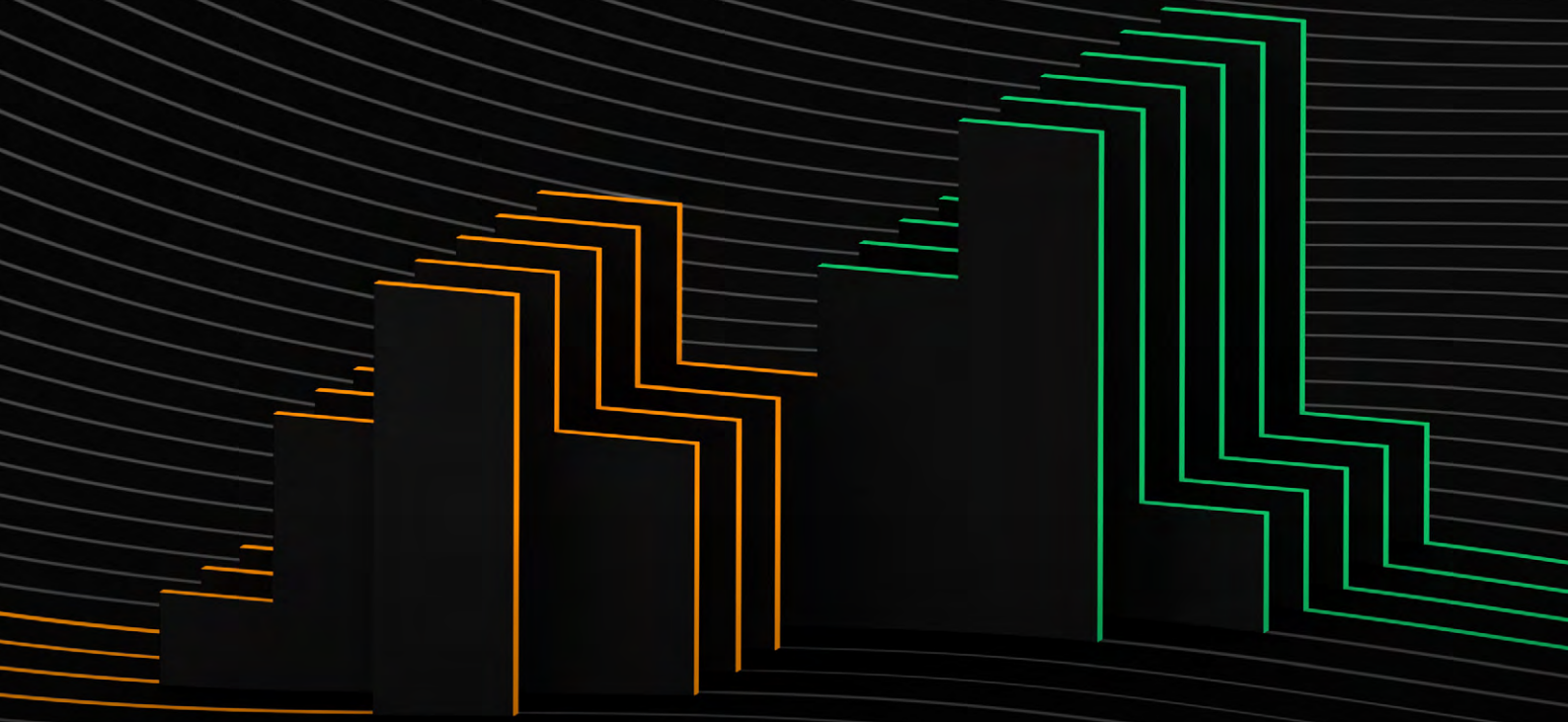




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# 2020: the ultimate stress-test for FirstNet



Extract from the Ericsson Mobility Report  
November 2020

# 2020: the ultimate stress-test for FirstNet

A reliable mission-critical network is vital for successful public safety operations – saving lives and protecting property.

