BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

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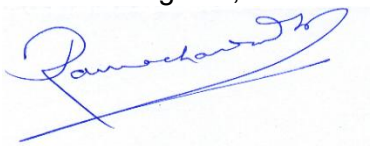
Shri Akhilesh Kumar Trivedi
Advisor (Networks, Spectrum & Licensing)
Telecom Regulatory Authority of India,
4th, 5th, 6th & 7th Floor, Tower-F,
World Trade Centre, Nauroji Nagar,
New Delhi – 110 029.

Dear Sir,

Subject: BIF Comments on the Consultation Paper on *"Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT)"*

This is with reference to TRAI's Consultation Paper No. 8/2025 on the Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT). Please find attached BIF's comments on the same for your kind consideration and perusal.

With best regards,



T V Ramachandran,
President,
Broadband India Forum

BIF RESPONSE TO TRAI CP ON AUCTION OF RADIO FREQUENCY SPECTRUM IN THE FREQUENCY BANDS FOR IMT

As a think tank working for the enhancement of the broadband ecosystem in a holistic and technology and service neutral manner, Broadband India Forum lauds the Telecom Regulatory Authority of India's (TRAI's) commitment to promote broadband and digital infrastructure readiness while bridging the digital divide through ubiquitous and affordable broadband connectivity across India. We enthusiastically support the TRAI's effort to come out with this consultation paper on the proposed Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT) ("Consultation") and are privileged to provide the following responses and recommendations.

While we appreciate that 10 spectrum bands are being put up for auction for growth of IMT and that we have commented on almost all the questions pertaining to all the other spectrum bands including the new bands, we wish to highlight that the newly introduced 6GHz band assumes special importance for BIF. The 6GHz band is required to be looked at seriously in the context of the fact that more and more data intensive applications are emerging you need more modern and advanced WiFi (WiFi 6E/7) particularly indoors , where almost 80% or more data is consumed and also in view of the fact that higher frequency waves from advanced Mobile Technologies are hugely challenged when it comes to in-building penetration. . Keeping in view the special role that delicensed 6GHz has to play in India's digital future, BIF has given extra emphasis to 6GHz in its submission.

Reliable and affordable digital communications are essential to overcoming the 'tyranny of distance' and ensuring that all Indian citizens can fully participate in the digital economy. Wi-Fi is instrumental to this mission as a cost-effective connectivity solution that extends broadband access across both urban and rural areas. BIF respectfully urges TRAI to recognize Wi-Fi's fundamental role in complementing mobile, fixed and satellite broadband networks, particularly in underserved regions where infrastructure challenges limit connectivity. The expansion of advanced Wi-Fi technologies (e.g., Wi-Fi 7), enabled by access to sufficient spectrum—namely the 6GHz band [5.925–7.025 GHz] will significantly enhance the mission and goals of Digital India by digitally empowering all the 1.45Bn citizens of the country and helping bridge the digital divide by providing affordable and reliable broadband connectivity while indoors and in public spaces, where over 80% of data generation and consumption takes place. Besides which the end-user equipment, which inevitably works on Wi-Fi, would keep pace with not only the rest of the world in research and development as well as consumer experience but with the bandwidths that 5G and 6G would provide, complementing the total digital experience promised in the 6G Vision.

BIF respectfully asks TRAI to consider the provision of Wi-Fi access to the full 6 GHz band (5.925–7.025 GHz) is essential to support high-capacity, multi-gigabit Wi-Fi networks that are scalable, inclusive, and locally deployable. Countries that have already opened the full 6 GHz band for Wi-Fi are seeing rapid innovation, cost-effective deployments, and the growth of vibrant digital ecosystems.

India's digital future depends on broadband wireless connectivity delivered by Wi-Fi. Importantly, 6 GHz Wi-Fi technology is available here and now, enabling advanced and affordable communications. It is already implemented in a wide range of products—including flagship smartphones, laptops, and access points. However, currently in India, 6 GHz Wi-Fi capabilities are impaired because access to the 6 GHz (5.925-7.025 GHz) spectrum remains unavailable . Notably, DoT has yet to issue final rules for Wi-Fi use in the lower 6GHz band [5.925–6.425 GHz], despite releasing draft regulations on 16th May 2025 to this effect, further delaying proliferation of advanced Wi-Fi connectivity (WiFi 6E & 7) in India. Thus, Indian consumers and enterprises are unable to realize the full benefits of higher data rates, ultra-low and deterministic latencies, improved mobility, better power efficiency, optimisation of energy utilisation or support for high densities of users and devices—features that are available in the US and across more than 80 countries in the world which are essential for modern connectivity. Unlocking Wi-Fi access in both the lower and upper 6 GHz band in India will unleash significant innovation and economic momentum, drive competitiveness and deliver meaningful consumer benefits. Acting promptly and without delay will help secure India's leadership in the global digital economy.

Q1. What measures should be taken to enhance competition and mitigate over-supply of the spectrum in various frequency bands in the forthcoming auction? Please provide a detailed response with justifications.

BIF RESPONSE

At the outset, BIF wishes to laud the Authority for correctly posing the Questions as to how to make the auctions more competitive and more meaningful.

Progressively over the years, the number of bidders has reduced to barely 3 players from almost 11 at one time, thereby making the market extremely consolidated. With at least one of the remaining bidders also struggling financially, the desire to increase competition in the market by the Authority is highly appreciated.

There is a category of players viz. ISPs (Cat B & C) , IoT/M2M SPs and some others for whom it is difficult to participate and compete in the auction with the larger TSPs. In fact asking them to participate in the auction with larger TSPs is completely unreasonable, unjustified and anti-competitive.

Therefore on the grounds of fairness, reasonableness and for ensuring a level playing field, we propose that such weaker and smaller players be clubbed under another category with reduced eligibility conditions as given below.

(i) The current auction system needs to be reviewed

(ii) The weaker and smaller players (who cater to niche segments viz. Cat B & C ISPs, M2MSPs. etc) who have turnover in the range of only a few crores, are unlikely to be able to compete with the stronger and larger TSPs who have turnover in lakhs of crores.

(iii) Unless the system permits opening up to these smaller players, the competition is unlikely to increase as the market is highly consolidated with presence of only 1-2 strong bidders.

(iv) Therefore special provisions viz. change in eligibility conditions, reduced rollout obligations , service area to be town/district level , etc to cater to these new and smaller entrants, is required to deal with this anti-competitive aspect.

(v) There is need to create a separate category of players based on their turnover and 'carve out a block of spectrum ' and earmark it to cater to their needs, as they simply cannot compete with the larger TSPs.

(vi) The sector and the market shall only be able to expand when these above mentioned steps are taken to allow new and smaller players to enter the auctions and they are made to only compete with each other (like for like) and not with the larger TSPs.

(vii) This would also ensure the chances of the weaker and smaller players getting access spectrum, while ensuring a level playing field for all the participants in the auctions and ensuring that the competition in the auction is between similar players, coming from different segments/ categories of the market .

We are of the view that restricting supply of spectrum shall harm the growth of the sector and go against consumer interests as it will lead to artificial increase in price of the spectrum.

Q2. Whether the entire available spectrum in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz band should be put to auction in the forthcoming auction? (a) If yes, what measures should be taken to ensure effective competition in the forthcoming auction? (b) If no, what quantum of spectrum in each of the frequency bands should be put to auction in the forthcoming auction? Kindly provide a detailed response with justifications.

