



SAMSUNG

Transforming Everyday Life and Industry with 5G

5G in Korea (Vol. 4)

Global telecom operators are planning to invest tens of billions of dollars into 5G.

Market research firm Gartner has predicted that telecom companies are likely to spend about \$91.7 billion over the next five years to expand networks, upgrade network equipment and develop applications.¹ This level of investment is derived from the expected return of 5G, but there are challenges that network operators must overcome in order to realize sufficient ROI. In terms of service, network operators must establish a stable subscriber base with competitive advantage while developing additional business opportunities that can generate new profits.

More USAGE

eMBB



Heavy Data Services

More BUSINESS

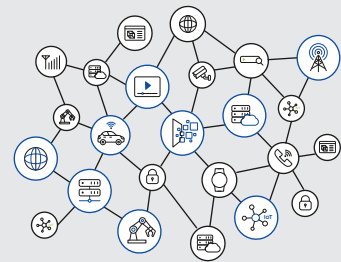
URLLC



Latency-Sensitive Services

More THINGS

mMTC



Massive-Connectivity Services

5G is an industry in itself and a key enabler of the fourth industrial revolution. In addition to the principal services provided by eMBB, mMTC and URLLC, network operators expect new business prospects with 5G. Network operators can create new business opportunities using new techniques such as Massive MIMO and Mobile Edge Computing to efficiently provide high bandwidth to more devices that need ultra-quick communications. 5G's network slicing enables dedicated end-to-end network service to establish and enforce service level agreements for enterprises. These 5G capabilities, combined with AI, Big Data, and IoT, will become the preferred core infrastructure for the fourth industrial revolution, which will provide new growth opportunities for existing industries.

Much of the success of the world's first commercial 5G services in Korea are attributable to the Korean mobile carriers' introduction of innovative 5G services. The enjoyment of these new services continues to create momentum that is convincing subscribers to experience the benefits of the new 5G networks.

This whitepaper presents several of Korea's 5G services contributing to the success of 5G in Korea.

1. Gartner, "Forecast: Communications Service Provider Operational Technology, Worldwide, 2018-2024, 2Q20 Update"

Operators are struggling to find killer content that can help consumers experience the benefits of and migrate to 5G, both of which are necessary steps for operators to reach their financial targets. Korean operators introduced initial 5G services that focused on eMBB services like UHD video, Virtual Reality (VR) and Augmented Reality (AR). The spread of COVID-19 pandemic is changing our everyday life, and several 5G services are gaining popularity, as they are providing new opportunities for consumers to utilize 5G for entertainment and communication services.

Korean operators are actively reacting to this trend by improving their 5G services and adding new functions.

One example involves professional baseball. As most professional sports games continue without spectators under the pandemic lockdown, Korea's professional baseball league is boosting the 5G competition among operators that are out to impress viewers at home and abroad. The live broadcasting capabilities of each operator are in the spotlight, and they are leaning into an opportunity to experience immersive viewing and other 5G-enabled content. Another example brought forth by the lockdown is related to rise of the home gym. Smart home training applications that enable users to watch and exercise with apps are attracting significant attention. Plus, as multi-party teleconferencing and online education are in full swing, 5G content users are increasing rapidly.

The following table presents Korea's 5G service which initially focused on eMBB services like UHD video, VR and AR. Main categories are sports, games, entertainment, education and communications. Most of these services are free of charge. Some are on OTT app of each operator so that once users charge for the OTT app, they can enjoy 5G services included in the OTT app.

Sports

Baseball

- Multi-angle view
- Multiple games simultaneous watching
- Instant replay during live broadcasting
- Zoom-in of the stadium
- 360-degree rotation of home video shot
- AR display of hit trajectory
- Live VR broadcast



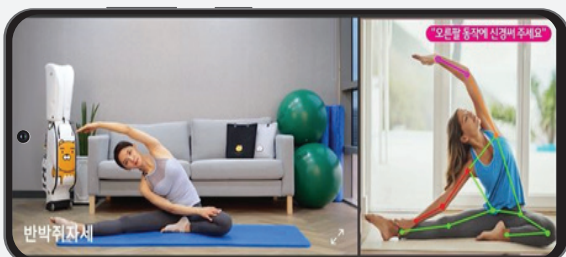
Golf

- Popular player exclusive broadcast
- Swing close-up video (Multiple angles / Slow motion)
- Instant replay of past holes
- Course three-dimensional relay (AR)
- My swing video lesson
- Step by step lesson VOD



