End-to-End Public Safety Communications:
Next Generation LTE Broadband for State & Local Public Service Networks

GENERAL DYNAMICS
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Building Communications for Public Safety Services

The next generation of public safety and administration services will be built on always on, always available voice, data and multimedia 4G communications. In urban centers and rural regions, at the state and local level, the efficiency and effectiveness of public safety and public administration agencies will be determined by the capabilities of the communications network infrastructure that ties personnel and equipment in the field with each other and with command centers.

Built properly, the next-generation communications infrastructure will enable:

• A police officer to share a photo of a crime scene with a fellow officer investigating a similar event in a neighboring city in real time.

• A fire truck to stream video of a hazardous spill to a regional hazmat center so that response teams can properly plan for a cleanup operation before they head to the site.

• A utility maintenance crew to upload diagnostic data at a power junction switch immediately upon arriving at an area that has lost power.

• A city building inspector to approve a license on-site through immediate access to city ordinances and site plans while in the field.

But to bring this level of capability to the street, public safety and administration service agencies need a communications infrastructure engineered to transport a variety of communications traffic in real time with the highest quality of service (QoS) at all times. And they need the in-field tools that can take advantage of the full capabilities of that infrastructure in any situation.

General Dynamics offers purpose built end-to-end communications networking solutions that leverage all the benefits of fourth generation Long Term Evolution (LTE) wireless broadband technology, from the core of the network to the edge where public safety and service personnel need it most.
Enable Always On, Always Available Communications

General Dynamics’ public safety and service communications networking solutions are engineered to take full advantage of LTE, the most advanced and most open, interoperable wireless communications networking technology available. LTE offers higher bandwidth, priority of service, better spectral efficiency and ability to work with a greater variety of user devices that public safety and service agencies need to enable always on, always available interoperable communications.

With a 3GPP based, open LTE solution from General Dynamics, state and local governments can ensure all public safety and service networks in towns, cities, counties and regions conform to the same high-quality communications standard. They can take advantage of the economies of scale LTE enables for future enhancements, upgrades and expansions. All while leveraging the specific enhancements for private networks servicing public safety that General Dynamics has introduced to ensure the availability, reliability and security of all communications at all times, as well as in emergency or crisis situations.

LTE and Public Safety

LTE is the next-generation, open standard, wireless communications networking technology being deployed worldwide by communications service providers. It can deliver long range wireless network access at speeds that can support many users, multiple simultaneous sessions and high bandwidth multimedia communications.

State and local governments in countries around the world are using LTE to build private networks that can extend regulatory services from the confines of brick and mortar institutions to anywhere citizens and public services interact. With LTE, government services can be delivered more efficiently, communications with in-field public servants can be more immediate, and applications and information can be shared more quickly with first responders.

LTE designed for Public Safety takes the rich capabilities of commercial LTE and purpose fits them to the small to medium size network, with specialized services and features and with a reliability factor focused on service delivery over revenue generation.
Build from the Core of the Network, To the Edge

The complete LTE offer from General Dynamics includes industry-leading products and services that enable the design and deployment of the most reliable, end-to-end network infrastructure for any public safety and administration application. General Dynamics provides everything state and local authorities need to build a future-ready communications infrastructure, from the central core of the network to the in-field personnel at the outer edge.

This complete approach eliminates the challenges associated with creating and deploying a rugged, full-featured, efficient and secure LTE network. It simplifies the process of selecting, the right network elements, end user devices and applications. And it reduces the risk associated with engineering an interoperable, wireless multimedia network.

Advanced Core Network Elements

**EPC3000 Evolved Packet Core**

To enable a resilient scalable network, General Dynamics’ Evolved Packet Core is a flexible, 3GPP compliant product that combines a Serving Gateway (S-GW), Mobility Management Entity (MME) and Packet Data Network Gateway (PDN-GW) into a highly scalable and cost-effective architecture. Different hardware configurations support deployments from economical LTE networks for rural communities to mission critical LTE networks for public safety operators.

**Service Management Platform**

User and device management, and policy control in a General Dynamics LTE network are enabled by the SMP. This integrated system is specifically optimized for small to medium-sized public safety deployments, and it has been developed for seamless operation with the General Dynamics EPC3000. It provides:

- Home Subscriber Server (HSS) functionality to support user authentication, authorization and mobility management
- Policy and Charging Control Function (PCRF) for policy control decision making as well as for controlling flow-based charging functionality
- Equipment Identity Register (EIR) function that monitors devices that want to access the network and performs the required mobile identity check
**LTE Network in a Box**

For crisis situations when critical infrastructure is damaged or where capacity needs to be rapidly expanded, General Dynamics offers the LTE Network in a Box. This compact, easily-transportable, product provides full 4G LTE networking technology to support any rapid deployment requirements. It contains all the essential LTE network components. Operators just connect power and backhaul, and attach the unit antennas to create a fully functional LTE network.

**Radio Access Network**

**V6 eNodeB**

Wireless base station functionality is provided by the General Dynamics LTE V6 eNodeB. This single carrier LTE base station is packaged in a compact, rugged water and dust proof enclosure, which contains two radio transceivers for 2x2 Multiple Input Multiple Output (MIMO) configurations. The Band Class variants of the V6 eNodeB supports 5 MHz and 10 MHz carriers in the bands allocated for public safety applications.

