GSMA
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CASE STUDY

Standalone 5G System Seeks to Save Lives

ZTE develops portable 5G network that can quickly provide coverage, sensing and location information at the scene of an emergency

Highlights

- ZTE's standalone 5G solution provides emergency connectivity, sensing and location services
- The temporary system can interact with the public network and satellite communication to enable real-time coordination of emergency services
- The solution employs far edge compute, local offload and data processing to optimise the communication and information flow.
- Responders wear 5G-connected helmets equipped with sensors, cameras and a screen
- The new system is being piloted by three major fire stations in the Guangdong province of China
- ZTE is teaming up with China Mobile to deploy the 5G Standalone Firefighter System widely in 2024

In an emergency, access to real-time information can be the difference between life and death. If they have high quality connectivity, first responders can get the information they need to assess the risks, make quick decisions, optimise the use of resources and increase operational efficiency.

To that end, ZTE has developed a 5G standalone support system that can be mounted on a vehicle, such as a fire engine, and then used to provide temporary connectivity, sensing and location services. The goal is to enable real-time coordination of emergency services and deliver a swift and effective response in the most challenging situations. At the same time, the sensing and location capabilities supported by the 5G network can help individuals navigate safely through hazardous conditions, while lowering the risk of getting lost, disoriented or injured. The net result should be more successful evacuations.

ZTE says its 5G Standalone Firefighter System is being piloted by three major fire stations in the Guangdong province of China and is now being used to support the response to emergencies. As well as saving lives, the system could reduce the billions of yuan of damage caused by fires each year in Guangdong. Working with China Mobile, ZTE is hoping to complete 30 deployments of the system by the end of 2023, ahead of a large scale rollout in 2024. "We have plans to grow massively," says Hans Neff, Senior Director, CTO Group, ZTE Corporation. "Now the commercialisation, the standardisation, the fine tuning, the shaping is going on."

The 5G Standalone Firefighter System is designed to be highly manoeuvrable and flexible. At the site of an incident, the arriving fire engines establish a temporary 5G network using on-board radio antenna. Ideally, three antennas will be deployed on different sides of a burning building so the temporary network can use triangulation to pinpoint the precise location of each fire fighter and any individuals trapped inside. "You can then track where people are in real time, in which room," explains Hans Neff.

The fire fighters wear 5G-connected helmets (see diagram) that are equipped with a thermometer, a harmful gas sensor, a thermal imaging camera and a visible light camera. Developed by ZTE, the helmet also has a screen to provide the wearer with real-time information about the incident, together with an intercom through which they can communicate with other fire fighters and the command centre. Even with batteries, the additional equipment adds less than 2 kilos to the weight of a conventional fire fighter helmet, ZTE says.

The on-site system is supported by a complete 5G network core located in the fire brigade's command centre. A satellite link connects the command centre to the lead fire engine, which has its own edge compute capacity (see diagram) that processes data locally to minimise any transmission delays. While this core network can function entirely independently, it has an MVNO interconnection to the public mobile network, meaning fire fighters can use the temporary network to contact the phones of citizens trapped in a burning building. In China, China Mobile is helping fire brigades to deploy and manage the 5G Standalone Firefighter System.

A public core network does not provide as precise location information as ZTE's private core system. But once the fire brigade can detect the handsets of people trapped in a burning building, it can track their movements, call them and steer them towards a safe exit route. Of course, the trapped individuals can also connect to the public mobile networks to proactively call for help. "They can call the fire brigade or the fire brigade can talk to the victims directly via the two core networks," notes Hans Neff. "As you also know roughly where they are, you can give them guidance on the best exit route."

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Hans Neff - Senior Director, CTO Group, ZTE Corporation

Tactical Benefits:

Enhanced coordination: ZTE's 5G-enabled firefighter system facilitates real-time coordination between firefighters, both on the ground and within command centres. The goal is to support swift decision-making and optimal resource allocation, ultimately reducing response times and increasing operational efficiency.

Situational awareness: With advanced sensing capabilities, the system delivers environmental data and accurate location information to responders. This empowers them to assess risks, strategise effectively, and navigate through hazardous conditions, resulting in safer and more informed decision-making.

Precise guiding: The integration of 5G technology and edge computing enables precise guiding of both firefighters and individuals in need of rescue to safe zones. This minimises the risk of getting lost or disoriented, leading to a higher success rate in evacuations and minimising injuries.

Strategic Benefits:

Cost savings: By streamlining communication, reducing response times, and enhancing decision-making, fire departments can significantly reduce operational costs associated with prolonged rescue operations, property damage, and medical expenses. Additionally, the ability to accurately assess and control environmental conditions can prevent costly accidents and equipment damage.

