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Mission critical

How GCC telecom operators can enable public safety communications

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Executive summary

In recent years, there have been public safety and security incidents around the world, involving fatalities and damage to property and infrastructure, which could have been mitigated by a faster first response. Governments are often not fully equipped to respond to such incidents. They often rely on commercial networks, which are prone to crashing during such events. Or they use siloed legacy professional mobile radio (PMR) networks that are outdated, are not interoperable, and do not offer the necessary broadband capabilities for successful operational interventions.

Governments and enterprises need broadband communication networks, known as mission critical communications, for their public protection and disaster relief (PPDR) forces and for their critical national infrastructures (CNI). Such networks allow instant group communications with a high degree of reliability, availability, and security. Broadband is important because emergency and security systems increasingly provide real-time information that involves transmitting significant amounts of data in a reliable and uninterrupted manner.

Telecom operators in the Gulf Cooperation Council (GCC) are well positioned to provide such networks and related services. They are already at the center of Long-Term Evolution (LTE) commercial deployments and have developed all the necessary capabilities to operate this technology effectively. Telecom operators have three options to pursue jointly or individually to become mission critical LTE providers: an upgraded commercial network, a greenfield mission critical network, and a hybrid brownfield network. Their range of service offerings to monetize their mission critical LTE infrastructure investments is in three main categories: communications, video, and telemetry (the automatic recording and wireless transmission of data from remote sources). To succeed, telecom operators need to act in three areas: network deployment strategy, go-to-market approach, and operations capabilities.

The emergency problem

Despite all the technical and financial capabilities of governments and enterprises around the world, there have been a number of security threats and industrial incidents in recent years. Moreover, the responses to them have been inadequate. Although implementing high-quality security and safety procedures to prevent the occurrence of such events is crucial, eliminating them entirely is impossible. When these incidents do occur, all personnel mandated with the safety and security of people and assets must be equipped with the right tools to conduct their activities with high operational efficiency, particularly, fail-safe communications networks. This is precisely the area in which governments and enterprises often fall short. Telecom operators can step in to provide the necessary capabilities.

Two types of organizations, in particular, require communications capabilities that enable effective interventions when incidents occur. These are public protection and disaster relief (PPDR) units and critical national infrastructure (CNI) operators.

PPDR units: These comprise first responders that are responsible for the health, safety, security, and welfare of citizens, such as police forces, firefighters, and ambulance staff. First responders need mission critical communications in the following scenarios:

- Police officer group coordination and license plate recognition for identifying suspect vehicles
- Firefighter group coordination, fire location monitoring, real-time provision of detailed location information and direction, and monitoring the physical well-being of firefighters
- Remote coordination by ambulances with hospitals for monitoring the condition of patients
- Coordination with headquarters, compiling information (such as a detailed location map) for a raid, and the monitoring of vehicle location

Mission critical networks differ substantially from commercial networks.

CNI operators: These comprise personnel overseeing infrastructure that is critical to the effective functioning of society, such as nuclear or electric power plants, reservoirs and water supply, oil and gas rigs and pipelines, mines and quarries, and key public transportation assets, such as airports and train networks. Examples of when CNI operators need mission critical communications include:

- Fleet monitoring for railway and metro operations
- Remote control and diagnosis of oil platforms or rigs, pipelines, power plants, and mines
- Group coordination in airports including ground operations, fueling, fire and rescue, cleaning and catering, customs and immigration

A number of recent incidents have shown how important it is for PPDR units and CNI operators to intervene quickly and effectively, either to thwart such incidents or to react to limit the damage. If they are unable to do so, the consequences can be devastating. To be able to intervene swiftly and coordinate their responses and activities with other units, PPDR units and CNI operators need reliable and efficient mobile communications that are labeled "mission critical."

Mission critical networks differ substantially from commercial networks. The latter, principally constructed for the mass market, are not designed to handle peak traffic and support real-time group communications, nor are they built with fully redundant architecture. They are therefore exposed to congestion and availability issues.

