GSOA
GLOBAL SATELLITE OPERATORS ASSOCIATION

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GSOA Response to the Utilities Regulation and Competition Authority ("URCA") public consultation on the Roadmap to enable 5G deployment in The Bahamas

I – Introduction

GSOA is the only global non-profit association of the entire satellite ecosystem that brings members together and serves as the premier platform for worldwide collaboration. As the only CEO-driven satellite association in the world, GSOA takes the lead in addressing global challenges, seizing opportunities, and providing a unified voice for the satellite industry GSOA is widely recognized as the representative body for satellite operators by international, regional, and national entities. Our vision is to help policymakers improve the state of the world by continuously bridging digital, education, health, social, gender and economic divides across diverse geographies and across mature and developing economies.

GSOA welcomes the opportunity to provide comments to URCA regarding its Roadmap to enable 5G to be deployed in The Bahamas, as outlined in the following paragraphs.

Section 2: Outlines the opportunities and challenges of rolling out 5G in The Bahamas

GSOA concurs with URCA that the main benefits associated with 5G include the ability to support ever increasing demand for capacity from existing services and use cases through deployment of advanced technical features. However, 5G is not a standalone terrestrial solution. It is most definitely the result of adding different services to provide the most effective connectivity to the up raising use cases, as was acknowledged in the 2019 ITU Report M.2460 on integrating satellite systems in next-generation technologies.

Satellite will play an important role in the global 5G ecosystem by helping to offer 5G services and applications in urban, suburban and rural areas, as well as providing connectivity for IoT, M2M, media services, connected transport networks and many other services. In doing so, satellite will also ensure 5G-type services will benefit a maximum of citizens.

GSOA is convinced that to realize a viable 5G ecosystem in The Bahamas, the integration of satellites into 5G networks at an early stage will be critical. The success of many 5G service deployments depends on unique characteristics made possible by satellite networks such as wide area coverage that is vital to extend networks to low-density populated areas, one-to-many distribution and reliable and resilient operations. Specifically, satellite networks can:

a) Provide fixed and mobile 5G services and applications to underserved areas and places that terrestrial networks cannot cover (e.g. on land, in the air, at sea);
b) Ensure robust and secure 5G services for critical and mobile public safety communications (incident response, public safety);
c) Ensure service continuity for M2M/IoT devices by providing reliable communications and supporting software updates on moving platforms (e.g. passenger vehicles, aircraft, ships, trains, buses);
d) Optimise the efficiency of 5G networks by multicasting/broadcasting data; and
e) Enhance existing fixed and mobile network links with hybrid connections.

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The primary use cases of satellite 5G made possible with today's high-throughput satellites (HTS) have been well recognized and explained in the CEPT Report dated 18 May 2018 entitled Satellites in 5G. Those use cases include mobile and fixed broadband connectivity to consumers, businesses and governments. Hybrid and network extension cases are also being presented where multiple networks are combined to achieve cost-effective and high-quality services. Some of the 5G performance expectations can already be met by today's HTS satellites (e.g., for a global reach of multicast or M2M services).

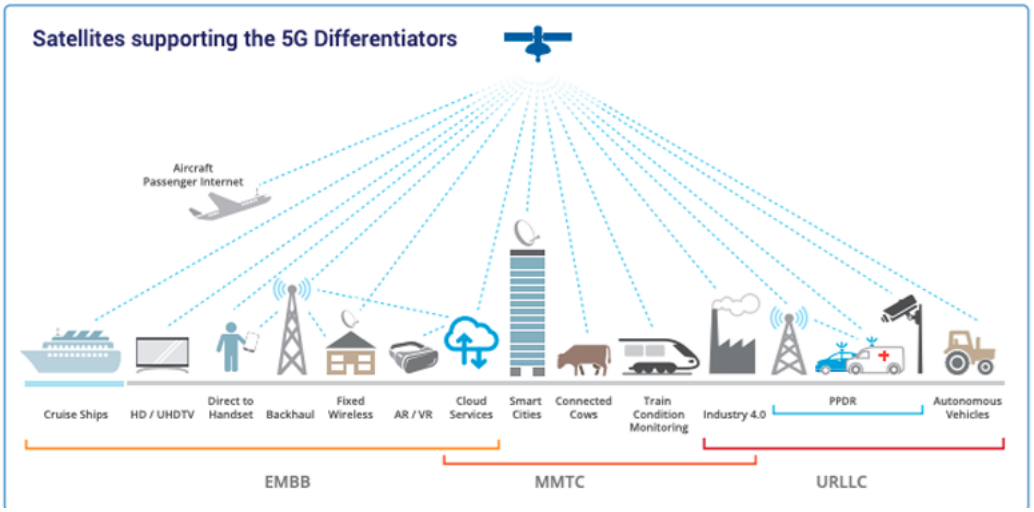
Satellite services enable communications on the move, direct to premises connectivity, direct connectivity to end-user devices, content distribution, and satellite-powered connectivity to the benefit of end users as part of the 5G ecosystem. Satellites will also support the three main use cases identified by the ITU:

- Satellites can provide **Enhanced Mobile Broadband** applications by powering 5G networks to consumers in urban, suburban and rural areas. Satellites already play this role today in 3G and 4G networks and are now starting to do the same in 5G networks with the advancement of Very High Throughput Satellite (VHTS) technologies and systems.