Home Training

- AI coaching (Real-time posture correction, AI meal camera, Exercise count)
- Multi-view
- 360-degree posture view
- VR lesson



Game



Cloud / VR Game

- Cloud streaming game
(No download)
- Game with bluetooth game controller
(Xbox, PS4, etc.)
- VR game



e-Sports

- FHD multiview
(Each player view)
- Instant replay during live broadcasting
- Slow video
- E-Sports VR live broadcasting
- AR e-sports cheering
- Social VR
(Getting together in a simulated world with avatars)

Entertainment



AR/VR Immersive Media Platform

- AR Zoo
- Social VR
(Getting together in a simulated world with avatars)
- E-Sports VR live broadcasting
- AR e-sports cheering
- VR replay



VR Webtoon

- VR webtoon
(360-degree view)

Education



3D AR Kids Library

- English fairy tales by level
- Science books 3D book
- English word dictionary
- Learning games
(Memory games, etc.)



VR English Conversation

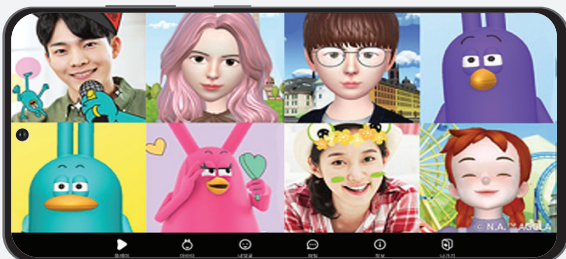
- FHD multiview
(Travel, Business, etc.)
- VR real-time video English
- AI level test
(Diagnosis, Learning, Test score prediction)

Communications




AR Shopping

- Home shopping product information via
AR image recognition
(Partnership with home shopping companies)
- Other product information via video AR
- AR placement on desired space



Video Call

- Customized video group call
(3D avatars, AR emoticker(emotion + sticker),
Virtual makeup and other beautification functions)
- 360 Video Call

An aerial night view of an industrial port. Several large cargo ships are docked at the pier, illuminated by the port's lights. In the foreground, there are numerous industrial structures, including tall smokestacks and large storage tanks, some of which are emitting smoke or steam. The overall scene is dark, with the primary light sources being the artificial lights of the port and the ships.

Mobile carriers can generate additional revenue by charging enterprises that use 5G-based services, rather than relying only on the tariff paid by subscribers.

The B2B and B2B2X business models can create applications for a variety of industries. By discovering these business opportunities, telcos will be able to generate revenue beyond 4G from 5G investments.

In addition to the impact on consumer services, the pandemic is also leaning towards new B2B services, like the increased use of 'untact' services in Korea. 5G provides the type of technology that can facilitate untact services in the workplace. We will look at main B2B cases that are currently commercialized in Korea.

Smart Factory

Enterprise uptake will be the most lucrative sector for the 5G market. But as the cellular networking technology promises to be a milestone for the digitization of industries, it is manufacturing, in particular, that promises to be the biggest prize. Smart factory is a widely known example that demonstrates low latency connectivity operating at a high speed without error. 5G solutions can provide connectivity that allows real-time detection of defects with AI and wireless robot control to improve operational productivity. In a bid to help manufacturers and small-medium enterprises cope with the current pandemic-induced economic downturn, Korean operators have been pitching in by introducing new 5G-powered smart factory solutions that aim to boost the efficiency of production systems that have been heavily impacted by the coronavirus.

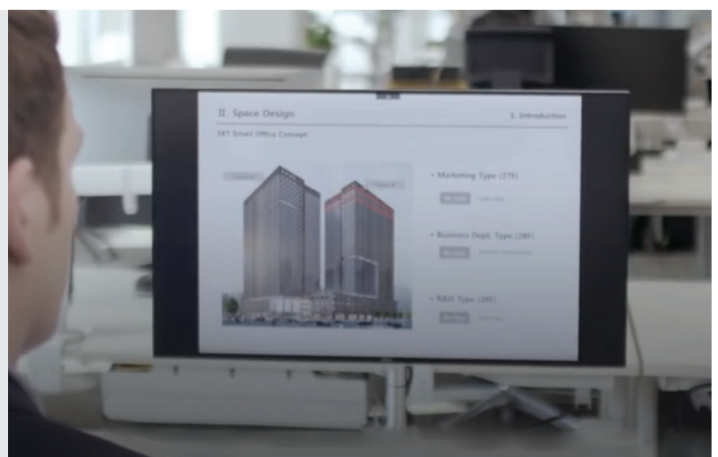
- **Cooperative robot**
- **Autonomous mobile robot**
- **AR smart glass**
- **Machine vision**
- **AI management system**
- **360 CCTV**



