4th November, 2025

Shri Akhilesh Kumar Trivedi,
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India
4th, 5th, 6th & 7th Floor, Tower-F,
World Trade Centre, Nauroji Nagar,
New Delhi: 110029

Subject: **Consultation Paper on Auction of Spectrum in Frequency Bands Identified for IMT**

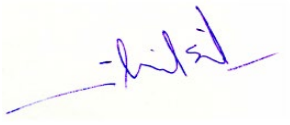
Dear Sir,

I am writing to you on behalf of GSA (Global Mobile Suppliers Association - https://gsacom.com), a not-for-profit industry organization representing companies across the worldwide mobile ecosystem engaged in the supply of infrastructure, semiconductors, test equipment, devices, applications, mobile support services. GSA actively promotes the 3GPP technology roadmap covering 3G, 4G and 5G, and is a single source of information for industry reports and market intelligence (with more than 220,000 reports, charts and presentations). Our reports are also referred by vertical markets such as aviation, automotive, broadcasting, emergency services, energy, health, media, music, policing, publishing, retail, transport, travel and government agencies.

GSA actively promotes the global harmonization, while incorporating regional specific changes to meet requirements of national regulators, policy makers and international organizations. Global harmonization is a key for achieving economies of scale. GSA promotes a successful evolution of the family of 3GPP technologies and International Mobile Telecommunication (IMT) of ITU and the associated administrative, operational and technical aspects.

GSA appreciates TRAI for initiating stakeholder consultations on the auction of radio frequency spectrum in the frequency bands Identified for International Mobile Telecommunications (IMT) in India. Please find GSA response in the Annexure to this letter.

Sincerely,



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Annexure

Please find below the GSA response on the questions from TRAI -

i) Q10. to Q13. (Topic – APT600 MHz Band)

GSA supports the 3GPP band plan n105 for the 600 MHz band in India.

a. Introduction: Why Auctioning the Entire 600 MHz Band Matters

The 600 MHz band represents a critical opportunity for expanding low-band 5G coverage, particularly under the 3GPP n105 band plan, which aligns with the Asia-Pacific Telecommunity (APT) 600 MHz framework. Auctioning the entire band (40x2 MHz) following the 3GPP n105 band-plan is provides an effective option to extend 5G services to rural, underserved, and geographically challenging regions. The APT600 (3GPP n105) MHz band plan has been studied extensively (considering the adjacent band plan APT700 used in APT region) and is tailored to meet the needs of the APT region, offering a regionally harmonized approach to maximize the spectrum utilization that supports Frequency Division Duplex (FDD) with reverse duplexer configuration.

b. Global Adoption and Regional Momentum

Several countries—including India, New Zealand, Vietnam, and parts of Latin America—have shown strong interest in adopting the n105 band. While global adoption remains uneven due to legacy regional plans and varying regulatory environments, the momentum toward harmonization is growing. Regional coordination efforts, supported by organizations like the ITU and 3GPP, are helping to streamline policy frameworks and encourage broader uptake of the APT600 MHz band plan. For emerging markets, n105 offers a realistic and cost-effective path to achieving nationwide 5G coverage, especially in areas where mid-band or high-band spectrum is impractical due to propagation limitations or infrastructure costs.

c. Ecosystem and Industry Readiness

One of the most compelling arguments for adopting the n105 band is to drive the readiness of the chipset ecosystem. Inclusion of APT600 MHz in the 3GPP NR bands list (since Rel 18) has simplified integration for handset manufacturers, fixed wireless access (FWA) providers, and IoT device makers due to readily available support in chipsets. Chipset vendors like Qualcomm have already incorporated n105 support across their product lines, including smartphones, customer-premises equipment (CPE), and FWA platforms. This was showcased during IMC-2024, where commercial devices demonstrated seamless operation on n105. When telecom operators procure this band, original device manufacturers (ODMs) and original equipment manufacturers (OEMs) are expected to enable n105 support across their new devices, including budget-friendly models.

Device support for any newer bands is very closely related to regulatory clarity. Having unambiguous and clear regulatory decision motivates the device vendors to start offering the band within the cost-sensitive markets like India. This was reflected in the successful rollout of Band n78 and n28 in India post-2022 auction, where ODMs quickly adapted to market needs. These bands n78, n28 among others followed a similar playbook, they were already supported in the chipset, and device makers rapidly enabled these

bands to cater to market trends. The support for n105 can be expected to follow a similar trend, with a robust and ready support in chipset, and devices to closely follow market trends based on business considerations in cost sensitive markets like India.

d. Technical Advantages of Low-Band Spectrum

The 600 MHz band offers superior propagation characteristics, making it ideal for wide-area coverage and deep indoor penetration. When combined with mid-band and millimeter-wave frequencies, low-band spectrum like n105 ensures consistent connectivity over longer distances and through physical obstructions. This is also particularly beneficial for indoor coverage, rural broadband, smart agriculture, and public safety applications. Additionally, low-band spectrum supports efficient spectral reuse and reduces the need for dense infrastructure, lowering deployment costs and accelerating time-to-market for operators.

e. Technical standards readiness

3GPP completed its Technical Report TR 38.892[1] "APT 600 MHz NR band" in April 2023. And following that, the 3GPP has fully completed all of the standardization work related to band n105 (i.e., APT 600 MHz Band". Further, 3GPP, while fully realizing that the true ecosystem development may require all necessary band combinations that are relevant for Asia Pacific and particularly India, the 3GPP RAN4 group has been consistently working towards adding several band combinations from 2CC to 6CC that include the n105 along with the frequency bands that are typically used for IMT in Region 3 (including those in India).

