3GPP TSG RAN Meeting #101 **RP-231888**

Bangalore, India, September 11-15, 2023

Agenda Item: **9.1.5**

Source: **Intelsat**

Title: **Motivation for Standardisation of the Ku Band**

Document for: **Discussion, Decision**

1 Introduction

In this document, we present background on the use of the Ku Band for Satellite Communications, the growth of the Satellite Telecommunication Market particularly for the Ku Band and offer a rationale for Standardising Ku Band for 5G Services. Currently, the Ku Band spectrum is fully operationally used by non-3GPP access schemes and proprietary solutions.

The aim of this document is to emphasize the wealth of services that are being offered through Satellites to consumers and businesses. Furthermore, the commercial opportunities of the Ku Band and 5G Services are presented in this rapidly expanding sector of the Telecommunication market.

2 Overview of the Satellite Telecommunication (SatCom) Industry

The core services that are activated by the Satellite Systems per ITU's definition, Fixed Satellite Services (FSS), Broadcast Satellite Services (BSS), and Mobile Satellite Services (MSS) have been actively used in the Telecommunication Industry for decades.

The satellite Communications market is growing rapidly to meet the need for global connectivity and coverage for consumers and businesses alike. Advancing Satellite and Telecommunications Technology is enabling the Satellite Industry's growth to meet this growing demand.

There are over 50 global communication satellite operators who manage over 600 GEO satellites. 294 of the 600 GEO satellites are equipped to utilize the Ku Band (Seradata). The number of satellites in orbit is expected to grow significantly, with most of the growth coming from NGSO's with thousands of Ku band satellites are currently in orbit.

Currently, over 17M satellite-capable ground terminals are in service. This number is projected to grow by a Compound Annual Growth Rate (CAGR) of 15% between 2023 and 2031. This growth is paralleled by a CAGR of 11% in SatCom service revenue over the same period. Overall satellite capacity supply revenue is projected to grow with a CAGR of 35%, and NGSO capacity revenue is projected to grow with a CAGR of 30%.

This growth in satellite capacity and terminals is necessary to meet the growing demand for key applications like mobility, consumer broadband, and cellular backhaul. Growth in the mobility segment is being driven by growth in in-flight connectivity. Whereas growth in consumer broadband and cellular backhaul is being driven by the need for global ubiquitous connectivity.

Figure 1 illustrates the Size of the SatCom industry, the revenue generated by various Services and the projected growth in different sectors of the industry:

