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7th of October 2024

Ericsson comments to Consultation ECS 73/2024 about the Roadmap to enable 5G deployment in The Bahamas

Introduction

Ericsson thanks The Utilities Regulation and Competition Authority ("URCA") for the opportunity to provide comments to its Consultation Document ECS 73/2024 about the Roadmap to enable 5G deployment in The Bahamas.

Ericsson comments

Question 1
Do you have any comments on the key features and benefits of 5G technology? If so, please provide a detailed explanation of these observations, including supporting evidence where available.

5G is the fastest-adopted technology in the history of mobile communications, and it is on the path to the become the backbone of digitalized economies and societies, contributing to prosperous, sustainable, and inclusive growth.

Mobile operators around the world continue investing actively in 5G since its introduction in late 2018. At the end of July 2024, the GSA [1] had identified 622 operators in 185 countries and territories investing in 5G in the form of trials, acquisition of licenses, planning, network deployment and launches. Of those, 348 operators in 129 countries had launched commercial 5G services. The number of announced 5G devices is up by more than 123% since the start of 2022, with 2,797 devices catalogued devices [2].

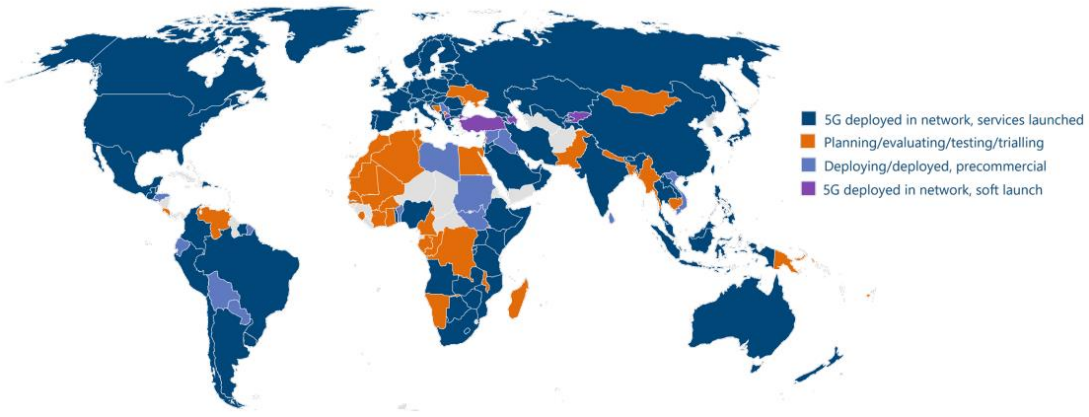

Fig. 1 – Map of Operator's investments in 5G

[1] GSA 5G Market Snapshot September 2024

[2] 5G | Technology | Reports & Trends | GSA.com

The continued strong uptake of 5G shows that demand for high-performance connectivity will grow over the coming years. The latest Ericsson Mobility Report [3], indicates that 5G is on track to become the dominant mobile access technology in subscriptions worldwide by 2028. By 2029, 5G is expected to reach 60 percent of all mobile subscriptions across all technologies globally.

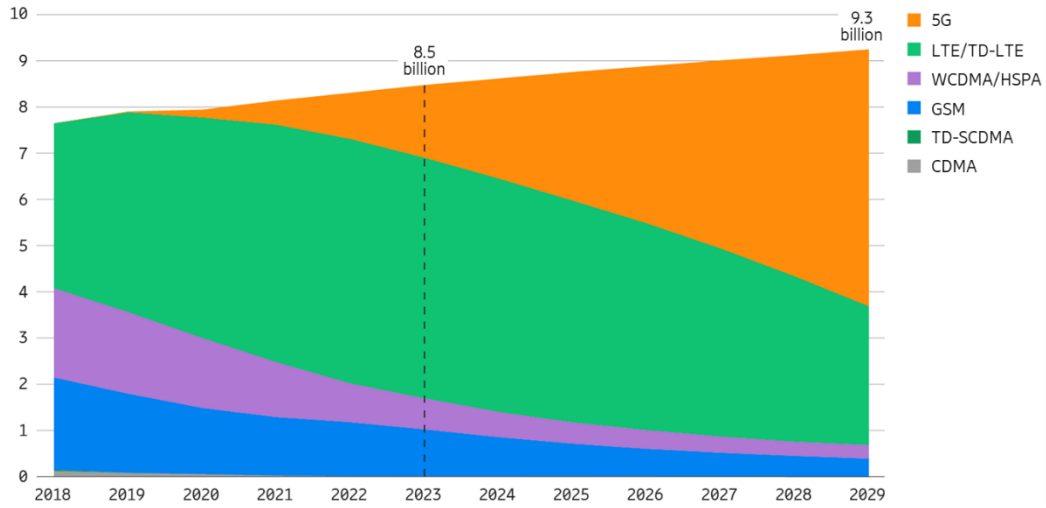

Fig. 2 – Global 5G mobile subscriptions by technology (billions), source: Ericsson

Ericsson estimates that by the end of 2029 around 75% of all mobile data will be delivered via 5G networks, which is a three-time growth compared to 5G mobile data traffic in 2023.