Four recent examples demonstrate the importance of mission critical communications.

- On March 22, 2016, three coordinated suicide bombings were carried out in Brussels, Belgium, in a limited radius and within hours of each other. So many people used their phones simultaneously to call family and friends that the network of the incumbent operator Proximus was paralyzed for eight hours. However, emergency services were able to rely on the Belgian public safety network to communicate and coordinate their activities successfully.
- On New Year's Eve 2015, a fire broke out in the Address Downtown hotel in Dubai in the United Arab Emirates. Owing to the swift intervention of first responders who were using a unified communications network to coordinate their activities, residents were evacuated quickly with minimal casualties.

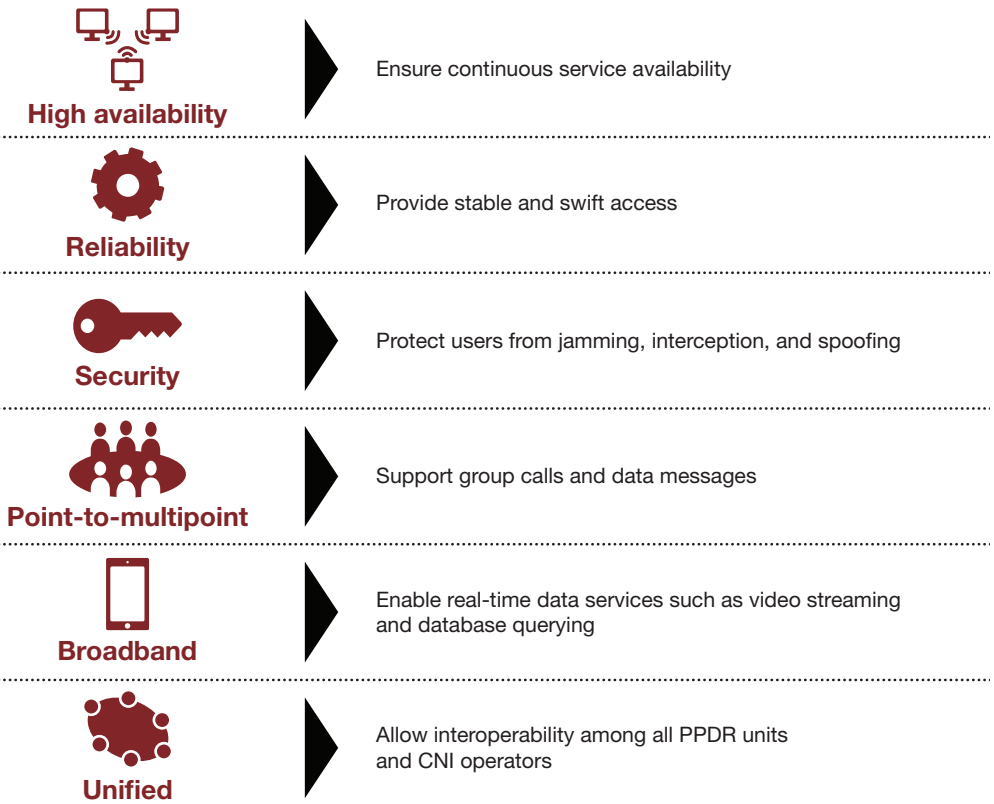
- On April 16, 2014, the MV Sewol ferry, transporting more than 470 passengers and crew, sank off the coast of South Korea. First responders found it difficult to coordinate their activities because of the multiple legacy communications systems operated by the different intervention units. The final death toll reached 304. A month later, the South Korean government decided to unify and upgrade the first responders' communications system, while also integrating high-speed data into their capabilities.
- In September 2004, Hurricane Ivan hit the southern U.S. In addition to massive property and infrastructure damage, power cuts affected more than 1.8 million people in multiple states. However, Southern Linc, a mission critical network operator, remained largely intact with only 8 percent of its cell sites affected by the storm, enabling the Federal Emergency Management Agency (FEMA) and other public safety bodies to coordinate their interventions effectively.