BIF RESPONSE

Yes - we are strongly of the view that all the available spectrum in the given 4G/5G bands must be put up for auction.

From the question posed, it seems the objective is to increase/maximise Government revenues by artificially restricting the supply of spectrum. This is not an effective methodology to increase competition

a) To ensure effective competition the following measures should be taken up viz.

(i) Some spectrum should be 'carved out' or reserved for new market entrants [smaller players viz. startups and others] who are seeking different categories of spectrum (for IoT/M2M,Smart Cities, enterprise connectivity and enterprise use case, etc) which would lower entry barriers and encourage indigenous IoT solutions.

(ii) There should be a separate 'auction' which should be exclusively for smaller players & startups with reduced or ' lighter' eligibility criteria (lower Turnover, lower Reserve Price, Permit spectrum to be given at town/district level , reduced rollout obligations, etc). This would ensure increase in number of players and also more competition and also guarantee access spectrum for these startups and other smaller players.

(iii) This would ensure more competition and in this manner, some new entrants may enter the market and thereby result in some additional spectrum being purchased.

Other measures that the Authority could possibly take are:

(i) limit total spectrum holdings by incumbents through the application of suitable spectrum caps within a specific geographic/service area,
(ii) rationalise the reserve prices so that they reflect the market realities and are not inflated, based on some legacy auctions where the prices became hugely inflated by creating artificial shortage of spectrum put up for auction and methodology of auction which became a case of existential survival for most TSPs.
(iii) There is also a need to review the Auction Design and the existing spectrum valuation methodologies, etc.

Q3. Whether the band plans, which have been adopted for the existing bands viz. the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands in India, should be retained in the forthcoming auction? If no, kindly suggest new band plan(s) for the existing bands with detailed justifications.

BIF RESPONSE

Yes-the current band plans must be retained for the existing bands. Band Plans should generally follow the international and WRC approved band plans.

In case it is not done, the operators would possibly need to modify/replace their existing equipment so as to be compatible with new band plan (if adopted). This will not only add to the financial burden of the operators but also add to the technical challenges for them, besides impacting the Quality of Service for the end consumers.

Q4. Whether the spectrum in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands should be auctioned on Telecom Circle/ Metro Area basis with a validity period of 20 years in the forthcoming auction? If no, what should be the area, and validity period of spectrum assignment in the existing bands? Please provide detailed response with justifications.

BIF RESPONSE

Yes-the spectrum should be auctioned on Telecom Circle/Metro Area basis, as Spectrum is only available at Circle/Metro Area level as given in the CP.

In case a special auction for smaller and weaker players is decided to be held for niche usages viz. IoT/M2M SPs, Smart Cities , etc , the service area for assignment of spectrum may be given at district /city level.

Tenure of Spectrum Assignment :

It may be noted that The Telecom Reforms 1.0 (announced in September 2021) [*https://www.pib.gov.in/PressReleasePage.aspx?PRID=1755086]* suggested an increase in the validity period for spectrum from 20 years to **30 years**. However, we recommend the spectrum may be given for 20 years duration with a proviso to extend it for a further period of 10 years without any auction , based on inflation linked indexaton. This will help operators plan their network investments and amortise their costs effectively over a longer period.

Q5. Whether the block size and minimum quantity for bidding in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands should be kept the same in the forthcoming auction as those in the spectrum auction of June 2024 as mentioned in Table No. 2.14 of this consultation paper? If not, what should be the band-wise block size and minimum bid quantity? Kindly provide a detailed response with justifications.

BIF RESPONSE

Yes, the block size and minimum quantity for bidding should be kept the same in the forthcoming auction as those in the June 2024 auction. This is a necessary step to ensure continuity and consistency.

Block Size basically depends on the quantum of spectrum being auctioned in that band, the number of operators, size of a single carrier, harmonisation with international standards and current spectrum holdings of existing operators.

Q6. What should be the eligibility criteria and associated eligibility conditions for participation in the forthcoming auction for the existing bands viz. the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands? Kindly provide a detailed response with justifications.

BIF RESPONSE

Eligibility Criteria for the spectrum auction for a separate category mentioned above needs to be suitably modified in light of our response to Q1 where the following has been suggested:

(i) The weaker and smaller players (who cater to niche segments viz. Cat B & C ISPs, M2M SPs etc) who have turnover in the range of only a few crores, are unlikely to be able to compete with the stronger and larger TSPs who have turnover in lakhs of crores.

(ii) Unless the system permits opening up to these smaller players, the competition is unlikely to increase as the market is highly consolidated with presence of only 1-2 strong bidders.

(iii) Therefore special provision (change in eligibility conditions viz. networth criteria, reduced rollout obligations, applicable to a town/district service area , etc to cater to these new and smaller entrants) is required to deal with this anti-competitive aspect.

(iv) There is need to create a separate category of players based on their turnover and carve out a ` block of spectrum ` specially to cater to their needs, as they simply cannot compete with the larger TSPs.

(v) The sector and the market shall only be able to expand when these above mentioned steps are taken to allow new and smaller players to enter the auctions and they are made to only compete with each other (like for like) and not with the larger TSPs.

(vi) This would also ensure the chances of the weaker and smaller players getting access spectrum, while ensuring a level playing field for all the participants in the auctions and ensuring that the competition in the auction is between similar players, coming from different segments/ categories of the market.

Q7. Whether there is a need for modifying roll-out obligations for the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands, as stipulated in the Notice Inviting Application (NIA) for the spectrum auction held in June 2024 in order to improve mobile coverage in the country? If yes, what modifications should be made in the roll-out obligations for the existing bands? Kindly provide a detailed response with justifications.

BIF RESPONSE

We don't recommend any change in the rollout obligations for existing spectrum bands

Justification:

- The current approach allows operators to meet rollout obligations using any technology in any band, and this flexibility is considered sufficient
- Relaxation in MRO would be anti-consumer as it would lead to reduced level of service for consumers
- There is little evidence or lack of sufficiently reasonable grounds to justify any change in the MRO (Minimum Rollout) Obligations between the time when the spectrum was purchased and now for existing spectrum bands, which warrants any change.

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Q8. Whether there is a need to review the spectrum caps for the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands for the forthcoming auction? If yes, what should be the spectrum cap per service provider for different frequency bands? Kindly provide a detailed response with justifications.

BIF RESPONSE

There is no need to change the spectrum cap in the existing bands.

Q9. Are there any other inputs/ issues related to the auction of spectrum in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands for the forthcoming auction? Suggestions may be made with detailed justifications.

BIF RESPONSE

None.

Q10. Whether the spectrum in the 600 MHz band should be put to auction in the forthcoming auction? If yes, whether the band plan n105 should be adopted for the 600 MHz band, or otherwise? Please provide a detailed response with justifications.

BIF RESPONSE

Post the standardization by 3GPP, the 600 MHz band has become very important IMT band and it should be put to auction in the forthcoming spectrum auction. TRAI should adopt the 3GPP Band Plan n105 for assignment of 600 MHz band which is also in line with position taken in year 2022.

Justification for the same is given below.