In Latin America and the Caribbean, Ericsson estimates that by 2029, 5G will represent 52 percent of all mobile subscriptions and that data traffic per smartphone will increase on average more than 3 times, from 11 GB to 36 GB per month per Smartphone.

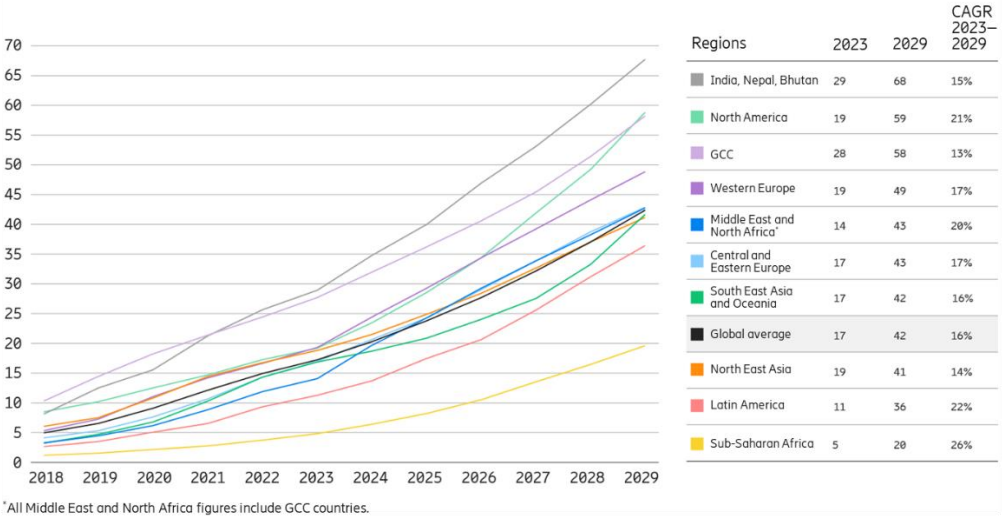

Fig. 3 – Mobile data traffic per active smartphone (GB per month)

[3] Ericsson Mobility Report June 2024

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It is essential that URCA anticipates and prepares for the 5G demand and strong growth in mobile data traffic by identifying sufficient spectrum in low, mid, and high spectrum bands, and assigning it under favourable conditions to facilitate operators' investments in 5G infrastructure and service innovation.

Question 2

Do you have any other comments on the importance of 5G for The Bahamas? If so, please provide a detailed explanation of these observations, including supporting evidence where available.

In the coming years, 5G will become the pillar of the digital transformation of society, increasing the economic growth and productivity of industries, and improving the service experience of mobile broadband users, who will access advanced applications from the home or business, and 5G IoT services via multiple devices including cameras, smart glasses, health monitors, sensors, and many others.

5G Fixed Wireless (FWA) services are a competitive alternative to bring high-speed broadband connectivity to homes and business in The Bahamas, improving employment, education, health, income opportunities, and entertainment to the population. Ericsson estimates that 5G FWA connections will grow to around 330 million by 2029, representing almost 85 percent of FWA connections [4]. FWA traffic to grow by a factor of 5 between 2023 and 2029.

