(Public Consultation)

On

National Spectrum Strategy 2025

Issued by

Communications and Information Technology Commission

Riyadh, Saudi Arabia

23 October 2019

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1. Introduction

The Communications and Information Technology Commission (CITC) is responsible, in accordance with the Telecommunications Act, Telecom Act Bylaw and CITC Ordinance; for managing radio spectrum for all users in the Kingdom of Saudi Arabia.

CITC continues to pursue its objectives of promoting innovation and prosperity. CITC is therefore pleased to announce that it has published a Public Consultation document on its "Executive Report on the National Spectrum Strategy 2025".

2. Scope and objective

The purpose of this public consultation is to provide the relevant interested parties with an opportunity to submit their views and comments on the document titled "Executive Report on the National Spectrum Strategy 2025". This strategy was prepared to fulfill the role of CITC and achieve its vision to unlock the potential of radiocommunication in Saudi Arabia, in order to secure a smarter and safer future by managing spectrum effectively and efficiently.

3. Submitting comments

Participants who wish to submit their views/comments on this Public Consultation Document must submit them to CITC no later than Thursday 21/11/2019, corresponding to 24/03/1441 H.

Views/comments can be submitted to one or more of the following addresses:

- By email to (Spectrum.Strategy@citc.gov.sa).
- Hand-delivered (paper and electronic) at the CITC premises.
- By mail (paper copy and electronic) to the following postal address: Communications and Information Technology Commission, Al-Nakheel District- Prince Turki Bin Abdul Aziz I Street intersection with Imam Saud Bin Abdul Aziz Road, PO Box 75606, Riyadh 11588, Saudi Arabia.

CITC invites all members of the public, including individuals, public organizations and commercial entities to engage in this process by submitting comments. Participants are invited to provide their views in detail. CITC also encourages Participants to support their comments with relevant data, analysis, benchmarking studies and other information. CITC will take all comments into consideration during its deliberation process, but CITC is under no obligation to adopt the comments or proposals of any participant.

هيئة الاتصالات وتقنية المعلومات
Communications and Information Technology Commission

هيئة الإتصالات وتقنية المعلومات
Communications and Information Technology Commission

SAUDI ARABIA
NATIONAL SPECTRUM STRATEGY 2025

Executive Report

Communication and Information Technology Commission
October 2019

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AT A GLANCE

Spectrum is a limited, natural and enabling resource for all radio systems vital for ensuring safety and security of the public and crucial for viability of the economy in the technological era.

With the boom in wireless connectivity, evolving technologies, and proliferation of use cases and applications, radio spectrum is facing significant rise in competing demands from a wide variety of stakeholders across different industry sectors. Saudi Arabia has made notable progress on addressing some of the most pressing issues, specifically on the International Mobile Telecommunication (IMT) front, as a result, being ranked among leading nations in awarded IMT spectrum; however, additional effort must be made to maintain this position and many new considerable challenges are yet to be addressed.

Our vision is to unlock the potential of radiocommunication in Saudi Arabia to secure a smarter and safer future by managing spectrum effectively and efficiently. We will achieve that by offering users the access to spectrum they need to innovate and grow in close collaboration with all stakeholders.

Saudi Arabia National Spectrum Strategy 2025 describes a blueprint of our priorities going forward, and is outlined in two main pillars supported by a foundational enabler:

• Pillar A aims to "Unlock the Future" by acting on current spectrum demand and proactively anticipating future needs. This is achieved by optimizing the legacy spectrum, fostering commercial & innovative uses, and safeguarding national access

• Pillar B aims to "Empower a 'Smart' Spectrum" in order to meet demand captured in pillar A in an innovative and efficient way by enhancing portfolio of spectrum management tools and services, including developing adaptive regulatory mechanism, facilitating wireless access and investments, as well as embracing market-oriented approaches

• Enablers aim to "Build the Foundation" in a way that ensures the organizational capabilities, tools, as well as the spectrum ecosystem are prepared to fulfill the strategic objectives

We expect a significant impact from the National Spectrum Strategy that contributes to Vision 2030: we forecast a sizeable contribution to the economy (direct GDP contribution of SAR ~500 million annually and ~20% increase in spectrum enabled GDP by 2025), additional non-oil revenue up to SAR ~18 - 36 billion, doubling of the spectrum allocated to commercial and innovative uses compared to today, and many other benefits that would drive the positioning of our nation to be among the top 20 ICT nations by 2030.

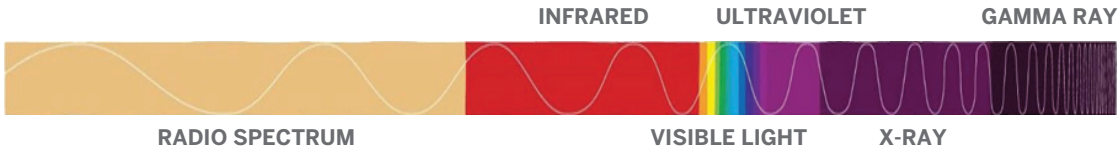
RADIO FREQUENCY SPECTRUM IN SAUDI ARABIA

Global context and importance

Radio-frequency (RF) spectrum is a natural resource that enables radiocommunication across all sectors, including applications such as mobile phones, TV broadcasting, maritime communication, remote sensing, earth exploration, emergency telecommunications, weather forecasting, global positioning system (GPS), space exploration, environmental monitoring and many others.

