

## CASE STUDY

# SK Telecom boosts 5G downlink data rates in metropolitan city centers with SRS-based Beamforming

- >20% increase in average throughput in mid-cell conditions (-85 dBm ...-105 dBm)
- 39% more users enjoy data rates above 1.2 Gbps

**NOKIA** | **SK telecom**

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**“At SK Telecom, we are constantly advancing our 5G mobile infrastructure to ensure the best quality of service, largest coverage and the highest data rates in Korea.**

We have a long history of working closely together with Nokia to deploy the latest technology innovations in our network.

To enhance the efficiency of our 5G Massive MIMO radio cells in densely populated cities, we chose Nokia’s SRS-based Beamforming. It helps increase the performance of our 5G network, resulting in enhanced mobile user experience.”

**Takki Yu**

Vice President and Head of Infra Tech Office,  
SK Telecom



**SK Telecom is the leading mobile operator in Korea, rapidly expanding its presence as an AI company.**

As of March 2023, the number of SK Telecom’s 5G subscribers stood at 14.15 million, taking up more than 60% of the company’s total mobile subscribers.

Nokia has a long history of collaboration with SK Telecom, with the first 4G LTE implementation dating back to 2011, followed by 5G in 2018.

With its constant drive for technology and service innovation together with partners such as Nokia, SK Telecom enables revolutionary changes in the life of its subscribers. Another important dimension is enhancing the productivity and competitiveness of its enterprise customers.

This case study illustrates how Sounding Reference Signal (SRS) based Beamforming was key to increasing the average downlink throughput for SK Telecom’s 5G users in metropolitan city centers.



## OBJECTIVE

# Enhancing 5G Massive MIMO performance in a dense urban environment

In the highly competitive and technologically advanced market of Korea, mobile subscribers have been fast to adopt 5G and have high expectations for the quality of service.

SK Telecom was looking for a technology for enhancing the performance of Massive MIMO radios in crowded downtown areas of the biggest cities and elsewhere in its nationwide network.

The operator together with Nokia evaluated the capabilities of SRS-

based Beamforming in Gwangju city, which is the sixth-largest metropolis in Korea with population of over 1.4 million.

The evaluation took place the residential area of Chungjang-dong, which features a lot of high-rise apartment buildings and has a population density of 7,771/km<sup>2</sup>.

This is a challenging environment as the mobile traffic volume is high and the radio cells are densely deployed.

## SOLUTION

# SRS-based Beamforming with AirScale Osprey 64 radios

In Gwangju city, SK Telecom's 5G network is built with Nokia AirScale Osprey 64 Massive MIMO radios, which provide power-intensive beams. The Sounding Reference Signal (SRS) based Beamforming feature was activated with a software upgrade for AirScale. In Nokia's solution, SRS-based Beamforming works alongside other beamforming techniques including Smart SSB Beamforming.

In this urban environment, the inter-site distance between cell sites is very short, however, the dense deployment combined with high-rise buildings causes a lot of reflections and interference. This results in non line-of-sight propagation of the radio signal.



## RESULT

# Enhanced 5G downlink throughput for more users

SK Telecom and Nokia worked together to validate the impact of the SRS-based Beamforming software feature in the 5G network.

Depending on the site environment, the results can vary.

SK Telecom gathered the following results in June 2022 in the residential area of Chungjang-dong, Gwangju city:

- >20% increase in average throughput in mid-cell conditions (-85 dBm ...-105 dBm)
- 39% more users enjoy data rates above 1.2 Gbps

Based on the positive results, SK Telecom decided to conduct a country-wide mass roll-out of Nokia's SRS-based Beamforming for enhancing downlink throughput.

Increase in average throughput in mid-cell conditions (-85 dBm ...-105 dBm)

>20%

39% more users enjoy data rates

>1.2 Gbps

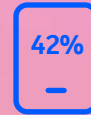
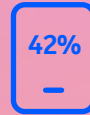
# Reference Signal Received Power (dBm)



-85 dBm

-105 dBm

-85 dBm



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# SRS-based Beamforming boosts 5G downlink data rates

In advanced 5G networks, Massive MIMO radios enable better channel conditions and signal strength to mobile users. Beamforming algorithms are critical for Massive MIMO. They help extend the coverage, increase the throughput and boost spectral efficiency of radio cells.

Nokia's SRS-based Beamforming has been proven to enhance the performance of Massive MIMO cells including typical user data rates even in demanding environments with many high-rise buildings.

Many operators, in particular those serving subscribers in large metropolitan areas, will benefit from

this solution as their 5G subscriber base grows.

The SRS-based Beamforming solution is part of the Nokia 5G Downlink Performance software suite.

To further enhance Massive MIMO cell capacity, SRS-based Beamforming also works with Multi-User MIMO software. All these software functionalities enhance the value of radio access networks built with Nokia AirScale.

SK Telecom together with Nokia is continuously enhancing advanced Beamforming solutions for achieving even higher performance in the future.



Visit Nokia AirScale Massive MIMO webpage to learn more

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