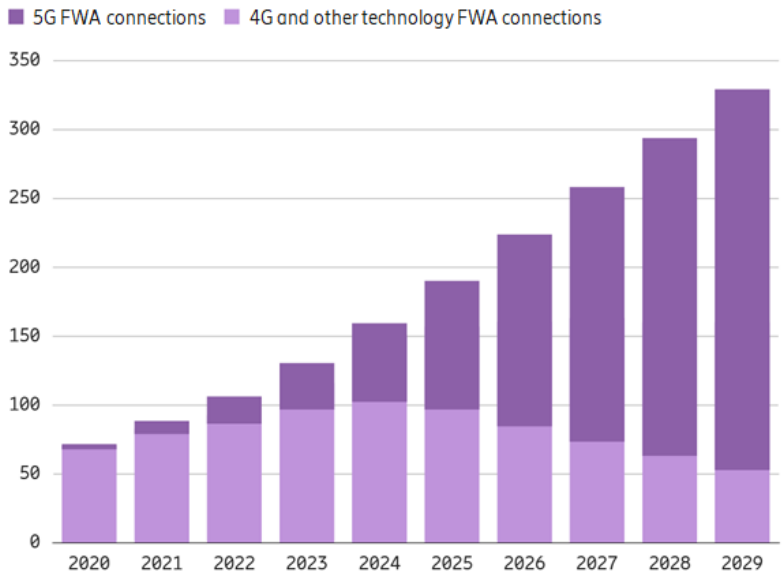

Fig. 4 – FWA connections (millions)

The World Economic Forum [5] has recognized that 5G fixed wireless accesses are powerful solution to bringing high-speed connectivity to homes, schools, and small- and medium-sized businesses everywhere while broadening the benefits of an intelligently connected world, and that 5G FWA can deliver similar connection quality as fiber thanks to enhanced capabilities, such as millimeter-wave (mmWave).

[4] Ericsson Insights - 5G FWA Momentum

[5] World Economic Forum 2023, Why 5G fixed wireless access is integral to bridging the digital divide

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Question 3

Do you have any comments on the likely challenges in deploying 5G in The Bahamas set out above? If so, please provide a detailed explanation of these observations, including supporting evidence where available.

The main challenges for 5G implementation in The Bahamas, are among others, the low population density distributed in a large archipelago, uncertainty on end users' willingness to pay for enhanced connectivity services (as indicated in the Document ECS 73/2024 under consultation), lack of enough power infrastructure in some islands, and spectrum fees.

It is recommended to consider providing incentives for mobile Operators to invest in 5G high-speed broadband infrastructure, which would bring several benefits to the country, such as better access to education, enhancing the productivity of enterprises, creating new jobs, and increasing economic activity and national GDP.

Some of the incentives could be the reduction of 5G spectrum license fees and taxes for the importation of telecommunications infrastructure, to facilitate mobile operators to invest in 5G network infrastructure, especially in areas that is economically non-profitable.

In addition, reducing taxes for the importation of subscribers' smartphones would encourage the demand of 5G services among low-income population.

Question 4

Do you agree with URCA's assessment that low-band and mid-band spectrum is sufficient for an initial deployment of 5G? If not, please provide a detailed explanation why not and the issues/observations, including supporting evidence where available.
Do you see any need of high-band spectrum in the next few years in the Bahamas? If so, for what type of use case?

It is essential that URCA develops a long-term 5G spectrum roadmap using low, mid, and high spectrum bands, that harmonized at global level, or at least regional level, to achieve large economies of scale, roaming and cross-border coordination. These 5G spectrum bands should be released in favorable conditions to foster infrastructure investments and service innovation.

For the introduction of 5G in The Bahamas, we recommend considering the spectrum bands that are being used in most 5G deployments globally [6], including the 700 MHz (3GPP n12, n14, n28), 3300-3800 MHz (3GPP n77/n78), 26/28 GHz (3GPP n257, n258, n261), and 2.5 GHz (3GPP n7/n38). In addition, the 600 MHz band (3GPP n71) is of interest in the Americas region, since 10 countries have already identified it for IMT (5G) expecting more countries to join in the next years ahead.

