opens the patch to obtain the location, date, time, 9-1-1 data, video and recordings, owner of cell number from original caller.

Police patrol vehicles equipped with mobile data computers, wireless broadband capability, AVL, in-car video camera system, Automated License Plate Reader (ALPR), Stalker Radar System with heads up display for video recording purposes.

Not all agencies have these capabilities so with LTE providing these various feature sets, we can add much more.

Assuming the capabilities listed above are part of a local network, this call can be handled on the local network (minus the files access to operators not on the LTE network).

Access to confidential file information will be the immediate success to the future.

Scenario

PSAP receives a cellular phone call from John Doe regarding a shooting that just occurred. John Doe provides pictures and video clips of the incident from his smart phone and sends the information to the PSAP operator he is speaking to. John Doe being a visitor to the state does not know his exact location.

The CT must instruct the caller how to operate the device to obtain the video feed.

Capability Need: For the CT to be able to capture the network identifier of the caller and be able to control the device. Disconnects from device when applicable with no backward review by cell owner (no access to any information transmitted when control of the device took place).

PSAP operator receives John Doe's location via GPS from his cellular phone along with all the photos and videos of suspects and vehicle involved in the shooting.

PSAP operator obtains all of the case information and electronically transfers all John Doe's information to include a map of his location he is calling from, the case text information, video, and pictures involving the case to the police radio dispatcher console CAD computer terminal.

CT and dispatch need ability to view any camera feeds in area applicable to the incident.

Access to files are accessible by a query code to display lists of business in the local area that have video cameras, as well as contact information for alarm systems, building blueprints, road and drainage information, gas line information, weather.

Police radio dispatcher proceeds to dispatch the shooting case info via digital voice over the air simultaneously as she/he is transmitting all of the case text information, video, and pictures to the police patrol vehicles mobile data terminals. At the same time, wanted vehicle license number and description is updated in the Automated License Plate Reader (ALPR) data base wirelessly and updates all patrol vehicles capable of ALPR.

Dispatch can access and obtain information on vehicle such as previous owner, last maintenance and where, lending firm information, all LE history of vehicle, low-jack capable.

Obtain information on registered owner such as community affiliations, friends, neighbors, medical alerts, hobbies, the cellular history of registered owner, any current method of active devices.

All responding police vehicles have received the same case text info, video, and pictures of the suspects and vehicle involved via wireless LTE broadband capability. All responding officers have the ability to view and see actual suspect description and type of vehicle with a visual license plate.

One of the responding officers en route to the scene passes the vehicle traveling at a high rate of speed going in the opposite direction. The ALPR captures the digital read out of the license plate, snaps a digital picture, alerts the officer, and transmits the digital image of the wanted vehicle with the matching license plate back to the police dispatch radio operator.

Dispatch uses the digital image and manipulates the feed to search person recognition files. Any pertinent records are transmitted or forwarded to the scene.

As the patrol officer initiates his/her lights and siren, the in-vehicle camera system is automatically activated and is now streaming video with AVL information back to the police radio dispatcher. The officer is now in pursuit of the suspect vehicle. The Stalker Radar unit in the patrol vehicle provides date, time, and speed of vehicle in the heads up display of the in-car video. All of the video information can be seen and monitored by the police radio dispatcher, dispatch supervisor, other responding patrol vehicles, and the field supervisor.

An announcement/alert system to surrounding potential responding agencies via a pre-loaded keystroke is activated. The alert is received via a tone and pre-recorded voice. The tone and pre-recording is delivered with a receipt of delivery returned. A 10-second timer is placed on unacknowledged receipts. The network continues to deliver until acknowledged and return delivery receipt.

Once the acknowledgment is received an invite to join the feed for call data, mapping, and video feed is prompted. Once accepted the call is now handled over the LTE network.

NOTE: The LTE network has multiple choices available for pre-configured selection by dispatch. Pre-configured choices could be:

- Multiple incidents being handled by one dispatcher. Limit the number of selections to each dispatch position: 5 patch capability, 5 multi-selects, instant playback by platform used.

- Potential coverage range options (Level 1 – 55 mile radius, Level 2 – 100 miles, Level 3 – unlimited).
- Secure communications options.

The dispatch supervisor is notified and quickly provides additional bandwidth and priority for the patrol vehicle in pursuit. Due to the high-speed data, high resolution of the video can be seen clearly as the pursuit continues. Through the video, it is clear that the vehicle description and license plates matches the suspect vehicle. With the quick use of technology, other responding officers are able to strategically position themselves through the guidance of visual location via their mobile data computers (MDCs) and with the field supervisor providing additional resource management while viewing resource locations via his/her mobile data computer.

The MDC visual location feature is loaded with preprogrammed ranges for dispatch selection: Pinpoint mapping draws the desired radius and the strategic locations draw the perimeter and alert the closest responding units with directions to their positions. Upon unit arrival at the mapped pinpoint, time and date stamp are associated to the event file and recording.