**Fixed Broadband User Equipment**

Connecting a fixed site with the LTE Network is possible through a family of flexible, compact, directional and omni-directional Outdoor Device user equipment. Each node includes a patented, state-of-the-art, baseband processor that delivers high performance throughput for any LTE application and connects to a local network through an Ethernet LAN port.

**LTE USB Stick Modem**

This LTE USB Stick connects to the USB port of a PC, or to a compatible Wi-Fi® router to support network access from standard user devices. It features a state-of-the-art, baseband processor and offers a high degree of programmability, high performance and ultra-low power consumption. The LTE USB Stick Modem supports all 3GPP defined LTE bandwidths and duplex modes and delivers maximum category 3 data rates of 102 Mbps downlink and 50 Mbps uplink in a pair of 20MHz FDD channels. It is packaged in a small USB stick form factor with built-in MIMO antennas that have been optimized to provide superior cell edge performance as well as high MIMO throughputs under good signal conditions.
**LTE PCI Express Mini Card**
To enable notebook computers, mobile routers, and vehicle mounted modems to communicate over an LTE network, General Dynamics offers the LTE PCI Express Mini Card, which operates in public safety LTE bands. The card is based on the industry standard PCI Express Mini Card form factor. It contains a 52-pin edge connector which uses the USB2.0 protocol to interface with a host device. In addition two U.FL connectors are provided for connection to external antennas.

**GD310 Rugged Smartphone**
Designed from the ground up to survive in harsh environments, the GD310 Rugged Smartphone is much more than a consumer smartphone in a protective case. The GD310 provides all the features necessary to enable full-featured applications and services for in-field public safety personnel. It includes a large 4.7” touchscreen display that works when its wet, (even under water), a battery that truly works all day, drop protection from six feet, a dual core 1.5GHz processor, a high sensitivity GPS, push-to-talk capabilities and much, much more.

**LTE Mobile Wi-Fi Hotspot**
General Dynamics also offers a full-featured LTE Mobile Wi-Fi Hotspot designed to provide mobile Wi-Fi access to up to 10 Wi-Fi devices anywhere in an LTE network, using LTE or HSPA for wide area access. The device is battery powered with up to four hours of continuous operation. A micro-USB interface enables charging, configuration and tethered use.
Optimize Daily Operations
General Dynamics integrated LTE wireless broadband solutions for public safety and administration optimize daily operations by supporting the unique needs of local and state governments. The complete portfolio offers:

- Support for public safety bands and commercial fallback
- Full compliance 3GPP and current national interoperable public safety network requirements
- Full roaming and interoperability with other public safety networks in accordance with 3GPP standards
- Proven network resiliency and stability
- Flexibility to prioritize traffic by user and application, full QoS, preemption

Create a Multi-Agency Solution
Plus, a dedicated LTE network infrastructure from General Dynamics offers the flexibility and configurability required to service multiple types of users and functions. User access may be limited or even blocked in certain situations, at critical times or in specific regions. Primary users can be granted access on a priority basis, either to network resources or network capacity, while regular or guest users have access only when the situation allows. This makes it easy to create a multi-agency solution that addresses current and future public safety and administration needs.

Figure 1: A General Dynamics multi-agency wireless broadband network allows user access to be limited or even blocked in certain situations, at critical times or in specific regions.
Rely on Field-Proven LTE Technology

The full benefits of the integrated General Dynamics wireless broadband solutions have been field-tested and proven through multiple deployments worldwide.

For example, New York City has deployed a full-featured, multi-agency wireless broadband network enabled by General Dynamics. Designed for government and public safety applications the network is the first high-performance mobile broadband infrastructure engineered specifically to deliver new levels of responsiveness, efficiency and cost-containment for both emergency and non-emergency municipal services.

The New York City Wireless Network (NYCWiN) provides mission-critical support for a wide variety of data, multimedia and high-speed mobility applications. It is the first viable large-scale municipal wireless infrastructure that can support virtually any use-model, from continuous monitoring of critical utilities and traffic control services, to broadband multimedia links between emergency response teams and more.

The network has proven its versatility by extending support for over 50 critical applications across more than 19 municipal departments, many of which deliver significant cost savings by replacing connectivity over leased lines. In addition the network proved more resilient than commercial networks when disaster struck during hurricane Sandy continuing to operate almost flawlessly. This flexible, future-proof solution is capable of offsetting a wide range of ongoing operational expenses, making it an ideal model for cities and counties interested in creating a wireless communications infrastructure.

The network, which is built on approximately 400 cell sites spanning all five of the New York City boroughs, uses licensed 2500 MHz spectrum to provide citywide coverage. It is equipped with unique, low-latency, QoS and Tier of Service mechanisms to deliver prioritized and preemptive network access to specified users and groups, such as government officials or emergency response personnel. It is also used to provision a wide range of city departments, such as building and health inspectors, and for monitoring key municipal installations and utilities.
Partner with an Industry Leader

By choosing a General Dynamics wireless broadband solution you are partnering with a leading provider of commercial off-the-shelf solutions for critical communications systems to the global public safety, critical infrastructure, defense and enterprise markets.

General Dynamics provides complex wireless communication networks with in-house developed 4G LTE wireless broadband for a variety of public safety and administration applications.

General Dynamics is an accomplished System Integrator, having delivered programs for defense, federal, state & local and commercial customers worldwide. General Dynamics is able to design, build, operate and train users on the use and administration of broadband communications.

These capabilities enable “always-on,” high-speed access to vital information needed by law enforcement, emergency first responders, government agencies and other professionals responsible for the public’s safety and national security.

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