[6] GSA 5G Market Snapshot September 2024

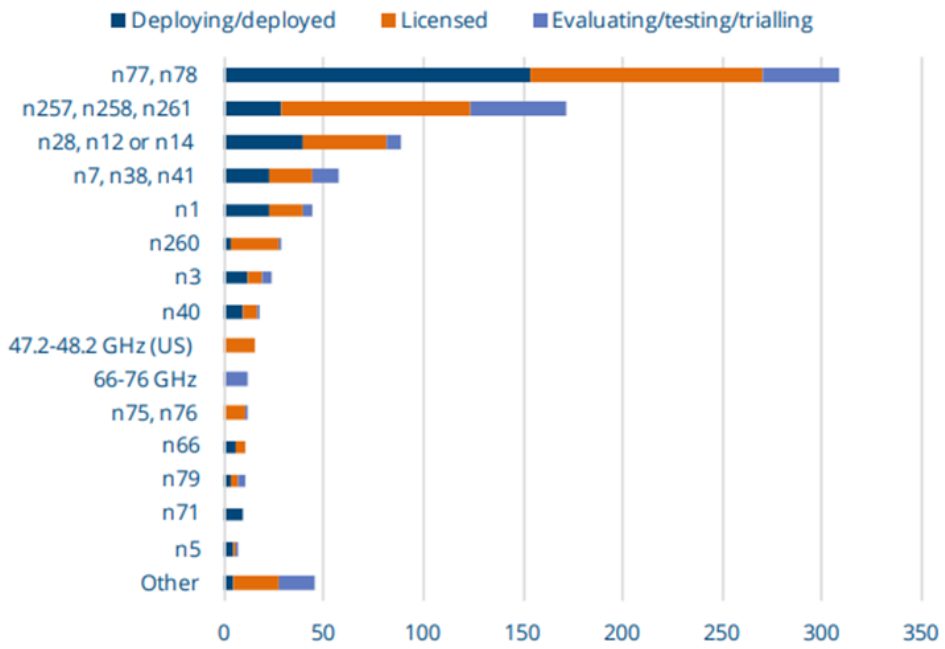

Fig. 5 - Operators investing in key 5G spectrum bands (end July 2024)

Question 5

Do you have any preference for a specific low-band spectrum band and/or mid-band spectrum band to be assigned to you for the initial deployment of 5G and for a carrier bandwidth? If so, please provide a detailed explanation of your preference(s) and the issues/observations, including supporting evidence where available Below we explain the benefits of these bands for The Bahamas.

Ericsson recommends URCA to defining a long-term 5G spectrum roadmap that includes sufficient spectrum for 5G in the low, mid, and high frequency bands, harmonized at global level, or at least regional level, to achieve high economies of scale, interoperability, roaming and coordination across borders. These spectrum bands should be assigned in a timely manner to facilitate 5G introduction.

Low bands

Due to its propagation advantage, the 600 MHz and 700 MHz bands are essential for expanding 4G and 5G service coverage to suburban and rural areas in a cost-effective manner, as well as, enhancing indoor penetration in urban areas. GSA database has listed 695 announced devices that support the 614-698 MHz band (3GPP band n71) and 1,757 announced devices that support the 700 MHz band (3GPP band n28).

We understand the 700 MHz band (3GPP n12) has been already assigned in The Bahamas and we assume it is used to provide 4G services (Tables 3 and 4 of Consultation Document ECS 73/2024). Thus, Ericsson recommends considering the release of the 700 MHz band (3GPP n14), i.e, 788 - 798 / 758 – 768 MHz, following the 700 MHz US band plan.

In addition, we recommend considering the assignment of the 2 x 25 MHz block available in the 600 MHz band, which could help expand 5G coverage in The Bahamas archipelago, providing advanced connectivity for consumers, government, tourists, farmers, fishermen, small entrepreneurs, and other businesses.

In the Americas region, the United States was the first country to award licenses in the 614-698 MHz band in 2017, followed by Canada which assigned licenses in 2019. Mexico is tentatively planning to award license in the 614-698 MHz in 2025. They all use the FDD frequency arrangement 617-652 MHz / 663-698 MHz (3GPP band n71).

At WRC-23, El Salvador and Jamaica joined FN 5.308A identifying the 614-698 MHz for IMT, together with another 8 Administrations, including the Bahamas, Barbados, Belize, Canada, Colombia, El Salvador, the United States, Guatemala, Jamaica, and Mexico, so there is large potential for roaming in the region.

Mid bands

A recent GSMA report [7] has estimated that mobile operators will require around 2,000 MHz spectrum in mid-bands to meet the 5G mobile data traffic growth in the period 2025-2030 in a cost-effective manner. GSMA estimates that a spectrum deficit of 800-1000 MHz in mid-bands would increase total 5G infrastructure investment costs by a factor 3-5 times over a ten-year period, as well as 5G service time to market and service tariffs for the consumers.

In the mid-bands, Ericsson suggests the release of the 3300 MHz – 3700 MHz (3GPP n78), AWS (3GPP n66) and 2300-2400 MHz (3GPP n40) bands for 5G introduction in The Bahamas.

In particular, the 3300 MHz – 3700 MHz band has been the prime focus of 5G investments around the world, supporting great economies of scale. As of July 2024, GSA has identified 329 operators in 91 countries holding licenses in this band. Of those, 167 operators have been identified as actively deploying or having launched 5G networks using 3GPP bands n77 or n78. Also, as of September 2024, GSA database has listed 2,181 announced devices that support 3GPP band n78 (3300-3800 MHz) and 1860 announced devices supporting 3GPP band n77 (3300-4200 MHz) [8].

