Operators need to consider automated assurance for providing new 5G services

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Early 5G use cases are using the non-standalone 5G deployment to deliver multi-gigabit enhanced mobile broadband (eMBB) services to consumers. However, it is the new business opportunities enabled or enhanced by the **standalone** 5G deployment, taking advantage of 5G's ultra-reliable low latency communications (URLLC) and massive machine-type communications (mMTC) capabilities, that are exciting those in many industries including telecoms, manufacturing, automotive, utilities, healthcare and emergency public services. The standalone deployment, combined with other network automation and digital transformation efforts, will introduce virtualised networks and software components, making 5G more complex than previous network generations. The existing approach to the provision and management of network services will no longer be applicable to 5G use cases that are driven by network slicing and edge clouds, and use 5G's next-generation, URLLC and mMTC, capabilities.

This comment is based on Analysys Mason's recently published white paper, *Assurance-driven network automation is key to 5G success*, and outlines two emerging 5G use cases, long-distance drones and smart grids, that will be potentially enhanced by 5G's URLLC and mMTC capabilities, and the next-generation service requirements necessary for providing these services.

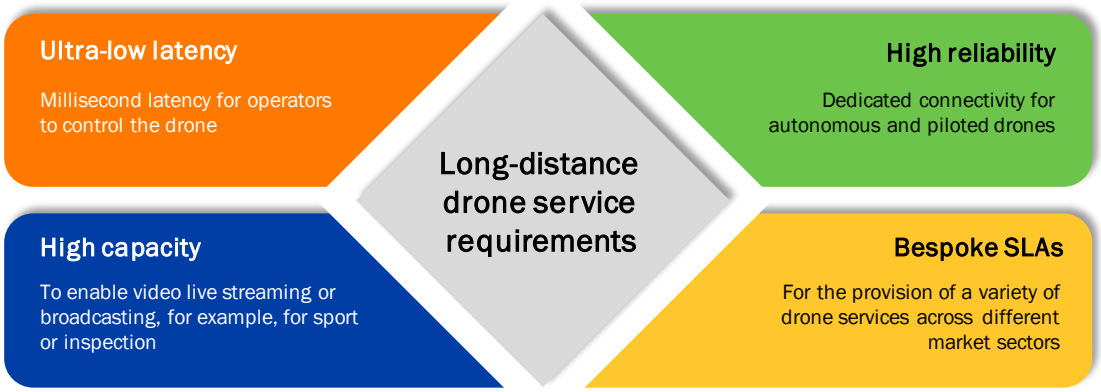
5G networks will need to be automated to support long-distance drone services

The market for commercial drones has grown significantly in recent years and the application of mobile connectivity is growing as the technologies and applications mature. In 2018, Vodafone reported that the market opportunity for commercial drone services would grow to USD84 billion worldwide by 2025.[1]

Services are emerging that leverage 4G connectivity for long-range drones offering commercial services, such as surveying agricultural and forestry land, but are prone to line-of-sight and other regulations in most countries. 5G connectivity is expected to drive both the adoption of mobile connectivity for drones and the broader growth of commercial drone services by guaranteeing the QoS with network slicing for drone operators and offering bespoke service-level agreements (SLAs) for different types of services. This opportunity has garnered interest from operators, who are trialling and demonstrating 5G drone use cases and exploring the necessary value chain. Verizon has committed to becoming the first mobile network operator with 1 million drones connected on its 5G network.

1 For more information, see www.vodafone.com/business/media/document/648_white_paper_drones.pdf.

Figure 1: Service requirements for long-distance drone services



Source: Analysys Mason

Figure 1 outlines the different requirements from commercial drone services, which include many different use cases each with different service requirements. For example, drone operators may request low-latency connectivity to allow them to precisely control drones over long distances, or ultra-reliable connectivity to allow them to monitor and reroute drone fleets. Bespoke SLAs beyond that of existing mobile broadband or IoT services will be needed to support this growing market. 5G networks will be necessary for the level of automation required for operators to provide and manage these drone services as the market grows.

Network slicing can provide a new level of isolation for critical smart grid applications on 5G

Smart grid applications include a broad range of use cases deployed broadly across the national grid within power generation, transmission, distribution and consumption. These applications can be limited due to the scale of the national power grid, which has thousands of sites with equipment to be connected; physical networks become unsustainable for anything but the most critical plants and substations and 4G connectivity cannot guarantee the security and performance necessary for advanced applications.

Analysys Mason estimates that the number of wireless smart grid connections in 2018 was 36 million and that this will grow to over 250 million connections by 2026. Some expect 5G will revolutionise the smart grid by delivering a single, scalable and high-performance connectivity solutions for utility providers, applicable to both existing smart grid applications and potential new advanced applications, such as predictive energy management or automatic fault correction.