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 for n105 deployment is not only technically sound but also strategically essential for countries aiming to extend 5G services to rural, underserved, and geographically challenging regions. The APT600 MHz band plan has been studied extensively and is tailored to meet the needs of the APT region, offering a harmonized approach to 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 the readiness of the chipset ecosystem. Inclusion of APT600 MHz in the 3GPP NR channel list has simplified integration for handset manufacturers, fixed wireless access (FWA) providers, and IoT device makers due to readily available support in chipsets. Major chipset vendors like Qualcomm have already incorporated n105 support across their

product lines, including RFICs for smartphones, customer-premises equipment (CPE), and FWA platforms. This was showcased during IMC-2024, where commercial devices demonstrated seamless operation on n105. As 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 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 mirrors 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 is 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. Compared to mid-band and millimeter-wave frequencies, low-band spectrum like n105 ensures consistent connectivity over longer distances and through physical obstructions. This is particularly beneficial for 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. Policy Recommendations and Strategic Outlook

To maximize the benefits of n105, it is recommended that national regulatory authorities auction the entire 600 MHz band in alignment with the APT600 MHz plan. This will ensure spectrum harmonization, simplify equipment certification, and foster a robust device ecosystem. Governments should also engage in regional coordination to align spectrum policies and avoid fragmentation. Furthermore, spectrum planning should consider future scalability, allowing for seamless upgrades to support advanced 5G use cases such as remote healthcare, autonomous transport, and industrial IoT.

In conclusion, the 600 MHz band—when aligned with the 3GPP n105 plan—offers a transformative opportunity for expanding inclusive, resilient, and cost-effective 5G networks. Its adoption will not only enhance connectivity but also catalyze innovation across sectors, making it a cornerstone of digital infrastructure for the next decade.

f. 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).

Q11. In case you are of the opinion that the 600 MHz band should not be put to auction in the forthcoming auction, what should be the timelines for auctioning of the 600 MHz band? Please provide adetailed response with justifications.

BIF RESPONSE

Not applicable as we recommend that the entire 600MHz band should be put to auction based on the n105 band plan.

Q12. In case it is decided to auction the spectrum in the 600 MHz band in the forthcoming auction, - (a) Should the entire available spectrum in the 600 MHz band be put for bidding in the forthcoming auction? (b) Whether the eligibility criteria, associated eligibility conditions, block size, minimum bid quantity of spectrum, validity period for the assignment of spectrum, area of assignment on Telecom Circle/ Metro Area-basis, spectrum cap and roll out obligations for the spectrum in the 600 MHz band in the forthcoming auction should be kept the same as those in the spectrum auction of 2022, or otherwise? Please provide a detailed response with justifications.

BIF RESPONSE

Please refer to our response to Q10 above.

Q13. Are there any other inputs/ issues related to the auction of spectrum in the 600 MHz band for the forthcoming auction? Suggestions may be made with detailed justifications.

BIF RESPONSE

None.

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.

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

BIF RESPONSE

The 6425-6725MHz band as well as the 7025-7125MHz band <u>should not be auctioned</u> because of the following reasons:

(i) **Consumer related loss -Inability to reap socio-economic benefits**

Delicensing of the entire 6GHz spectrum band was first established by the FCC in the US in April 2020 . Since then, more than 14 countries all over the world, have delicensed the entire 6GHz band while over 80 countries have delicensed the 500MHz in the lower 6GHz band , similar to what India has proposed to do. US, UK, South Korea, EU, Japan, Saudi Arabia, UAE, Brazil -many of the countries have already delicensed the band. Since regulatory approval was granted (e.g. in the U.S. in 2020) for unlicensed use of 6 GHz, billions of 6 GHz-capable devices have entered the market. The availability of the spectrum has catalysed global momentum around deploying Wi-Fi 6E and Wi-Fi 7. The global device ecosystem (chipsets, access points, routers etc.) is well established for delicensed 6GHz. Few Indian OEMs are also making WiFi 7 devices in India and exporting to rest of the world. Delay in delicensing of the 6GHz band means India could be excluded or delayed from benefiting from this large ecosystem.Every day of delay makes India lag behind its global counterparts, something we as a nation can ill afford as we strive to become the third largest economy in the world and a Viksit Bharat by 2047.

(ii) Consumer related loss -Inability to take advantage of advanced digital regime .

What Delicensed 6GHz can do, cannot be done with existing delicensed spectrum bands. It can work to download intensive data centric applications viz. Advanced Gaming, Sony Playstation 5 Pro , Quest AR/VR headsets , Meta Ray Ban AR/VR Glasses and other High-bandwidth immersive services viz. Industry 5.0, Robotics, AI & E-health including robotic surgeries, all of which need delicensed 6GHz band. Delay in opening of the band results in denial of these globally available products to Indian consumers besides resulting in the inability to cater to increasing data demand indoors.

Following critical sectors stand to be benefited by delicensing 6GHz spectrum band

- Education
- Healthcare
- Manufacturing
- Enterprise
- Agriculture

This is the year of startups and innovation, as was highlighted by Hon'ble PM at the inauguration of IMC 2025. All smart applications and innovations need delicensed 6GHz .

iii) National loss -due to startup innovation and economic growth.

Delicensed 6GHz spectrum is foundational for next-generation technologies like advanced IoT devices, smart homes, and industrial automation. Every single day of delay costs opportunities in digital innovation, exports, and hinders growth of local manufacturing opportunities, besides causing significant opportunity losses to the public exchequer and stalling of Hon'ble PM's vision of Viksit Bharat. In contrast, countries like the U.S. which have delicensed the entire 6GHz band more than 5 years ago, have already seen hundreds of billions of dollars in economic value from opening the band years ago.

Device affordability improves when manufacturers can sell globally standard 6 GHz-enabled devices, instead of having to make region-specific variants. This brings down costs everywhere.

(iv) Economic Loss to the Nation

As per Dr. Raul Katz (Dynamic Spectrum Alliance) Report based on a study carried out specifically for India , the Total Economic Value of allocating the 6GHz band for WiFi is estimated to be USD 4030 Billion which amounts to **322.4 lakh Crores** over a period of 10 years. This roughly translates to an Average per year of 32.24 lakh crores .

Basis a more conservative estimate which was carried out by Prof. Rekha Jain, formerly of IIMA in 2021, estimated the Economic Value of Delicensed Spectrum Bands in 2025 would have been **2.3 lakh Crores**, provided the 6GHz band was delicensed by 2023.