Radio spectrum is finite; with a limited overall bandwidth ranging from 3 KHz to 300 GHz. RF transmissions transcend borders, potentially causing interference in other countries. As such, managing the radio spectrum is a matter of high national and international significance. The International Telecommunication Union (ITU), a specialized agency of the United Nations, has the responsibility for international management of RF spectrum use and satellite orbit resources, developing the standards for radio systems, mediating debates on RF utilization, as well as other issues related to information and communication technologies.

FIGURE 1: WHAT IS SPECTRUM?



Radio Frequency Spectrum is a scarce natural resource that is the fundamental pillar for wireless technologies, services and daily activities

Radio spectrum has an economic contribution (enabled GDP) of at least ~3.4% in the top 20 ICT nations.

The global demand for radio spectrum access is increasing rapidly, driven by growing demand for existing digital wireless services, the emergence of new technologies and use cases, and international harmonization decisions relevant to spectrum.

Like any other natural resource, radio spectrum is a national asset that has an important economic value. It contributes substantially to, amongst others, Gross Domestic Product (GDP), employment, non-oil revenue, and technological and investment development.

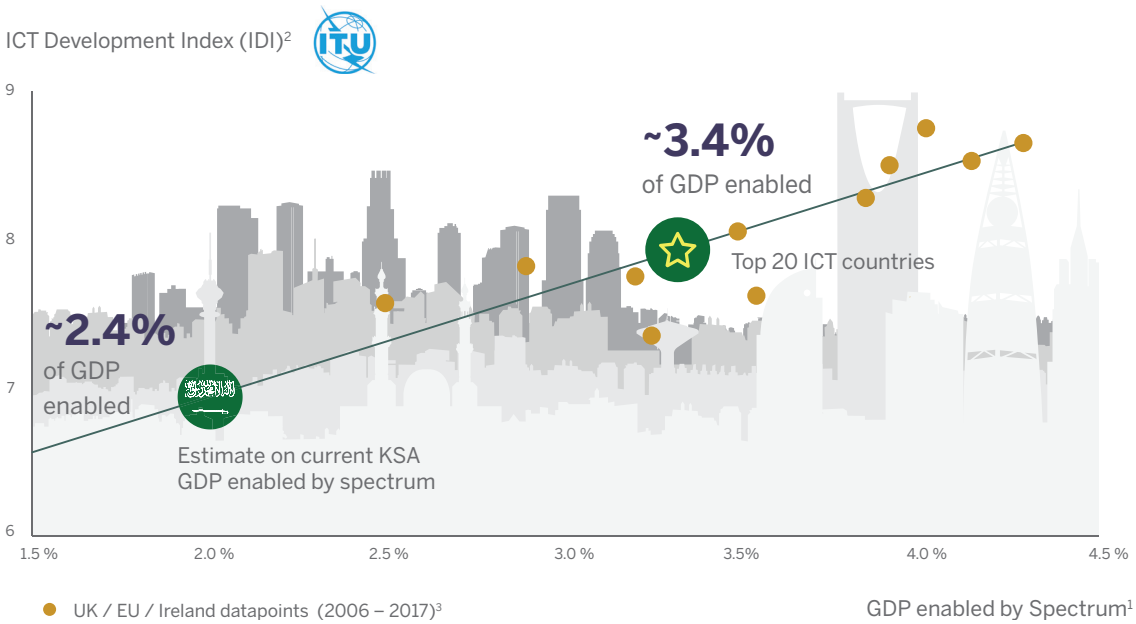
Analysis from several benchmarked country data points suggests that the use of radio spectrum has an economic contribution (enabled GDP) of at least ~3.4% in the top 20 ICT nations as illustrated in figure 1. When correlated with the ICT development index, we can observe that Saudi Arabia currently stands at around 2.4% GDP contribution, implying significant room to unlocking further value from spectrum.

The use of radio spectrum, through its role in enabling new technologies and innovation, also positively contributes to improvements in economic efficiency, productivity and profitability. While it can't always be measured directly, many experts back the link between increased use of Information & Communications Technology (ICT) and greater efficiency, productivity, etc.

The use of radio spectrum, through its role in enabling new technologies and innovation, also positively contributes to improvements in economic efficiency, productivity and profitability. While it

FIGURE 2: TOP-DOWN ESTIMATE OF SPECTRUM-ENABLED GDP CONTRIBUTION

Spectrum can boost economy, enabling to ~3.4% of GDP



cannot always be measured directly, many experts back the link between increased use of Information & Communications Technology (ICT) and greater efficiency, productivity, etc.

Radio spectrum also brings a variety of important social and public service benefits. First responders (police, fire protection, ambulance services, etc.) can only function efficiently with reliable and secure mobile communications. Radio spectrum, for instance, enables the defense forces to carry out their duties, and has a fundamental role in the safe operation of air, sea and land transportation.

