

5G Launches in Korea

Get a taste of the future



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Korea has long been regarded a leader when it comes to mobile technology and service adoption, and it is a market that other operators and vendors follow closely.

Samsung's significant role in helping all three Korean mobile operators roll out their commercial 5G networks gives the vendor significant credibility as it looks to expand its 5G network solutions into other markets around the globe.

Daryl Schoolar, Practice Leader for Service Provider Technologies at Ovum

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Korea, always on the cutting edge of telecommunication

No1. Download Speed

No1. LTE Availability

Korea certainly is the hottest LTE market in the world. Given the title of the first country to reach 100% LTE coverage, Korea featured in the No.1 rank for LTE availability¹⁾, hitting 97.5% according to Opensignal. The nationwide LTE coverage ensures being connected at high speed anywhere. Korea also ranked No.1 in terms of download speed experience²⁾ of 3G and 4G combined.

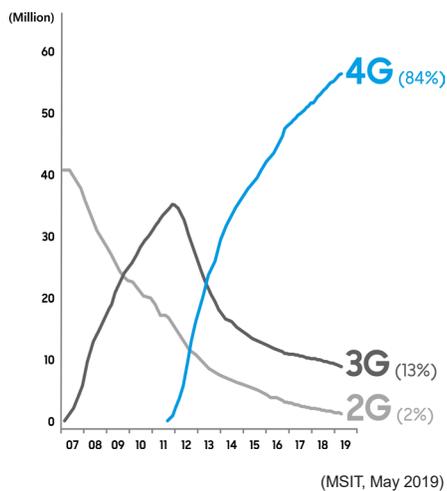
(Opensignal 'The state of mobile network experience', May 2019)

Skyrocketing LTE Subscribers and Monthly LTE Data Traffic

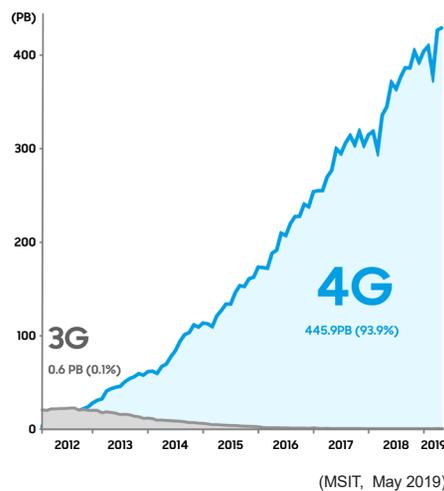
9 GB

The monthly data traffic per user in Korea has been skyrocketing with an average of 9 GB LTE traffic in May 2019, according to MSIT³⁾. The total monthly data traffic is 475PB in the same period of which 4G accounts for 93.9% totaling 445.9PB. The LTE data traffic is about 807 times than that of 3G, which proves the solid technological stance of LTE in Korea. When it comes to total wireless subscribers, LTE subscribers are increasing continuously and according to WCIS, LTE penetration rate has reached 111.9% in May.

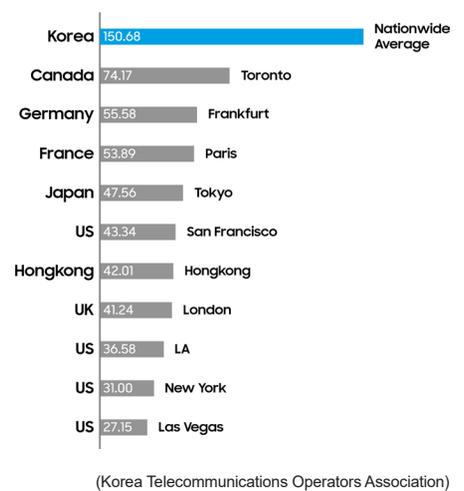
[Total Wireless Subscribers ('07~'19)]



[Total Monthly Data Traffic ('12~'19)]



[Communication Quality Comparison '18]



1) LTE Availability : the proportion of time users with a LTE device have a LTE connection

2) Download Speed Experience : the average download speed experienced by users across an operator's 3G and 4G networks

3) MSIT : Ministry of Science and ICT

Korea switches on commercial 5G

5G Milestones in Korea

Korean mobile carriers are at the forefront of the 5G commercialization as well. In April, the U.S. and South Korea switched on the first mobile 5G networks, bringing the much-anticipated new technology officially into its first stage of global adoption, and those lucky enough to own a 5G-capable smartphone are getting a taste of the future.