From the above studies it is evident that even on a conservative basis , the **Daily Economic loss to the nation amounts to a minimum of INR 630 Crores.**

iv) Immediate consumer benefit via license-exempt Wi-Fi 7

The upper-6 GHz band is pivotal for next-generation Wi-Fi (Wi-Fi 7 and beyond), enabling wider channels (160/320 MHz), lower latency, and higher throughput for homes, enterprises, education, healthcare, and public venues. Delicensing this band—at least for low-power indoor (LPI) and very low power (vLPi)use now would deliver near-term gains to Indian consumers and enterprises at minimal administrative cost.

vi) **Ecosystem readiness and time-to-reap socio economic benefits**

The global device and infrastructure ecosystem for 6 GHz Wi-Fi is mature and shipping at scale today, while a robust handset and radio ecosystem for 6 GHz IMT does not even exist today. Auctioning spectrum that lacks immediate, widespread IMT ecosystem support begets uncertainty and disruption to the services of the incumbent users (fixed services, fixed satellite services, etc.) in the short term, and under-utilization in the medium to long term, and delaying or potentially not realizing the socioeconomic benefits that can be readily delivered by 6 GHz Wi-Fi which already possesses a mature ecosystem.

vii) **Competition and a level playing field for all**

Preserving 6 GHz for license-exempt use supports **TRAI's objectives of fair competition and a level playing field** for all by empowering millions of small and large players—ISPs, device makers, start-ups, campuses, and households—without erecting barriers to entry inherent in exclusive (auctioned) licensing.

viii) **Efficient spectrum use where data actually flows**

The majority of broadband data is ultimately delivered over Wi-Fi at the edge. Opening the upper-6 GHz for Wi-Fi aligns spectrum supply with demand points (homes, enterprises, dense venues), improving spectral efficiency and quality of experience for the consumers while complementing India's licensed mobile network infrastructure.

ix) **Incumbent protection and implementation practicality**

Upper-6 GHz hosts important incumbent services. Establishing a license-exempt regulatory regime (LPI & VLPI now) offers TRAI a proven, low-risk coexistence solution that can be implemented faster and at scale, avoiding

the protracted coordination challenges that would accompany exclusive IMT use.

x) International spectrum harmonization and investment certainty

A number of countries -at least 14 countries globally viz. US., Korea, Saudi Arabia, Brazil, and some others have already delicensed the entire 6GHz spectrum band . This includes this portion of the band viz. 6425-6725MHz band as well. This band is meant for usage for Modern & Advanced WiFi based on globally harmonised IEEE Standards 802.11ax and 802.11 be aligning India accordingly, will accelerate local manufacturing, drive economies of scale, and reduce costs for Indian consumers and enterprises

xi) Environmental Sustainability and Energy Efficiency

Wi-Fi's inherent energy efficiency and spectrum reusability contribute meaningfully to sustainability objectives, including e-waste reduction and the development of sustainable digital infrastructure. Wi-Fi industry supports India's commitment to decarbonization targets and net-zero goals. We recognize that efficient spectrum management plays a critical role in reducing energy consumption and carbon emissions.

As a key enabler of digital connectivity, Wi-Fi provides energy-efficient broadband access while reducing the need for extensive infrastructure builds—contributing directly to environmental and sustainability goals.

Moreover, Wi-Fi contributes to reduced CO_2 emissions in the following ways:

- Offloading mobile traffic: Wi-Fi reduces the power consumption and environmental impact of traditional cellular infrastructure.
- Supporting fiber deployments: Wi-Fi eliminates the need for energy-intensive cellular towers in residential and enterprise environments.
- Incorporating energy-saving features: Wi-Fi 6/6E and Wi-Fi 7 technologies include innovations such as Target Wake Time, which significantly reduces power consumption for connected devices.
- Enabling smart building automation: Wi-Fi powers IoT-based energy management systems that optimize energy use in homes, offices, and industrial environments.
- Facilitating remote services: Wi-Fi supports remote work, telehealth, and digital learning—helping reduce transportation-related emissions.
- Empowering smart agriculture: Wi-Fi-based connectivity enables precision farming, minimizing resource waste and lowering the carbon footprint of agricultural operations.
- Please note this study *https://www.wik.org/en/publications/publication/nachhaltigkeitsvorteile-bei-der-6-ghz-spektrum-vergabe*

The aforementioned WIK Consult study has established that use of IMT (in 6GHz band) instead of delicensed 6GHz WiFi **would require 16% more energy, translating to as much as 3.2 megatons additional CO2 emissions** for Europe per year.

- If the entire 6GHz band were to be delicensed in India (which has nearly double the population of Europe and higher GDP growth), the **energy savings annually would be several orders higher - probably be about 10-15 megatons of CO2.**

We respectfully recommend prioritizing spectrum policies that enable energy-efficient connectivity, including **license exempt access to the full 6 GHz band for Wi-Fi to optimize network performance and energy savings.**

xii) This additional 300MHz in conjunction with the 500MHz in the lower 6GHz band , would provide together a solid chunk of 800 MHz band which will help provide 2 channels of 320 MHz and an additional channel of 160MHz concurrently. This will enable the consumer to download high bandwidth intensive applications like 4K/8K video, advanced gaming, AR/VR/XR, robotic surgeries, besides spurring innovation. In fact, the entire 1100 MHz in the 6GHz band viz. 5925-7025MHz should be made available for delicensed use as it will permit 3 channels of 320MHz , besides one channel of 160Mhz concurrently.

xiii) Due to fragmented availability of IMT spectrum in chunks of 300MHz and 100Mhz respectively and lack of contiguity between the 6425-6725 MHz band at one end and 7025-7125MHz at the other end, this cannot be properly or optimally utilised for IMT. Also 300MHz in this band is insufficient to take care of the needs of 4 operators. Hence in the overall interest of the consumers, the 300MHz in this band should be delicensed

BIF Recommendations: :

- **The Upper 6GHz band should be completely delicensed and not auctioned.**
- **Delicense Upper 6GHz band and permit Wi-Fi low-power indoors (LPI) & VLPI (Very Low Power) to unlock consumer and enterprise benefits now.**
- **Undertake a structured, evidence-based review of actual utilization, device ecosystem maturity, and socioeconomic outcomes before considering the upper 6GHz band for possible IMT auction.**

This balanced roadmap delivers rapid, tangible benefits to Indian users and industry, advances TRAI's pro-consumer and pro-competition objectives, and enables

acceleration towards achieving a Digital India and enhances our way forward towards becoming a Viksit Bharat by 2047.

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.

BIF RESPONSE

BIF respectfully submits **that the entire 6GHz band should be delicensed, as explained above.**

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.

BIF RESPONSE

At the outset, BIF wishes to state that BIF is not in favour of auctioning the upper part of the 6GHz band.

BIF respectfully submits that TRAI should *not* leave determination of keep-out distances to telecom service providers post-auction. Any IMT vs. incumbent coexistence determination in the upper 6 GHz spectrum must be completed *before* an auction through a transparent, government-led process in coordination with WPC/DoT/ISRO and published for comment.

Justification for the same is given below:

1. **Treaty-level obligations are already defined.** Following extensive ITU-R studies, the 2023 World Radiocommunication Conference (WRC-23) adopted Resolution 220 (WRC-23) which establishes the expected e.i.r.p. spectral-density limits vs. elevation angle (i.e., emission/compatibility mask) that IMT base stations in 6 425–7 125 MHz must meet "to ensure protection for the FSS (Earth-to-space)." These limits constitute binding international commitments and must be complied with in India. A domestic auction cannot assume looser conditions ex post.

2. **Post-WRC-23 feasibility concerns**

   After WRC-23, IMT proponents themselves have stated that deploying a commercially viable macro-cell network while consistently meeting the WRC-23 satellite-protection mask would be impractical. If true, keep-out distances and/or configuration constraints (e.g., e.i.r.p., antenna tilt/height, density) could be so onerous that they undermine the utility of any spectrum rights auctioned—creating material risk of stranded investment and disputes.

3. **Public-interest risk management**

   Deferring coexistence to fragmented, operator-specific trials after an auction would shift systemic interference risk to incumbents and consumers, and invite inconsistent practices, enforcement challenges, and litigation. A uniform, pre-auction determination is essential to give all parties regulatory certainty.