The WRC-23 harmonized the 3300-3700/3800 MHz frequency band for IMT in the Region 2 (FNs 5.429D, FN 5.434, FN 5.435B) benefiting consumers with larger roaming options.

In the medium to long term, we recommend URCA to consider assigning the upper part of the 6 GHz band (i.e., 6425-7125 MHz) for IMT services, since it would help meet the spectrum capacity needs of 2000 MHz required for 5G evolution during 2025-2030 and achieve the highest socioeconomic benefit of the 6 GHz band. The test results presented in the "*6 GHz opportunity: licensed spectrum for mobile networks – whitepaper June 2022*[9]" have confirmed that 6 GHz band has similar penetration and performance that is comparable to the 3.5 GHz band [10].

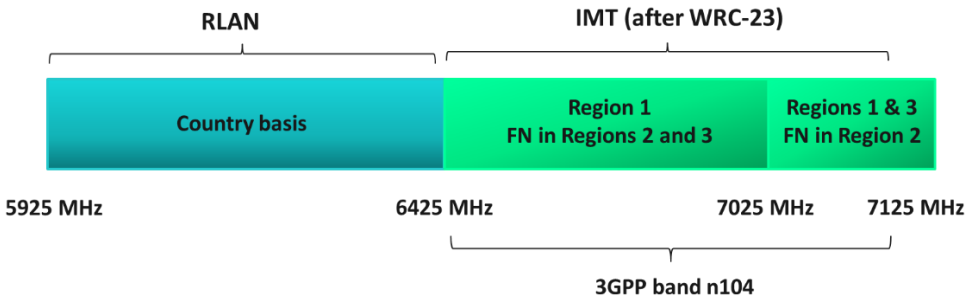

Fig. 6 – Recommended 6 GHz band allocation

[7] GSMA 5G Mid-Band Spectrum Needs

[8] GSA 5G Devices Ecosystem Report - September 2024

[9] https://6ghzopportunity.com/wp-content/uploads/2022/06/22-06-09-Licensed-6-GHz-opportunity-v2.pdf

[10] https://6ghzopportunity.com/news/

The World Radiocommunication Conference 2023 (WRC-23) provided wide support for IMT (5G) in the 6425-7125 MHz (6 GHz band) band in all ITU regions:

- In Region 1 (i.e., Europe, Africa, Arab, and CIS) [11], the 6 GHz band was identified for IMT.
- In Region 2, the 6425-7125 MHz band was identified for IMT in Brazil and Mexico [12], with the opportunity for other Administrations in the Americas to also join at World Radiocommunication Conference 2027 (WRC-27).
- In Region 3, Cambodia, Lao People's Democratic Republic, and the Maldives [13] identified the 6425-7025 MHz band for IMT, while the 7025 to 7125 MHz range was identified for the terrestrial component of IMT in the entire region (Asia Pacific).
- Many other Administrations in Region 3 expressed their interest in joining this footnote, which will be possible at the next World Radiocommunication Conference WRC-27.
- The IMT identifications in all ITU regions include harmonized technical conditions to protect the existing Fixed Satellite services (Earth-space), while at the same time, allowing the deployment of macro IMT radio bases for greater efficiency in deployments, maximizing economies of scale in the upper 6 GHz band.

All Administrations that identified the 6425-7125 MHz band for the IMT during WRC-23, and those which officially expressed interest in doing so, represent a total combined population of more than 4.75 billion people, equivalent to 60% of the world's population, which will enable significant economies of scale for 5G service introduction and adoption.

Fig. 7 – IMT identifications and interest in 6425-7125 MHz band during WRC-23

High bands

The mmWave spectrum was identified for IMT at the past ITU-R WRC-19, and since then, it has been used as a key asset for providing high-speed connectivity and capacity in venues (e.g., stadiums, airports, ports, and others) and high-traffic locations (e.g., business districts) in urban, suburban, and rural areas.

[11] WRC-23 Final Acts, footnote 5.457E
[12] WRC-23 Final Acts, footnote 5.457F
[13] WRC-23 Final Acts, footnote 5.457D

While mmWave spectrum is often associated with providing mobile broadband services (MBB) in dense traffic areas with each 5G site covering only a few hundred meters, the extended range of mmWave offers mobile service providers a golden opportunity to deliver 5G fixed wireless access (FWA) to homes and businesses located several kilometers of distance from the 5G base station [14], addressing their high-speed digital connectivity needs.

In The Bahamas, 5G FWA services could help extend low-latency gigabit connectivity to semi-rural and rural communities helping close the Digital Divide[15] with more cost-effective and faster 5G rollouts than traditional fiber infrastructure.