The Year 2019 will be a cutthroat yet exciting year for Korea as 5G is about to bring changes in day-to-day lives of 50 millions of people.

Feb. 2018

Pre-commercial 5G

At the 2018 Winter Sport Events, pre-commercial 5G services were successfully showcased in Korea with Samsung's 5G end-to-end solution. 5G-based immersive services such as 'Time Slice', 'Sync View' and 'Omni Point View' were introduced.

Jun. 2018

5G Spectrum Auction

Korea completed auctioning off 5G spectrum; 3.5GHz and 28GHz band. KT and SKT each won 100MHz of the 3.5GHz band, while LGU+ clinched 80MHz. All three carriers secured 800MHz of the 28GHz band.

Dec. 2018

Commercial 5G with Mobile Hotspot

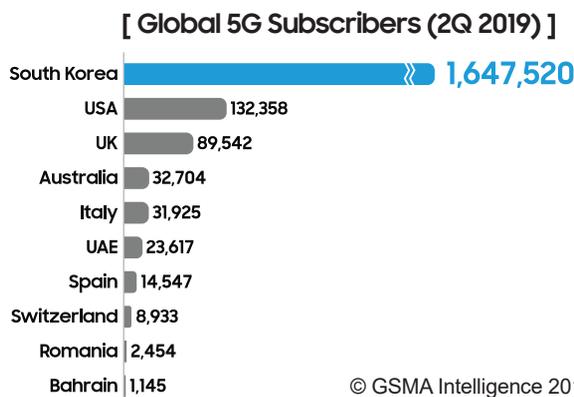
The three Korean carriers launched limited 5G commercial services in the capital city, Seoul, and six metropolitan cities in 3.5 GHz band. With 5G Mobile Hotspot as a device, initial services targeted B2B customers.

Apr. 2019

Commercial 5G with 5G Smartphone

KKorea claimed to launch full 5G commercial services in April with Samsung's Galaxy S10 5G. Korean carriers are providing 5G coverage in dense urban areas in 85 cities. Immersive media, cloud/VR Game and many other 5G services for general customers have been introduced.

5G subscribers surge in Korea hitting 1 million in just 69 days



Korea was estimated to have 1.6 million 5G subscribers at the end of June 2019, accounting for an overwhelming 82.4 percent of the global total at 2 million according to GSMA. The figure far surpassed USA's 130,000 and the UK with 90,000 as of the end of June.

5G adoption in Korea outpaced early uptake of 4G. Korea hit 1 million 5G subscribers in only 69 days, beating 4G record of 80 days. 5G subscribers surpassed 1 million on June 10 — following the country's official April 3 launch of commercial 5G services — and has seen an average 17,000 new 5G customers each day. The industry expects that the total 5G subscriber number is expected to reach over 4 million by year's end, particularly with more availability of 5G smartphones.

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Major Drivers

1 Greater weight on 5G subsidy

Carriers are putting greater weight on 5G subsidy to attract more 5G subscribers in the initial stage since subscribers usually sign 2-year contract.