2020 has proved to be an exceptional test year for a nationwide network deployed to serve first responders in the US. This has been triggered by the growth in emergencies related to the pandemic, one of the most active hurricane seasons on record, and severe wildfires. This article examines the role of FirstNet, the only nationwide network purpose-built to serve first responders, and the broader trend of using mobile broadband networks for public safety applications. FirstNet is deployed and operated by AT&T in the US in a first-of-its-kind, public–private partnership.

**Public safety authorities embrace cellular**  
Public safety authorities worldwide have expressed a need for improving the network services used to link first responders in the field. To meet this need, they are increasingly turning to 3GPP-based solutions due to the capabilities provided by 4G and 5G, such as the secure and timely sharing of data, images and video.

A broader opportunity for public safety authorities is to improve and harmonize communication capabilities across different first responder types. With a 3GPP-based interoperable communication system like the nationwide public safety broadband network, cross-functional communications can effectively be established between first responders, different agencies and agencies closely affiliated to first responders, allowing for more agile responses in emergencies.

Service providers can add mission-critical capabilities to their networks to support consumers, businesses and first responders, all from one network. Networks for public safety applications can have very different requirements over time. The dimensioning

must be sufficient to handle worst-case scenarios and provide high availability and reliability as events unfold. Emergencies are growing in complexity, and a shared connectivity network makes it possible for all first responders to effectively coordinate in the field. Between emergencies, the idle capacity can be utilized to enhance mobile broadband services for consumers and businesses on the same network.

## FirstNet was born out of 9/11 and ready to serve

FirstNet is an initiative driven by US authorities with a history dating back to the 9/11 terrorist attack in 2001. The 2004 after-action report<sup>1</sup> of the attack identified two critical communication shortcomings. First, collaboration between police, firefighters and paramedics was hindered by communications relying on radio systems that were not optimized to work together. Second, the demand for network resources spiked for both consumers and first responders at the same time, saturating networks and impeding communications.

In the years after the report's release, public safety organizations and associations came together to press the US Congress to pass legislation establishing a reliable, dedicated and national high-speed network for first responders. This led to the First Responder Network Authority (FirstNet Authority) being created in 2012. The law that established the FirstNet Authority required it to consult with federal, state, tribal and local public safety entities to ensure that FirstNet was designed to meet the needs of public safety across the country.

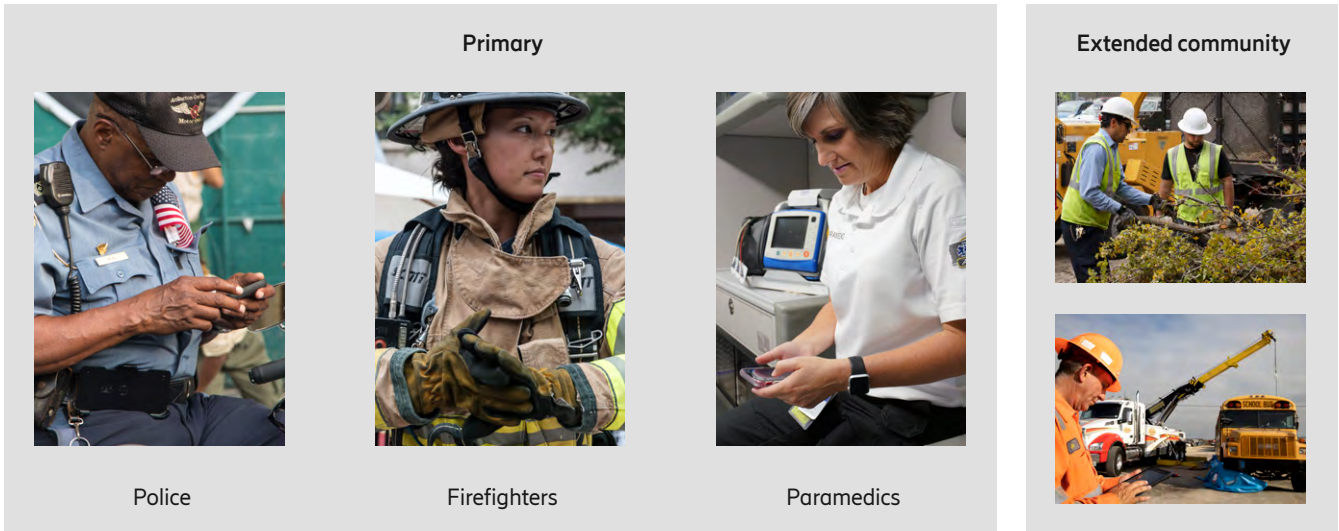
This article was written in cooperation with AT&T, a market-leading global service provider delivering a range of innovative mobile and fixed-line communications-based services to help people, businesses and first responders stay connected.