Ericsson recommends URCA to consider assigning the 26 GHz band (3GPP n258) in The Bahamas. In most countries where mmWave spectrum has been auctioned – i.e., Brazil, Chile, USA - the Regulators have provided very low spectrum fees to encourage operators to acquire this spectrum.

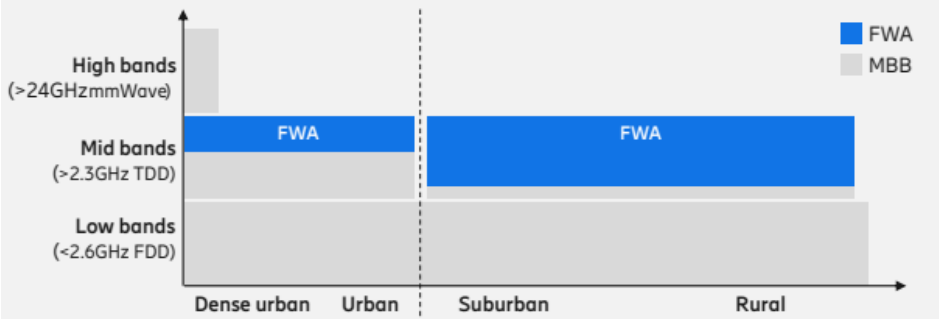

Fig. 8 – 5G FWA deployment scenarios

Question 6

Do you have any comments on the technical considerations that need to be taken into account when determining the relevant spectrum blocks to be made available for 5G in The Bahamas and limitations of its usage? If so, please provide a detailed explanation of these issues/observations, including supporting evidence where available.

For initial MNO 5G deployments, we recommend licensing 5G spectrum below 3GHz in blocks of 2x5 MHz (FDD) / 1x10 MHz (TDD), and spectrum in the 3.3-3.8 GHz band (TDD) in blocks of 100 MHz, as well as spectrum in the 26 GHz band (TDD) in blocks of 200 MHz to be able to support different 5G use cases. Regulations should allow aggregation/disaggregation of blocks to achieve the recommended spectrum licenses size.

Question 7

Do you have any comments on the proposed spectrum award procedure for 5G spectrum? If so, please provide a detailed explanation of these observations, including supporting evidence where available.

[14] Ericsson - Realizing the 5G FWA growth opportunity

[15] Ericsson - Closing the digital divide with mmWave extended range FWA

We recommend considering the positions of mobile Operators about the best mechanism to award spectrum.

Question 8
Do you have any comments on the price and non-price considerations for the 5G spectrum award and licenses set out above? If so, please provide a detailed explanation of these observations, including supporting evidence where available.

We recommend that spectrum is licensed in periods of 20 years or longer, and with a presumption of renewal, to provide investors with higher business predictability and longer periods for return on investment (aligned with GSMA [16]).

Also, we recommend that spectrum licenses are granted on a national level, and that are technology neutral (i.e. not specifically for 4G, 5G, 6G, etc.) and service agnostic (i.e. not specifically for mobile broadband, IoT, etc.).

Moreover, several studies [17] have indicated the negative impact of high spectrum fees in Developing countries, since it usually affects the operator ability to invest in infrastructure and the consumer affordability of services, resulting in low adoption rates.

Therefore, Ericsson recommends the Authorities of The Bahamas to reduce the spectrum license fees, avoiding the objective of maximizing the proceeds from the 5G spectrum award, to incentivize network investments in a timely manner and facilitate the adoption of reliable and fast 5G connectivity.

Question 9
Do you have any comments on these non-spectrum related implementation considerations? If so, please provide a detailed explanation of these observations, including supporting evidence where available.

Investment incentives for 5G

Ericsson recommends considering providing incentives for mobile Operators to invest in 5G high-speed broadband infrastructure, which would bring several benefits to the country, such as better access to education, enhancing the productivity of enterprises, creating new jobs, and increasing economic activity and national GDP.

Some of these incentives could be the reduction of 5G spectrum license fees and taxes for the importation of telecommunications infrastructure, to facilitate mobile operators to invest in 5G network infrastructure, especially in areas that is economically non-profitable.

In addition, reducing taxes for the importation of subscribers' smartphones would encourage the demand of 5G services among low-income population.