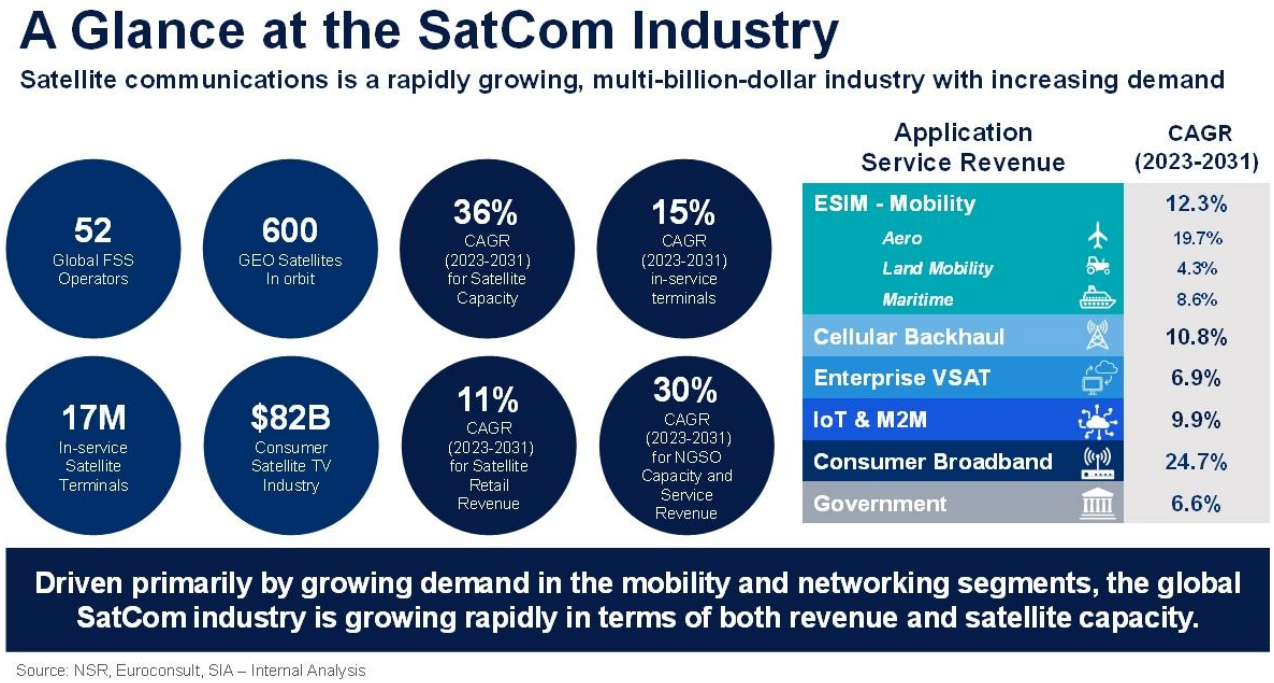

Figure 1: Overview of the SatCom Market and Projections

3 The Use of Ku Band in Satellite Communications

The Ku Band (13/14 GHz UL and 10/11/12 GHz DL) has been used in Commercial Satellite Communication for a very long time for FSS and BSS Services.

Many of the networks that are providing services to enterprise networks and support large scale VSAT corporate networks today operate the 14 and 10/11/12 GHz frequencies (i.e., the “Ku Bands”) and the 30 and 20 GHz frequencies (i.e., the “Ka-Bands”).

With the growth of demand for higher data throughput, the industry has new growth associated with more and more regional and domestic systems and higher demand for international services. The Ku Band in many ways is well suited to spot beam operation and thus smaller wavelengths are suitable to creating higher and higher gain spot beam antennas that could be smaller yet have higher gain.

Most recently, the demand for additional satellite capacity has driven satellite services toward even more powerful and narrow spot beams managed by digital payload technology to allow high degree

of frequency reuse and dynamic coverage creation utilizing advanced digital beam forming. Additionally, Ku Band Services have demonstrated dependable and efficient Service Availability of 99.98% for GEO, 99.9% for MEO and 99.5% for LEO constellations.

VSAT services in Ku globally are expected to see double-digit growth over the next 3+ years. This includes rapid deployment of mobility applications, Aero, Maritime, transportable and vehicle mounted terminals as well as fixed locations to support data and Video applications.

The Internet of Things (IoT) via satellite market is an evolving and expanding landscape with promising growth potential. There exists a growing opportunity in the FSS IoT market, primarily due to advancements in antenna technology. As flat panel antennas become smaller, it will allow for a higher speed and lower cost. Given these factors, FSS IoT providers could cater to higher bandwidth requirements.

4 Size and the Commercial Opportunities of the Ku Band Market

Satellite Connectivity, through various satellite bands, has been used extensively around the world to provide data connectivity to areas with no terrestrial data coverage.

When focusing on the Global Satellite Communications Market with a focus on the utilization of the Ku Band, there is significant growth in both satellite capacity supply and demand, as well as in-service terminal units. According to NSR, the projected compound annual growth rate from 2023 to 2031 is 27% for ground terminals utilizing the Ku Band for satellite communications.

This demand for Ku Band is reflected in the sizeable growth rates in most satellite communications application segments. When looking at the use of Ku Band in these applications, there is significant growth coming from the Mobility applications (e.g., aircraft, vessels) and Consumer Broadband, followed by growth in the IoT and Cellular Backhaul segments.