The law associated with the formation of the FirstNet Authority included allocating 20MHz of spectrum nationwide and USD 7 billion to support the build-out of FirstNet. After consulting with states, territories, tribal governments and public safety agencies at every level, the FirstNet Authority sought to form a public–private partnership with a nationwide service provider.

<sup>1</sup>"The 9/11 Commission report" (July 2004).

Figure 19: FirstNet connects the public safety community



**Highly secure and interoperable connectivity**  
 – across all public safety authorities and jurisdictions

**A communications ecosystem for public safety**

FirstNet is exclusively for first responders and those who support their vital efforts. This includes law enforcement, emergency medical services and fire protection services, and important supporting services such as emergency (9-1-1) call dispatching, government Public Safety Answering Points and emergency planning and management offices. Other essential personnel who support first responders before, during and after an emergency can also subscribe to FirstNet. These organizations provide medical care, mitigation, remediation, overhaul, clean-up, restoration, or other such services during or after an incident.

In 2017, the FirstNet Authority selected AT&T to build and manage the FirstNet network for a period of 25 years. FirstNet is an entire communications ecosystem dedicated to public safety and characterized by:

- a shared radio network utilizing all AT&T LTE commercial spectrum bands, as well as 20MHz of nationwide coverage in the 700MHz bands, dedicated to first responders, and available to commercial users when not in use by public safety
- a highly secure, dedicated network core designed from the ground up to serve the public safety community
- a network launched with 4G LTE and currently being upgraded to provide 5G capabilities

- always-on, 24/7 priority and preemption across voice and data, with multiple priority levels that first responder users can allocate as needed to protect communications against commercial traffic congestion
- a nationwide, dedicated fleet of land-based and airborne portable cell sites to help provide coverage in remote locations or immediately following a disaster
- mission-centric ruggedized mobile devices, applications and features, including Mission-Critical Push-to-talk, to complement existing legacy radio networks communication services

The FirstNet Authority has laid out a comprehensive roadmap based on public safety input, to ensure mission-critical mobile broadband communications capabilities. These are:

- a dedicated core network to enable mission-critical capabilities
- sufficient spectrum capacity and coverage
- improved situational awareness (such as three-dimensional location services)
- mission-critical voice communication services
- high information security and integrity
- improved user experience for first responders