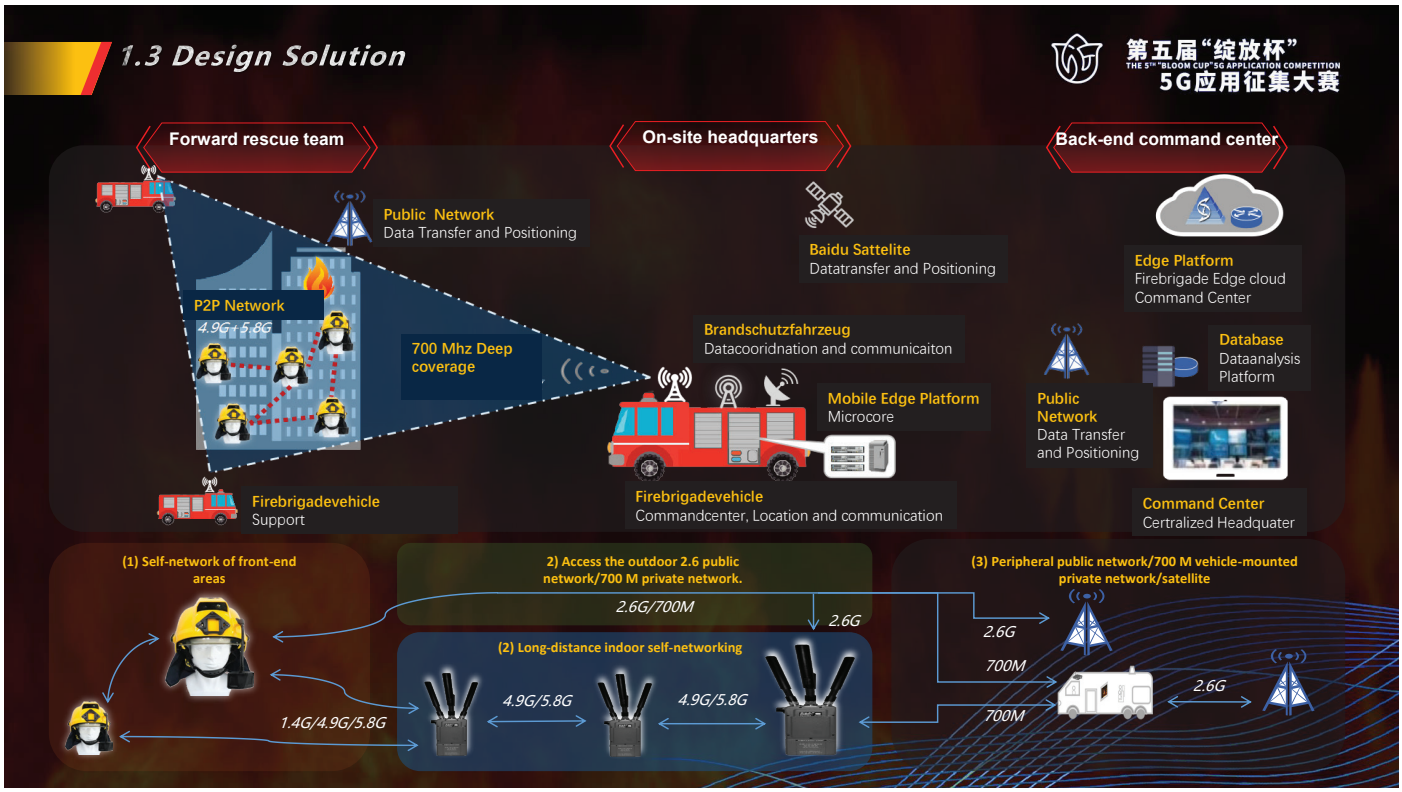
Revenue generation: The system could help position fire departments as leaders in emergency response technology. This distinction can attract partnerships, sponsorships, and government contracts, generating additional revenue streams that can be reinvested into improving public safety infrastructure.

