OneWeb India Communications Private Limited
Tower-B, Knowledge Boulevard, Sector-62
NOIDA Gautam Buddha Nagar UP
201301 IN

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Shri Syed Tausif Abbas, Advisor
Networks, Spectrum and Licensing,
Telecom Regulatory Authority of India

OneWeb India Communications Pvt. Ltd.
Auction of Spectrum in frequency bands identified for IMT/5G

Dear Sir,

At the onset, OneWeb would like to recognize the transparent and consultative approach TRAI is taking to get stakeholders opinions on this matter. Recognizing that the object of this particular consultation is mainly aimed at Telecom Service providers, OneWeb would like to offer its views on relevant questions in the consultations impacting both mobile and satellite industries.

1. ABOUT ONEWEB

The OneWeb system will provide low latency, high capacity, connectivity solutions to customers through a new generation of low-earth orbit (LEO) satellites. OneWeb believes that satellite systems have a key role to play in a multi-network broadband ecosystem, often in a complementary way to terrestrial telecommunication solutions.

OneWeb is being deployed worldwide and the OneWeb commercial services in northern region will start at the end of this year, with full global coverage by end of 2022. OneWeb is currently deploying the required infrastructure, including establishment of a Ka-band (18/28GHz) gateway earth station in India, to allow providing satellite broadband connectivity to the most remote part of India and South Asian countries from next year.

2. THE IMPORTANCE OF RADIO SPECTRUM

The COVID-19 pandemic has highlighted the **critical nature of the digital infrastructure to the economy and communities** of every nation including those in rural and remote areas. Lockdowns and quarantine measures across the world in the wake of COVID-19 are creating an increasing gulf: it has accelerated adoption of home working, digital health care, fintech and remote education for the connected population. However, the same jobs, education, and public services are not accessible to the unconnected. As a result, the wealth prospect difference is growing larger the longer the pandemic lasts.

Partnerships between satellite and terrestrial operators are key to improve the access and affordability. Only by using LEO satellite constellations will universal service be truly achieved across India. Particularly, **OneWeb will be working hand in hand with our telecom partners** who will use our cost effective, fibre-like connectivity solution to further their networks' reach. National mobile operators' customers will likely pay cost-effective fees like those of their counterparts in the cities. Successful partnerships such as these can enable remote communities to finally enjoy the benefits of truly inclusive connected societies, unlock digital opportunities, and spur economic growth.

4G and 5G matching QoS on OneWeb's LEO constellation allows it not only to provide coverage solution where terrestrial build out is never going to be feasible economically, but also to the "temporarily" unconnected areas, as satellites provide an important interim infrastructure in areas even where terrestrial may eventually arrive. By encouraging telecom terrestrial operators to use satellites for interim infrastructure satisfying promptly the user demands, Nations can not only meet their universal service goals, but also begin to enjoy the advantages of a connected population and economies far sooner than expected. A recent study[1] from PLUM Consulting showed that the provision of **high-speed broadband connectivity via satellite to unserved regions in India can contribute up to US$184.6 billion in GDP growth per annum by 2030**.

Furthermore, satellite-based solutions offer highly robust technologic and operational solutions when facing natural disasters, and Fixed and Mobile satellite user terminals are the fastest way to establish or re-establish communication for emergency services to assist them during relief effort. In addition, combining OneWeb User Terminals to an existing or a vehicle mounted cellular base station can re-establish the entire public mobile network in a matter of hours to reconnect the whole community.

Spectrum policy has a critical role to play on adoption of emerging technology such as the LEO satellites, and access to interference-free spectrum in bands such as Ku- and Ka- band is critical to operation of the OneWeb solutions. Moreover, affordability of these spectrum directly impacts the business case of bringing service into those rural and remote area, and realise the above-described socio-economic benefits.

3. 28 GHZ

OneWeb has strong concern regarding this footnote reserving this band for IMT, and this footnote INS39 is in total contradiction to the footnote INS34C reserving this band for FSS.

OneWeb is currently using the 27.5-29.5 frequency band for its gateways to provide critical communications services. The 28GHz band (Ka-Band) has long been assigned for Satellite service, however in recent years terrestrial mobile equipment vendors are pushing this as a pioneer 5G band. This has found some support with US and South Korea regulators. The risk of interference will arise if terrestrial mobile services are authorized in this band. This band however was not accepted as a potential IMT band at ITU WRC-15 and WRC-19. ITU Members States has instead harmonised a total of 17 GHz of other mmWave band[2] for 5G.

In the case of OneWeb, the Ka band (27.5-30.0 GHz uplink, paired with 17.8-19.3 GHz downlink) is used for the gateway earth station to satellite link in our current satellites design. Carving away any portion in the uplink will limit the bandwidth and coverage of the gateway, and severely impact our operation in India and South Asia region.

We believe the mobile industry has many better alternative spectrum for 5G than 28GHz, instead of pushing for an extra 1GHz on top of 17GHz already identified for IMT. Giving the choice, mobile operators would prefer

[1] https://plumconsulting.co.uk/expanding-digital-connectivity-through-satellite-broadband-in-the-28-ghz-band/
[2] Total bandwidth in 26GHz, 40GHz, 45GHz and 66GHz bands identified for IMT at WRC-19.

using 3.5GHz which has better propagation, or 26GHz with larger addressable market. We would like to share details of recent development regarding 5G spectrum below.

