A strategy for differentiating the 5G user experience

Extract from the Ericsson Mobility Report
November 2019

Key contributors
SK Telecom
Jonghun Lee, Chiyoung Choi
Ericsson AB
Peter Jonsson, Jason Kyohun Shim
A strategy for differentiating the 5G user experience

Applying a 5G cluster-based deployment strategy, focusing on the customer experience.

SK Telecom has completed the first phase of its 5G deployment, focused on an initial coverage build-out primarily in major metropolitan areas, along major traffic and commuter routes as well as other densely populated areas. The second phase continues the 5G coverage build-out with mid-band, complemented by deployments in the millimeter wave band to meet expected capacity needs and increase network speeds in selected densely populated areas. When 4G was commercialized in 2011, it took SK Telecom about 11 months to build out nationwide network coverage. A 5G population coverage of around 90 percent is expected to be achieved by the end of 2020.

To drive further uptake of 5G services, SK Telecom has identified areas with large numbers of potential customers that could be provided with a variety of high-quality services supported by a dense 5G network. Identifying and selecting such areas is a key part of SK Telecom’s cluster-based 5G deployment strategy. This strategy is centered around providing a premium 5G network experience and innovative services to customers in selected geographical locations. The goal is to drive uptake of 5G subscriptions by providing differentiated mobile broadband services at these locations, as well as to stimulate the development of new 5G services for consumers, enterprises and industries.

In these locations, 5G network capacity will be built out to enable high-volume data traffic and include localized services and benefits tailored to the area’s specific characteristics. The objective of these 5G clusters is specifically to enhance customer value, showing the features and benefits of 5G-enabled services, and to make it obvious that these services bring new experiences compared to 4G. As the 5G ecosystem is still under development, consumers will be the main target group initially, while industry and enterprise opportunities will be addressed on an “on-demand” basis to drive industrial innovation.

---

1 3.5GHz (mid-band)
2 28GHz (millimeter wave band)
3 Reaching 99 percent population coverage
Cluster area selection criteria

Target areas for the 5G cluster-based deployment are selected using floating population data, to identify where many potential customers are expected to need 5G services and to stimulate the development of new services. Initial main target areas are high population or office areas, with people in the 20–40 age group, as well as areas with high seasonal populations. The size of a cluster area varies depending on its characteristics. For example, Haeundae Beach, a popular beach area in Busan, South Korea, is roughly 1.5km long and 30–50 meters wide, and can have up to 500,000 visitors daily. It can be covered by 15 5G cells, while covering the Olympic Park would require about 50 5G cells.

Examples of cluster areas are as follows:

- The League of Legends (LoL) Park, an eSports stadium in the center of Seoul, receives more than 120,000 visitors per year. Various augmented and virtual reality (AR/VR) services linked to watching e-sports and supporting the gaming culture are provided in the stadium. For example, LoL Park visitors can view messages from other fans in AR when pointing their smartphones in a specific location inside the stadium, and VR live broadcasting and playbacks are available during games.
- The Olympic Park, with more than 400,000 visitors per month, provides localized AR/VR services to visitors. An aim is to reduce entry barriers when introducing new types of 5G services, as customers have gained user experience from existing AR/VR-based services.
- The Ikseon-dong region of Seoul, a trendy area with many popular cafes, restaurants and handicraft shops, receives more than 80,000 visitors per month. Providing services, such as customer-centric discount coupons or promotion of discounts and events at local shops, cafes and restaurants, serves to stimulate the local economy of small and medium-sized enterprises.

Other selection criteria include potential areas with an expected demand for business-to-business (B2B) services using 5G in the future, such as mobile game development clusters where 5G networks with low-latency capabilities can be used by the gaming industry. During 2019, more than 70 cluster areas have been selected, addressing mainly consumers, to stimulate innovation and uptake of new 5G services. Greater cluster expansion will follow, along with development of further 5G-based B2B-specific solutions during 2020.

Build 5G networks with precision to optimize performance

SK Telecom deployments include a combination of different radio and antenna configurations to meet the specific performance needs of each site and optimize the total cost of ownership. These range from 4T4R radios, to variants of mid-band Massive MIMO with 32T32R and 64T64R.

As part of its strategy to provide the best possible customer experience, SK Telecom has deployed 4G–5G new radio (NR) dual connectivity technology, which allows a mobile device to exchange data with a 5G NR base station and a 4G base station simultaneously. SK Telecom has been able to reach typical speeds of between 1.5 and 1.8 gigabits per second (Gbps), with top rates of up to 2.7Gbps by combining 5G and 4G carriers. Deploying 5G in the millimeter wave band (28GHz) will enable peak rates of up to 7.2Gbps. Software upgrades to improve and optimize network performance are first implemented in the cluster areas. Drive tests conducted in cluster areas show four to five times higher average download speeds on the 5G network using dual connectivity compared to 4G alone.

70
SK Telecom has identified more than 70 specific areas for its cluster-based 5G deployment strategy in 2019.

---

4 Utilizing 100MHz bandwidth on 3.5GHz
5 Utilizing 75MHz bandwidth on 850MHz, 1.8GHz, 2.1GHz and 2.6GHz
6 SK Telecom (September 2019)
SK Telecom’s go-to-market services strategy for 5G
SK Telecom has the ambition of becoming a full-service provider by developing content and services specifically designed and optimized for 5G networks.