As the preceding examples suggest, PPDR units and CNI operators have a critical need for voice communications and an increasing need for broadband data usage. Moreover, it is clear that just one network should be used by all organizations (PPDRs and CNIs alike) to ensure that interventions are effectively coordinated.

Mission critical communications

PPDR units and CNI operators must always be able to conduct voice and data communications even in the most extreme circumstances. They must always have the ability, whenever required, to effectively collaborate in dispatching intervention teams and managing their operations. Such communication needs can be met only by a mission critical network, which has six key features (*see Exhibit 1*):

Exhibit 1
Mission critical networks need six key features



Note: PPDR = public protection and disaster relief, CNI = critical national infrastructures.

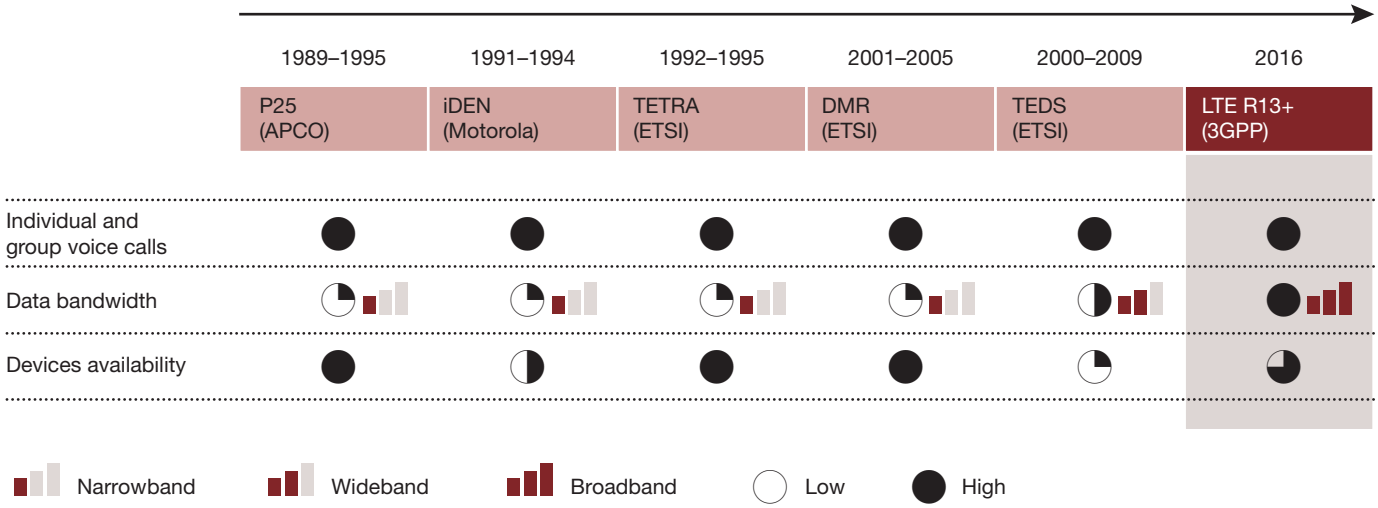
Source: Strategy&

A number of legacy mission critical technologies exist that primarily focus on voice services and have limited data capabilities. These are known as professional mobile radio (PMR) systems (such as TETRA, P25, iDEN, DMR, and TEDS). However, for supporting today's complex emergency environment, only mission critical Long-Term Evolution (LTE) currently possesses the broadband capabilities that provide sophisticated users with services such as video streaming, automated vehicle location, and remote asset monitoring (*see Exhibit 2*).

Today, a number of mission critical LTE deployments can be seen in the GCC:

- One telecom operator is currently planning to deploy a single, national mission critical LTE network to serve PPDRs and CNIs across the country.
- A government-owned professional communication corporation has been mandated by its government to deploy mission critical LTE for public safety and situational awareness.
- The ministry of interior of one GCC country has already built its own public safety LTE network.