Smart Office

The COVID-19 pandemic is changing the work environment. Prior to the pandemic, SK Telecom was preparing a smart office system to enable flexible work-anywhere capabilities, but the pandemic break out brought the introduction of the smart office moved forward. 5G enables smart office with '5G walking-through' system, which allows entry without ID cards/passes via AI-based facial recognition and a mobile VDI docking system that replaces desktops to realize an optimal work environment. Plus, the solution combines the advantages of either working at home or working from regional hub offices, that not only saves the employee's time previously spent commuting in to the office, but also helps mitigate risks of contracting illnesses from longer mass transit rides.

- **AI face recognition for security**
- **Mobile VDI (Virtual Desktop Infrastructure)**
- **Smart seat reservation**
- **Robot barista**
- **Smart sensor building**



Service Robot

With COVID19, the transition to the 'untact', or non-contact, era is expected to quickly grow. And with 5G- and AI-powered robots that deliver amenities from a central location to rooms such as those in a hotel, apartment or office building, 5G is helping to accelerate the untact world. KT said it applied 5G technology to its hotel concierge robot because AI robots sometimes need to download large-sized map data. KT's robot also adopted self-developed technologies such as 3D space-mapping, autonomous driving and AI camera recognition.

KT's head of AI business Kim Chae-Hee said, "KT will try to help our customers enjoy greater convenience in their everyday lives by applying AI robot services in a wider variety of areas beyond hotels, including food and beverages and office operations."

- **Hotel concierge robot**
- **Robot barista**



Public Safety

Collaboration among relevant organizations, including medical support, police, military and fire department, is crucial in swiftly responding to unexpected and dangerous catastrophes. As such, seamless communication and information exchange among the different parties are top priorities. With 5G, instead of fuzzy and vague voice communications, agents in the field can immediately exchange multi-media content such as high-resolution images and crystal-clear videos between each other in a very time-sensitive manner to instantly take appropriate actions. With the advent of a stable, fast and high capacity 5G network, real time surveillance systems can now receive vast amounts of high quality videos wirelessly.

- **AI video security**
- **Thermal imaging camera**
- **AR glass**
- **5G skyship** (search-and-rescue platform)
- **Resource allocation priority for ambulances**



Korean telco operators share a common focus on customer experience and discovering new opportunities; however, their differentiation approaches vary by strategy.

Each operator have different approaches with 5G. We identified three distinct strategies adopted by each operator.