Q14. Whether the spectrum in 6425-6725 MHz and 7025-7125 MHz ranges in the upper 6 GHz band should be put to auction for IMT in the forthcoming auction? Kindly provide a detailed response with justifications.

GSA recognizes India's decision on the identifying the entire (6425-7125MHz) 700 MHz of the Upper 6 GHz band[2] for IMT. GSA also recognizes that in India G.S.R. 1046(E) dated 18th Oct 2018 applies with respect to some other low power applications in this frequency range on non-interference, non-protection and shared on non-exclusive basis. GSA supports the consideration of spectrum in 6425-6725 MHz and 7025-7125 MHz ranges in the upper 6 GHz band to be put to auction for IMT in the forthcoming auction. Given that this spectrum range is part of the 3GPP band n104 that is defined over 6425-7125MHz, it is important to adopt the 3GPP n104 to encourage device ecosystem.

The Upper 6 GHz band is considered critical for meeting the mid-band capacity demands for the mobile growth in India. GSA's opinion is that it is necessary to ensure that mobile network operators have sufficient access to dedicated, licensed spectrum in order to be able to continue providing wide-area and widespread positive socio-economic benefits. 3GPP Technical specifications for the band are available for operators to enable 5G Advanced features that will also evolve towards new 6G features.

[1] https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=4123

[2] For this band, some GSA members also have interests in other wireless technologies / applications

This band will facilitate larger contiguous block sizes compared to those available in current harmonised mid-bands in India. This would be particularly beneficial for targeted new services and applications that require larger bandwidth.

The Upper 6 GHz band is expected to be deployed on the same network grid as 3.5 GHz and to provide compliment the indoor and outdoor performance to support high capacity and wide area coverage, especially in urban and dense environments. This has been recently demonstrated by several field tests and trials[3].

The upper 6GHz band was auctioned/assigned in UAE and Hong Kong. In UAE, the entire Upper 6 GHz band was assigned to the two MNOs (2 block of 350 MHz each) in November 2024. In Hong Kong, auctioned 300 MHz within 6425-7125 MHz to three MNOs in November 2024.

With the first upper 6 GHz assignment processes to the operators were finalised during the end of 2024, some key players in device component and network infrastructure ecosystems indicated that the commercial base station would be available soon. Commercial chipset is available now: the MediaTek M90 Modem within a standard smartphone is used in a recent test conducted by Vodafone[4].

Q15. In case you are of the opinion that the spectrum in 6425-6725 MHz and 7025-7125 MHz ranges should not be put to auction in the forthcoming auction, what should be the timelines for auctioning of this spectrum for IMT? Kindly provide a detailed response with justifications.

-NIL-

Q16. Considering that the satellite-based service (uplink) will coexist with IMT-based services in the upper 6 GHz band, - whether pilot trials should be conducted to ascertain the keep out distance of the IMT base stations for satellite uplink stations before the auction of the upper 6 GHz band, or should it be left to the telecom service providers to ascertain the keep-out distance of the IMT base stations for satellite uplink stations at the time of commercial deployment after the auction? Kindly provide a detailed response with justifications.

The coexistence between IMT and FSS in Upper 6GHz were extensively studied during WRC-23 cycle. For coexistence with FSS UL, Resolution 220 (WRC-23) defines an *Expected EIRP mask* to ensure the protection, while allowing the deployment of macro-cellular IMT base stations in this band. Followed by the definition of *Expected EIRP mask in Res. 220 (WRC-23)*, 3GPP further specified the Expected EIRP mask of NR band n104 base station and its conformance test requirement in TS 38.104 and TS 38.141-2 in 2025.

[3] Recent trials related to Upper 6GHz:
- Nokia: The potential of upper 6 GHz for 6G: Field insights and comparison with 3.6 GHz
- Vodafone's world-first 6GHz spectrum test positions Europe to lead in advanced 5G and 6G
- Use of U6 GHz band for mobile (https://www.bt.com/content/dam/bt-plc/assets/documents/about-bt/tech-fellowship/use-of-u6-ghz-band-for-mobile.pdf)
- First pre-6G video stream in Austria: A1 and - Telekom Austria Group
- Orange-Nokia Tests Confirm 6 GHz Band for Mobile Network - Orange Hello Future
- https://www.linkedin.com/posts/ericsson_5g-6ghz-uaevision2031-activity-7388545463316013058-e8AW (Oct'25)

[4] Vodafone's world-first 6GHz spectrum test positions Europe to lead in advanced 5G and 6G

With the well-defined technical conditions from WRC-23 and the conformance specifications from 3GPP, GSA is of the view that the coexistence between IMT and FSS can be achieved in U6GHz. GSA supports to left it to the service providers to further ascertain on this if required.

