

CASE STUDY

How CST Makes Evidence-Based, Data-Driven Spectrum Policy Decisions Supported by Ookla Analysis

The Kingdom of Saudi Arabia's (KSA) Vision 2030 program has laid out national goals to create a thriving digital economy in the coming decade. High-speed, widely accessible mobile networks are central to that digital transformation. KSA's telecommunications regulator, the Communications, Space & Technology Commission (CST), enables the nation's communications infrastructure while assuring that services meet specific standards of accessibility, performance, fairness, and value. CST has developed a three-year spectrum roadmap to establish the country as a world leader in radio communication — while supporting soaring consumer data consumption and future wireless technologies that will fuel economic growth.

While developing its ambitious spectrum outlook, CST conducted extensive trials and technical analysis, leveraging data from Ookla® and other sources. As a result of this spectrum outlook, its collaborative regulation with other national stakeholders and other key policies and initiatives, CST was recently designated as a fifth-generation (G5) regulator by the International Telecommunications Union (ITU) — the highest level of regulatory maturity.



“Collaboration and engagement with our domestic and international partners is at the heart of our spectrum strategy. We greatly value our partnership with Ookla, and Ookla data has been an important component of our decision-making process. Their data and consultation responses provided insight that has helped shape our spectrum policy to take advantage of the absolute maximum device and network capabilities that can be supported at this time and throughout the duration covered by our Spectrum Outlook.”

— Mohammad AlJanoobi, General Manager of Radio Spectrum Planning

Situation

CST has a strategic vision to embrace digitalization as a central anchor for the country, connecting its constituents to economic opportunities, and reshaping the national approach to connectivity. In previous years, Saudi Arabia's spectrum was split evenly between three operators. However, to enable technologies like 5G, satellite broadband, and Wi-Fi 6e, a progressive spectrum policy was needed to meet the growing demand for wireless proliferation.

In advance of its upcoming spectrum auction, CST needed data to inform the development of its spectrum strategy, including intelligence on similar spectrum policies in other global markets. CST committed to a new, evidence-based approach to spectrum assignment drawing from technology trials and consultations with

network operators, device and chipset manufacturers, infrastructure providers, end users, and network data providers, including Ookla. Most notably, CST needed data to expand its analysis of spectrum usage, performance of various bands and existing network infrastructure to see where investments had been made within certain bands (e.g., extra capacity in specific bands in urban areas and coverage of rural areas using adequate bands).

Solution

As part of its global outreach, CST engaged with Ookla to access data and insights on network performance, quality, and availability throughout the country. Backed by data and insights from Speedtest Intelligence® and Cell Analytics™, Ookla’s team provided consultation on CST’s spectrum outlook, including an analysis of spectrum policy in other global markets and in-depth quarterly analysis of network metrics in Saudi Arabia.

To make the most informed policy decisions possible, it was crucial for CST to understand which bands and network technologies Saudi Arabian operators were using, the performance of each band and technology by operator, and regional trends in network performance, quality, and coverage. Ookla’s custom regulatory reports provided a comprehensive analysis of the state of mobile networks in KSA, as well as detailed analysis of device performance, distribution of popular devices, frequency band performance, and network availability and coverage by technology type.

CST used this information to ensure that every decision in their roadmap could take advantage of the maximum capabilities of the latest generation of chipsets and devices, while also factoring in anticipated future capabilities.

	2019	2020	2021	2022 and beyond
5G spectrum available to Saudi operators	~ 200 MHz* (FR1)	~ 200 MHz* (FR1)	~ 300 MHz* (FR1)	~ 300 MHz (FR1), ~1000 MHz (FR2)
5G bandwidth capabilities of commercially available 5G devices	100 MHz (FR1)	100 MHz (FR1)	200 MHz (FR1)	300 MHz (FR1), 1000 MHz (FR2)
Examples of 5G-capable devices/modems	Huawei Mate 20 X 5G (HiSilicon Balong 5000), Samsung Galaxy Note 10+ 5G (Exynos 5100), ZTE Axon 10 Pro 5G (Qualcomm X50)	Apple iPhone 12 (Qualcomm X55), Samsung Galaxy S20 Ultra 5G (Exynos 990)	Huawei CPE Pro 2 (HiSilicon Balong 5000), Samsung Galaxy Fold 3 5G (Qualcomm X60)	Qualcomm X65

* Since 2019, stc: 200 MHz (n40, n78); Mobily: 200 MHz (n41, n78); Zain: 190 MHz (n41, n78). Zain implemented 5G CA for their n41 and n78 5G carriers.

Outcome

In advance of making more than 23 GHz of spectrum available for both innovation and commercial use, CST has laid out the most ambitious spectrum release plan in ITU Region 1 (Europe, Middle East, and Africa).

Utilizing intelligence on operator and device performance by band and network technology, CST has allocated the 600 MHz and 3.8-4 GHz bands for mobile use in 2021. CST has also made the entire 5.925-7.125 GHz and 57-71 GHz bands license-exempt, which will enable advancements in Wi-Fi, IoT, and wireless machine-to-machine (M2M) communication applications. Looking beyond terrestrial applications, CST will also allow secondary mobile use of the 28 GHz band, while fully protecting satellite use of the band in 2022.

With the implementation of the CST's spectrum outlook, Saudi Arabia will have one of the most advanced and well-balanced spectrum policies in the world:

1446 MHz allocated for mobile use in the Sub-6 GHz frequency range in 2021	+1500 MHz allocated for mobile use in the Sub-6 GHz frequency range by 2022	+6.7 GHz allocated in the Sub-30 GHz frequency range by 2022	+2000 MHz of license-exempt spectrum accessible to technologies such as Wi-Fi	14 GHz of license-exempt spectrum accessible to WiGig*
--	---	--	---	--

* allows Wi-Fi devices to access uncongested frequency bands with wide channels to transmit data efficiently at multi-gigabit per second speeds

With the addition of the 3800-4000 MHz band to the existing 3400-3800 MHz in the C-band, operators will be able to add massive capacity to their networks and maximize the country's existing network infrastructure, as well as the latest 5G-capable devices. Specifically, recent mobile chipsets capable of FDD+TDD NR carrier aggregation will allow the country to smoothly transition to standalone 5G — allowing network operators to deploy an ideal mix of 5G coverage and capacity. Having multiple contiguous TDD NR carriers will also allow operators to sustain the growth in capacity and speed as mobile chipsets evolve to support the aggregation of a larger number of NR carriers.

Because every mobile network operator must use its spectrum to the extent that CST has deemed acceptable for the bands it assigned, the regulator was able to create a deferred cost structure based on existing and future investments. This allows operators to invest in near-term upgrades to bring higher speeds and better connectivity to more residents.

Read the CST Spectrum Outlook for Commercial and Innovative Use 2021-2023 [here](#). If you are a regulator looking to make more data-driven, evidence-based policy decisions, [inquire here](#).