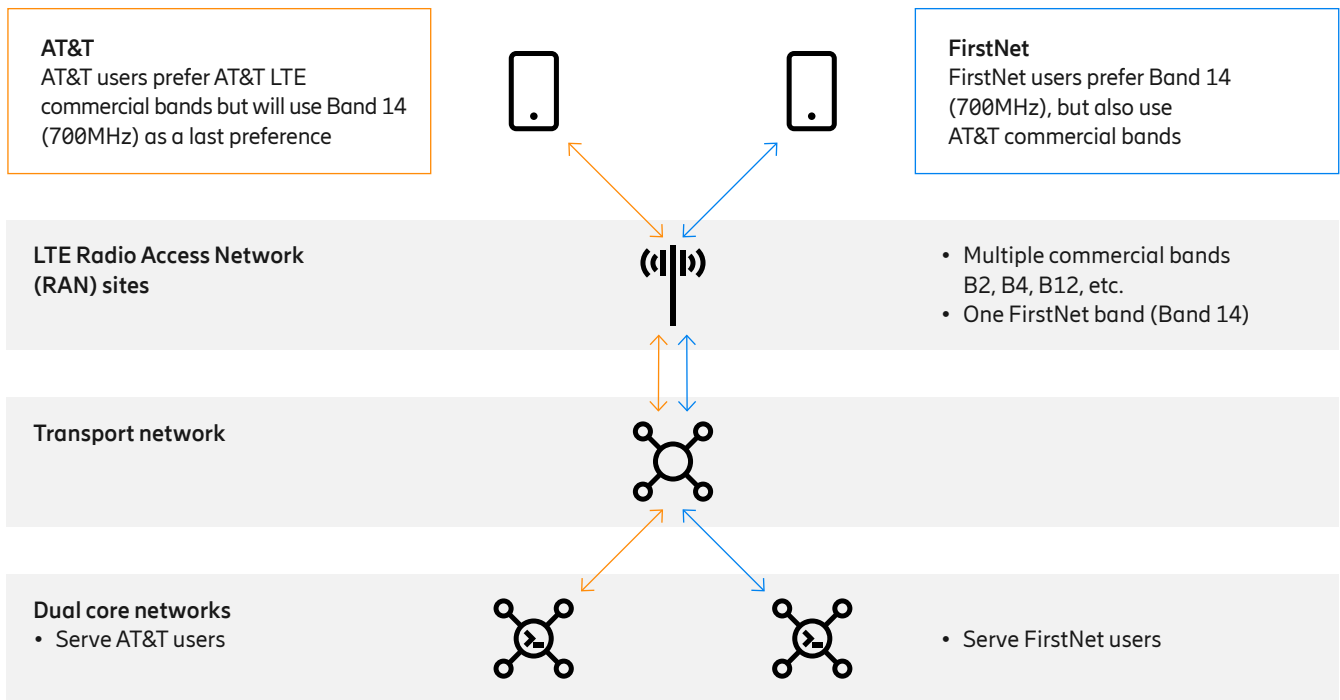
User experience represents an essential part of the vision for FirstNet. Once fully implemented, the value of the network will be measured by how much easier it has become for first responders to focus on their prime task. FirstNet already covers over 99 percent of the US population, and by mid-2020, the initial FirstNet build surpassed 80 percent completion, serving over 1.7 million connections in more than 14,000 agencies across the US. Fortunately, the initial FirstNet build had reached a sufficient level of completion to support the emergencies hitting the US this year.

In addition to the initial USD 6.5 billion investment allocated by the FirstNet Authority for the build-out, AT&T is investing about USD 40 billion to build, operate and maintain the network. This co-investment and public-private partnership approach is proving to be a successful model for a network serving public safety.

# 1.7m

As of Q3 2020, FirstNet has grown to serve over 1.7 million connections used by first responders and the extended public safety community.

Figure 20: FirstNet network architecture



**Managing changing traffic demand during the pandemic**

The emergencies hitting the US in 2020 caused substantial changes in traffic levels and patterns across consumer, business and public safety segments. During the first six months of the pandemic, mid-March to mid-September, the following changes in mobile traffic generated by consumers and businesses were observed in AT&T’s network:

- The overall traffic grew by 20 percent, compared to pre-pandemic figures.
- Mobile traffic shifted from public/office to home/remote work locations, as 60 percent of Americans worked remotely.
- The mobile data traffic was flat to slightly declining, supported by Wi-Fi offload in homes with good fixed broadband connections.
- Mobile voice traffic increased by almost 40 percent.