2 More attractive tariff than 4G

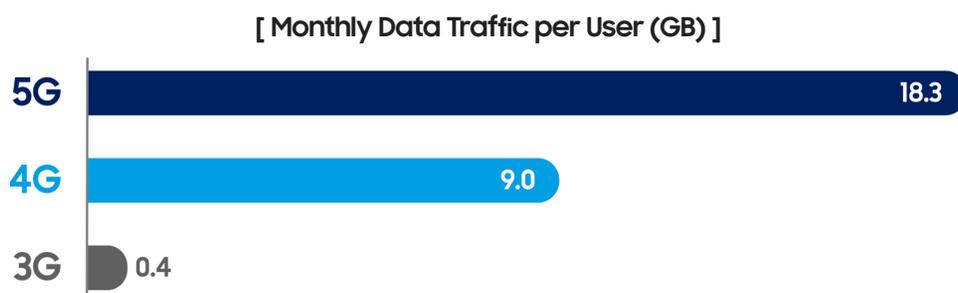
Unlimited 5G data plans are another growth driver. 5G subscribers can access data with virtually no limit in speed and capacity, whose unit price is eventually cheaper than its 4G counterpart.

3 Compelling 5G contents

A large amount of content and value-added services are bundled in order to attract early adopters of 5G. Most of these new services relate to video, games and social applications in new formats, especially VR and AR.

Data usage is also going through the roof

Data use surges on Korea 5G network. Average data usage by 5G users is as high as 18.3GB, and average 4G users use 9GB in the same period, according to MSIT in May 2019. 5G data is about 2 times than that of 4G.



(Source : MSIT, May 2019)

20% of 5G data traffic is from AR/VR contents

This remarkable traffic growth is driven by UHD and AR/VR contents. According to LG Uplus, new services featuring AR and VR functions are proving popular and already account for 20% of 5G traffic, compared with 5% for 4G. The company said it aims to double the number of AR content to 1,500 by the end of this year, including K-pop dance, home training and sports videos, to cater to varied consumer needs.

Key Success Factors for Early 5G Launch

Cooperation is the key

Amid intensifying competition among global mobile carriers, it is significant for the government and companies to join hands and reach the goal together. Early 5G commercial launch in Korea is attributed to the close cooperation among government, carriers and vendors.

Korean government paved the way for early commercial launch by advancing the 5G spectrum auction date and forming 5G Strategy Promotion Committee. Carriers' passion to deploy 5G network fast enabled early and successful commercial launches together with unlimited data plans and compelling 5G services. On top of them, Samsung's 5G end-to-end solution played a key role in fast deployment and operation.

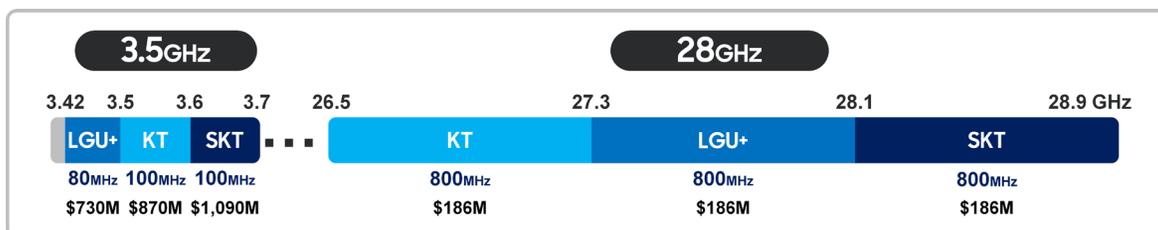
Government's Initiative

Early Spectrum Auction

In order to be at the forefront of the global 5G competition, Korean government advanced the 5G spectrum auction date. Consequently, a year earlier than initially planned, Korea completed a tender process in June 2018 in 3.5 GHz and 28 GHz bands. The government made available a total of 280 megahertz in the 3.5 GHz spectrum band and 2,400 megahertz in the 28 GHz band.

The spectrum was divided into 28 blocks and 24 blocks. Participant operators SK Telecom, KT, and LG U+ had a 10 block cap per spectrum band. The telcos paid a total of 3.6183 trillion won (\$3.3 billion) for the spectrum, 340 billion won higher than the starting price of 3.3 trillion won. The 3.5 GHz band licenses covering a ten-year period and the 28 GHz band licenses a five-year term.