Exhibit 2
Existing mission critical technologies



Source: Strategy&

The role of telecom operators in the mission critical market

Telecom operators are ideally placed to deliver the mission critical communications that governments and enterprises need.

First, telecom operators are well acquainted with LTE, which they already rely on to enhance their commercial offerings and meet the mass market demand for mobile high-speed data services.

Second, telecom operators currently serve governments and enterprises through a variety of services, such as voice and data communications, managed services and cloud, or enterprise solutions. Telecom operators should build on these existing relationships and capabilities to include the provision of mission critical services, with the client benefiting from having all its communications needs covered by one operator.

Telecom operators have three options available to make them mission critical LTE providers, which they can pursue individually or in combination: an upgraded commercial network, a greenfield mission critical network, and a hybrid brownfield network.

Upgraded commercial network
Simple software upgrades to existing LTE nodes permit basic mission critical communications services (such as group calls, user and call prioritization, and group management) at relatively low cost. Bringing these services together by means of an upgrade fully exploits synergies within the telecom operators' technological capabilities. However, this option may not ensure the necessary network hardening — which involves employing all the security features to make sure the network is secure — that is required of telecom operators to be robust mission critical providers. Nor may this option meet all the terms of service-level agreements (SLAs) that governments and enterprises will demand. Neither would it allow premium pricing for services as there is no differentiation with commercial offerings.

Greenfield mission critical network
Deploying a fully dedicated mission critical LTE network requires large-scale capital expenditure. It will be difficult to justify such an investment given how much money telecom operators are already spending on expanding the existing commercial LTE network. Although this option will justify premium pricing, the resulting revenue will be insufficient to make the investment worthwhile over a reasonable time frame.

Hybrid brownfield network
Telecom operators can deploy mission critical LTE nodes over existing sites, minimizing civil work expenditures that typically account for the majority of network deployment cost. They can also invest in deploying additional backhaul links, backbone elements, and core equipment to ensure high availability and guarantee redundancy. In this way, premium pricing is justified, while the hardening of the network meets the terms of the SLAs.

Telecom operators could rely on a combination of these options to deploy their mission critical network while making the most of the underlying investments. For instance, the upgraded commercial network option can be adapted to rural areas. The greenfield mission critical network option can be adapted to certain remote areas that contain critical infrastructure (such as oil rigs). The brownfield network option can be adapted to large cities where operators already exploit a wide footprint of sites.

Given that mission critical network deployments require heavy investment and mainly target governments and enterprises that manage critical infrastructure, telecom operators can aim to strike public–private partnerships (PPP) with governments, for the purpose of obtaining their buy-in and securing the spectrum for LTE.

A number of mission critical LTE deployments are in use today, for example, in the U.K., the U.S. and South Korea (*see Exhibit 3*).

Exhibit 3

Examples of mission critical LTE deployments worldwide

	Deployment type	Spectrum	Public partner
1 AT&T	**Hybrid brownfield network** (public safety network built over AT&T's existing infrastructure)	**Dedicated Spectrum**	First Responder Network (**FirstNet**) Authority in the U.S.
2 Everything Everywhere (EE)	**Upgraded commercial network** (with increased network coverage)	**Shared Spectrum** (with EE's commercial network)	U.K. **Home Office**
3 KT Corporation, SK Telecom	A combination of **greenfield mission critical network** and **hybrid brownfield network**	**Dedicated Spectrum**	South Korea's **Ministry of Public Safety and Security**

Source: Strategy&

Monetizing mission critical

Telecom operators can provide a wide range of service offerings to monetize their mission critical LTE infrastructure investments. Telecom operators will need to customize these offerings to fit the needs of each customer, given the widely varying goals of government entities and enterprises. For instance, the police force will require mission critical services for usages that are different from those of oil and gas refineries. Also, some needs may be unique to a country, for example, crowd monitoring during the Hajj season in Saudi Arabia.

The offerings can be grouped into three main categories: communications, video, and telemetry (*see Exhibit 4*).

