# Smart 5G networks: enabled by network slicing and tailored to customers' needs

To date, mobile networks have been inflexible. Customers (people, businesses and machines) had to take what was available, and all mobile networks had very similar services to offer. In 5G, mobile networks will change gear and become smarter, more flexible and more tailored to specific customers' needs. This paper explores how Network Slicing will enable these smart networks to be tailored around the unique service requirements of different business customers.

5G mobile networks, will provide even more speed and higher quality than its predecessors. Importantly too, they will also introduce a novel architecture solution that allows the creation of a set of logically independent networks that run on a common physical infrastructure. Each of these logically independent networks (network slices) can be designed to fulfill specific business needs, making 5G a truly smart network.

The complexity of how network slicing delivers its benefits to the 5G user will not be discussed in this paper. Instead, this paper describes how business customers can benefit from the ability of mobile operators to adapt the 5G network to the different needs. As every business customer has its own priorities (some value bandwidth more than response times and vice versa) and specific demands on the level of functionality the network should provide, this paper sets out three general types of business arrangements between the operator and the client for fulfilling technical and business needs.

It is anticipated that in the initial phases of 5G, there may be a limited number of standardised slices, however mobile operators will be able to create bespoke slice types where business requirements of customers cannot be met by any of the standardised slices.

Starting from a clear understanding of what businesses want from a network and setting adequate service level agreements (SLA) will become a much more common way for operators and customers to enter business relationships.

5G network slicing will offer more ways of managing, monitoring and apportioning every aspect of the communications service offered. All the components that make up a communications proposition – such as bandwidth, dedicated processing power collected data, security model and so on – can be varied by management systems. This means that customers can get exactly the amount of performance and features they require.

For customers that require their data to be highly secure and not exposed to other customers (isolation), operators can create a logically separated network slice that is seen as a dedicated physical network by the customer.

The GSMA aims to work closely with different industries to collect business requirements and then support mobile operators in generating technical descriptions of the network slices needed to satisfy them.

Examples of relationship between customer and operator enabled by network slicing.

### 1. Operator hosting of customer applications

Since operators can effectively create a private network for each client, it becomes easier to install and run applications on their behalf. Furthermore operators can collect targeted data relevant for the application and use advanced tools like machine learning and artificial intelligence (AI) to predict future trends / improve the analytics and more generally to improve the performance and efficiency of the hosted enterprise application. For example, a mobile operator hosting a Content Delivery Network application can provide to such application network-specific information on when, where and by whom content was consumed. Based on this information the application can apply predictive algorithms to pre-position data at the edge of the network where it is likely to be used.

### 2. Capabilities exposure

Rather than creating a customised network slice for each customer, operators may provide the tools to the customers to run their piece of the network how they like. By offering Application Programming Interfaces (API) into the 5G system to third parties, clients can create even more functions. This helps to bring everyone closer to the ideal of matching the performance of the network to the SLA they paid for.

### 3. Integration of existing business processes

If a business has its own existing private network and business processes using mobile network data (on its own premises for example), this infrastructure can be integrated into an operator-provided network slice. This will generally make the private network and business processes more efficient. A manufacturing plant could for example integrate their internal communication system with the mobile network to gain access to additional and more sophisticated functionality and management systems the mobile operator has at its disposal.

CUSTOMERS CAN GET EXACTLY THE AMOUNT OF PERFORMANCE AND FEATURES THEY REQUIRE

BUSINESS CUSTOMERS CAN BENEFIT FROM THE ABILITY OF MOBILE OPERATORS TO ADAPT THE 5G NETWORK TO THE DIFFERENT NEEDS

## Business benefits case studies

The following case studies show how very different types of businesses with different requirements may all benefit from working with operators to customize the 5G network to suit their needs.

### Utility

A water company needs a mobile network capable of handing the transmission of small amounts of data from thousands of devices simultaneously. As some of the meters may be battery operated, another important requirement for the water company is that communications are highly energy efficient.

When comparing the demand on the mobile network e.g. in terms of throughput and latency, it is evident that they are quite different from what a mobile broadband user will expect.

The data collected by the mobile network (e.g. for the purpose of charging) and identity of the meters and sensors may also be specially designed to fit the business needs.

The water company may also have sensors that monitor the health of the pipework, sewers and reservoir network and for which a different set of requirements exist: reliability and prioritization of mission critical alerts would be a primary requirement.