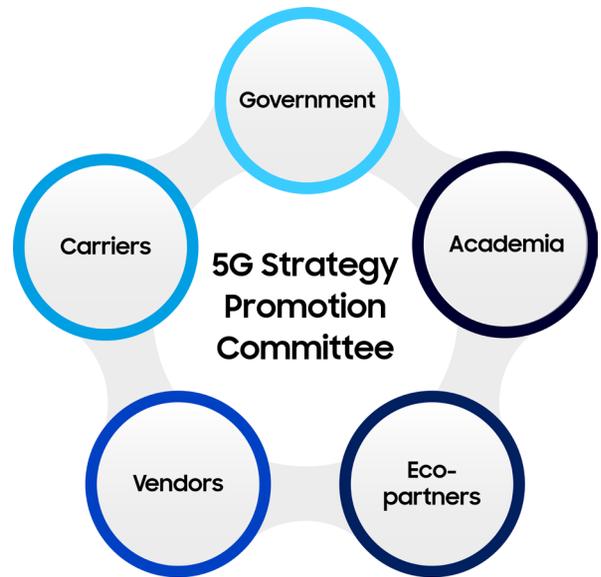
[Korea Operators 5G Spectrum Auction Result]



“Our goal is to lead the fourth industrial revolution and to support the early commercialization of 5G technology”
Jun Sung-bae, Senior ICT Ministry Official

5G Strategy Promotion Committee

One of the crucial factors Korean carriers' early commercial launches is attributed to the cooperative organization called the 5G Strategy Promotion Committee led by Korean government since 2015. In order to promote strategic 5G, 5G Strategic Promotion Committee was formed. Once every half year, the committee shared the current status of Korea's 5G policy and the difficulties of the private sector, and various discussions on future plans were held.



Global Standardization Effort

Before commercial launch, the committee tried to make mmWave selected as a 5G global candidate spectrum in ITU as well as participating in 3GPP standardization to drive domestic standards to be reflected in global standards.

Tax Breaks and Government Investments

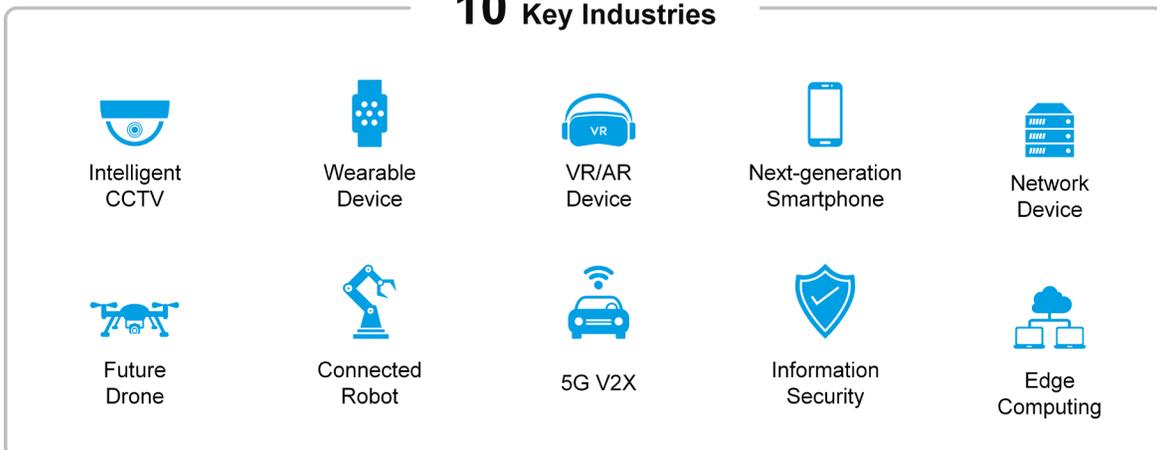
After commercial launch, in order to maximize the 5G early commercialization effect, Korean government further enhanced the committee announcing 5G+ Strategy. The 5G Plus Strategy includes tax breaks and government investments totaling \$27 billion by 2022. Government announced to foster 15 5G-based "strategic industries"; which consist of five "core services" and 10 "core industries."