Figure 2, illustrates the growth of the Ku Band market and services which utilize the Ku Band for their connectivity. The Ku Band Market is projected to grow by 14.7% providing connectivity to over 9.3 million terminals:

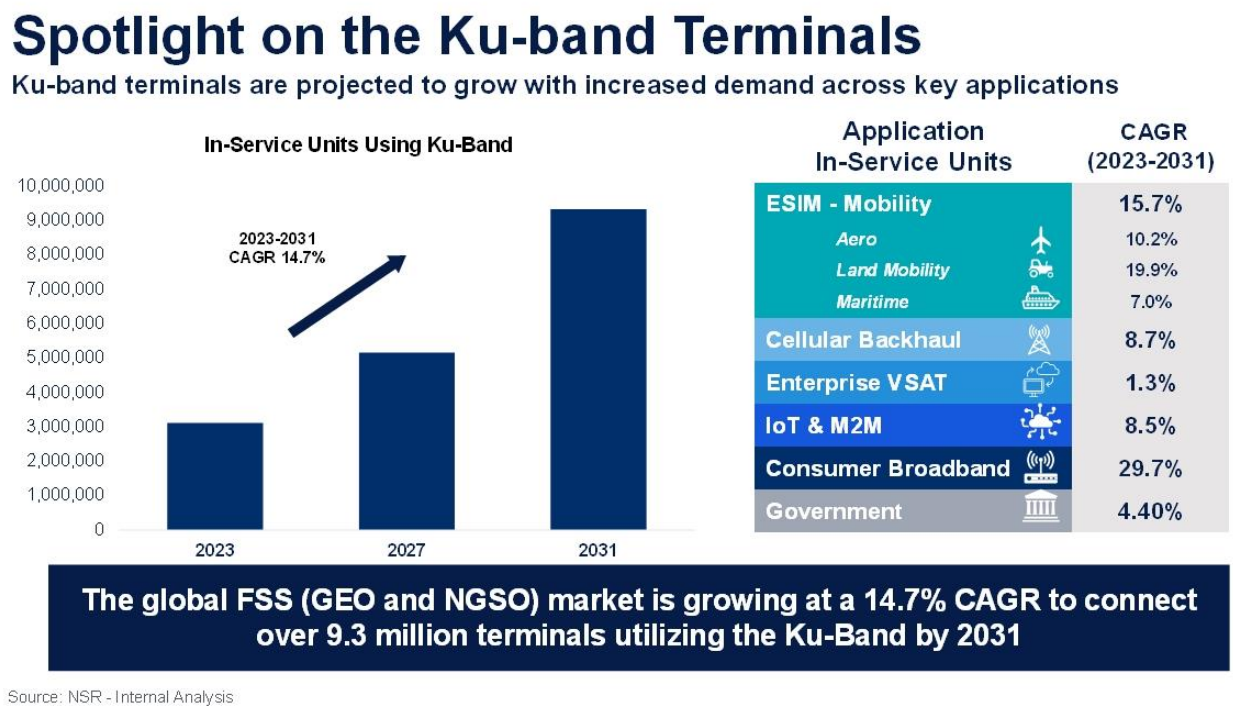

Figure 2: Ku Band Market Forecast and Services Utilising Connectivity through the Ku Band

By reference to Figure 2, it can be observed that the Compound Annual Growth Rate (CAGR) is around 14.7% with the market growing to approximately 9M terminals by 2031. Please note that this is based on the present projections without the 5G Services. The implementation of NTN 5G in Ku Band Services will grow the market significantly larger.

Further analysis of the SatCom market and the size of the data services provided by the Ku Band is shown in Figure 3, we observe that Ku Band carries the bulk of the satellite connectivity in GEO and NGSO sectors of the industry.