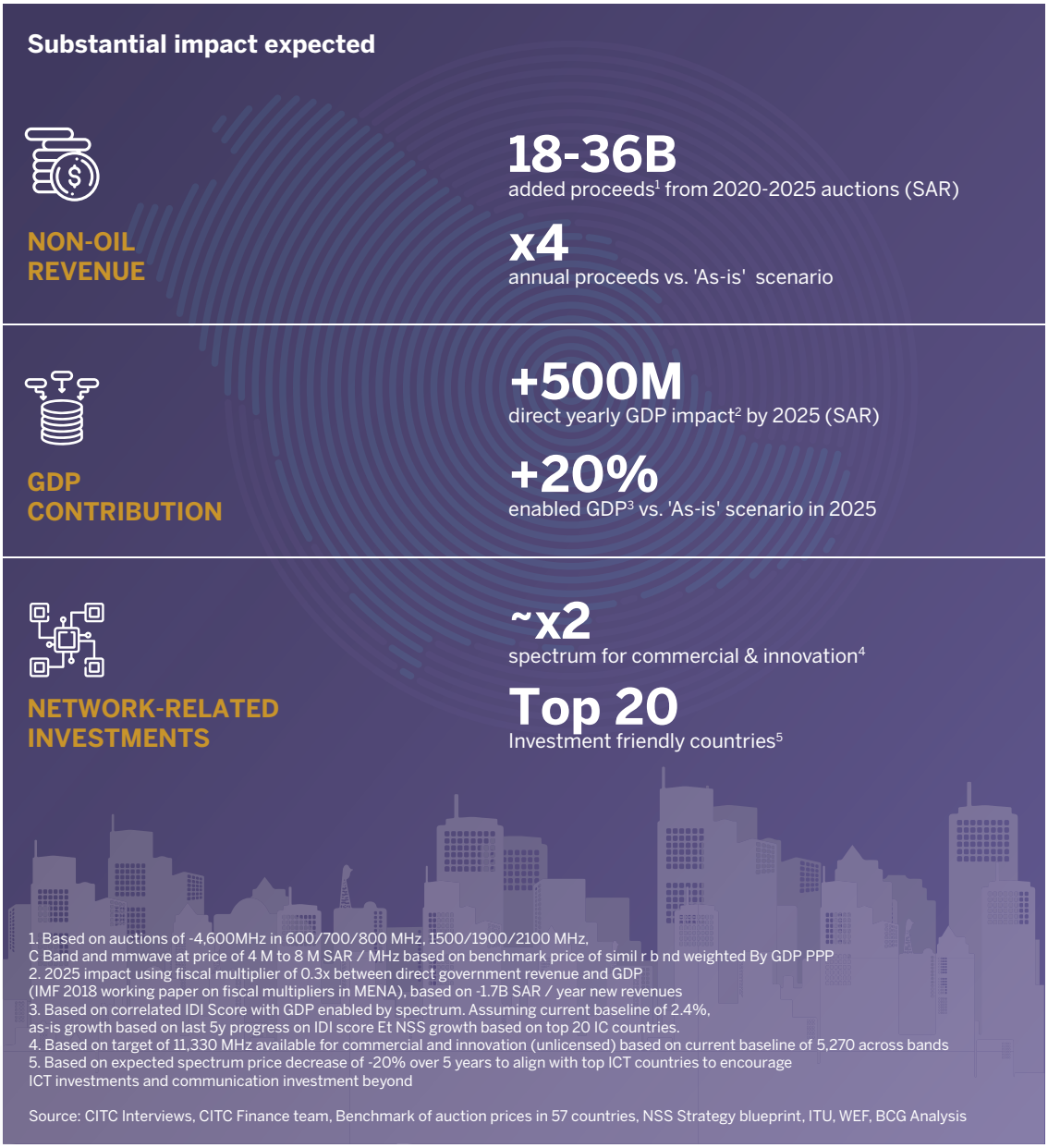
In Saudi Arabia, we forecast that spectrum-related activities will potentially add approximately over SAR 500 million to the gross domestic product (GDP) annually and contribute to more than ~3% of enabled GDP by 2025. In terms of non-oil revenue, we expect that the releases of key commercial bands to further contribute up to SAR 18 - 36 billion by 2025.

On top of that, proactive, smart spectrum management will support strong growth in the commercial sector by catalyzing innovation. With doubling of the commercial and innovation related spectrum compared to today, Saudi Arabia would be well positioned to keep a leading rank among the top 20 ICT nations by 2030.

Amongst other dimensions of impact, this National Spectrum Strategy aims to create a transparent and stable regulatory environment through, as an example, a revision of the spectrum access fees that would create a fertile ecosystem for infrastructure and systems related investments. It will also allow Saudi Arabia to deliver high Quality of Service for mobile and fixed wireless services, benefitting businesses and the community alike. Increased rural coverage, improved network performance, and lower prices would give customers a service that should stimulate both their personal and working lives.

Safety and security continues to be a critical strategic priority, and a special attention is given to allowing the respective spectrum users to upgrade their services towards higher capacity, better reliability, and robust security. They should be also able to improve interoperability, multimedia data sharing, etc., thus ensuring a secure and peaceful environment in which citizens and businesses can grow and thrive.

FIGURE 3: SUBSTANTIAL IMPACT FOR KSA FROM SPECTRUM



As we continue to move forward, we need to carry on with the momentum to maintain our leading position with IMT spectrum awards, while having to overcome numerous other challenges.

Spectrum management: Role and mandate of CITC

Spectrum management involves several strategic, technical, economic, and administrative activities that enable efficient utilization of spectrum by users without causing harmful interference to their radio systems.

The activities we carry out include, but not limited to:

- Allocating frequency bands to radio services
- Authorizing frequency spectrum use to diverse users, including government institutions and private individual entities such as industrial enterprises
- Authorizing spectrum through a general licensing regime for unlicensed use, such as Industrial, Scientific and Medical applications, or short-range and low-power devices used by the general public
- Licensing spectrum to public radiocommunication networks, through a competitive framework, including elements such as best price and applicant liability
- Evacuating spectrum currently used by older technologies, so that it can be redeployed for more spectrum-efficient applications
- Redirecting spectrum demand from the most congested frequency bands to other frequency bands through various incentives
- Coordinating, on international level, access to orbital resources for satellite communications
- Inspecting radio transmitting stations of all spectrum users and monitoring frequency bands to ensure compliance with granted license terms.