[16] GSMA Mobile Spectrum Licensing Best Practice

[17] GSMA Impact of spectrum prices on Consumers Technical Report

Several authorities have introduced spectrum pricing incentives to facilitate the initial investments in 5G network infrastructure, including the following countries:

• Brazil (2021): the latest 5G spectrum auction warded spectrum in the 700 MHz, 2.3 GHz, 3.3-3.7 GHz, and 26 GHz bands, introducing price incentives that allow Operators to discount up to 94% of the payment for their spectrum licenses in exchange for investment in infrastructure. Additionally, operators were allowed to make annual payments during the 20-year license term, to reduce the financial impact of a one-time payment at the beginning of the license term.

• Chile: all spectrum auctions use the beauty contest model, in which the expansion of coverage and social use is privileged over tax collection objectives.

• Colombia (2019): allowed operators to use up to 60% of their spectrum license payment in the 700 MHz band in exchange for investments to expand coverage in rural areas.

• Korea (2018): assigned 5G spectrum in the 28 GHz band at a price five times lower than the 3.5 GHz spectrum with the aim of encouraging investments.

• Japan (2019): allocated 5G spectrum in the 28 GHz band without charging spectrum licenses to promote infrastructure investments.

• US (2018): allocated 5G spectrum in the 28 GHz band with a license fee equivalent to 1% of previous spectrum auctions in 4G bands.

• France (2018): renewed LTE licenses in the 900 MHz, 1800 MHz, and 2100 MHz bands at no cost, in exchange for operators to expand their 4G networks in rural areas until 2024.

Private 5G networks

The global demand for private mobile networks based on 4G/5G technologies is increasing, given the multiple benefits it offers to industries, such as higher data protection, better reliability, higher security, process automation, lower latency, higher productivity, higher efficiency, higher performance, and flexibility to address mobility requirements within the enterprise and government premises.

In addition to companies looking to deploy their own private mobile network for the first time, there is a large group of existing customers facing the need to modernize their current private networks with advanced 4G/5G technologies to fulfill the critical broadband demands, which are simply not available in legacy technologies, such as TETRA, P25, Digital Mobile Radio, GSM-R and Wi-Fi.

The GSA has identified 1,489 customers deploying private mobile networks in 80 countries around the world as of July 2024 [18], 51.6% of them based on 4G/LTE technology, and 47% on 5G technology.

[18] GSA Private Mobile Networks - September 2024

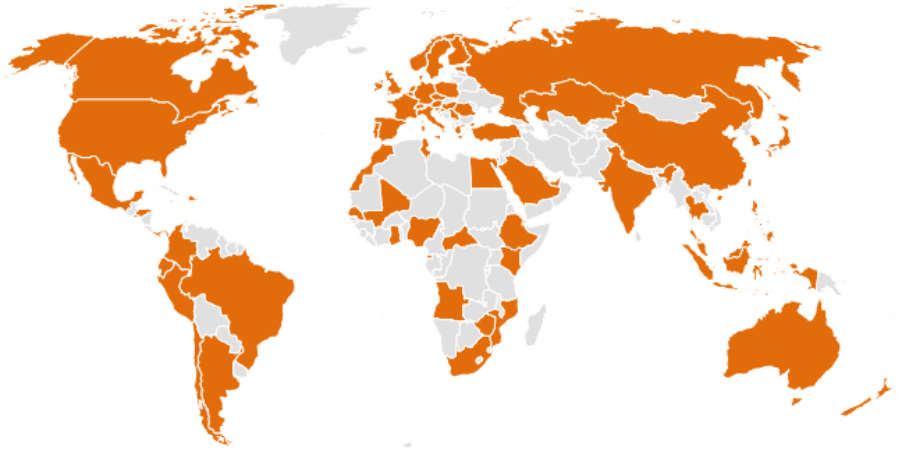

Fig. 9 – Countries deploying private mobile networks

The Bahamas may benefit from private 5G networks to improve productivity and attract investments in a wide range of economic sectors and industries, including [19] tourist resorts, seaports, logistics ports, airports, universities, financial centers, power utilities, broadcasting, defense, financial centers, and manufacturing plants, which would increase the security, productivity, and efficiency of their operations.