Exhibit 4
LTE mission critical offerings span three main categories

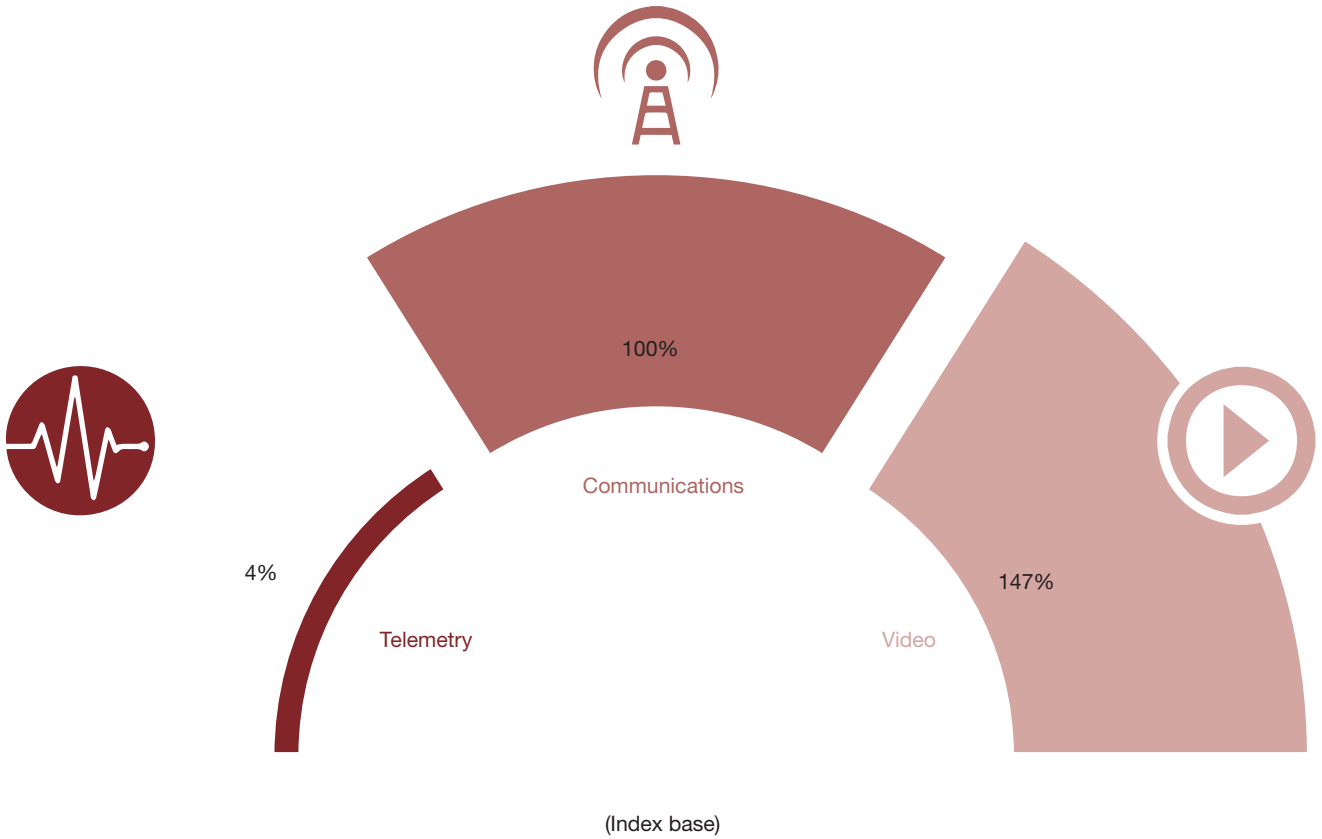
Category		Service	Description
Communications	1	Group voice communications	**Push-to-talk services,** enabling **one-to-many** and **many-to-many** voice communications
	2	1-to-1 voice communications	**Voice over LTE** communications services
	3	Data usage	**Data usage such as browsing, file transfer, and database access** for writing reports and cataloguing on-scene events and evidence
Video	4	Stationary cameras	**Surveillance cameras** such as **CCTV** to monitor key sites
	5	Individual cameras	Mainly **body-worn video cameras** for streaming events encountered by PPDR personnel
	6	Vehicle cameras	**Drones** and **in-car cameras** used during **crowd surveillance and environment monitoring**
Telemetry	7	Individual sensors	**Sensors** monitoring **individual safety and well being**
	8	Network sensors	**Sensors** collecting and monitoring **status and functioning** of n**etwork elements** such as water or oil tank levels – includes **fleet management**