### Automotive

Cars of the future are likely to be heavy users of mobile technology for a variety of purposes. In-car infotainment is likely to have similar requirements to consumer mobile broadband. However in order to support assisted or even autonomous driving, the mobile network needs to be able to support ultra-reliable communications and extreme low latencies in the order of few milliseconds. An automotive company will also expect the service to be provided across country boundaries. Security requirements and addressing are also likely to differ from the mobile broadband general purpose network. Furthermore, sensors in the vehicle may need to report anomalies to a central office.

It becomes evident that a general purpose network cannot be expected to be able of fulfilling all these requirements, in fact, it is likely that a mobile operator will create multiple network slices to address the needs of the automotive industry.

### Manufacturer

A manufacturing plant may wish to utilize mobile technology to monitor and control their industrial production line. The mobile network in the plant will need to deliver ultra low latency and high reliability that are only obtained by deploying much of the “intelligence” of the network near the edge. Some procedures commonly used for mobile broadband users (for example mobility management) are not used by the manufacturer and only add unnecessary complexity.

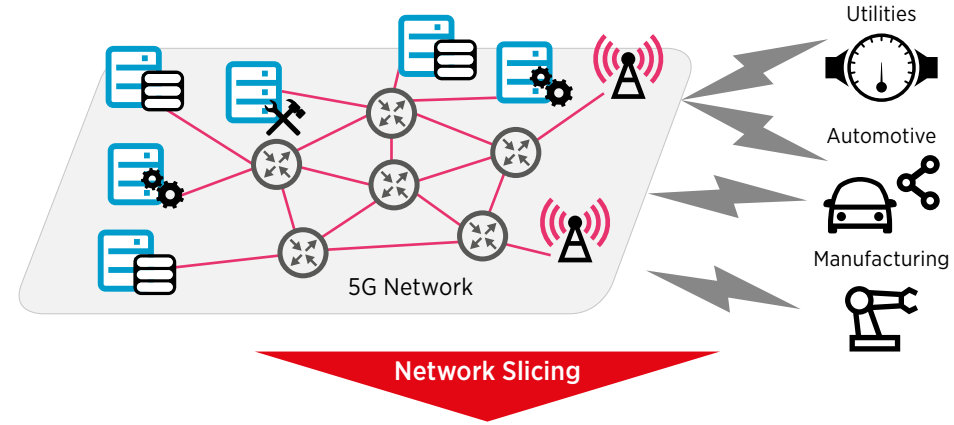
Summary

5G networks take mobile operators away from the supply of dedicated hard-wired networks into space where they can quickly configure and operate Smarter networks, which are richer and have significantly more flexible capabilities to satisfy different customers' needs. 5G with network slicing can provide, upon customers' request, global reach, seamless connectivity, greater security, energy efficiency, accountability and much more.

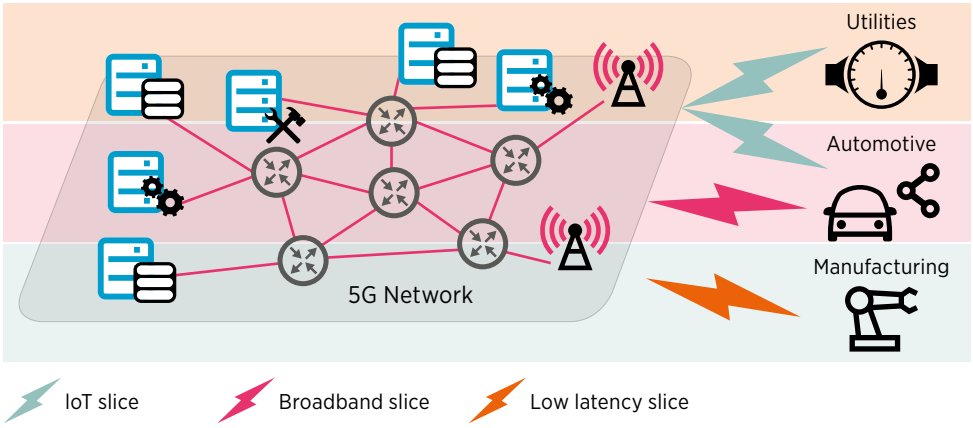
Just as digitisation has opened up the consumer mobile market to a previously unimaginable array of experiences (most from outside the mobile ecosystem), we believe that slicing, and its ability to enable smarter mobile networks, will be a similar catalyst for business customers, enabling them to facilitate their activities in ways we may struggle to imagine today.

**For more information or to get involved in shaping the development of network slices, contact 5Gnetworks@gsma.com.**

**5G networks need to serve customers with very different needs**




**5G networks subdivided into virtual networks each optimised for one business case**



The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with almost 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

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