



Nokia 5G FIRST ushers in the next era of telecommunications

Executive Summary

5G is one of the most important technological shifts that will drive a fundamental change in our communications infrastructure. Today, we may be at the beginning of a change that is more far-reaching than the launch a decade ago of the iPhone, which started a revolution in the mobile handset market, as well as changing the lives of consumers and the business models of many industries.

With subscriber penetration peaking, 5G comes at a time when many operators are being forced to diversify and expand beyond their traditional business of connecting consumers.

At the same time, many other industries are also facing fundamental disruptions that demand they transform their underlying business model. From media and entertainment to manufacturing and transportation, companies must find new ways of working and increase their performance. Many face intense and growing competitive pressure in dynamic markets where the lifecycle of new products and service introductions is constantly shrinking.

5G has the potential to help operators and other companies meet their ambitions.

5G is also one of the most rapidly changing technologies ever, with standardization phase 1 due for completion in 2018 and phase 2 in 2019. Nokia is making substantial contributions to this standardization process. Through its close cooperation with early adopters such as Verizon and Korea Telecom (KT), Nokia is now offering a pre-standard solution to enable early 5G services.

The first available 5G solution for early adopters

Nokia is launching the world's first 5G solution. Nokia 5G FIRST will be ready for commercial deployment, going beyond the technology showcases based on proprietary specifications that other vendors are promoting. Instead, Nokia 5G FIRST is based on well-defined market requirements, namely the specifications of Verizon TF (Technology Forum) and KT SIG (Special Interest Group).

Nokia 5G FIRST enables operators to launch specific 5G use cases even before standardization has been finalized. This early commercial solution not only allows early-adopter operators to gain a hugely beneficial first-to-market advantage, but also uses real world experience to drive standardization in 3GPP to help create the best possible 5G.

Showing how 5G can change human existence

Nokia 5G FIRST enables the communications industry to accelerate its development of 5G technologies and use cases. At Mobile World Congress 2017, Nokia will offer a series of live demonstrations, showing how 5G will change homes, events and industries.

5G home experience: Immersive, life-changing experiences for consumers with high-throughput Nokia OZO VR 4K including a low latency VR Gaming demo. 5G-to-the-home is the initial use case for 5G FIRST, allowing rapid deployment of enhanced broadband to areas where conventional fiber-to-the-home (FTTH) is difficult or expensive to deploy. Nokia will deploy this use case in partnership with Verizon and Intel.

5G event experience: Alternative live views of the action across locations, across time, at scale, showing live feeds of a sports game to thousands with the ability to see close-ups, instant replays and augmented reality. These demanding applications are powered by Nokia Bell Labs innovations.

5G industry experience: This demo illustrates 5G's potential to become the communication standard of the fourth industrial revolution. 5G controls the entire factory's workflow automation, guarantees people's safety by immediate intrusion detection and enables new forms of interaction between robots and humans.

5G FIRST is end-to-end

Nokia 5G FIRST spans the entire network and builds on the 5G-ready commercial Nokia AirScale and AirFrame platforms to deliver a complete and versatile solution to operators.

The solution comprises several innovative components that include:

- 5G AirScale massive MIMO Adaptive Antenna, initially available for 3.5, 28 and 39 GHz
- AirScale Radio Access baseband upgraded to 5G and AirScale Cloud RAN, with 5G software to run 5GTF/KTSIG for 5G FIRST and later 3GPP standards as they are finalized
- Cloud packet core with cloud-native architecture to support essential service capabilities such as network slicing and Dev-Ops cloud systems. The core also provides the scalability needed for 5G, through 'state-efficient' processing, software disaggregation and centralized and distributed deployment models. The cloud-native architecture results in up to 80 percent cost savings and can also be used for LTE
- 5G-ready microwave transport, fiber for the 5G era and IP backhaul offer cost-effective backhauling and ultra-low latency end-to-end transport.

Services, business models and devices

In addition, Nokia 5G Acceleration Services aim to help operators evolve their networks to 5G. Nokia Bell Labs Consulting helps to translate an operator's 5G vision into a tailored transformation and deployment plan, while Nokia services can provide end-to-end design and deployment support for 5G use cases based on reference architecture and solution blueprints.

New services to deploy the 5G FIRST network have also been launched: 5G Transformation Consultancy, 5G Phase 1 Network Design and 5G Cross-Domain Architecture Services (xDA).

Nokia is also launching the 5G Community, which builds on the success of the ngConnect program with 300+ members. The 5G Community will evaluate and validate use cases and business models, with leading device, content and application vendors. This collaboration will accelerate the delivery of 5G solutions and create more business value.

Finally, Nokia 5G FIRST includes the world's first 5G user device for fixed wireless powered by Intel's 5G commercial chipset. Supporting 5G-to-the-home, the 5G modem connects to a local 5G radio. This uses mm Waves, massive MIMO, beamforming, flexible frame structure, large channel bandwidths, dynamic TDD and other capabilities to deliver minimum guaranteed fixed wireless throughput to all users in the coverage area. The 5G radios use fiber to connect to the

cloud-based packet core which will evolve towards Next Generation Core as the interfaces are defined.

With the launch of 5G FIRST, Nokia is transitioning from being “5G-ready” to launching the world’s first 5G solution, enabling early 5G services and accelerating industry-wide standardization.



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