[15 5G-based Strategic Industries]

5 Key Services



10 Key Industries



(MSIT, 5G Plus Strategy, April 2019)

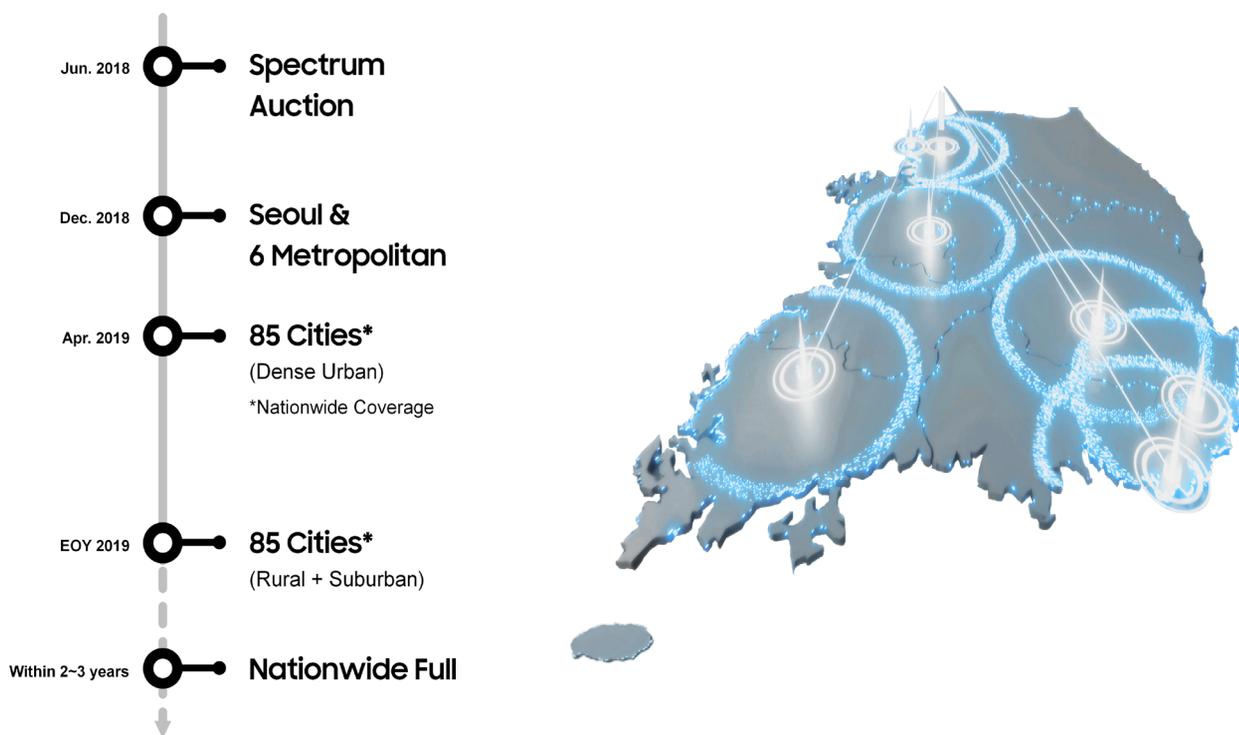
Carriers' Ambition

Aggressive Rollout

Korean carriers are leading the pack when it comes to deploying 5G. Korea has for many years been at the forefront of cellular technology deployment, being one of the first to deploy a number of advanced network features.