4. In the Consultation, Annexure - 1.2, *DoT Response letter dated 14.08.2025*, Paragraph 2.5, DoT notes that incumbents in the upper-6 GHz band "*will be relocated to another frequency band in due course of time*." Absent a clear, time-bound relocation plan and process, proceeding to auction would be premature. A clearly stipulated incumbent relocation plan is a fundamental precondition to any auction.

BIF Recommends (in case upper 6 GHz band is under consideration for IMT)

- Complete, before any auction, national coexistence studies that includes:

  a) Codifying the WRC-23 emission/compatibility mask for IMT in India's regulations
  b) Independent India-specific modelling (terrain, clutter, network density, antenna patterns) to derive protection contours/keep-out distances for both individual satellite earth stations and aggregate interference to satellite receivers;
  c) Controlled field pilots led by the government (not operator-run alone) in representative environments, using worst-case network parameters, with measurements made public;
  d) An impact assessment showing that any contemplated IMT configuration both meets the mask with margin and remains commercially viable without excessive exclusion zones
  e) If the pilots/modelling show impractical keep-out distances or infeasible deployment constraints, TRAI should not auction this spectrum for IMT and should instead prioritize license-exempt

use—which can protect incumbents while delivering immediate consumer and enterprise benefits.

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.

BIF RESPONSE

At the outset, BIF wishes to state that BIF is not in favour of auctioning the upper part of the 6GHz band.

Specific Response to the Question: It is not yet determined whether the 3GPP n104 band plan should be adopted for the upper 6 GHz band, as it is a subject of ongoing global debate. Adoption varies by region, with very few countries considering possible allocation of the spectrum for licensed mobile use (as per n104 band) and a large number of countries (over 14 countries) having decided for delicensing of the band. Some other countries are still in the process of taking a decision for delicensing the upper 6GHz spectrum band (6425-7025MHz) along with the 500 MHz in the lower 6GHz band.

Reasons for dedicating the upper 6 GHz band to delicensed use has been given above.

BIF Recommendations:

The decision to adopt the 3GPP n104 band plan for the upper 6 GHz band depends on a country's spectrum strategy and priorities. **There are strong, competing arguments for delicensed Wi-Fi use, and a global consensus has not been reached. Dedicating the spectrum to delicensed Wi-Fi can better serve the growing demand for high-speed indoor connectivity.**

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.

BIF RESPONSE

At the outset, BIF wishes to state that BIF is not in favour of auctioning the upper part of the 6GHz band.

As regards specific response to the Question:

BIF Recommendations :

(i) This bundling of spectrum bands are based on similar/near-similar propagation characteristics

(ii) Since the propagation characteristics of the 3300MHz and the upper 6GHz (6425-6725MHz) are quite different from each other, **hence the spectrum cap should be separate for both the bands (3300MHz and the upper 6GHz band) and not based on combined spectrum holding**

(iii) The spectrum cap should be based as follows:

1. 40% should be the cap for 3300 MHz
2. 25% should be the cap for upper 6GHz as there are 4 bidders and 400MHz is likely to be placed for auctions. By doing so, each of the 4 TSPs would be guaranteed at least 100Mhz in an equitable manner

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.

BIF RESPONSE

At the outset, BIF is not in favour of auction of the upper 6GHz band but recommends that the entire 6GHz band -both upper and lower be delicensed as it has been done in more than 14 countries across the world.

As regards specific response to the Question: Yes, the interference mitigation approach for the 3300 MHz and 26 GHz bands should be extended to the upper 6 GHz

band, primarily through a strategy of maintaining contiguous spectrum and assigning the same frequency spots to an operator across different Local Service Areas (LSAs). This approach is recommended to ensure consistency in TDD (Time-Division Duplex) band plan management.

Justification for extending the approach

- **Consistency in TDD management:**

  A consistent approach across different frequency bands used for TDD (like 3300 MHz, 26 GHz, and the upper 6 GHz band) will simplify spectrum management and operator coordination.

- **Harmonization with existing strategies:**

  The suggested approach is already being used for the 3300 MHz and 26 GHz bands, and applying it to the 6 GHz band would align with existing regulatory and technical strategies for 5G deployment.

- **Mitigation of interference:**
  Using the same techniques of maintaining contiguous spectrum and assigning frequency spots across different LSAs helps to minimize interference, especially between different operators using TDD configurations.

- **Guard bands and out-of-band emissions:**

  In addition to the frequency assignment strategy, operators should also ensure compliance with guard band and out-of-band emission limits to protect adjacent services.

- **Operator accountability:**

  It's crucial to make it clear that the successful bidders are responsible for ensuring their networks do not cause harmful interference to existing services, regardless of the mitigation methods in place.

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.

BIF RESPONSE

BIF respectfully submits that market evidence and risk factors do not support auction of the upper 6 GHz at this time.

- It is worth noting that, in Hong Kong (with heavy subscriber density similar to the dense locations of India), the recent auction of 400 MHz of spectrum in the 6GHz band received only a tepid response from four telecom service providers, even though these providers collectively own only 200 MHz of spectrum in the 3.5 GHz band. The 6GHz auction fetched prices just 10% above the reserve

price, reflecting poorly on the spectrum's value for mobile, compared to the much higher premiums of 460% and 410% above the reserve price for the 900 MHz and 2300 MHz bands, respectively. Additionally, 100 MHz of the 6GHz spectrum remained unsold. Again, it is essential to note that many of the world's leading chip manufacturers are supplying chips for the delicensed o 6GHz spectrum use for Wi-Fi. This reflects a lack of interest among global manufacturers in developing IMT devices for the 6GHz band.

- India's recent spectrum auctions already saw large unsold inventories even in "harmonized IMT" bands**.** In June 2024, India sold only **~141.4 MHz of 10,522 MHz on offer**, with **600 MHz and 3300 MHz** bands seeing no takers—underscoring demand and affordability constraints that are likely to be more acute for a nascent upper-6 GHz IMT ecosystem.

- 6 GHz IMT device/network ecosystem immaturity increases the risk of idle spectrum**.** Compared with Wi-Fi 7 (already shipping at scale), the commercial handset/RAN ecosystem for upper-6 GHz IMT remains early, which may help explain weak auction interest and unsold blocks in Hong Kong

- International policy uncertainty and coexistence obligations depress effective value**.** Many regulatory authorities are still deciding how (or if) upper-6 GHz IMT would be used given satellite-protection obligations from WRC-23 and the growing adoption of Wi-Fi access or sharing approaches—factors that reduce the effective, usable MHz-pop for exclusive IMT licenses.

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.