- Satellites can also support **ultra-reliable, low-latency 5G applications**. Broadcasters and governments today count on the reliability of satellite services for their most sensitive applications. For some of the newest 5G applications that require the lowest latencies, satellites can also distribute content to the network edge for quick access by user devices. Satellites with their broad coverage are particularly well suited for such "multi-casting" applications. Edge caching of such content is essential for meeting 5G latency requirements.

- Finally, satellites can support **massive Machine-type communications** or IoT applications. They already do so today.

For more information on the role of satellite in 5G, GSOA invites URCA to review its "White Paper on Satellite, an Integral Part of the 5G Ecosystem"[1]. Below is an infographic depicting the various satellite 5G differentiators.



Source: GSOA 5G White Paper

[1] https://gsoasatellite.com/reports_and_studies/satellite-communications-services-an-integral-part-of-the-5g-ecosystem/

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Section 3: Sets out the possible options for spectrum assignments to enable 5G in The Bahamas

- **Considerations about 3.700-4.200 MHz (C-band)**

GSOA fully appreciates the transparency of URCA's regulatory process. GSOA does not oppose the concept that the terrestrial IMT/5G industry will need spectrum for the deployment of 5G services, but we do believe that sufficient spectrum is available in several low and mid bands that are not used for critical services such as satellite services to meet these requirements.

In this regard, we respectfully draw the URCA's attention to the fact that C-band spectrum remains essential to the Fixed Satellite Services (FSS), which are widely used in the region. We therefore urge the URCA to balance the interests of each industry and ensure that satellite services can continue to operate in 3700-4200 MHz to provide their essential services in the Country as well as in the Caribbean.

GSOA would also like to draw the URCA's attention to a recently publish paper by Plum consulting[2] showing the total spectrum allocation compared against the current assignments and awards to operators within C band. The paper highlights the total spectrum assigned in three frequency range categories for each country for which information was available (approximately 160 countries).

The C-band frequencies provide satellite coverage of the Earth and robustness of satellite transmissions to atmospheric conditions which remain unmatched. This specific combination of coverage and robustness makes this band even today a prime asset for satellite services as well as a critical target for continued investment to enable fundamental missions (aeronautical communications, weather services, emergency response, disaster recovery, connectivity anywhere, broadcasting, etc.) Hence, the number of satellites operating in Latin and Central America in the 3700-4200 MH band is significant, all providing essential telecommunications services.

The importance of 5G networks for the socioeconomic development of The Bahamas cannot be underestimated, and as already mentioned above, GSOA recommends considering also the satellite component of 5G. Not only for a correct development of all radio technologies contributing to the deployment of 5G solutions (and not only IMT), but also to guarantee the continuity of other essential services, it is imperative to guarantee access to sufficient spectrum to FSS.

URCA proposes to assign 400 MHz of C-band spectrum from 3300-3700 MHz to IMT for 5G services and, at a later stage, additional 500 MHz of C-band spectrum from 3.800-4.200 MHz, noting that 3700-4200 MHz is currently identified for FSS (space-to-Earth downlinks) in the National Spectrum Plan. GSOA supports that for now 400 MHz of C-Band spectrum (i.e. from 3300-3700 MHz) for terrestrial use is sufficient to promote the initial deployment of 5G in Bahamas. With 400 MHz, there is enough spectrum for every MNO to offer high quality 5G services. Even when looking at the current situation in Bahamas there are only 2 MNOs this would equate to 200 MHz bandwidth each.

[2] Examining the current assignment and usage of mobile spectrum (gsoasatellite.com)

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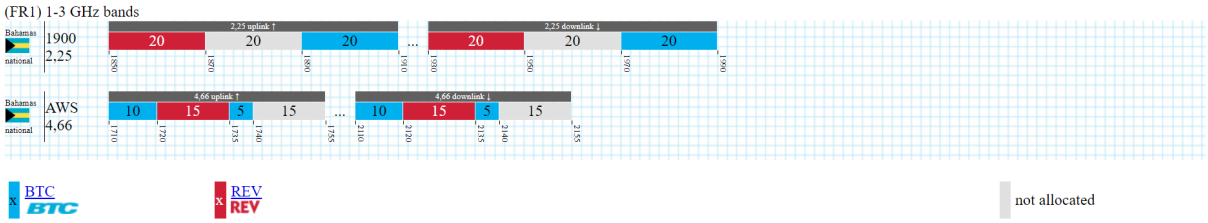

Figure showing the number of MNOs and their frequency assignment today in Bahamas.