Spectrum demands and challenges in Saudi Arabia

We have already achieved considerable success in assigning spectrum to public mobile networks that utilize International Mobile Telecommunication (IMT) standards to provide mobile broadband services. In early 2019 we reached a milestone of awarding more than 1.1 GHz of spectrum to IMT operators after the auctions of 2.3 GHz, 2.6 GHz and 3.5 GHz bands, which significantly contributed to increasing mobile Internet speeds in the Kingdom. Furthermore, as part of the efforts to facilitate the introduction of 5G in the

Kingdom, a dedicated subcommittee was created, focusing on 5G spectrum matters within the National 5G Taskforce.

As we continue to move forward, we need to carry on with the momentum to maintain our leading position with IMT spectrum awards, while having to overcome numerous other challenges. For example, the spectrum re-deployment challenges that hindered IMT services in the past, continue to hinder other services and applications. Specifically, acute inefficiencies in the management of problematic bands is leading discontent among spectrum's stakeholders in Saudi Arabia. The Kingdom also faces frequent local and international radio interference, which threatens its national security and creates undue restrictions on operation of various services.

Framework for world class spectrum management

Radio spectrum management involves the careful consideration of a broad range of factors (e.g. administrative, regulatory, social, economic and technical) with a view on ensuring that radio spectrum is used effectively and efficiently. This also involves balancing a range of competing factors within demand and supply of spectrum, including:

• On the demand side: appropriately meeting the requirements of all radio services in the current, mid and long term by addressing immediate needs and proactively anticipating future demands from market and industry research, as well as from direct stakeholders' input. This applies to both commercial and public uses, such as public safety, national security and media; and

• On the supply side: ensuring that spectrum management capabilities can deliver the required spectrum in an efficient and effective manner, while maintaining the flexibility and responsiveness needed to adapt to changes in, among other things, technologies, demand from spectrum users and end-users (e.g., promoting interests of various user communities), market developments (e.g., promoting competition, contributing to development of internal market) and relevant public policy objectives (e.g., ensuring that the end-users derive maximum benefit in terms of price, choice and quality).

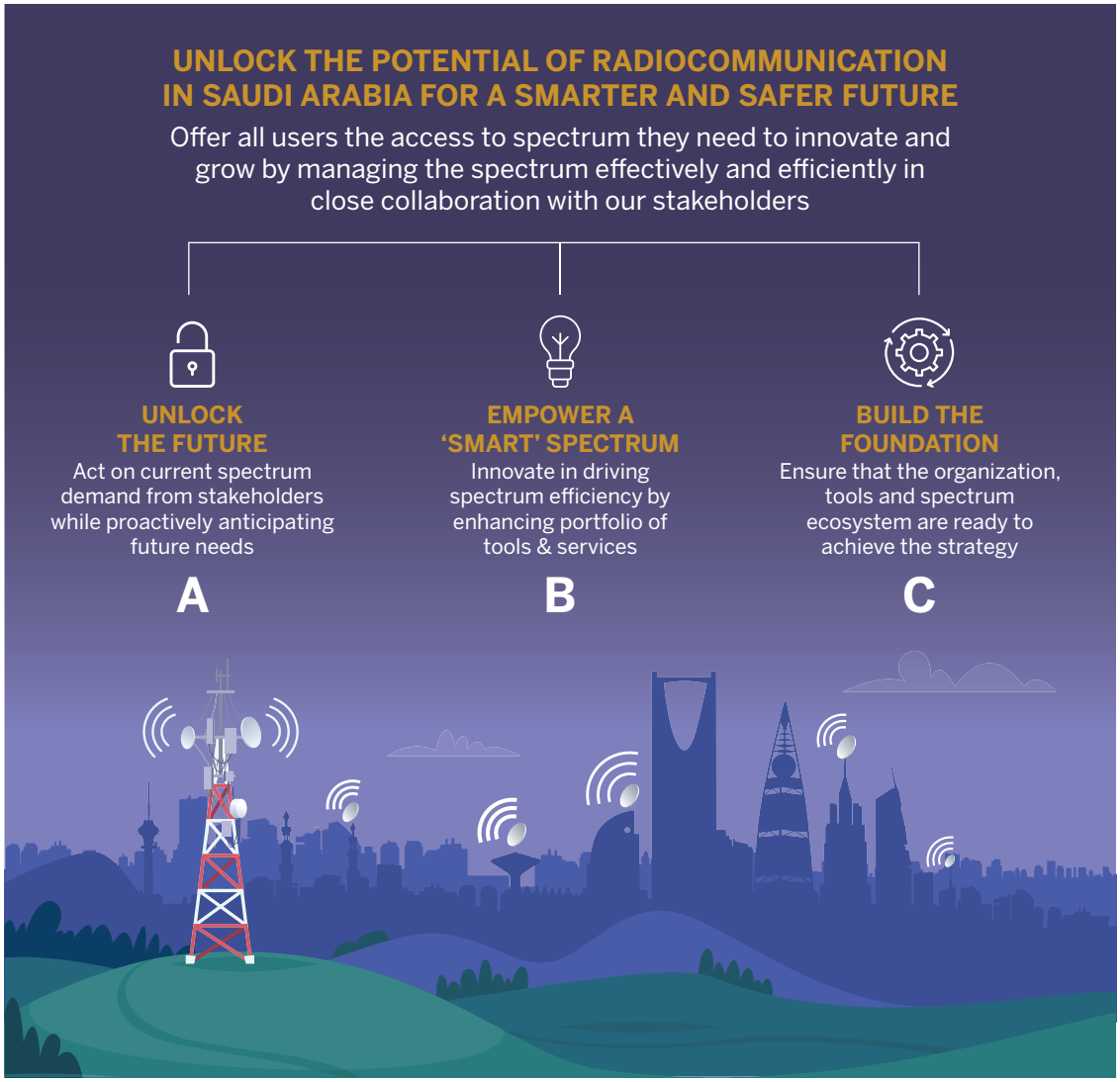
To develop our National Spectrum Strategy we started with the comprehensive benchmarking exercise, followed with expert and local interviews, spectrum users' workshops, and public consultations to ensure we cover all the stakeholders in the spectrum management ecosystem. We closely engaged with more than 55 external stakeholders (including spectrum users and end-users) and 50 individuals from within our organization (CITC) to develop a national spectrum strategy grounded in the local context of Saudi Arabia.