Opportunistic use of 28 GHz in USA

The situation of 28GHz was very unique to USA. In 1999, FCC assigned this band to LMDS[3] as "wireless cable", but the technology never took off commercially and operators such as Verizon who hold the spectrum lobbied the FCC to convert it for 5G fixed wireless. Key considerations was there were no mid-band spectrum that could be made available for 5G in USA except through CBRS[4], and 26GHz was not immediately available to the mobile industry.

However US mobile operators' 5G strategy is shifting as they acquire more alternative spectrum in their portfolio. Verizon, who initially built its 5G strategy on acquiring the most spectrum in 28GHz, has spent over $45 bn to acquire 160 MHz of C-band spectrum in the February 2021 auction. The FCC acting chairwoman recently said that the FCC made a mistake a few years ago when it focused all of its energy in the early 5G days on millimeter wave[5]. Recently, Verizon is also reportedly selling off some of its 28GHz in secondary market[6].

In mmWave, 26GHz is better suited for global harmonisation

mmWave could be used in hotspot scenario to add capacity to the base layer of mid-band 5G deployment. 26GHz is the most mature ecosystem among the spectrum identified for IMT at WRC-19. We put forward the following considerations for licensing 26GHz for 5G:

- 26GHz is identified for IMT at ITU WRC-19, and therefore harmonised globally.
- **26 GHz band has a total bandwidth of 3.25 GHz, enough bandwidth for the 4 MNOs to have 800MHz each**
- 5G NR has maximum carrier bandwidth up to 400 MHz in the mmWave frequency range, and can be aggregated to a maximum bandwidth of 800 MHz
- Many countries are only making 1.0-1.2 GHz available (i.e. 200-400 MHz per MNO) in 26 GHz and use innovative regime such as "club licensing" to enhance spectrum efficiency.

[3] Local Multipoint Distribution Sevice

[4] Citizens Broadband Radio Service, a shared spectrum access scheme to 3.5GHz, disliked by MNOs due to uncertainty of spectrum access.

[5] "I think that the FCC made a mistake a few years ago when it focused all of its energies in the early 5G days on spectrum called millimeter wave. Those are airwaves that are really high up there they have lots of capacity but their signals don't travel very far. And so what that means is that you have to have lots of ground based facilities to make those signals viable. And that's a really costly thing to do. And so, if we just relied on millimeter wave spectrum we'd actually grow the digital divide with 5G." – Jessica Rosenworcel. Jul 16, 2021 (https://www.axios.com/fcc-5g-midband-milimeter-spectrum-digital-divide-ee591e73-53be-4cf9-8818-f43bdb8d1976.html)

[6] https://www.rcrwireless.com/20210326/5g/verizon-sells-5g-mmwave-spectrum-to-geolinks

For example, **Finland** has released the most bandwidth in the 26 GHz band for IMT: 800MHz per MNO. And since there are only 3 MNOs in Finland, there was enough bandwidth in the band to cater for the MNOs' needs, while still having 850MHz to be licensed to vertical players such as local and/or private networks. As India mobile market is going through consolidation, there is more than enough bandwidth to accommodate 3 to 4 MNOs, even at this maximum bandwidth.

Another example is **Italy**, which licensed a total of 1GHz in the 26 GHz band, i.e. 200 MHz to each MNO, in a 'club licensing' model. Under this approach, licensees will be able to share any unused spectrum from the other licensees, improving their offering and overall spectral efficiency at no extra cost.

In developing markets, the usage for mmWave is yet to be seen. In the recent 5G auction in **Brazil**, which included 700MHz, C-band and 26GHz, most of the mmWave bands get unsold. Communications Minister Fabio Faria noted that the 26 GHz spectrum did not attract interest due to uncertainties in the business model[7].

If in the future there are indeed additional needs in the mmWave for IMT or for private networks, India also identified the **37-43.5 GHz**, **47.2-48.2GHz** and **66-71GHz bands** for IMT at WRC-19. Should the additional spectrum be necessary, TRAI needs to consider licensing those bands first, before looking to the 28 GHz band that is in use by satellite operators today.