Even where there are more than two players, and this would increase to four MNOs inside the country, the likely outcome is that each operator will secure 60-80 MHz, or perhaps 40-100 MHz, if operators pursue different approaches to launching 5G.

Observe that, in all these cases, the expectation is that every operator will secure at least 40 MHz. This is more than sufficient for every MNO in every region to provide a great 5G service, as demonstrated by recent research published by Ofcom[3], the communications regulator in the United Kingdom. In response to claims by some MNOs that they needed access to at least 80 MHz of contiguous spectrum, Ofcom researched the ability of mobile operators to launch 5G services with 40 MHz of spectrum. It found that: *"there was no evidence that 5G could not be delivered with smaller [e.g. 40 MHz blocks] or non-contiguous carriers in other frequency bands [i.e. spectrum other than C-band]."*

To support its finding that 40 MHz of C-band was sufficient to provide 5G services, Ofcom developed a theoretical cell site throughput model to estimate network performance based on various assumptions on the type of antenna used, bandwidth of C-band carrier, and signal strength received by the user.

GSOA also developed a white paper "TEN GOOD REASONS why mobile operators in Africa do not need 100 MHz of contiguous C-band spectrum each"[4] while this paper was intended for Africa, we believe the content is still valid and useful for the Bahamas and is intended to provoke debate regarding the reasons which MNOs have given for requiring large amounts of C-band spectrum.

The introduction of high-power terrestrial IMT / 5G transmissions in the C-band used for FSS downlinks will unavoidably cause harmful interference to satellite services, because they can overwhelm the ability of satellite earth stations to receive low-power transmissions from outer space anywhere in the band, cause intermodulation effects, and create other interference issues. Numerous ITU studies and reports have reported the difficulty to ensure FSS / IMT coexistence. The risk of harmful interference is even more severe in the case of unlicensed satellite receive-only earth stations which location is unknown and the protection impractical.

GSOA would like to propose that an implementation of the Guardband (between 30 to 40 MHz) is needed to protect the existing C-band FSS operations in the adjacent band (i.e. bands above 3700 MHz). Such guard band are needed to protect the existing C-band FSS operations from the Out of Band Emissions (OOBE) of the terrestrial 5G services. Today MNOs using 5G services have a number of tools at their disposal to manage and reduce the aggregate OOBE from base stations and user equipment to acceptable levels. Some of the tools available to reduce the OOBE levels are mentioned here below, noting that number 3, 4 and 5 all require that the FSS earth stations locations are known. These mitigation techniques

[3] §A7.39 https://www.ofcom.org.uk/__data/assets/pdf_file/0017/192410/annexes-award-700mhz-3.6-3.8ghz-spectrum.pdf
[4] Ten Good Reasons why mobile operators in Africa do not need 100MHz of contiguous C-band – GSOA – Global Satellite Operator's Association (gsoasatellite.com)

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can be deployed across the entire network, in specific areas or on a case-by-case basis to ensure the interference will not impact the C-band FSS operations.

1. Use lower transmit power levels for the base station and user equipment.
2. Install better transmit OOBE mask.
3. Use Multiple-Input Multiple-Output (MIMO) technology to null the radiation pattern in the direction of earth stations.
4. Deploy microcells near FSS earth stations which have lower transmit powers.
5. Force user equipment to roam to non-C-Band frequencies near FSS earth stations.

In addition, GSOA would also like to highlight that based on 5G deployments around the world, this mid-band frequency will only be used for urban deployments. In our view, the use of 3300-3700 MHz would certainly be sufficient to meet the needs of 5G deployments nationally in this band, while allowing existing services above 3700 MHz to operate uninterrupted.

The need for additional C-band spectrum to IMT / 5G therefore needs to be balanced against the severe impact it would have on the incumbent services. GSOA invites the URCA to preserve 3700-4200 MHz for the delivery of essential satellite services and not to propose it as a possible candidate for IMT systems. It is also important to point out that any IMT allocation would also need to be accompanied with clear regulatory conditions as IMT can also severely impact services operating in adjacent band.

Mobile operators may want 80-100 MHz of C-band spectrum - as alluded to by the URCA - for optimal performance, but they do not need this to offer high quality services to remain competitive. Put differently, most of the benefits for the economy and consumers from 5G deployment will be realized through MNOs each deploying the first 40MHz of C-band spectrum, with much smaller incremental benefits from them deploying any additional spectrum up to 100 MHz that they may acquire.

In light of the above, the GSOA urges the URCA to consider that allocating 3300-3700 MHz of C-band spectrum to IMT, together with spectrum from other bands, will be largely sufficient for the optimal deployment of 5G in the country.

GSOA appreciates the opportunity to provide comments on this Consultation and remains at your disposal should you have any questions about this submission.