Q17. In case it is decided to put the spectrum in 6425-6725 MHz and 7025-7125 MHz ranges in the forthcoming auction, -

- **(a) Whether the 3GPP band plan n104 should be adopted for the upper 6 GHz band? If no, which band plan should be adopted for the upper 6 GHz band?**
- **(b) What amount of spectrum in the 6425-6725 MHz and 7025-7125 MHz ranges should be put to auction?**
- **(c) Whether the spectrum in the 6425-6725 MHz and 7025-7125 MHz ranges should be auctioned on Telecom Circle/Metro service area basis with a validity period of 20 years? If no, what should be the area and validity period of spectrum assignment in the 6425-6725 MHz and 7025-7125 MHz ranges?**
- **(d) What should be the block size, minimum bid quantity, and roll-out obligations for the spectrum in these ranges?**
- **(e) What should be the eligibility criteria and associated eligibility conditions for bidding for the spectrum in these ranges? Please provide a detailed response with justifications.**

GSA supports the 3GPP band plan n104 for the upper 6 GHz band in India.

Q18. What provisions with respect to the spectrum cap per service provider in a licensed service area (LSA) should be made applicable for the spectrum in the upper 6 GHz band for IMT? Specifically, -

- **(a) Whether a combined spectrum cap for the 3300 MHz band and the upper 6 GHz band should be prescribed? If yes, what should be the spectrum cap per service provider?**
- **(b) In case your response to (a) above is in the negative, what should be the spectrum cap per service provider for the spectrum in the upper 6 GHz band? Please provide a detailed response with justifications.**

-NIL-

Q19. To mitigate inter-operator interference due to TDD-based configuration, whether the approach adopted for the 3300 MHz and 26 GHz bands should also be made applicable for the newly identified spectrum in the upper 6 GHz band? In case you are of the opinion that some other provisions are required to be established, suggestions may kindly be made with detailed justifications.

-NIL-

Q20. Are there any other inputs/ issues related to the auction of spectrum in the upper 6 GHz band for the forthcoming auction? Suggestions may be made with detailed justifications.

None.

-NIL-

Q21. Considering the need to assign a contiguous 24 MHz block in the 1427-1518 MHz range to the Government user,

- **(a) Which band plan and duplexing scheme should be adopted for IMT in the 1427-1518 MHz range?**

(b) Which range of spectrum (a contiguous block of 24 MHz) should be assigned to the Government user? Kindly provide a detailed response with justifications.

Q22. Are there any other inputs/ issues related to the spectrum in the 1427-1518 MHz range? Suggestions may be made with detailed justifications.

GSA's Combined Response for Q21 and Q22. GSA recommends the decision of the band-plan to be reconsidered in future consultations, when the 3GPP specifications are further evolved and developed based on the capacity/coverage demands in UL/DL beyond 2026.

a. Propagation Advantages of L Band

The L Band (1427–1518 MHz) offers superior propagation characteristics compared to higher frequency bands like 3.5 GHz and 6 GHz. Lower frequencies experience less free-space path loss, allowing signals from low-power user devices to travel farther and penetrate obstacles like buildings and foliage more effectively. This ensures reliable connectivity, especially in urban and suburban environments. By making use of the 1500MHz Band, operators can maintain robust connectivity even at cell edges, improving overall network performance and user experience.

b. Network Efficiency and Economic Viability of L Band

Deploying in the L Band enhances spectral efficiency and reduces interference due to its wide coverage and better resource reuse. Fewer base stations are needed, simplifying network planning. Economically, the 1500MHz Band is attractive because many regions already have allocated or underutilized spectrum, reducing acquisition costs. Its proximity to legacy LTE and sub-2 GHz bands ensures compatibility with existing antenna and RF technologies, lowering deployment expenses. These factors make the 1500MHz Band a cost-effective and technically sound choice for improving reliability and coverage in 5G networks.

c. Regulatory Considerations and Band Planning

Currently, there are FDD, TDD and SDL (Supplemental Downlink) band plans supported in 3GPP specifications for this frequency range within 1427-1518MHz (L band/1500MHz band). However, discussion regarding Supplemental Uplink (SUL) band plan for the L Band are under discussion stage.

(i) ITU-R recommends three arrangements: SDL (G1), FDD (G2), and TDD (G3).

(ii) Existing 3GPP bands include FDD (Bands 11, 21, 74, n74), SDL (Bands 32, 75, 76, n75, n76), and TDD (Bands 45, 50, 51 n50, n51).

Currently, the minimal channel size supported for any of the above 5G NR band-plans in 3GPP is 5 MHz, which leads to usable spectrum above 1451 MHz in multiples of 5 MHz only. However, a government decision to reserve 24 MHz of L Band spectrum limits usable bands for telecom therefore, to facilitate IMT deployment, IMT spectrum in L Band should be contiguous. There should not be additional regulatory requirements for operating band 1451-1518MHz in addition to the 3GPP specification. This would streamline equipment design, ensure contiguous and clean spectrum for operators, and simplify future harmonization if the government relinquishes the spectrum.