SAUDI ARABIA'S NATIONAL SPECTRUM STRATEGY 2025

Aspiration

Our vision is to "Unlock the potential of radiocommunication in Saudi Arabia for a smarter and safer future". This is a holistic vision that outlines the potential of radio spectrum to transform Saudi Arabia into a digital society by enabling different industries, including, for example, transportation, space, media, and Industry 4.0. Our vision aligns with the Saudi Vision 2030 by ensuring availability of radio spectrum to meet the needs of the public entities that deliver key safety and security services. We also aim to ensure that the spectrum fulfills the needs of direct spectrum users and end-users, thus serving the interests of the nation and benefitting all of Saudi Arabia.

FIGURE 4: HIGH-LEVEL OVERVIEW OF KSA NATIONAL SPECTRUM STRATEGY 2025



We aspire to achieve our vision by "offer[ing] all users the access to spectrum they need to innovate and grow, by managing spectrum effectively and efficiently in close collaboration with our stakeholders". Our top priorities are: addressing the needs of all the users, maximizing value by making efficient and effective spectrum allocations and assignments, and ensuring that spectrum management engages all relevant stakeholders in the development of various regulations.

Three guiding principles will anchor our efforts towards fulfilling our Vision. They guide how the work is done, how stakeholders must be engaged, and how decisions are approached:

1. Future orientation in our policies, whereas the needs of Spectrum users are met and anticipated to sustain predictability, as this promotes investment
2. Efficiently and proactively seeking opportunities to optimize spectrum for its users, maximizing its value to society
3. Engagement and building strong relationships with all national stakeholders to ensure that spectrum management decisions reflect market dynamics and to strengthen representation of Saudi Arabia interests abroad.

One of our key strategic priorities is to "Unlock the Future," by ensuring that we continue to provide timely, sufficient access to spectrum to meet current and future spectrum demand, thus optimizing economic and social benefits for Saudi Arabia.

Strategic pillars

Pillar A – Demand: Unlock the Future

One of our key strategic priorities is to "Unlock the Future," by ensuring that we continue to provide timely, sufficient access to spectrum to meet current and future spectrum demand, thus optimizing economic and social benefits for Saudi Arabia. The captured demand covers spectrum needs of various industry verticals, national operators as well as those within the broader umbrella of private and public sector users and thus drive efforts within this strategic pillar.

A1 Optimize Legacy Spectrum

A.1.1 We aim to identify and resolve existing inefficiencies in Saudi Arabia's spectrum assignments, while overcoming hurdles that prevent international harmonization and optimal spectrum utilization. For instance, accumulated legacy assignments for fixed point-to-point links have resulted in multiple overlapping band plans that cause major technical inefficiencies for users. We will perform a comprehensive review of fixed point-to-point links to determine the most optimal band plans. Our overall objective in this area will be to review and optimize a total of 5.4 GHz of legacy spectrum by 2025.

A2 Foster Commercial And Innovative Uses

We will promote innovation and commercial uses of spectrum by increasing access to spectrum (both licensed and unlicensed), ensuring management practices account for competitive dimensions, and tackling problem issues very specific to the local ICT market context (e.g., Quality of Service requirements for Saudi Arabia).

A.2.1 **Drive 5G+** will push 5G+ deployment to position Saudi Arabia among leading nations in unlocking innovative high-performance use cases and applications based on 5G. We will focus on giving timely and sufficient spectrum access to operators in a way that will allow them to meet Quality of Service objectives in terms of mobile services' performance, price, and coverage. We will also aim to enable deployment of private 5G networks for industry verticals. For instance, factories in remote areas within the Kingdom can greatly benefit from access to 5G connectivity. Additionally, we will develop effective assignment and authorization models for spectrum releases that reconcile operators' needs with national interests and those of the consumers. We have an ambitious target to keep Saudi Arabia at the forefront of spectrum assignment to IMT networks by releasing at least 4,660 MHz of spectrum and thus achieving a total of more than 5,770 MHz assigned for IMT by 2025.

A.2.2 Accelerate Innovation, Sciences and Radio Technologies aims at enabling applications and use cases that rely heavily on free/eased access to spectrum and unlocking spectrum-related innovation. We aim to increase the total unlicensed spectrum to at least 5.5 GHz, enable wireless Internet of Things, promote emerging radio technologies (such as High-Altitude Platform Stations, etc.), and potentially leveraging these technologies to increase rural coverage, while also encouraging scientific and other radio services such as Amateur radio, meteorological services, radio astronomy, etc.