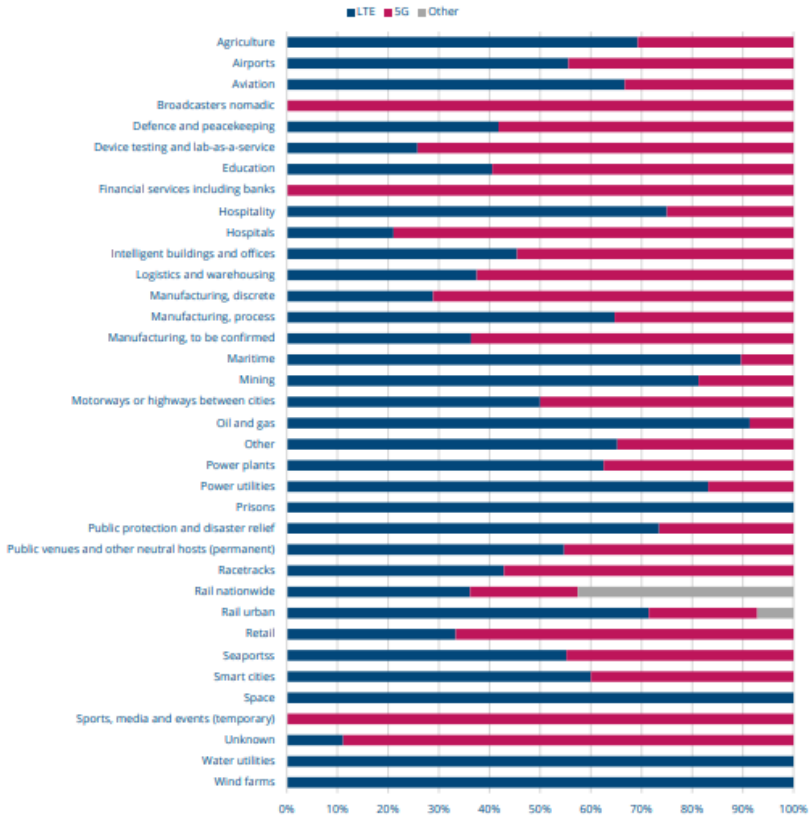

Fig. 10 – Private mobile network by technology used and industry

[19] Ericsson Private 5G Networks

According to GSA, the spectrum bands that have been mainly used to implement private 5G networks are 3700-4200 MHz, 2570-2620 MHz, and 450 MHz bands. In the USA, the CBRS band has been used to deploy private 5G networks, but it does require a central database that it is expensive and lengthy to implement, which was introduced to handle specific spectrum licenses conditions in their country.

Recent studies from GSMA [20] recognize that 5G offers a strong proposition for the digitalization of enterprises, and although mobile operators offer robust 5G end-to-end solutions based on shared public infrastructure, some enterprises have unique connectivity needs with requirements, that may be solved via various options, including spectrum sharing frameworks, specific licensing conditions, and spectrum set-aside to reserve use for potential local users. When considering the spectrum set-aside approach, the GSMA study recommends not to reduce the amount of spectrum available to public mobile networks, to avoid potential negative impacts on public network quality.

The 3GPP [21] defines private mobile networks as Non-public networks (NPN), which are isolated mobile networks intended for the non-public (or private) use. 5G specifications support various configurations of NPN, but the 3GPP defines two major categories of NPNs: Standalone Non-Public Network (SNPN) and Public network integrated NPN (PNI-NPN). The standardization of NPN at 3GPP started in Release 15 and has continued until Release 18.

Ericsson [22] offers a broad portfolio to assist its customers' needs with advanced local cellular connectivity based on 4G and 5G private networks, supplying reliable, secure, low latency, and high-performance connectivity tailored to industrial and business demands.

Health Regulations

Ericsson recommends The Bahamas to adopt the Electromagnetic radiation (EMF) limits specified in the guidelines described in the ICNIRP 2020 [23], which are based on scientific limits and endorsed by the World Health Organization (WHO).

The limits specified in the 2020 ICNIRP EMF guidelines have been set with wide safety margins for the protection of the population and workers. The ICNIRP EMF guidelines provide a high level of protection for all population and workers, covering all radio technologies including 2G/3G/4G and the new 5G technology. These guidelines guarantee the protection of the population against exposure to electromagnetic fields (EMF) emitted by radio frequency (RF), in the range of 100 kHz to 300 GHz, which is why they have been adopted in most countries in the world.

The ICNIRP 2020 guidelines will allow the continued deployment of 4G/5G mobile communications networks in The Bahamas, in an optimal and safe manner for all the population, allowing the deployment of advanced 5G telecommunications services, supporting sustainable development for the benefit of consumers and industries.

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[20] https://data.gsmaintelligence.com/research/research/research-2024/the-impact-of-spectrum-set-asides-on-private-and-public-mobile-networks

[21] https://www.3gpp.org/technologies/npn

[22] https://www.ericsson.com/en/portfolio/enterprise-wireless-solutions/private-networks

[23] International Commission on non-ionizing radiation protection - ICNIRP: RF EMF Guidelines 2020.