Source: Strategy&

Monetization will mainly come from communications and video services. Telemetry services will generally have very low average revenue per user (ARPU) when compared to the other two categories, mainly due to the fact that sensors require only very limited bandwidth. On the other hand, video services will have the highest ARPU on a per-subscription basis, due to the high volumes of data that require a significant portion of the network bandwidth (*see Exhibit 5*).

Exhibit 5
Communications and video services will have the highest average revenues per user (ARPU)

Estimated relative ARPU percentage increase per service



Note: ARPU calculations for all services are indexed relative to communications services ARPU. Also, ARPU of certain services can depend on local constraints and regulations in each country.

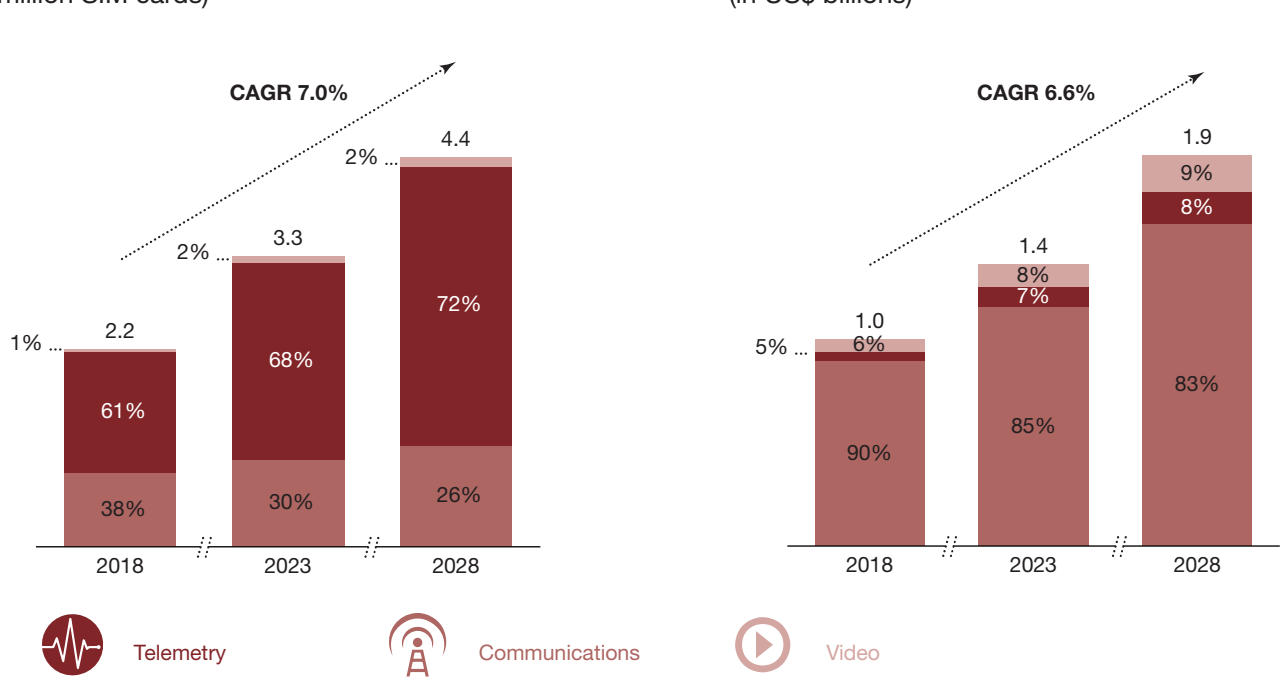
Source: Strategy&

Prospects for mission critical LTE in the GCC

There is a clear need for mission critical services, and it is evident that telecom operators can provide them. However, the business case is not always apparent. Mission critical demands investment in infrastructure and capabilities, both of which are already a substantial cost to telecom operators. Then again, as the GCC mission critical market is sizable and should double over the next 10 years, the rewards could be significant (*see Exhibit 6*).