A.2.3 Upgrade Media shall focus on optimizing efficiency of spectrum used for media (e.g. TV/Audio Broadcasting) and proactively supporting the emerging trends that enable integration of media and other services. For instance, we will continue to push for such optimization by enabling the expansion of Digital Audio Broadcasting (DAB+) across all Saudi Arabia regions. We will be also monitoring international discussions regarding 600 MHz band and considering repacking UHF (ultra-high frequency) DTV (digital television) distribution to achieve more efficient spectrum use by media services, while accommodating increasing demand for other services, in light of the decreasing popularity of terrestrial broadcasting within Saudi Arabia.

A3 Safeguard National Access

To safeguard strategic national access to spectrum, we will focus on ensuring that government and civil entities that deliver crucial services such as safety and public transportation for the Saudi population have the spectrum resources they need in a timely manner.

A.3.1 Enable Space Spectrum shall focus on championing spectrum availability for Saudi Arabia's emerging space industry in international discussions and within the Kingdom. This work will be carried out in strategic partnership with the recently established Saudi Space Commission. We will work closely with the ITU and other parties on satellite coordination requests and strive to resolve all such requests in a timely manner. This will give existing and future satellite services access to spectrum and manage trade-offs with IMT allocations. We will prioritize efforts to identify ways of integrating satellite in 5G by promoting relevant technologies (such as high-throughput satellites, small satellites, and non-GSO satellites, such as LEO (low-earth orbit) and MEO (middle-earth orbit)

A.3.2 Empower Industry & Logistics seeks to unlock the future of transportation, logistics, Industry 4.0, and smart utilities in Saudi Arabia. We aim to establish this by addressing interference and congestion issues plaguing maritime and aeronautical users. Additionally, we are exploring the use of dedicated bands for land transportation and measures to enable emerging technologies such as Intelligent Transportation Systems in Saudi Arabia. Moreover, we are addressing the spectrum needs of Industry 4.0 and public utilities to enable applications such as smart grid. The current objective for Industry 4.0 and public utilities is to allocate required

Delivering cutting-edge spectrum management capabilities will benefit all stakeholders in the spectrum ecosystem and help advancing the Kingdom to be among those countries with best spectrum management

spectrum for developing a shared network with the goal of migrating majority of PMR (Private Mobile Radio) users over to this network. At a later stage, we will also assess the need and feasibility for spectrum to support developing a shared LTE (Long Term Evolution) network for civil users.

A.3.3 Improve Public Security & Safety shall focus on the spectrum needs of public entities that deliver crucial national services, such as emergency, security, and defense. These efforts should facilitate the development of national networks to eliminate the fragmentation of government bands, and ensure that all evolving radio systems needs for emergency and national defense and security services are met. This will allow national security users to upgrade their services towards higher capacity, better reliability, and robust network security. Shared networks would also help to improve interoperability, multimedia data sharing, etc., thus providing a secure and peaceful environment in which citizens and businesses can grow and thrive.

Pillar B – Supply: Empower 'Smart' Spectrum

This pillar will pay special attention to the spectrum supply-side by address the identified areas of improvement pertaining to carrying out basic functions of spectrum management. Delivering cutting-edge spectrum management capabilities will benefit all stakeholders in the spectrum ecosystem and help advancing the Kingdom to be among those countries with best spectrum management practices.

B1 Adopt Adaptive Regulatory Mechanisms

Flexible, clear and streamlined regulatory mechanisms are key to creating a predictable and stable spectrum management ecosystem. We will further put our efforts in making sure our distributive and regulatory policies, pricing frameworks, etc. are developed in agile and engaging manner in order to stay relevant in an ever changing and evolving environment.

B.1.1 Streamline Regulatory Policies and Procedures entails developing regulatory policies for major radio services to clarify and communicate information on all available bands, applicable licensing process, any restrictions and limitations. We seek to ensure that all parties clearly understand the bands available for their services and the accessibility conditions. Additionally, we will formalize, streamline, and publish procedures to reduce the application processing time of different radio services.

B.1.2 Optimize Spectrum Use shall focus on conducting spectrum audits to identify, complement, and refine all data on spectrum use in the country. Notably, this will enable us to revamp the National Frequency Register. Such audits will improve confidence in data quality and better inform spectrum management decisions. We will also leverage the gathered knowledge to identify opportunities for optimizing spectrum by releasing it from users and potentially repurposing it. For example, we will address the phenomenon of spectrum warehousing by public entities

in order to increase the percentage of spectrum accessible to non-government entities from ~30% to ~50% in sub-6 GHz bands.

B.1.3 Support Spectrum Research will build Saudi Arabia's contribution to global spectrum innovation and development by studying feasibility of innovative spectrum management methods, nurturing local spectrum and wireless R&D efforts, and playing an active role in international R&D initiatives, e.g. examining the impact of quantum communication technologies on the radio frequency ecosystem. To achieve those objectives, we will foster partnerships with academia, the wireless industry, and other entities. Innovative spectrum management tools, possibly including blockchain based databases, Artificial Intelligence (AI) tools for dynamic spectrum access and other methods, would enable us to improve operational efficiency and maximize value from spectrum.

B2 Facilitate Wireless Access and Investments

To enable Saudi Arabia spectrum users to utilize their assignments efficiently, we will revamp our core spectrum management functions and activities: spectrum pricing, licensing, and overall decision-making regulatory framework and processes.