After the 5G frequency auction in June 2018, 3 Korean carriers started commercial 5G in December 2018 in Seoul and six metropolitan areas. And then, April 2019, 5G commercial service with 5G smartphone has started focusing on dense urban area of 85 major cities in Korea. By the end of 2019, carriers will cover both rural and suburban areas of 85 major cities heading toward a perfect nationwide coverage for the next two to three years.

In addition, shared 5G deployment model is one other factor for driver for fast deployment. Led by Korean government, the three carriers announced to share the 5G deployment costs, which will save nearly \$1 billion over a decade.



5G Unlimited Data Plan

All three Korean carriers adopted unlimited 5G tariff plan. Unlimited means that neither the amount of data nor its network speed is in any way capped. 5G plan is higher than 4G. But the unit data price of 5G is eventually cheaper than its 4G counterpart due to unlimited data. Thus, many 4G subscribers are migrating to 5G and more than 80% of them chose unlimited data plan.

One characteristic is the wide gap in the amount of data between data plans. There is a huge gap in the amount of data between the lightest data plan and the very next one which is the strategy to induce subscribers to unlimited data plan.

Compelling 5G Services

The key of 5G service is contents. This is because end users can experience the difference of 5G most directly through contents. Korean carriers are actively introducing new 5G services in order to secure initial customers

Immersive Media

The first killer media service is broadcasting of professional baseball games. Baseball is one of the most popular sports in Korea and each game demands 3 to 4 GB for watching, leading to higher data consumption.



Wide View (SKT)

Wide View shows a panoramic view of the stadium in 12K UHD quality with three 4K cameras. Users can expand the areas that they want without degrading image quality.

Motion Tracking (KT)

Motion tracking shows the movement of baseball and batter easily with four field tracking cameras. Users can check the trajectory, restraint, rotation direction, turnover rate, etc.

VR/AR

With 5G, motion sickness removed with latency as low as 1 millisecond, immersive experience with wireless VR headsets would also flourish. All three Korean carriers are trying to take the lead in the 5G era by competitively investing in AR and VR.



Idol Live (LG U+)

Idol Live is gaining huge popularity among K-POP fans. Users can focus on an individual idol and enjoy the stage as if they were sitting in a real theater.

Social VR (SKT)

Multiple users can watch sports and movies together in a virtual reality environment. Users can gather in the same VR space to watch video content as if they are right next to each other.

Game

There is also fierce competition in the areas of games and e-sports. Korean carriers have struck partnerships with global game developers and content providers to offer "killer content" available on 5G smartphones.



e-Sports Live (KT)

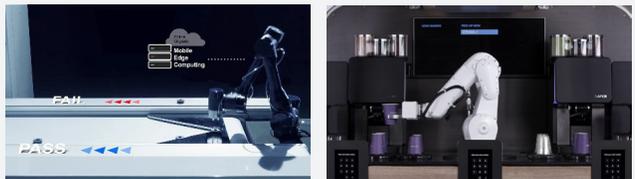
e-Sports Live is a live streaming application of e-sports competition. Users can watch up to five game screens simultaneously and select which screen to watch.

Cloud Game (LG U+)

5G has flattened the experience of cloud games under wired conditions and wireless conditions. With a mobile device connected to the internet, everyone can play masterpieces anytime and anywhere just like playing a current web game.

B2B

In the era of 5G, B2B industry applications will become a key territory for operators' mid- and long-term success and new sources of revenue, as business restructuring and innovation in vertical industries take center stage.



Smart Factory (SKT)

5G-AI Machine Vision automatically identifies product defects. A 12-megapixel camera takes 24 pictures from various directions. Picture sent to a cloud server, AI checks for any defects and filters out defective products with robotic arms in less than eight seconds.

Barista Robot (KT)

A robot barista takes orders and serves customers drinks and coffee. The status of the robot and high-quality CCTV are sent to the control tower 24 hours a day. KT will apply voice recognition and AI function to enable voice orders and more customized service.

Samsung's 5G Leadership

Samsung has played a key role in early commercial 5G launch in Korea. Providing end-to-end 5G solutions covering chipsets, network equipment, core and even software tools, Samsung enabled successful 5G ahead of others.