Exhibit 6
GCC market users and revenues

Forecast GCC mission critical LTE revenues by product category



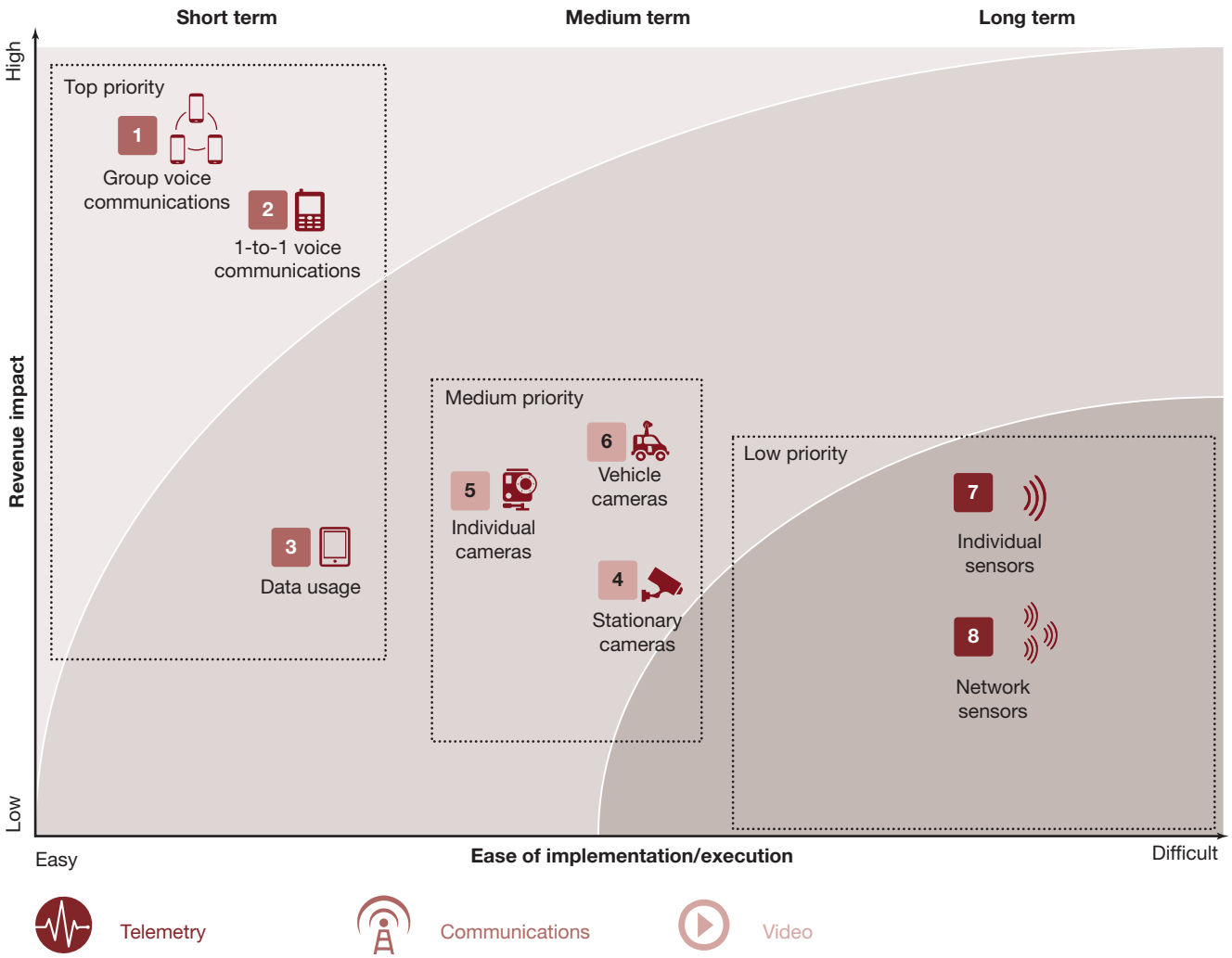
Source: Strategy&

Demand will be mainly driven by communications and telemetry services. PPDRs and CNIs will always need to equip their teams with mission critical voice and PTT (postal, telegraph, and telephone) communication services, as these represent the most essential means of effectively coordinating interventions. In addition, since governments and enterprises have had more need for individual and critical asset monitoring in recent years, sensors will be required in high volumes.

Accordingly, telecom operators can prioritize their portfolios based on the revenue impact and the ease of implementation and execution (*see Exhibit 7*).

Exhibit 7

Telecom operators need to prioritize their portfolios for the mission critical market



Note: Numbers refer to order of priority. Data usage refers to internal browsing, file transfer, and database querying (i.e., it excludes Internet access and video streaming).

Source: Strategy&

Success factors

To succeed in mission critical services, telecom operators should consider specific actions in three areas: network deployment strategy, go-to-market approach, and operations capabilities.

Network deployment strategy
Telecom operators should rely on a combination of the different deployment models available, each adapted to a specific type of area, thereby rolling out a mission critical network while simultaneously optimizing the underlying investments. This implies the maximum reutilization of all existing high-cost assets, such as towers, and parts of backhaul and backbone that are redundant. In addition, telecom operators can aim to strike a PPP with the government, thereby enabling the necessary spectrum for mission critical LTE, and the buy-in of PPDRs who constitute the majority of potential users.

Go-to-market approach
Telecom operators should put communications services at the top of the priority list, followed by video streaming services. Video streaming is the service that consumes the most data, so it could be offered on a limited basis at first, perhaps only to clients who need it as a mandatory bundle with other services. This offering can later be expanded as network capacity is increased to cater for demand.