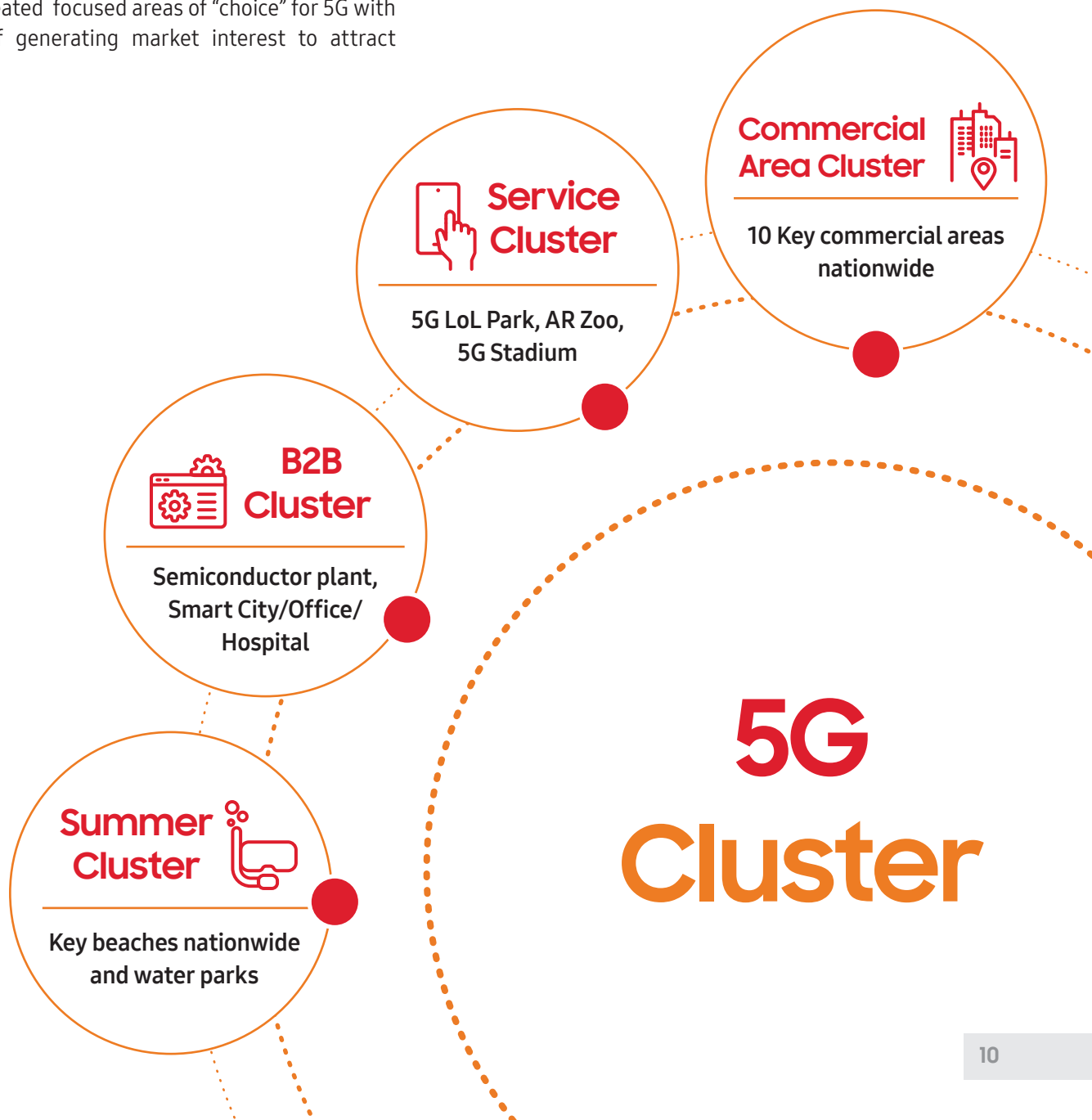


5G Clusters Create the Choice and Focus Strategy

SK Telecom is building 5G clusters, which are 5G specialized zones where subscribers can experience the value and benefits of 5G such as high-speed mobile connectivity and new applications like AR/VR and 5G membership benefits.

During 2019, SK Telecom built 70 5G clusters mainly in densely populated areas, transportation hubs, and university districts, and now plans to more than triple the number of 5G clusters to 200 this year.

In the early days of 5G, these clusters like key shopping districts, university areas, bus and train terminals and airports, created focused areas of “choice” for 5G with the goal of generating market interest to attract subscribers.



B2B-Focused Strategy

Along with 5G commercialization, KT announced that it would change the 5G center axis from B2C to B2B, and they are making various successful cases.

KT has signed a strategic business agreement to apply 5G to various B2B areas such as smart factory, autonomous driving, smart medical service, and media.