Regarding FirstNet, public safety authorities made more than 450 requests for temporary network coverage solutions, such as cell on wheels (COW) deployables, in-building solutions and macro network enhancements to support planned and emergency events. This covered everything from drive-through COVID-19 testing sites to natural disasters like hurricanes and wildfires. Interestingly, throughout the pandemic, the average first responder consumed more than double the mobile data of the average consumer, which reinforces the importance of having a network service specifically for public safety – especially during times of crisis.

**Flexible coverage solutions required during emergencies**

The demand for temporary coverage solutions to support first responders in different emergency situations illustrates the high level of flexibility that FirstNet needs to support:

- Hospital ships, with 1,000 beds and 12 operating rooms, were deployed to offload hospitals in metropolitan areas hit hard by the pandemic. There was an immediate requirement to support a high concentration of first responders as soon as ships reached the ports.
- Hurricane landfall areas. FirstNet One, a 17m-long blimp flying up to 500m high, was deployed to elevate the cellular radios to address larger geographical areas than a COW can cover.
- Wildfires where ground forces need a bird’s-eye perspective on the development in real time. Specialized aircrafts performed reconnaissance flights and fed real-time insights to first responders on the ground serviced by COWs, that can quickly move with changes in the firefighting location.

Overall, traffic patterns shift from known/predictable to more dynamic scenarios during acute emergencies. The ability to support these types of shifts is a key feature of FirstNet. Even when business and consumer traffic is surging, first responder communications are protected, with spectrum dedicated to public safety when needed, and prioritization across all AT&T LTE commercial spectrum bands. This gives public safety authorities immediate access to network connectivity as well as even more coverage and capacity. In addition, using shared network infrastructure enabled first responders to immediately access the early benefits and capabilities of FirstNet while AT&T built the dedicated FirstNet network core – designed with a defense-in-depth approach that helps maintain security at every level.

# 20%

Emergencies directly affect mobile traffic; in the first 6 months of the COVID-19 pandemic, mobile traffic grew by 20 percent.

**An evolutionary path towards 5G capabilities**

FirstNet and the mission to serve first responders during the exceptional challenges they are facing during 2020 have proven the value of mission-critical networks for public safety applications. The need for digital transformation is not limited to businesses, but also stretches into the public safety sector and first responders' needs. Paramedics can be in direct contact with the receiving hospital from the moment they reach their patients, aiding remote diagnosis and treatments. Fast deployment of temporary network coverage accelerates the recovery and reconstruction phase of local communities and society immediately after a hurricane. Firefighters get a better view of the nature of uncontrolled wildfires, saving their lives and the lives of others.