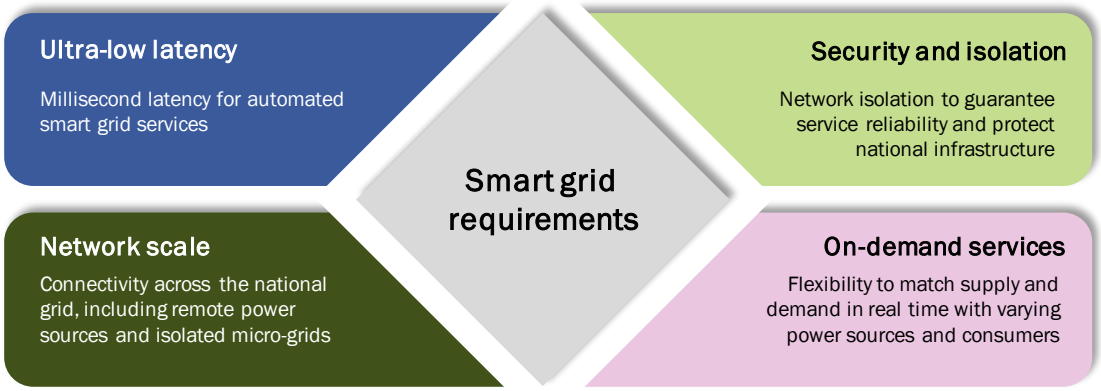
Research from Telefónica O2 highlights the application of 5G's mMTC capabilities for real-time monitoring and control of the national grid. The broad network of smart grid connections could rapidly detect and respond to spikes in energy demand and manage emerging micro-grids, which are expected to improve efficiency and competition in energy markets. The research identified the loss incurred from faults in the national grid and the growing demand from electric vehicles.

In 2015, the UK experienced 533 hours of blackouts, costing GBP23.4 billion in lost productivity. The UK's energy grid capacity will need to increase by 30% for the widescale adoption of electric vehicles to become a reality by 2040.

- Telefónica O2[2]

Like long-distance drones, smart grids present many different opportunities, but all smart grid solutions must be secure to protect national power infrastructure (see Figure 2). In this aspect, network slicing would be relevant to isolate critical smart grid connections from the public 5G network. Further, millisecond latency would be applicable for smart grids to deploy automatic operations, capable of reacting to potential faults or changes in the demand and supply in real time, and potentially support predictive energy management or self-healing smart grids in the future.

Figure 2: Service requirements for smart grid applications



Source: Analysys Mason

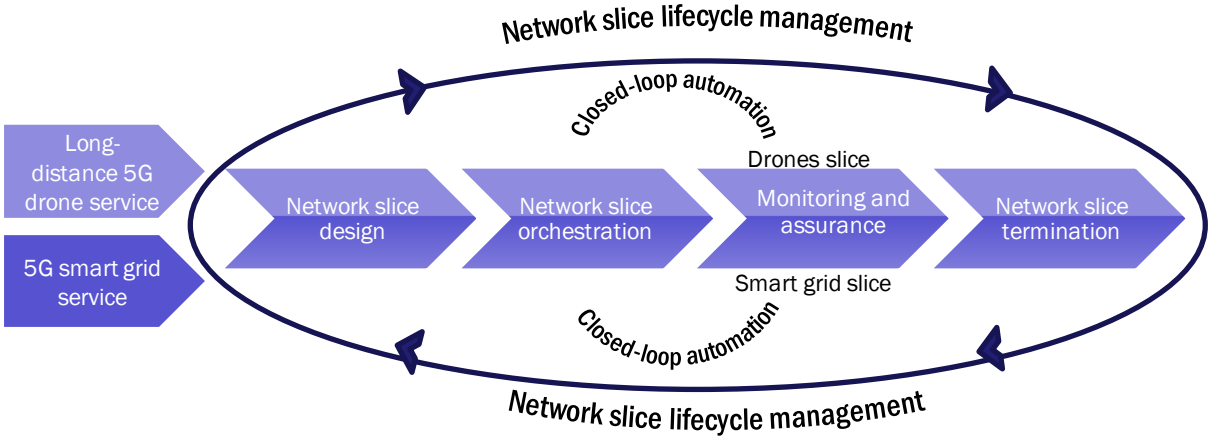
Automated assurance will play a crucial role providing network slicing, and URLLC and mMTC capabilities for new 5G services

These services, and any that will rely on 5G connectivity, will require the assurance and monitoring of the QoS and SLA performance to ensure the necessary URLLC and security is provided.

5G network slicing will be crucial for the URLLC and mMTC capabilities required of these use cases. Figure 3 shows the key operational functions of the network slice lifecycle management, covering the network slice design, instantiation and orchestration, monitoring and assurance, and termination. Automated assurance must work in conjunction with orchestration systems to dynamically monitor the 5G network and leverage machine learning and artificial intelligence (ML/AI)-based predictive assurance to guarantee the SLAs and QoS delivered. This will be critical to perform the closed-loop automation based on the insights generated from monitoring the drone and smart grid services.

2 For more information, see www.mobileuk.org/cms-assets/O2%20Smart%20Cities.pdf.

Figure 3: Assurance-enabled network slice lifecycle management



Source: Analysys Mason