BIF RESPONSE

Based on development of Standards at 3GPP level, there is a new approach which suggests for utilisation/deployment of this band for Supplementary Uplink for reasons as given below :

a. Evolving Uplink Demand in Telecom Networks

Telecom networks are undergoing a paradigm shift due to rising uplink traffic. Historically focused on downlink for streaming and browsing, networks now face surging demand for uploads driven by video calls, live streaming, cloud gaming, IoT, and remote work. Modern devices continuously transmit data to the cloud, necessitating low-latency and high-efficiency uplink channels. Technologies like 5G,

edge computing, and massive MIMO are being deployed to support symmetrical data flows. This shift is critical for emerging applications such as virtual reality, telemedicine, autonomous vehicles, and industrial IoT, which rely on real-time, two-way communication. As users increasingly generate and share content, the traditional download-centric model is obsolete. Strengthening uplink capacity is essential to meet the demands of a hyperconnected world and ensure seamless digital experiences.

b. **Propagation Advantages of L Band for Uplink**

The L Band (1427–1518 MHz) offers superior propagation characteristics compared to higher frequency bands like 3.5 GHz and 6 GHz, making it ideal for Supplemental Uplink (SUL) in 5G networks. 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. Unlike downlink transmissions, which benefit from high-power base stations and massive MIMO, uplink transmissions are constrained by device limitations such as battery life and hardware. These constraints make higher frequencies less effective for uplink, leading to signal degradation and reduced range. By shifting uplink traffic to the L Band, operators can maintain robust connectivity even at cell edges, improving overall network performance and user experience.

c. Network Efficiency and Economic Viability of L Band SUL

Deploying SUL 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. The L Band complements mid-band downlink carriers, enabling high downlink throughput while maintaining strong uplink channels. This dual-band strategy balances performance in asymmetric networks, especially for data-heavy applications. Economically, the L 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 L Band a cost-effective and technically sound choice for improving uplink reliability and coverage in 5G networks.

d. Regulatory Considerations and Band Planning

Currently, there is no 3GPP-defined SUL band plan for the L Band, though discussions are underway.

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

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

However, a government decision to reserve 24 MHz of L Band spectrum limits usable bands for telecom. To facilitate SUL deployment, a contiguous 24 MHz block—

preferably 1427–1451 MHz—should be allocated to government use. This would streamline equipment design, ensure clean spectrum for operators, and simplify future harmonization if the government relinquishes the spectrum. Authorities are advised to support L Band SUL adoption and await 3GPP outcomes to guide implementation.

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

BIF RESPONSE

None.

Q23. Whether there is a need to review the spectrum auction method and design followed in India? If yes, suggestions on spectrum auction method and design may be made with detailed justifications and international practice in this regard.

BIF RESPONSE

We are of the view that to increase the competition in the market and on grounds of fairness, reasonableness and for having a ` level playing field' between such players , there is a need to create a separate category for smaller and weaker players , as provided in our detailed response to Q 1 & 2 above.

Should there be need to modify the design of the spectrum auction, this may require a detailed separate consultation.

Q24. What additional economic, technical, or market-related factors should be taken into account while determining the valuation and, subsequently, the reserve price of spectrum, in order to promote effective competition, ensure optimal spectrum utilization, and encourage wider participation in auctions?

BIF RESPONSE

Valuing spectrum for auction requires considering economic, technical, and market factors beyond simple revenue maximization. To promote effective competition, optimal utilization, and wider participation, auction authorities should account for the following considerations when determining the reserve price:

Economic factors

- **Macroeconomic environment**: The overall economic health of a country, including GDP growth, inflation, and interest rates, affects operators' ability and willingness to pay for spectrum. High inflation or slow growth can reduce an operator's perceived value of future earnings.

- **Consumer affordability**: High spectrum prices can lead to higher tariffs for consumers, hindering adoption, especially in price-sensitive markets. A reserve price must balance state revenue goals with the need for affordable access.

- **Network rollout costs**: The cost of deploying a network with the auctioned spectrum is a significant factor. Spectrum valuation should consider required infrastructure investments for meeting coverage and quality of service obligations.

- **Spectrum usage charges (SUC)**: The presence or absence of a recurring SUC can influence an operator's valuation of the initial spectrum license. Lowering or eliminating SUCs for auctioned spectrum can reduce the overall cost for operators.

- **Investor and bank confidence**: The financial health of the telecom sector and banks' willingness to finance it influences participation. Unrealistic pricing can cause financial distress and make it harder for smaller players to secure funding.

- **Demand-supply balance**: The number of available spectrum blocks versus the number of bidders directly impacts valuation. A reserve price set too high in regions with low demand can lead to unsold spectrum.

Technical factors

- **Band characteristics**: Different frequency bands have distinct technical properties that influence their value.

    - **Low-band spectrum (e.g., 700 MHz)**: Offers excellent propagation and coverage, making it ideal for rural areas and building penetration. It is highly valuable but may have greater deployment costs for rural areas.

    - **Mid-band spectrum (e.g., 3.5 GHz)**: Provides a balance of coverage and capacity, making it a "sweet spot" for 5G services.

    - **High-band spectrum (e.g., 26 GHz)**: Offers massive capacity but has limited range, making it suitable for high-density urban areas and fixed wireless access.

- **Efficiency factor**: This technical parameter accounts for the different capacities of different frequency bands. The valuation of one band can be

benchmarked against another by applying an efficiency factor, as some bands are inherently more efficient at carrying data.

- **Interference issues**: The presence of interference from existing users (e.g., military, satellite) can reduce the value of a spectrum band. Regulators should inform bidders of potential interference to allow for informed decisions.

- **Technology evolution**: Spectrum valuation must account for the current generation of mobile technology (e.g., 5G) and potential future upgrades (e.g., 6G). Emerging technologies can alter the efficiency and demand for different spectrum bands.

- **Spectrum refarming**: The process of repurposing a spectrum band for new technologies can be complex and expensive. This may involve coordinating with and compensating existing users, which should factor into the valuation.

- **Spectrum sharing**: Mechanisms for shared spectrum access, such as Licensed Shared Access (LSA), can create more efficient use of the resource. Regulations that encourage sharing can enhance overall value and should be considered.

Market-related factors

- **Market concentration**: The number and strength of existing operators influence competition. In highly concentrated markets, new entrants may struggle, and the reserve price should be structured to encourage wider participation, not just incumbent consolidation.

- **Auction design**: The rules of the auction itself—such as the bidding format (e.g., Simultaneous Multiple Round Auction vs. sealed bid), the spectrum lots, and spectrum caps—fundamentally impact the outcome. A well-designed auction with modest reserve prices and reliance on market dynamics to set the final price can lead to more efficient outcomes.

- **International benchmarking**: Comparing auction results from other countries can provide a reference point for valuation, but these benchmarks must be carefully adjusted to account for local market differences like population, ARPU, and GDP per capita.

- **Spectrum caps**: Restrictions on how much spectrum any single operator can acquire can promote competition by preventing one player from dominating a band. Lower caps can also encourage new entrants.

- **Rollout obligations**: The license conditions requiring a winner to deploy services to a certain area within a specific timeframe affect an operator's business plan and thus its valuation. Less stringent rollout requirements may encourage wider participation, particularly from smaller players.

- **Secondary markets**: The presence of a vibrant secondary market for spectrum trading can provide a more accurate and current gauge of spectrum value than old auction prices. Regulatory guidelines for trading should be considered when valuing new spectrum.

Q25. Should the valuation of a given spectrum band, among 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2500 MHz, 3300 MHz, and 26 GHz, be based exclusively on its respective auction-determined price from the 2022 and/or 2024 auctions, without applying any other valuation approach? In such a case, should the auction price be indexed using MCLR or any other basis (please specify) to account for the time gap? Please provide detailed justification.