Telecom operators should rely on a combination of the different deployment models available.

Within their go-to-market strategy, telecom operators should develop a premium pricing model. Mission critical offerings should be differentiated from comparable yet commercial business-to-business offerings currently provided by commercial networks with less stringent SLAs, and can lead to high ARPUs. This should be accompanied by an effective communication campaign aiming to shift the perception of government entities and enterprises in relation to telecom operators. These customers should ideally see operators less as commercial communications providers and more as mission critical communications providers and national security partners. Telecom operators will need to convince others about their capability to provide both types of communications via networks with different SLAs and levels of hardening.

Operations capabilities

Telecom operators should consider separating certain activities into two distinct parts, one for commercial and one for mission critical services. For instance, network operations teams will not have the same SLAs. Creating dedicated teams for each type of network can therefore serve to optimize technical interventions. The same applies for customer support, where a dedicated team should be made available at all times of day for mission critical customers. This is not necessarily needed for commercial customers.

Conclusion

Telecom operators are well-positioned to succeed in the mission critical market, and provide the vital telecommunications support that governments and enterprises need at times of crisis. Although it seems certain that the mission critical market will expand at a rapid rate, many operators still have to make important strategic decisions about the precise services they can offer, and the actions to be taken to exploit this opportunity. With careful judgment and the right choices, the potential gain for telecom operators could be significant.

Endnotes

[1] The GCC countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates.

[2] Long-Term Evolution (LTE) is a standard for high-speed wireless communications for mobile phones and data terminals.

[3] TETRA is Terrestrial Trunked Radio, P25 is Project 25 digital radio, iDEN is Integrated Digital Enhanced Network, and DMR is Digital Mobile Radio.

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