B.2.1 Tailor Pricing aims to redesign the pricing framework to be more market and competition friendly and encourage development of new, innovative business cases, as well as public safety applications. A re-adjusted framework would yield significant benefits by reducing the burden of fees on spectrum users and allowing investment to thrive. We are taking on multiple ambitious objectives for this initiative, with the goal of having Saudi Arabia reach the 20 top countries in the Affordability rank from a spectrum perspective. Through periodic pricing reviews, we will ensure competitiveness on an ongoing basis.

B.2.2 Revamp Licensing will create a baseline from the current portfolio of licenses in the Kingdom while identifying opportunities to serve new use cases. We will also review and fine-tune some of the legacy licenses in the country. Our goal is to integrate 95% of current licenses into the newly established framework and to conduct two license review cycles. By granting usage conditions tailored to specific application, we will enable spectrum users to deliver the best possible services. Meanwhile, we will also simplify overall authorization processes and spectrum usage by moving towards unified, lighter licenses and introducing new types of licenses, such as test-and-trial and temporary licenses.

B.2.3 Future-Proof Planning and Allocation shall focus on specific ways to adopt a forward-looking approach and methodology for spectrum management, decision-making, and spectrum allocation. We will also focus on building an impact assessment framework that aids decision-making, and developing tools to forecast

1. This effort will be based on the Spectrum audits conducted in B.1.2, as well as on the redesigned license portfolio.

We have identified a set of key enablers to improve engagement in spectrum management ecosystem and expand our toolkit with better equipment, while growing our own capabilities and those of our stakeholders.

spectrum needs of key services and industry verticals. This initiative will overall ensure that our organization can proactively plan and anticipate spectrum changes by analyzing market trends and industry research.

B3 Embrace Market-oriented Approaches

As we move forward, we are eager to increase our agility by adopting market-based models for spectrum management and using mechanisms and tools that are inherently driven by market dynamics. At the same time, this means we will complete moving away from wielding top-down spectrum management techniques without any input from the market.

B.3.1 **Pilot Spectrum Sharing** aims to maximize spectrum efficiency by enabling several users to use the same spectrum band simultaneously in the same geographic area without harmful interference. Our aim is to enable a plethora of ways in which spectrum can be shared and utilized, be it within the same service or user group (e.g. Dynamic spectrum sharing between various mobile networks) or across the services and user groups (e.g. between broadcasting and mobile, or between commercial networks and government services).

B.3.2 **Experiment with Decentralized Assignments** will investigate possibilities for devolving spectrum assignment/licensing for some target services/user groups to sectoral agencies or industry bodies for reducing operational overhead, delivering higher quality of service and faster processing time (e.g. providing one stop shop for the thousands of fishermen radio licenses annually).

Our objective is by 2025 to have piloted at least three efforts related to decentralization, by collaborating with other agencies or industry bodies. This initiative may also test a secondary market for spectrum, with the goal of achieving more fluid assignment of frequencies and licensing flexibility in the Kingdom.

Enablers: Build the Foundation

In order to achieve the goals enumerated under pillars A and B, we have identified a set of key enablers that will help us improve engagement in spectrum management ecosystem and expand our toolkit with better equipment, while growing our own institutional capabilities and those of our stakeholders.

C1 Engage the Ecosystem

The spectrum management ecosystem is multi-layered, covering national spectrum users, administrations in neighboring countries, and international standardization organizations such as the ITU. Managing spectrum successfully in Saudi Arabia requires integrated and effective communication with stakeholders on all three of these tiers.

To achieve its national interests, Saudi Arabia must have a comprehensive understanding of national spectrum demand from businesses, end-users, public entities, and others. Saudi Arabia must then be able to fulfill those

national demands by championing them in regional and international discussions related to spectrum.

C.1.1 Involve Stakeholders in various aspects of spectrum related policy-making by developing mechanisms for interaction and ensuring an open and transparent environment that provides stakeholders with further visibility on spectrum manager processes, decisions and plans. This two-way exchange would enable us, on one hand, to leverage market-based information and expertise to enhance the quality of our decision making and, on the other hand, provide the stakeholders with a stable regulatory environment that supports investment decisions, and further knowledge and information sharing that improves business planning. We will achieve this by enhancing our communication capabilities in terms of content and methods as well as tools, and by identifying optimal measures for engagement with stakeholders, such as developing channels to achieve strategic alignment with key stakeholders on important topics.

C.1.2 Strengthen Saudi Arabia's International Influence to play an impactful role in shaping international discussions and decision-making related to spectrum in light of the impact they have on Saudi Arabia national interests (e.g. representing national interests at ITU World Radiocommunication Conferences). As such, we will develop our capabilities to negotiate and advance our national interests in regional and international venues. We will continue participating in activities and increasingly lead debates on key international spectrum issues at the relevant regional and global organizations, most notably the ASMG ,ITU-R , and other sector-specific organizations as needed. To take a leading role on the international stage, Saudi Arabia stakeholders will need to forge new alliances and partnerships with key international stakeholders such as industry associations, equipment suppliers and vendors. Additionally, we will host key international spectrum events to gain greater visibility on the international spectrum management scene. Between 2020 and 2025, we aim to host no less than 10 radiocommunications-related international events in Saudi Arabia and participate in work of five ITU-R study groups.

C2 Expand the Toolkit

We shall be adding new tools and capabilities, including upgrade of our spectrum IT systems, so that we can deliver on our responsibilities to carry out efficient spectrum planning and assignments, monitor its usage and resolve any interference instances.