BIF RESPONSE

No, the valuation of a spectrum band should not be based exclusively on its auction-determined price. While auction prices provide a market-tested benchmark, they are influenced by numerous, often temporary, factors and do not reflect the full, long-term economic value of the spectrum. A comprehensive valuation requires considering additional approaches and market-specific variables.

Limitations of using auction-determined prices alone

Auction prices serve as a useful starting point but have several limitations that prevent them from being the sole metric for valuation:

- **Auction-specific market dynamics:** The final auction price is influenced by the specific market conditions, including the number of bidders and their bidding strategies. For example, low demand in the 2024 auction resulted in spectrum selling at the reserve price, a situation distinct from the high-demand 2022 auction.

- **Time dependency:** The value of spectrum changes over time due to evolving economic circumstances and rapid technological shifts. Prices from 2022 and 2024 do not account for future market developments, technology advancements, or shifts in consumer demand.

- **Collusion risk:** Auctions carry the risk of collusive bidding, where operators strategically bid low to reduce the final price. This is particularly possible when there are a small number of bidders.

- **Incomplete market information:** In some cases, the full economic value of the spectrum is not reflected in auction bids because operators have incomplete information or are unsure of future demand.

- **Overspending risk:** Aggressive bidding can lead to operators overpaying for spectrum, which may limit their capacity for future network investments.

Other valuation approaches and factors to consider

For a more complete and accurate valuation, it is essential to incorporate additional methodologies and consider the following factors:

Alternative valuation approaches

- **Benchmarking (Market Comparables):** This method uses past auction results from the same or similar bands in comparable markets. For this to be effective, raw prices must be adjusted for differences in factors like bandwidth, population, and license duration.

- **Income Approach (Discounted Cash Flow):** A bottom-up, Greenfield approach involves forecasting the net present value (NPV) of the projected cash flows from using the spectrum. This method requires operators to estimate network costs, projected revenues, and the investments needed to support the spectrum.

- **Cost Approach (Opportunity Cost):** This method determines the value of spectrum by analyzing the savings in network costs that an operator could achieve by deploying new spectrum instead of building more cell sites.

Additional factors affecting spectrum value

- **Spectrum band location:** Lower frequency bands (like 800 MHz and 900 MHz) have superior propagation characteristics, which means fewer cell sites are needed to provide equivalent coverage. Higher frequencies (like 26 GHz) offer greater capacity but have shorter range, making them better suited for high-density areas.

- **Spectrum characteristics:** Contiguous blocks of spectrum, and whether the spectrum is paired (FDD) or unpaired (TDD), can affect network efficiency and service quality.

- **Market competition:** The value of spectrum is highly dependent on the competitive landscape. In concentrated markets, an incumbent operator's willingness to pay can be significantly higher to block rivals.

- **Technological evolution:** The ongoing development of technology, such as 5G and future generations, constantly reshapes the demand for different frequency bands. Spectrum valuations must be dynamic to account for these changes.

- **Regulatory conditions:** The valuation is also impacted by regulatory policies such as spectrum caps, coverage obligations, and annual usage fees

Q26. If the answer to the above is in the negative, should the past auction-determined price of the respective spectrum band still be considered as one of the approaches or basis for valuation, along with other approaches? Please provide justification for your response. In such a case, should the auction price be indexed using MCLR or any other basis (please specify) to account for the time gap? Please provide detailed justification.

BIF RESPONSE

Yes-our answer to previous question was in the negative or No.

Using Marginal Cost of Funds based Lending Rate (MCLR) to index auction prices is generally inappropriate because MCLR is an internal bank lending benchmark, not an indicator of asset value. Further, MCLR is determined by a combination of the repo rate, deposit rates, operating costs, and the cost of maintaining the Cash Reserve Ratio (CRR). Repo rate and CRR are remedial measure for dealing with Inflation and other economic issues. Thus, may not be reflective of the dynamics of telecom sector wrt to its commercial viability and absorb higher cost of spectrum based on higher MCLR.

A more suitable basis for adjusting auction prices for a time gap would be the **External Benchmark Lending Rate (EBLR),** particularly the repo rate, or an appropriate **consumer or wholesale price index**.

The correct method of indexation depends on the nature of the auctioned asset and the desired outcome of the price adjustment.

Why MCLR is an unsuitable index for auction prices, the MCLR is a benchmark that individual banks use to determine the minimum interest rate for specific loan products. Its components reflect a bank's internal cost of funds, which are not relevant to adjusting the market value of an auctioned item.

Better alternatives for indexing auction prices

1. **External Benchmark Lending Rate (EBLR)**
For auctions involving financial assets or where the opportunity cost of capital is the primary concern, the Reserve Bank of India's repo rate is the most relevant benchmark. EBLR is directly linked to the repo rate, making it a reliable and transparent index.

2**. Price Index (e.g., Consumer Price Index)**

For adjusting the price of physical assets like real estate or tangible goods, a standard price index provides a more accurate measure of the change in market value over time due to inflation.

- **Consumer Price Index (CPI):** Reflects the change in the average price of a basket of consumer goods and services over time. It is a suitable index for assets that people acquire for consumption.
- **Wholesale Price Index (WPI):** Reflects the change in the average price of goods at the wholesale level. It is often used for commercial goods.

Q27. Should the spectrum valuation exercise be undertaken once every three years, as recommended by the Authority in its recommendations dated 11.04.2022? If not, what should be the revised periodicity for conducting the valuation exercise? Please justify your response along with detailed basis for conducting a fresh valuation exercise.

BIF RESPONSE

Yes, a spectrum valuation exercise should be undertaken once every three years for existing bands, as recommended by TRAI in its 2022 recommendations. For interim auctions, it's recommended that reserve prices be set by either indexing the last auction's price (if the spectrum was sold) or using the past reserve price (if it was unsold).

- **Initial recommendation:**

  TRAI recommended a new spectrum valuation exercise every three years for existing bands to keep values current.

- **Interim auctions:**
  For auctions that occur between these three-year valuation cycles, the following methods are recommended for setting reserve prices:

- **For spectrum that was sold:** Use the price from the previous auction, adjusted by the Marginal Cost of Lending Rate (MCLR) if more than a year has passed.
- **For spectrum that was unsold:** Use the last recommended reserve price without any indexation.

Q28. Should the valuation models as adopted by the Authority in its last recommendation, continue to be used as a basis for valuation of spectrum in the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands? Please provide a detailed justification.

BIF RESPONSE

No Comments

Q29. Is there a need to introduce any changes to the valuation models or methodologies currently followed by the Authority for spectrum valuation exercises, including the discontinuation of any existing model or the introduction of a new model? If yes, please provide specific suggestions along with a detailed justification.

BIF RESPONSE

There is a need to review and possibly revise the current spectrum valuation methodologies. This process is driven by evolving market conditions, including the rollout of 5G and the muted demand seen in recent auctions.

Potential areas for valuation model changes

- **Re-evaluation of existing bands:** Recommendations from May 2022 call for a fresh spectrum valuation exercise for existing bands once every three years. For bands that remain unsold, past reserve prices (without indexation) should be used.
- **Approach to unsold spectrum:** The recent TRAI recommendations suggest re-auctioning unsold spectrum, but the reserve price may be maintained if it was previously unsold. In the past, operators had suggested that pricing needs to be revisited based on market realities, citing instances where reserve prices failed to attract bids.