In June 2020, the FirstNet Authority Board approved USD 218 million

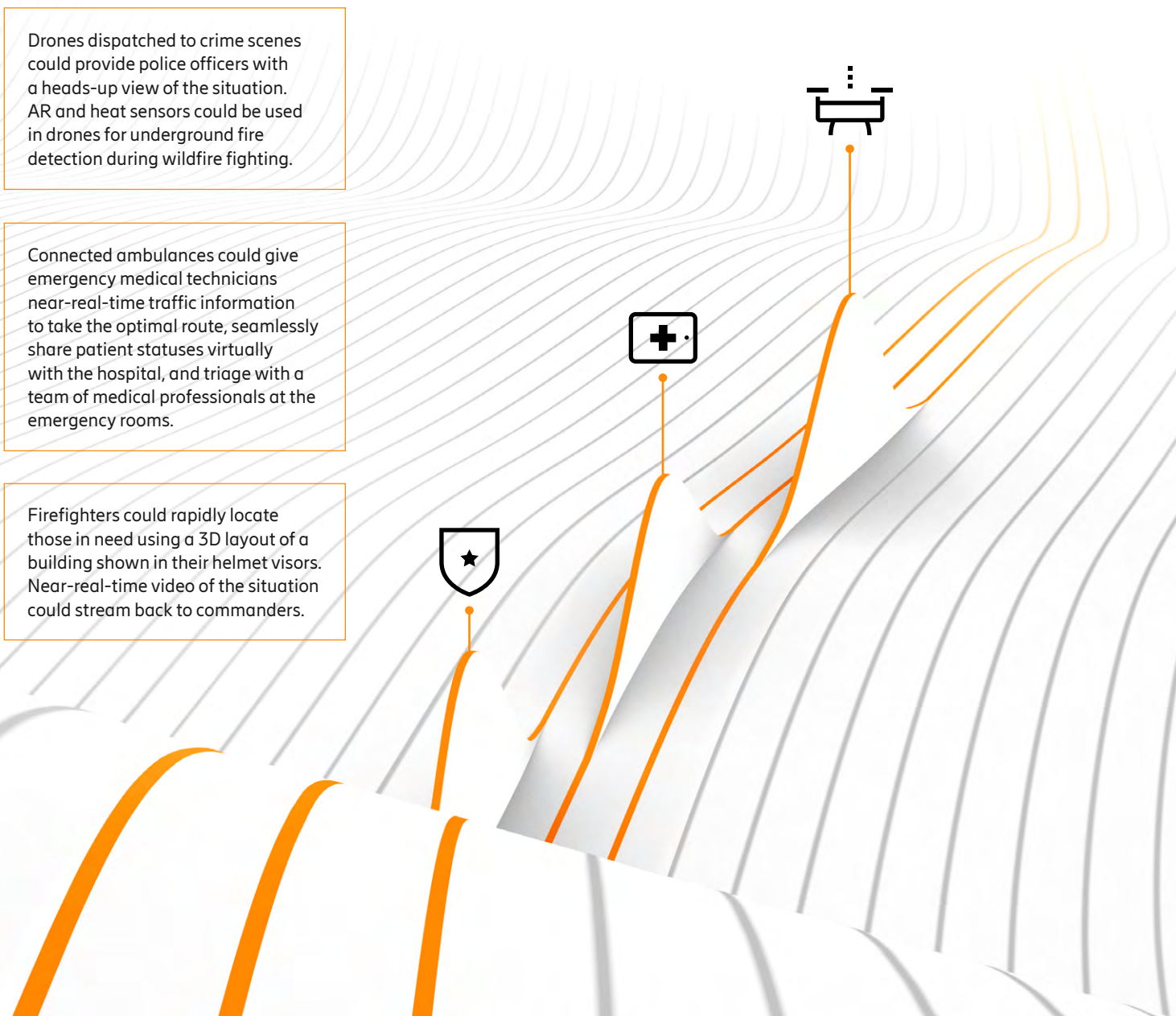
– the first set of investments – for AT&T to upgrade the FirstNet core network with 5G technologies and expand the fleet of deployable network assets. This is the beginning of a multi-phase, multi-year journey to deliver full 5G capabilities on FirstNet for public safety. During the coming years, 5G technologies will provide a range of network improvements, including low (predictable) latency and capacity enhancements, that could enable new capabilities for mission-critical networks and public safety applications.

Today, many of the priority and preemption capabilities to efficiently manage LTE radio and network resources do not yet exist for 5G, but are works in progress. LTE is therefore the current platform for mission-critical mobile broadband and will remain so for years to come. Innovations in mission-critical features are still being developed and tested. However, the

FirstNet Authority's investment is setting the stage for reliable, secure 5G for first responders in the US. It will ensure public safety services are able to take advantage of 5G's potential when it is ready for these applications. As it does today, FirstNet is designed to manage traffic so that public safety has the ultimate fit-for-purpose user experience – sending the data via the best route. That could be done over 5G or 4G with priority and preemption, but it will be an evolutionary path where 4G LTE and 5G will coexist.

As shown in Figure 21, 5G technology can enable a broad ecosystem of additional applications and use cases beyond what is possible today. 5G will eventually further improve first responder command, control and communications capabilities and be a catalyst for additional technological innovations to support emergency response and enhance the odds for positive outcomes and saving lives.

**Figure 21: Examples of applications and use cases 5G could unlock for first responders**



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