# Simplified 5G for better 5G business

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*At MWC Barcelona 2019, Huawei unveiled its "Simplified 5G" network construction strategy for guiding future network development with network simplification, automation, and business simplification.*

The strategy reflects Huawei's core design philosophy of taking on the complexity to make things simple for its customers, helping operators build simplified networks for the 5G era.

In the past year, operators across the globe have launched 5G deployment plans, and the speed and scale of 5G development has been unprecedented. In 2019, more than 50 countries will distribute 5G spectrum, 60-plus operators will deploy large-scale 5G networks, and over 40 commercial 5G devices will be available.

This is the first time in nearly 40 years of mobile communications that network hardware and devices will have matured at the same time.

According to statistics, it took 10 years to reach 500 million 3G users globally, and for 4G it was 5 years. With 5G, it will take only 3 years. 5G is developing rapidly, and the market size of the first wave will far exceed that seen during similar periods for 3G and 4G.

## Simplified networks will accelerate 5G deployment

As operators embrace 5G development opportunities, they will also face challenges in this new era. These include increased complexity from multi-band, multi-RAT networks, and ever-increasing network O&M costs, with rental for indoor site equipment and energy costs surging year on year. Operators are eager to liberate site equipment from equipment rooms to reduce OPEX.

Huawei has proposed an LTE+NR target network construction concept for 5G era, which involves the gradual migration of basic voice, IoT, data services to LTE networks, and finally to 5G. This will transform LTE into a basic service bearer solution and create a network with simplified systems.

In terms of site deployment, Huawei has launched a new outdoor site solution for 5G, the Super Blade Site, which includes Blade RRU, Blade AAU, Blade BBU, Blade Power, and Blade Battery. Each boasts full-outdoor modular designs to solve the following site construction issues: large footprint, high rent, high energy consumption, and complex O&M. The Super Blade Site solution also fully leverages existing site resources to improve deployment efficiency. With sites simplified to "zero", operators' reliance on basic resources is reduced, enabling rapid site construction and substantially lowering site TCO.

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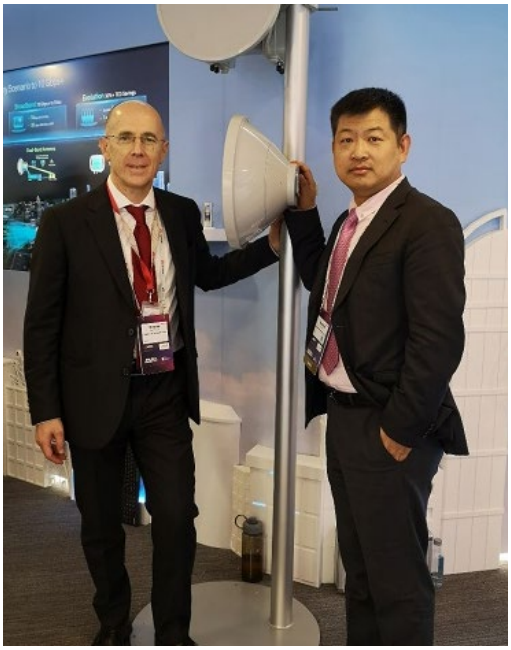

On the antenna mount deployment side, Huawei's "1+1" site helps operators to roll out full-band, full-RAT networks. Huawei's leading Blade AAU product integrates passive antenna and active Massive MIMO. The passive antenna supports full-band 4T4R on sub 3 GHz, while the active Massive MIMO unit supports C-band 64T64R. This offers a powerful solution for the issue of limited antenna mount space.

For microwave solutions, Huawei has launched simplified 5G microwave "1+2" architecture. The solution supports large bandwidth while minimizing demands on tower space. "1" dual-band antenna supports any combination of two frequency bands, alleviating space demands on towers, reducing TCO, and making upgrades easier. Meanwhile, "2" any-frequency-band (6 to 86 GHz) RF units provide up to 8 channels. One RF unit has 4 channels, four times higher than a traditional ODU, making this the only carrier aggregation ODU in the industry. The RF units support over 10 Gbps bandwidth for easier upgrades to large bandwidth microwave.

The high diversity of 5G deployment scenarios mean that only a simplified network will make it possible to handle complex deployment environments and accelerate the large-scale commercial adoption of 5G.

## Developing the autonomous driving mobile network

With the advent of the 5G era, new standards and new services have led to exponential growth in various network parameters, as well as increased network complexity and O&M costs. In response, Huawei has unveiled a series of Autonomous

Driving Mobile Network solutions. These include the MBB Automation Engine (MAE) and the new BTS5900 base station, which offers more computing power. The two products can help operators achieve full-scenario automation, reduce network OPEX, and accelerate 5G construction by providing hierarchical autonomy, vertical coordination, O&M efficiency, resource efficiency, energy efficiency, and better user experience.

MAE acts as the brain of the mobile network, the control engine that enables wireless network automation. MAE enables two kinds of transformation: first, a shift from network-oriented O&M to scenario-oriented O&M, and second, a shift from simple network management to integrated network management and control. Leveraging a cloud data platform and powerful network prediction and reasoning capabilities, MAE provides various scenario-based solutions that closely match the needs of operators' deployment, maintenance, optimization, and service provisioning processes. The MAE also enables end-to-end closed-loop automation on each process.

