

mmWave spectrum developments in South Korea continue to be turbulent

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According to [Analysys Mason's Spectrum auction tracker 4Q 2023](#), 15 countries have assigned mmWave spectrum via an auction, either regionally or nationally. In several other countries, mmWave has been assigned by other means.

In 2018, South Korea was the first country to auction 5G mmWave spectrum for mobile services and has been a leader in the roll-out of 5G; 98% of the population is covered (the highest national population coverage alongside the USA).¹ However, the three national MNOs have failed to fulfil their mmWave roll-out obligations, resulting in the cancellation of their licences. This article discusses the re-auction of some of the 28GHz band and the potential opportunity it provides for a new entrant to establish itself in the South Korean mobile market.

South Korean MNOs have struggled to find a commercial case for mmWave spectrum

In 2018, South Korea's three national operators each won 800MHz of 28GHz spectrum, each paying a total of USD187 million. Under the licence conditions, operators were required to build 22 500 base stations, meeting 15% of the target after 3 years and 30% after 5 years. However, in November 2022, KT Corp and LG Uplus had failed to satisfy the deployment requirements and both operators lost rights to the 28GHz spectrum, while SK Telecom had its licence reduced. SK Telecom was required to meet the 15 000 base station roll-out target by 31 May 2023 but failed to meet this target and its licence was cancelled.

To use the cancelled mmWave spectrum, South Korea's Ministry of Science and ICT announced that it would grant exclusive 5-year rights to 800MHz of the 28GHz spectrum to a new operator via an auction (national operators were excluded from participating). As an incentive, the Ministry also offered 20MHz of 700MHz spectrum, which should be used only for signalling and billing to anchor the 28GHz frequencies, and which was offered only in combination with the 28GHz spectrum.² The ministry's objective was to encourage a new player to enter the mobile market. The conditions of the new auction were much less stringent than the 2018 auction. The minimum price for spectrum at a national level was set at USD57 million. In terms of coverage requirements, winning operators are required to build a total of 6000 28GHz base stations on a national basis in the first 3 years.

¹ ETNO (January 2024), [The State of Digital Communications 2024](#).

² The Ministry put forward a proposal for a supplementary licence fee to be levied on a licensee that wanted to use the 700MHz band for mobile carriage. At the time of writing, we have no indication whether this is a possibility or a realistic aspiration.

Stage X aims to use its mmWave spectrum to disrupt South Korea's mobile market with low and competitive pricing

Stage X, led by MVNO Stage Five (a communication affiliate of tech giant Kakao Corp.) was the highest auction bidder and was assigned 800MHz of 28GHz spectrum and 20MHz of the 700MHz band at the end of January 2024. The company paid USD325 million. As a consequence, Stage X has become South Korea's fourth mobile carrier. The company will be the only mobile network operator (MNO) in the 28GHz band for the first 3 years and has the time to become established within the market. Financial benefits, including tax cuts and loans, will also be provided to support Stage X.

Stage X has announced ambitious plans to use its new 5-year 28GHz spectrum licence. The company will invest USD460 million to deploy a fully virtualised 28GHz 5G network across South Korea, with nationwide network services to be launched in the first half of 2025. The company is looking to undercut on pricing ([in a country where total market mobile ARPU has been around USD28-31 per month for the last 5 years](#)).

Stage X has the difficult task of proving the business case for consumer mmWave

Several mobile markets have fourth entrants (for example, Iliad in Italy and earlier in France) that have established themselves even though they have limited spectrum positions, often gained through market remedies. However, in other countries, fourth entrants have struggled commercially: an obvious point of comparison is Rakuten Mobile in Japan. Others have yet to prove themselves: 1&1 in Germany and DISH Networks in the USA.

Fourth entrants that were hitherto MVNOs and that have established themselves with a limited spectrum position have typically done so by acquiring mainstream 4G/5G spectrum bands and shifting as much traffic as possible from the host network to the acquired bands. mmWave poses two main problems: lack of compatible devices and poor indoor coverage.

Currently, there are no devices that support 28GHz spectrum for sale in South Korea. This was a challenge that the three national operators raised – highlighting that a mature mmWave device ecosystem is required to support mmWave success. Stage X plans to work alongside manufacturers like Samsung and Foxconn to develop an exclusive, mmWave-capable 5G smartphone. Stage X also aims to partner with Apple and Google, which are already providing mmWave devices in the USA. However, most consumers in South Korea are already getting 5G speeds above 400Mbit/s and so it may be challenging to incentivise enough consumers to upgrade to a mmWave capable device.

Although, mmWave spectrum can provide gigabit outdoor coverage in Korea's high-density urban environments, outdoor-to-indoor propagation is notoriously weak. Without indoor base stations, Stage X may struggle to shift sufficient traffic onto its own mmWave frequencies. Moreover, the prospect for mmWave FWA does not look promising in South Korea due to its close-to-universal FTTB/FTTP coverage and low fixed broadband prices.

To increase its chances of success in the South Korean mobile market, Stage X must present a strong and viable go-to-market commercial strategy that will convince mobile users to churn from the 5G services offered by the other three MNOs. This approach is expected to be more impactful than relying on the cost-cutting promises of technological innovations like Open RAN and virtualisation.