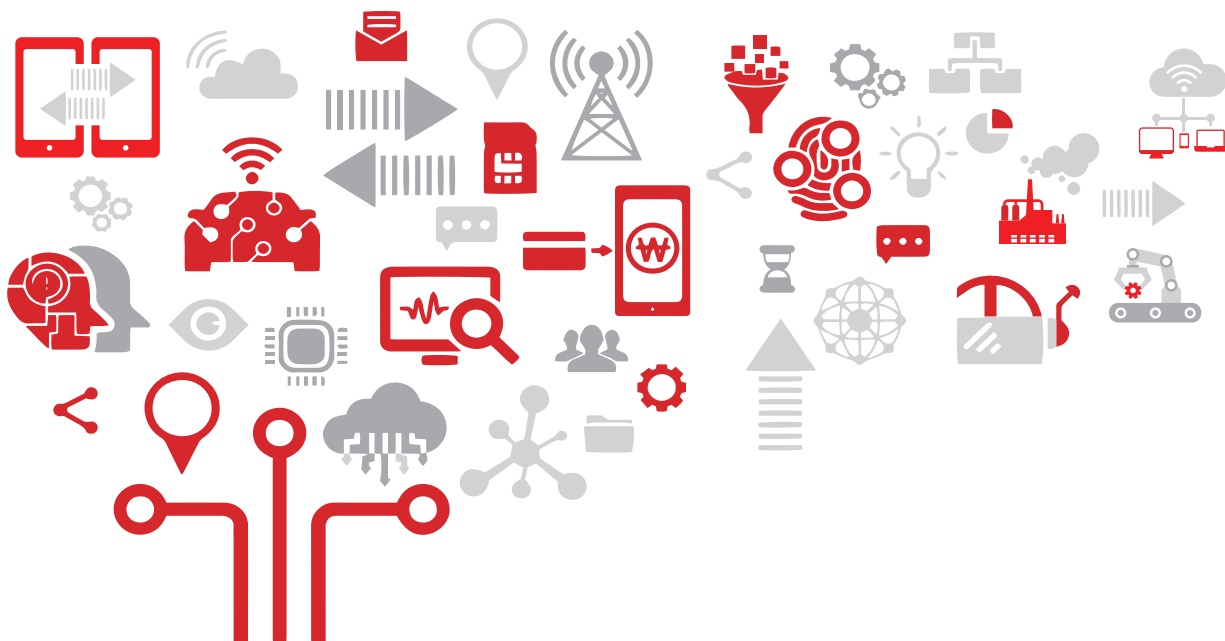
By the end of 2019, KT produced 150 B2B cases and secured 53 5G enterprise customers. Industry experts predict that KT's 5G network will take over as the primary communication fabric for the B2B market, supplemented with its nationwide wired networks.

The combination of 5G's reliability with the success of the wired network allows 5G to bring an agility to B2B communications that is backed by the wired network.



"Above all, B2B customers will have a willingness to pay, as they can see the benefit for their business. They see telecommunications services as an input, not as final product. For these reasons, there is a **huge opportunity in the B2B market**, and that is where we should be heading."

- KT CEO Koo Hyun-mo at GTI Summit -



Step-By-Step 5G Service Roadmap Strategy

The LG U+ 5G approach uses a step-by-step 5G service roadmap. Initially, the services it offered with the launch of the 5G network focused on upgrading existing 4G services with additional 5G features, which they branded U+ 5G 1.0 service.

In June 2019, LG U+ launched U+ 5G 2.0 service, some service features only available to 5G, expanding services into gaming and life areas.

In 2020, it is introducing U+ 5G 3.0 service, which combines 5G with cloud service in areas including education. At the same time, many existing U+ 5G services are being upgraded with AR and VR capabilities. This step-by-step service-launching strategy provides thoughtful insights for telecom operators who might be concerned about 5G service introduction.

U+ 5G 1.0



Apr. 2019 Launch
U+ Pro Baseball



Apr. 2019
U+ Golf



Apr. 2019
U+ Idol Live



Apr. 2019
U+ AR



Apr. 2019
U+ VR

U+ 5G 2.0



Jun. 2019
U+ Game Live



Jul. 2019
NVIDIA GEFORCE NOW



Oct. 2019
Smart Home Training
kakaoVX × U+ 5G



Oct. 2019
AR Shopping

U+ 5G 3.0

Adopting and implementing a 5G network does not happen overnight.

The success of the 5G uptake in South Korea is attributed to the carriers' collective passion for developing compelling 5G services.

As a result, the Korean network operators are reaping first-mover advantages by offering immersive 5G services like AR and VR applications.

There may be a dip in profitability for the telcos during early deployment years if they cannot create must-have services, but the risk versus reward considerations are the questions that first-movers explore with any new technology. It is the choice of the mobile network operator to weigh the pros and cons of deploying new technology like 5G in their network, but the Korean network operators are certainly reaping financial benefits by moving forward fast. Early deployments allow mobile network operators to analyze and understand 5G user behaviors, stabilize the network faster, and be more prepared to predict and plan for the future. And this experience becomes the driving force behind innovation.

Related Contents

5G in Korea

Volume 1: Get a Taste of the Future

Volume 2: Korea's 5G Continues Exceeding Expectations

Volume 3: Optimized 5G Solutions that deliver on the Promise of 5G



Video

5G revolution in Korea—it's here now

※ This paper is based on the information from Korean operators' homepage.

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