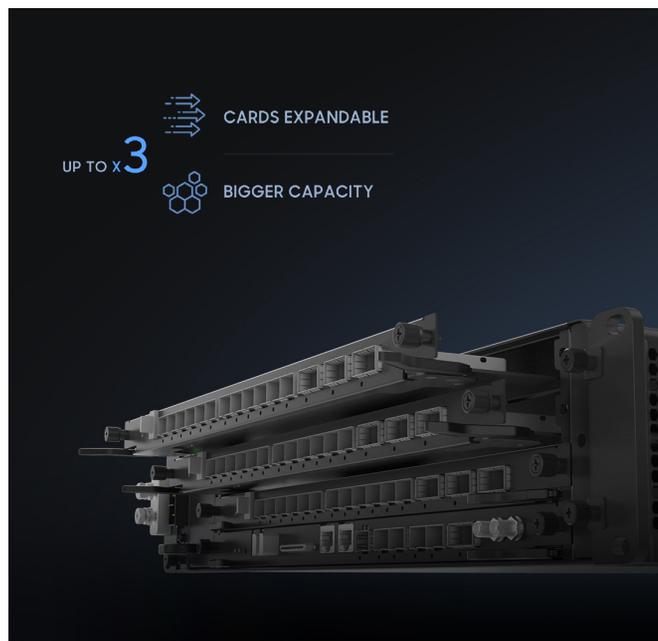


5G Massive MIMO Unit

Fits in Conventional Sites

Samsung MMU has a slim and compact design intended for efficient on site installation. It is among the smallest and lightest in the industry and can be easily installed in existing carriers' cellular sites. Carriers can reuse the infrastructure that is already installed on site with minimal changes necessary.

This ability to re-use existing site has been key to enabling the Korean operators to deploy 5G network consisting of tens of thousands of radios within just few months since the Dec 1st launch. Also, this is extremely critical when we consider how difficult the site acquisition process is for carriers when deploying commercialized 5G with new equipment.



5G Digital Unit

Boost in Capacity

Based on the same footprint, Samsung's digital unit can handle three times more capacity than other company products. Operators can initially begin 5G deployment with one channel card to save CAPEX and gradually add up to three channel cards and increase cell capacity with Samsung' digital unit.

In addition, Samsung's digital unit supports both LTE and NR with the same hardware. It is also backward compatible allowing operators to evolve current infrastructure when migrating from 4G to 5G. Existing LTE channel cards can fit right into the new digital unit and operators can protect their previous investments.



5G NSA vCore

Provided to All Three Operators

The virtualized 5G core solutions support both legacy 4G networks and next generation 5G services in Non- Standalone (NSA) mode. They can also migrate to Standalone (SA) mode through a simple software upgrade. Samsung's solution implements many of the key technologies of 5G networks, such as Control and User Plane Separation (CUPS), which are essential for network operators to scale their networks and support the new services enabled by 5G technology.

Samsung and SKT has completed Korea's first interoperability test between 5G SA Core and other commercial network systems. This implemented Data Parallel Processing technology that performs QoS and transmission control simultaneously; Data Acceleration technology that classifies and distributes similar traffic types; and Path Optimization technology that automatically delivers data traffic to Mobile Edge Computing (MEC) platform.



End-to-End Solution

Enables Fast IoT

Already today, Samsung has complete 5G end-to-end solution covering from chipsets, network equipment, core, device and software tools. By creating chipsets in-house, we are able to fine-tune the software specifications included in the chipsets and develop our products on schedule without any delay.

Samsung can conduct interoperability development testing faster than others. The successful interoperable connection of the end-to-end 5G system serves as a significant industry milestone towards commercialization of 5G NR technologies at scale, driving rapid development of 3GPP standards-compliant networks and devices.

SAMSUNG

www.samsungnetworks.com
www.youtube.com/samsung5G

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