4. ONEWEB RESPONSES TO SELECTED QUESTIONS

Q.6 Do you agree that TDD based configuration should be adopted for 24.25 to 28.5 GHz frequency range? Kindly justify your response

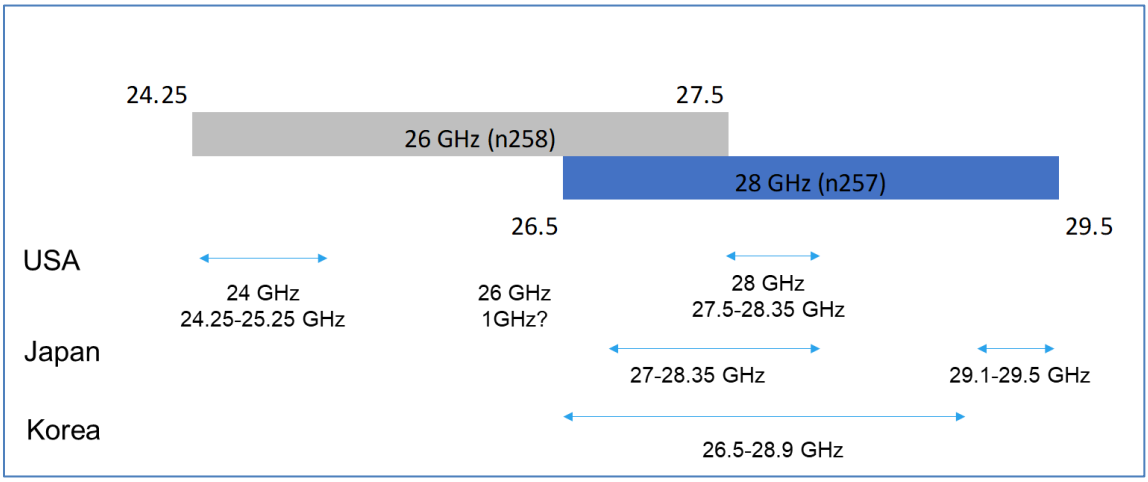
Given the above explanation regarding the criticality of the spectrum band above 27.5GHz for the satellite industry, and unsubstantiated needs for more capacity than 3.25 GHz already in offer in the 26GHz, OneWeb respectively submit that TRAI should recommend the DoT to only auction the 24.25-27.5 GHz in the TDD configuration.

Q.7 In case your response to Q6 is in affirmative, considering that there is an overlap of frequencies in the band plans n257 and n258, how should the band plan(s) along with its frequency range be adopted? Kindly justify your response

OneWeb would like to note that while the band plan n258 for 24.25-27.5 GHz is clear and easily implementable, it is unclear how 3 different 3GPP band plan to include the 27.5-28.5GHz can be implemented in the same devices without increased cost for the handset and therefore the consumers. Moreover, among

[7] https://www.rcrwireless.com/20211108/5g/brazil-raises-total-8-billion-5g-spectrum-auction

the 3 main proponent countries of 28GHz for 5G, the portion of the band licensed to mobile operators varies significantly, demonstrating a very fragmented approach to licensing this band. It is worth noting that **in all 3 cases below,**



26GHz was not immediately available for release at national level. It is an opportunistic use of spectrum by those countries, due to their inability to release mid-band and globally harmonised mmWave spectrum. OneWeb urges the TRAI to recommend the DoT to not follow those countries who have different circumstances, and when sufficient alternative spectrum in the 26GHz is readily available.

Q8. Whether entire available spectrum referred by DoT in each band should be put to auction in the forthcoming auction? Kindly justify your response.

As mentioned in section 3, frequency bands above 27.5 GHz are essential to the operation of OneWeb gateways and IMT should not be introduced in this band, especially when enough mmWave bandwidth in 24.25-27.5 GHz, in addition of low and mid bands, are made available through this upcoming auction. TRAI should recommend DoT to stick to the internationally harmonised IMT spectrum only and not jeopardise the future development of satellite industry.

Q.16 Is there a need to prescribe any measure to mitigate possible interference issues in 3300-3670 MHz and 24.25-28.5 GHz TDD bands or it should be left to the TSPs to manage the interference by mutual coordination and provisioning of guard bands? Kindly provide justification to your response.

OneWeb would like to reiterate that 27.5GHz and above should not be auctioned, at least not until the usage of other mmwave like 26GHz has been substantiated and other IMT bands has been exhausted. On the 24.25-27.5 GHz, the interference considered should not only look at the synchronisation issues and guard band between TSPs holding the license, but also other spectrum users such as Fixed Satellite Service in adjacent bands, and proper protection/mitigation are required to be in place. Example of mitigation include 5G base stations need

to point to below the horizon, and coordination between the FSS Earth Stations and the 5G operations should be based on a predetermined coordination threshold.

Other: Spectrum for Space-based communication

Possibility of Auction of spectrum for space-based has been mentioned in this consultation, although TRAI indicated it will be the subject of a later consultation. OneWeb stand ready to provide our detailed view at appropriate time, but would like to note the following: There are no precedence of auction to satellite services in these bands in any country for a very good reason, the basic principle of an auction of any sort is provide exclusive access to a resource where demand exceed supply, in this regard, spectrum assignment by auction is not suitable for spectrum that can be shared between multiple satellite operators (such as in Ku/ Ka band) and should be based on an administrative process.

Spectrum for satellite earth station should be assigned administratively, and on a case by case basis, as those are used only at very specific location rather than a nation-wide assignment. It is an entirely different situation from spectrum assignment to terrestrial mobile operators where spectrum cannot be shared amongst the TSPs and each needs exclusive access to the spectrum resource.

Please do not hesitate to contact us if you would like to discuss the content further.

Yours truly,

Christopher McLaughlin

Chief of Government, Regulatory Affairs and Engagement
OneWeb Communications Ltd