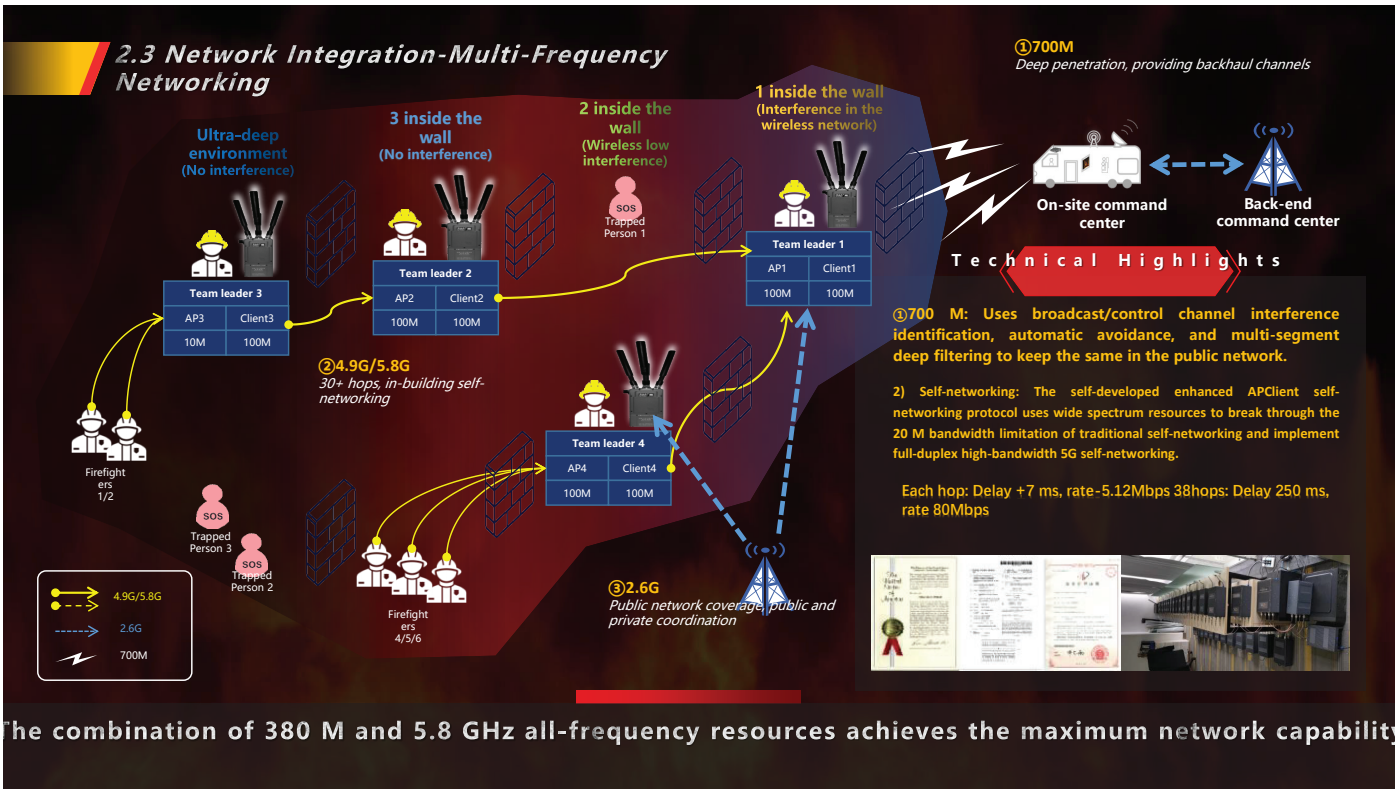
Benefits for Trapped Persons and On-Site Commanding:

Lifesaving information exchange: The system is designed to facilitate rapid and accurate communication between trapped individuals and rescue teams. This direct connection can provide crucial information about the location, condition, and needs of trapped persons, expediting their rescue and reducing potential harm.

Real-time commanding: Real-time data feeds from the 5G system give on-site commanders greater control. This allows them to make informed decisions, adjust tactics on the fly, and ensure the safety of both responders and those in need of rescue.

Comprehensive environmental monitoring: The ability to measure temperature, gas levels, electricity presence, and vital signs through 5G-enabled helmets ensures that the most up-to-date and accurate data is available. This empowers responders to make well-informed decisions, mitigating risks associated with unpredictable environmental factors.





In future, ZTE's system may also be able to provide connectivity to citizens in cases where the public mobile network has been damaged or lacks sufficient coverage. "This is called EPLMN (equivalent public land mobile network)," Hans Neff explains. "On the private network you can position EPLMN interconnect with the public core network for the SIM card." That would enable the trapped individuals to use the EPLMN link of the private network to make calls and retrieve information.