Initially, it is targeting the enhanced mobile broadband opportunity of immersive consumer experiences based on VR, AR and ultra-high definition (UHD) streaming services. Services such as streamed cloud gaming (ultra-low-latency gaming) are implemented. VR content is available with 3D animation and six degrees of freedom functionality. AR content displays superimposed information (sounds, image and text) on real-world objects, often by using a smartphone’s camera. VR and AR are both part of rapidly evolving device ecosystems which include smartphones, headsets, glasses and displays.

SK Telecom is focusing on providing services to consumers through an over-the-top (OTT) multimedia services platform that enables users to watch high-quality streaming content in UHD (2K, 4K and 8K) formats, as well as VR- and AR-based services. Two key attributes of 5G networks enabling these services are reductions in latency and support for more symmetrical uplink/downlink throughput. Some multimedia content produced includes multi-view and pinch/zoom features to enhance and differentiate the 5G media experience compared to watching regular TV or video content. For example, SK Telecom’s Social VR service enables multiple users to experience sports events and movies together in a virtual environment as if they were in the same physical location. As the VR ecosystem is built, these types of media services will be expanded to additional vertical domains to secure a scalable business model. In a similar fashion, fun and engaging AR services are provided to expand the customer base and will be followed by further service expansion through own and third-party provisioning of utility-based AR services, such as information-, commerce- and zone-based services.

New business opportunities in the game streaming market will emerge with the introduction of ultra-low-latency capabilities in the 5G networks.

5G drives an increase in average mobile data consumption
South Korea’s monthly mobile data traffic was at around 550 petabytes in August. The share of traffic carried by 5G networks was 67 petabytes, equal to about 12 percent of the total mobile data traffic. It is noteworthy that the 5G traffic comes on top of continued 4G traffic growth, which continues to grow at a similar rate as prior to the 5G network launches. Total mobile data traffic figures from the top 30 websites in South Korea show that the share of video traffic has been stable at around 50 percent since 2015.

A 5G subscriber’s average monthly data consumption was 26.6GB/month versus 9.5GB/month for a 4G subscriber in September, i.e. almost 3 times higher than that of 4G subscribers.

---

1 Named “Wavve”
2 Ministry of Science and ICT, South Korea
3 YouTube, Wavve, Facebook video, Sports video, etc.
25 percent of total mobile data traffic may be carried over the 5G network by the end of 2019

It took SK Telecom 8 months to reach 1 million 4G subscribers after commercial launch in 2011. In comparison, it took just 4.5 months from commercial 5G launch to reach 1 million 5G subscribers, beating an early forecast\(^{10}\) of reaching this figure by the end of 2019. The average monthly data consumption of those early 5G adopters switching from a 4G device increased from 20.4GB (4G) to 33.7GB (5G) – a usage growth rate of 65 percent, where increased consumption of immersive content is the main contributing factor. As these are early adopters, with typically high consumption of data and services, the average data consumption figure is expected to decrease slightly in the near term as further market segments become 5G subscribers.

SK Telecom forecasts that the average monthly data usage for its subscriber base on 5G will be 27.9GB compared to 8.2GB for 4G subscribers by the end of 2019. In one possible scenario,\(^{11}\) SK Telecom could reach 2.2 million 5G subscribers by the end of 2019, meaning that almost 25 percent of total mobile traffic will be carried over the 5G network.

Immersive formats contribute to traffic growth

Currently, SK Telecom does not offer any “5G-only” services. Many of the services mentioned in this article are already available to 4G customers, but are much better when experienced over 5G, as the more immersive formats demand higher bandwidths. This is governed by the media (bit) rate of different content types. The data transfer rate (bandwidth) of the network required for a good customer experience can be twice the media (bit) rate.

Immersive formats drive traffic growth. For example, high-quality AR/VR content with a media (bit) rate of 25Mbps would consume about 12GB per hour, while watching an e-streaming sports event in multi-view\(^{12}\) would consume about 7GB per hour. High-quality VR is currently predominant, typically viewed with a Head Mounted Display (HMD) device, while most current AR services do not drive data consumption, as they are about downloading small-sized objects in advance via an app rather than based on real-time streaming. Present AR services are mostly proof-of-concept services, paving the way for more advanced AR services in the future.

Building clusters to address new 5G service revenue opportunities

SK Telecom customers are accustomed to a well built-out and high-capacity 4G network, and have high expectations of services provided over 5G. To build 5G network coverage and capacity, providing ubiquitous access to a wide range of applications and services will take a few years, where 3.5GHz 5G NR deployments will continue to play a key role in SK Telecom’s 5G deployment strategy. However, with a cluster-based 5G deployment strategy, customers can have an early experience of the benefits and value of innovative 5G media services provided over a high-quality 5G network. The cluster-based 5G deployment strategy is not only a strategy to deploy a network, but a strategy to provide various new services and benefits to customers in the cluster – creating new business growth opportunities.

During 2019, SK Telecom will build 70 clusters in which they will provide differentiated 5G-specific services. This will be expanded to 200 clusters in 2020, with the aim of continuing to drive further uptake of 5G services among consumers, industries and enterprises.

---

\(^{10}\) SK Telecom 5G subscriber forecast (April 2019)
\(^{11}\) Scenario assumptions: 27.2 million SK Telecom subscribers, comprising 25 million 4G subscribers and 2.2 million 5G subscribers, by the end of 2019
\(^{12}\) Media rate 15Mbps
Ericsson enables communications service providers to capture the full value of connectivity. The company’s portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson’s investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

www.ericsson.com