C.2.1 Enhance Spectrum Monitoring shall boost our RF monitoring capabilities, targeting a near-real-time spectrum awareness. It aims to modernize and expand the entire complement of our monitoring systems and equipment (e.g., handheld equipment, vehicles, and fixed stations), revamp monitoring operations, optimize daily tasks of CITC radio monitoring staff. As a supporting activity, we shall also educate spectrum users and end-users to improve their operational practices with wireless equipment and

2. Arab Spectrum Management Group

3. International Telecommunication Union-Radio communication Sector

to prevent the use of illegal devices. We also aim to address current flaws and inefficiencies regarding our enforcement activities by improving communication channels with users, strengthening the legal terms for on-site inspections, and reinforcing ties with relevant government entities. By 2025, 100% of all planned monitoring equipment will be deployed and operational.

C.2.2 Upgrade Spectrum IT Systems shall concentrate on increasing reliability, efficiency and smoothness of our spectrum management processes and services by redeveloping software tools and e-services in IT system, in order to create an integrated, prime quality Automated Spectrum Management System (ASMS). We have already begun reviewing the specifications for the new ASMS, and we will review the user experience (UX) and user interface (UI) of our website and online portals to ensure better e-services for spectrum users. By 2025, we plan to deploy 100% of newly developed ASMS modules and ensure that more than 99% of radio license requests are submitted online. We will ensure the ASMS will guarantee a secure and reliable access to data stored in our National Frequency Register and perform Big Data Analytics on collected data by the spectrum monitoring system, for informed decisions on spectrum future planning. The two systems (hardware and software) will create the foundation for our future evolution; by enabling spectrum awareness and consequently autonomous spectrum management.

C3 Grow Capabilities

By improving and revamping our internal processes and institutional capabilities, we will build the foundation for future reforms and improvements.

C.3.1 Revamp Core Processes will undertake a systematic review of the core organizational processes. It will entail evaluating interactions between diverse teams and departments within the spectrum management organization to improve processes and overall quality of services. For example, one of the goals is to bring the average time required to answer interference complaints to less than 6 hours and to fully resolve interference complaints in less than two working days.

C.3.2 Grow Talent Pool seeks to fuel organizational growth by acquiring and growing top talent in the spectrum ecosystem, i.e. primarily within our organization, but also within organization of external stakeholders. We will be developing a national learning and development (L&D) program to improve professional knowledge and capabilities of personnel to be employed in radio spectrum management. Our L&D program will include secondments that aim to boost employees training by sending/receiving skilled workforce to and from peer organizations (e.g. exchanges with other spectrum managers or Saudi Arabia government agencies, receiving secondees from ITU, etc.) but also through a portfolio of training sessions, industry events and higher education sponsorships. By 2025, we aim to fully complete the recruiting plan developed as part of this strategy.

FIGURE 5: BLUEPRINT OF KSA NATIONAL SPECTRUM STRATEGY

UNLOCK THE POTENTIAL OF RADIOCOMMUNICATION IN SAUDI ARABIA FOR A SMARTER AND SAFER FUTURE

Offer all users the access to spectrum they need to innovate and grow by managing the spectrum effectively and efficiently in close colloboration with our stakeholders

A1
Optimize Legacy Spectrum

A.1.1 Optimize Legacy Spectrum

A2
Foster Commercial and Innovative Uses

A.2.1 Drive 5G+
A.2.2 Accelerate Innovation, Sciences, and Radio Technologies
A.2.3 Upgrade Media

A3
Safeguard National Access

A.3.1 Enable Space Spectrum
A.3.2 Empower industry & Logistics
A.3.3 Improve Public Security & Safety

B1
Adopt Adaptive Regulatory Mechanisms

B.1.1 Streamline Regulatory Policies and Procedures
B.1.2 Optimize Spectrum use
B.1.3 Support Spectrum Research

B2
Facilitate Wireless Access and Investments

B.2.1 Talior Pricing
B.2.2 Revamp Licensing
B.2.3 Future-proof Planning & Allocation

B3
Embrace Market-oriented Approaches

B.3.1 Pilot Spectrum Sharing
B.3.2 Experiment Decentralized Assignments

C1
Engage the Ecosystem

C.1.1 Engage Local Stakeholders
C.1.2 Stengthen Saudi Arabia's International Influence

C2
Expand the Toolkit

C.2.1 Enhance Spectrum Monitoring
C.2.2 Upgrade Spectrum IT Systems

C3
Grow Capabilities

C.3.1 Revamp Core Processes
C.3.2 Grow Talent Pool

LOOKING FORWARD

We will monitor the aggregate effects of implementing this strategy by keeping track of key performance indicators and metrics to ensure we continue to optimize the spectrum access and use, and to inform future decisions related to spectrum management in general.

Those metrics include, on the demand side, the number of MHz assigned to specific uses and radio services (including unlicensed spectrum), percentage of harmonization with international standards, as well as efficiency of spectrum utilization, especially in congested bands. Also included, on the supply side, are the proportion of commercial spectrum vs government spectrum, affordability of spectrum services, and degree of implementing shared spectrum schemes.

We will continue to track changing spectrum demand and the effectiveness of the spectrum supply management to keep this strategy under review.

As technologies evolve, consumers and markets change, we expect our strategic direction to adapt and our efforts and resources to adjust.

As required, we will assess and respond to new developments in consultation with stakeholders (including users, other regulators, government entities, etc.).

There is a clear path forward that we have articulated in our implementation plan in terms of phasing actionable projects to realize our ambition and identifying mitigation actions to overcome risks and roadblocks, so we are confident that with an engaging and collaborative approach, we are set to embark on a successful journey to unlock the full potential of radio communications in Saudi Arabia.

هيئة الاتصالات وتقنية المعلومات
Communications and Information Technology Commission