Providing coverage deep inside a building

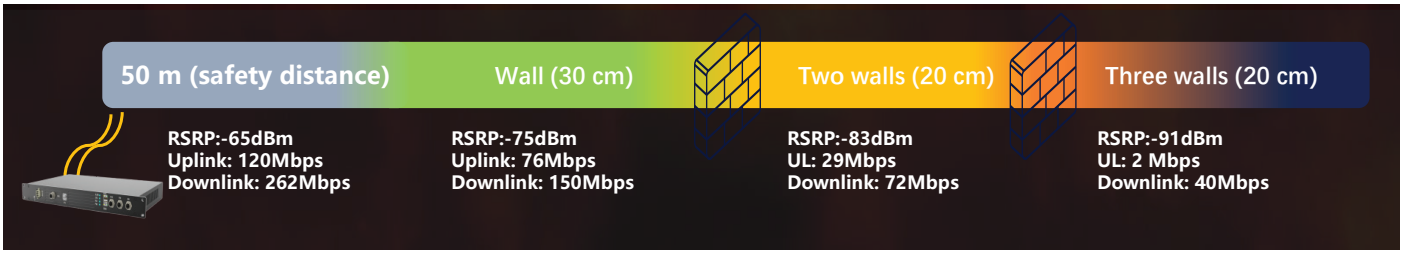
Crucially, ZTE has designed its 5G Standalone Firefighter System to penetrate at least three walls, even if they are made of steel or concrete. This deep indoor coverage is achieved by using low frequency spectrum, ideally in the 700 HMz range, transmitted from a 40 watt base station at a safe distance of 50 metres from the building. ZTE says its solution can transmit four channels of video in 1080p resolution through two walls (see diagram), while it has developed a protocol that can support positioning and basic communication requirements through three walls.

The system also uses the 4.9 GHz and 5.8 GHz spectrum bands for peer-to-peer communications (see diagram), enabling fire fighters to share real-time video information or temperature and air quality data.

Greater access to low frequency spectrum required

The pace of international adoption of the 5G Standalone Firefighter System could depend on the availability of suitable spectrum in different markets. While the 4.9 GHz and 5.8 GHz bands are available across the world on a license-exempt basis, the lower frequency bands used to penetrate deep inside buildings are allocated to existing services in many markets.

In China and other Asian countries, low frequency spectrum is being reserved for emergency situations and usage by the police, fire brigades and rescue services, according to ZTE. Other regions, such as Latin America, that also need better communication and emergency connectivity over large distances could follow suit. But in some regions, deployments could be hindered by alternative usage of the



spectrum. Accessing the 700 MHz band in Europe, for example, would require negotiations with the licence-holder, which could be a mobile operator. “To have the capability to roll it out worldwide, there must be regulations for such emergency services,” notes Hans Neff.

More broadly, there are likely to be discussions around regulatory standards to guide the usage of emergency connectivity systems in critical safety situations. For example, regulatory bodies may need to establish guidelines to ensure the reliability, interoperability, and safety of these systems.

Portable 5G systems could have a wide range of applications

ZTE believes fire brigades will lead the adoption of its system. “It is the emergency service which is reproducible in every large city,” explains Hans Neff. “You have a fire brigade with the same procedures, with the same methodologies, with the same ways to handle things everywhere, so, it’s a replicable service. If we talk about an emergency service for mountain rescue, it is slightly different and they have different processes and the market potential is smaller.”

Over time, ZTE plans to provide standalone 5G systems to a wide range of emergency services with portable mobile communication, coordination, location and rescue requirements. Clearly, all kinds of search and rescue operations, whether in urban or remote areas, could greatly benefit from advanced communication and location systems. These systems can help to locate missing persons, coordinate search efforts, and ensure the safety of both responders and those in need of assistance. During natural disasters and humanitarian crises, efficient communication and location systems are crucial for coordinating relief efforts, distributing resources, and ensuring the safety of responders and affected populations.

Portable and flexible 5G connectivity could also be valuable to high-risk industries, such as construction, mining, and manufacturing, which require robust communication and location systems to ensure the safety of workers in hazardous environments. Another potential market segment could be the public infrastructure sector (e.g., airports, stadiums, hospitals), which requires advanced emergency communication and location systems to facilitate evacuations, response coordination, and safety procedures.

Over time, ZTE believes standalone 5G systems will significantly reduce the operational costs associated with prolonged rescue operations, property damage, and medical expenses. Moreover, the ability to accurately assess and control environmental conditions could prevent costly accidents and equipment damage.

For the mobile industry, the introduction of a specialised system for emergency response would diversify its market offerings and create new revenue streams from sectors, such as public safety, disaster management, and industrial safety, potentially expanding the mobile industry’s customer base.

As China Mobile is doing in China, some mobile operators could provide the standalone 5G system as a managed service to fire brigades and other public agencies. Operators have the necessary technology expertise to manage the connectivity and periodic software upgrades, allowing the emergency service to focus on its core role.

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The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

For more information, please visit the GSMA corporate website at gsma.com

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The GSMA Foundry is the go-to place for cross-industry collaboration and making positive change happen, supported by leading technology organisations and companies. By bringing together members and key industry players, engaging, and unifying the end-to-end connectivity ecosystem, the GSMA is solving real-world industry challenges.

Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. This enables the mobile industry's mission: to connect everyone and everything to a better future.

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About ZTE

With innovative technologies and product solutions, ZTE serves global telecom operators, government and enterprise customers, and consumers.

Covering more than 160 countries and regions, ZTE serves over 1/4 people worldwide, and is committed to achieving a bright future of connectivity and trust everywhere.

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