Equipped with an additional 8 TFlops of computing power, the new BTS5900 base station also maximizes resource utilization through the high-precision management of wireless radio resources, including refined radio channel state, real-time matching, trend prediction, and rapid codec rate adjustment.

As the radio resource state managed by the base station changes every 0.1 ms, precise management calculations need to be completed in a very brief time. The shorter the processing time, the greater the computational power required. This calls for powerful computing capabilities to achieve precise management and a closed loop in the base station.

The hierarchical integration of the MAE and the BTS5900 automates whole sites, increasing O&M efficiency tenfold, boosting user rates by 30 percent, and cutting energy use by 30 percent. Huawei has already collaborated with a number of operators, and the autonomous driving mobile network solution is already generating value in some key scenarios.

## Business simplification means 5G business success

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In the initial phase of 5G, eMBB service is key. eMBB is the continuation and development of mature 4G business models. It primarily emphasizes three business forms: unlimited services, wireless home broadband, and Cloud X. Today, 70 percent of operators globally have launched unlimited services. Of these, 40 percent have boosted ARPU. In the coming unlimited era, there will be an increased need for differentiated network experiences and service experiences, including speed and latency.

## Wireless home broadband

In the 4G era, wireless home broadband was a commercial success. In 2018, there were approximately 30 million more wireless home broadband users. According to the European Union's Digital Economy and Society Index Report 2018, in the EU fixed broadband speeds range from 7 Mbps to 23 Mbps while LTE rates range from 20 Mbps to 42 Mbps. In Finland and Italy, 37 percent and 23 percent of households respectively use LTE wireless technology to access the Internet. The 5G era is set to usher in a golden age of development for wireless home broadband.

Huawei's WTTx Wireless Fiber solution is based on LTE or 5G technology. It harnesses large bandwidth (over 40 MHz), Massive MIMO multi-antenna technology, and high-performance indoor and outdoor CPE. The solution boasts five main benefits: full-service support, fiber-like experience, rapid deployment, flexible service quality, flexible speeds on demand, and 5G-oriented evolution. At MWC Barcelona 2019, Huawei unveiled four new wireless fiber use cases: Wireless to the Home (WTTh), Wireless to the Enterprise (WTTe), Wireless to the Building (WTTb), and Wireless to the Camera (WTTc). More mobile operators are adopting wireless fiber to offer a variety of services. These include new FMC services, with bundled personal and family packages that enable rapid increases in revenue; stable broadband access for small and medium businesses; and remote cameras for image and video backhaul deployed in places with high satellite access costs, such as mines, oil fields, and marine fisheries. Wireless fiber will help more families cross the digital divide and drive the development of the digital society.

## Cloud X: Smart devices, broad pipes, and cloud applications

Cloud X is a new service for the 5G era based on smart devices, broad pipes, and cloud apps. Cloud X will introduce new business models and become a key way that operators can use to expand their business scope.

Cloud X services include Cloud PC, Cloud Gaming, and Cloud AR/VR. These harness powerful cloud computing capabilities to overcome the performance limitations of individual devices, allowing for simplified,

lightweight devices, lowering usage barriers for consumers. 5G features such as low latency, large bandwidth, guaranteed networks, and operators' edge cloud infrastructure, provide the foundation for implementing Cloud X services. 5G and cloud are the twin engines that will drive Cloud X services.

Cloud enables devices to go beyond their inherent capabilities. Users no longer have to configure the chassis of on-premise PCs, use high-performance devices to play high-spec games, or require on-premise dedicated PCs for rendering AR/VR. With 5G, Cloud X services can be ubiquitous and will ensure a consistent user experience.

Huawei began exploring cloud PC services at a very early stage. In 2010, Huawei began to replace its office PCs with cloud PCs. Over the past 8 or so years, more than 80,000 Huawei R&D engineers have switched to cloud PCs. Huawei devices' latest EMUI 9.0 system has a built-in Cloud PC app, meaning that 100 million Huawei smartphones in the Chinese market now support cloud computing services.

Huawei's newly released Mate X – the fastest 5G foldable smartphone in the industry – will provide an unparalleled way to experience Cloud PC and Cloud Gaming. By connecting to the Cloud Gaming service via a 5G network, it will be possible to run triple-A games at 4K resolution/60 fps on smartphones, transforming them into super gaming devices.

Cloud PCs will form the infrastructure for Cloud VR. Operators will be able to use Cloud PC service platforms and add GPU rendering capabilities, Cloud VR service middleware, and Cloud VR applications can easily build Cloud VR service platforms. Huawei unveiled a global version of its 5G Cloud VR service at MWC 2019, launching the industry's first public-cloud Cloud VR virtual machine service.

The technical feasibility of Cloud PC, Cloud Gaming, and Cloud VR has been verified on a live network. Now the industry must build a sound ecosystem and provide better 5G network services.

In the future, 5G will enable industry-wide digitalization, opening up more revenue sources for operators. Huawei is actively exploring new applications in its X Labs with more than 280 partners worldwide. In addition, Huawei hopes to work with operators to discover more application scenarios and develop the simplified 5G network to embrace rapid development in the 5G era.

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