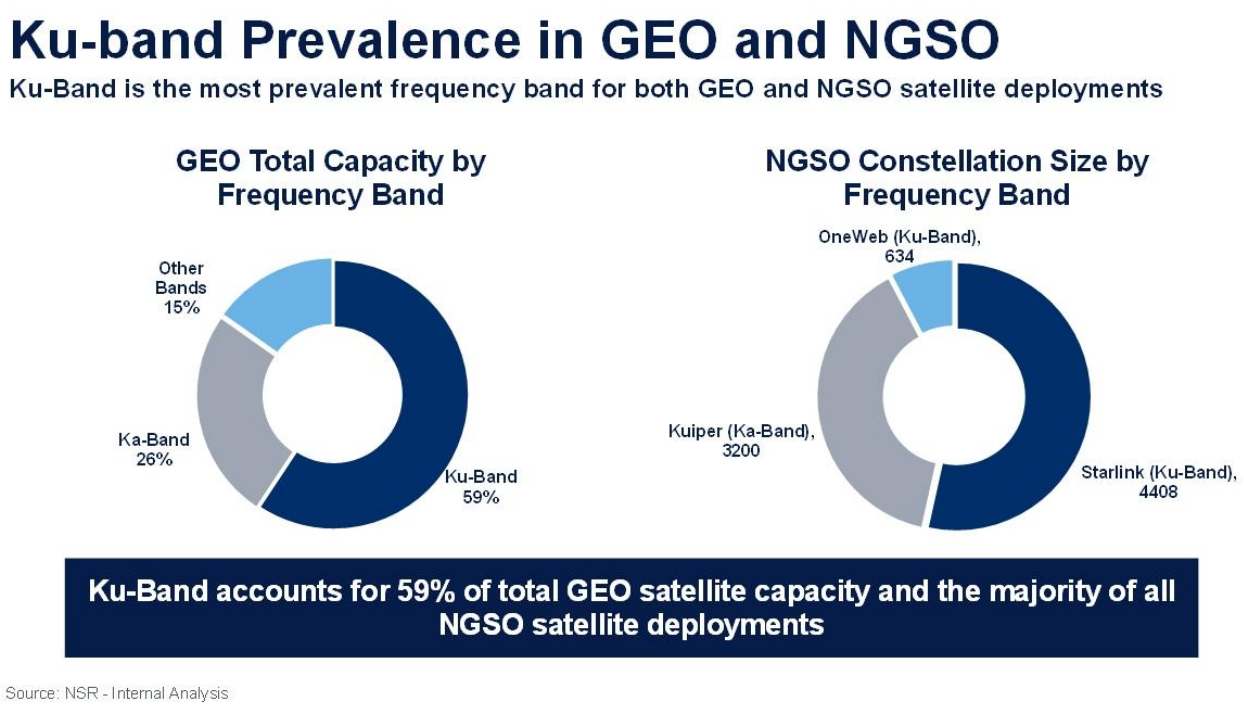

Figure 3 Portion of the SatCom traffic carried over the Ku Band

5 Motivation for Standardising the Ku Band

Over the years, Satellite Industry has relied on proprietary bespoke technological solutions to address its services' needs.

The 3GPP NTN standard is an open standard provides robust solution for Satellite communication solutions across networks. It facilitates satellite network solutions deployment and addresses the challenges of reachability and service continuity in unserved and underserved areas. Additionally, it will enhance reliability through connectivity between various access technologies and will provide improved network resilience and dependability in responding to natural and man-made disasters.

In the envisioned future of the 5G Ku Band market, open interfaces reflect clear-cut requirements, enabling true plug-and-play operation. Modular 5G Ku Band elements would allow network operators to reconfigure, update, or replace subsystems as needed, easily and in minimal time. Additionally, Mobility and Service Continuity is significantly enhanced due to inter-operable signalling.

In summary, 3GPP NTN Open Standards, allow for the expansion of the market, encourage innovation, and reduce deployment and maintenance costs.

6 Summary and Conclusions

In this document we have illustrated the size of the Ku Band and its growth to provide various data services to the Telecommunication Industry.

Currently, Ku Band carries large proportion of the satellite's capacity over GEO and NGSO Satellites.

The Ku Band market is expected to grow exponentially with CAGR of 15% and it is expected to grow larger by implementing 5G Service.

There is an urgent need to standardize the Ku Band to meet the 5G services deployment. The 5G ecosystem infrastructure is currently being built and it is important to ensure available terminals equipped with the 5G chipset. Additionally, by standardising the Ku Band for 5G Services, new commercial and technological opportunities will present themselves for network equipment, chipset, and terminal manufacturers to produce new products. These new innovations will undoubtedly expand the 5G Ecosystem and strengthen the telecommunication market.

It is our view that the 5G Services on the Ku Band will offer the next big wave of market expansion and innovations, for the Telecommunication Industry.

7 References

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