The suspect vehicle is finally stopped due to additional officers locking down roadways and intersecting roads and immediately stopping the threat. Meanwhile all video streaming is being monitored by dispatch and field supervisor of road conditions, weather conditions, traffic conditions, and any other possible public or officer safety condition that may be used to determine the risk of the high-speed pursuit.

The patrol vehicle in-vehicle video cameras continue to stream video as the suspects are being safely removed from the vehicle and placed into custody.

Through LTE Smart phones, field facial recognition equipment, and field Automated Fingerprint Identification Systems equipment, officers take digital photos of all suspects and obtain fingerprints from suspects. Quickly, the field mobile facial recognition and fingerprinting equipment transmit data back to the NCIC databases for identification and verification.

Officers detaining the suspects conduct a field line up via video. The video pictures of the vehicle and of the field lineup of the suspects are streamed to officers at the scene of the shooting. The complainant and witnesses at the shooting scene are able to view the video on the officer's mobile data computer and confirm identify all of the suspects and vehicle involved in the shooting.

The on-scene unit has obtained video of the scene, video of the witnesses, and is able to run tags of all vehicles at scene and confirm ownership /identity.

Conclusion

With the latest technology and wireless mobile broadband capability, all information to include callers' information provided by John Doe was captured and obtained by the PSAP and transmitted to all responding officers. The information received by the officers provided accurate description and detail of the suspect and vehicle wanted in the shooting. The videos and pictures provided to the officers with the same visual information as to what they were looking for. Wanted vehicle information was uploaded to the field ALPR systems to enhance the detection and verification of the suspect vehicle. Once detection was made of the suspect vehicle, in-car video systems streamed information back to the police dispatch center and other responding police officers and supervisors

from the start of the pursuit, until the suspects were in custody and were identified by witnesses. All of the information is securely streamed and captured in CAD and RMS from the beginning of the 911 call to the PSAP. Everything from start to finish is maintained in a secured RMS for evidence, further investigation, and prosecution. With the use of technology and a dedicated public safety wireless broadband system, everyone can expeditiously get the same information at the same time, to enhance first responders' and the public's safety.

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Use Case #8: Law Enforcement Use Case Scenario

Case: Undercover (UC) units have three target locations in three different jurisdictions. UC squads are made up of multiple entities. Each target requires dispatch intervention.

One dispatch center aligns all users on a dedicated talkpath providing video, voice, and control (access) of/to all electronic feeds and devices that could be useful during the timeline.

Units equipped with video, audio, and emergency alerting vests advise dispatch of arrival and send video feed of property vehicles. Dispatch runs vehicle for all history, as well as, all owner history.

All file requirements have been met: Time and date stamp for video and audio feed attached to event.

Upon entry to target location, shots are fired and one unit is in foot pursuit out the back door. Unit activates the vest for video, voice, man down alert and shots fired locator, unit GPS tracker.

Dispatch immediately maps a 1-mile perimeter and coordinates local response sending the mapped perimeter locations along to the assisting agencies.

Incident UC Lead has provided the names of potential suspects to dispatch to obtain facial recognition files to send to responding units.

Air support is involved and aerial video is available of foot pursuing unit. With warm body detection, the video to ground units can be viewed by all involved. The suspect runs into a local business and holds the business and patrons at gunpoint.

Dispatch accesses files to determine business information: Name, number, hours, building blueprints and can send to on all responding units if/when applicable. Now on scene, units send video of surrounding vehicle tags to dispatch to obtain all vehicle and owner information. On-scene Commander sets up perimeter via a mapping resource. This perimeter/position map is sent out to all additional support responding. Each unit selects a perimeter and dispatch can view their status on the same, live (continually updating) mapping resource.

A secondary talkpath is requested for hostage incident, (as remaining two target locations are safe. Original UC units remain at original target location.

Dispatch has captured all responding units and can place all of their communication equipment (voice, video and data) on the secondary talkpath: Seamless to the end user.

Due to this incident, all original target locations are now capturing video stream of the properties and immediate roadways.

The suspect inside the business has altered his appearance as he advises he is releasing hostages. Once outside, he, along with two hostages, are taken by uniform to a safe area for protection. The suspect runs off on foot and hops onto a local bus two blocks away.

Dispatch announces to the bus dispatch center what has happened and invites them to join the already established talkpath. Bus dispatch can share bus video with the talkpath participants and safety instruction is provide to the bus driver via a silent mode of communication (e.g., in the ear headset, earbuds, etc). Coordinated communication can be given to the bus driver to direct undercover units onto the bus for surveillance. The bus driver can give a verbal command to silence incoming audio into the headset. Dispatch immediately controls the communication path on the radio installed in the bus.

The undercover units apprehend the suspect without incident.