Several factors are prompting a re-examination of valuation methods:

- **Subdued auction demand:** The June 2024 spectrum auction saw low participation, with bids significantly below the total base price set by the government. This outcome highlighted a potential mismatch between the

government's valuation and the market's perception of value, especially for bands where operators felt they had sufficient capacity, such as certain 5G bands.

- **Shift in operator strategy:** With major operators like Jio and Airtel having already acquired significant 5G spectrum in the 2022 auction, they are now more focused on monetizing their existing holdings. Their bidding behavior has become more strategic and less aggressive, which affects the government's auction revenues.

- **New technologies and use cases:** The emergence of satellite-based communication and captive 5G networks for enterprises is introducing new spectrum users and market dynamics. This necessitates specialized valuation approaches, as these services have different requirements and revenue models compared to traditional mobile services.

Current models used and potential adjustments

TRAI typically uses a combination of different valuation methods, including:

- **Auction-determined prices:** Using prices discovered in previous auctions, often indexed for inflation. The February 2025 recommendations formalize the use of auction-determined prices for future auctions in cases where spectrum was sold.

- **Discounted Cash Flow (DCF) analysis:** This model estimates the future cash flows generated from the use of spectrum to determine its present value.

- **Production function approach:** This method assesses the value of spectrum as a productive input by estimating its substitutability with other resources like cell towers.

While it is unlikely that any existing model would be fully discontinued, there is a clear need to refine and adjust the inputs and assumptions used in these models to better reflect current market realities. The low interest in the 2024 spectrum auctions suggests that previous reserve price calculations, especially for certain bands , may have been overly optimistic.

Q30. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands? If yes, which spectrum bands be related, what efficiency factor or formula

should be used and what is the basis for the same? Please justify your suggestions.

BIF RESPONSE

No, the auction determined price of other bands using a single spectral efficiency factor should not be the sole basis for valuing a wide range of bands, as it oversimplifies a complex process. A comprehensive valuation approach uses a combination of methodologies, including basing future reserve prices on past auction results (indexed for inflation) and conducting periodic, independent valuation exercises to account for evolving market conditions, technology, and spectrum availability.

Why a single factor is insufficient

- **Limited scope**:

  Relying on one factor like spectral efficiency ignores other key market dynamics, such as the strategic importance of different bands, available ecosystem development, and specific use cases for each frequency.

- **Market and technology changes**:

  The value of spectrum is not static. New technologies and network build-outs can drastically alter a band's perceived value, making a single efficiency calculation quickly outdated.

- **Inconsistent results**:
  Valuation based on a single factor might not reflect the actual prices that emerge from the competitive bidding process, where multiple factors influence a bidder's strategy.

Recommended approach to valuation

- **Periodic valuation**:

  A fresh spectrum valuation exercise should be conducted periodically, such as every three years, to account for market changes.

- **Leverage past auctions**:

  For interim auctions, the previous auction's determined prices are used as a basis for setting new reserve prices, often with an inflation adjustment.

- **Use multiple methodologies**:

  A combination of valuation approaches is necessary. This includes using past auction data, considering technical factors like spectral efficiency, and analyzing the economic conditions of the bands being auctioned.

- **Address specific band characteristics**:

The valuation for each band should also consider its unique characteristics. For example, the 26 GHz band's high-frequency nature has different implications for deployment than a lower-frequency band like 900 MHz.

Q31. Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of spectrum in existing bands? Please provide detailed information along with justifications.

BIF RESPONSE

No Comments

Q32. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for 6425– 6725 MHz and 7025–7125 MHz bands? If yes, which spectrum bands be related, what efficiency factor or formula should be used and what is the basis for the same? Please justify your suggestions.

BIF RESPONSE

BIF is not in favour of auction of the upper 6GHz band . The entire 6GHz band should be delicensed for reasons elaborated in response to previous questions .

As regards to specific response to the Question, BIF response is as given below:

No. A cross-band benchmarking approach using a generic "spectral-efficiency factor" is not appropriate for the upper-6 GHz band and should not be used as the basis for valuation—**particularly when the Authority is still assessing fundamental questions about feasibility of IMT deployment under WRC-23 satellite-protection limits and when substantial public-interest value can be realized through license-exempt use.**

Rationale:

- **Non-comparable technical characteristics**. Upper-6 GHz propagation, power/antenna constraints, and likely dense/small-cell topology are materially different from sub-GHz, 1800/2100/2300 MHz, or 3.3–3.67 GHz "mid-band" IMT. A scalar efficiency factor will not capture these structural differences.

- **Binding coexistence obligations**. These obligations may force large exclusion zones/keep-out distances or severe IMT network configuration limits. Any "value" must first reflect the effective usable MHz-pop after such constraints—something a generic factor cannot do.

- **Ecosystem maturity and time-to-use**. Unlike well-established IMT bands, upper-6 GHz IMT device/network ecosystems remain nascent. Benchmarking

to bands with mature ecosystems overstates realizable value and risks idle/unutilised spectrum.

- **Public-interest alternative (license-exempt).** The upper 6 GHz spectrum can deliver immediate, broad-based consumer surplus. Auction benchmarks ignore this counterfactual and therefore cannot guide welfare-maximizing policy.

Q33. Should the auction determined price of other countries in 6 GHz spectrum bands serve as a basis of valuation of 6425- 6725 MHz & 7025-7125 MHz bands in India? What methodology should be followed for using this auction determined price as a basis for valuation? Support your suggestions with justifications and country-wise auction data.

BIF RESPONSE

BIF is not in favour of auction of the upper 6GHz band . The entire 6GHz band should be delicensed for reasons elaborated in response to previous questions .

As regards specific response to this question , since the auctions in most of the regimes have been a damp squib , e.g. Hongkong where only a small portion of the band that was put up for auction got sold and that too at reserve price only , due to muted demand lack of development of the ecosystem in this band.

Therefore, in our opinion as mentioned in response to the previous questions, the upper 6GHz band should not be auctioned but it should be fully delicensed along with the lower portion of the band.

Q34. If the above approach is considered appropriate, should the international auction-determined prices be normalized to account for cross-country differences such as population, GDP, purchasing power parity (PPP), subscriber base, and other relevant factors? If so, should normalization be carried out by using the ratio of auction prices of 6 GHz spectrum bands vs other mid band/mmWave band within the same country to neutralize the impact of cross-country differences? Alternatively, please suggest any other suitable normalization methodology that may be adopted in this context.

BIF RESPONSE

BIF is not in favour of auction of the upper 6GHz band . The entire 6GHz band should be delicensed for reasons elaborated in response to previous questions .

As regards specific response to this question , since the auctions in most of the regimes have been a damp squib , e.g. Hongkong where only a small portion of the band that

was put up for auction got sold and that too at reserve price only , due to muted demand lack of development of the ecosystem in this band.

Therefore, in our opinion as mentioned in response to the previous questions, the upper 6GHz band should not be auctioned but it should be fully delicensed along with the lower portion of the band.

Q35. Apart from the approaches highlighted above, which other valuation approaches may be adopted for the valuation of 6425-6725 MHz & 7025-7125 MHz bands? Please provide detailed information along with justifications.

BIF RESPONSE

BIF is not in favour of auction of the upper 6GHz band . The entire 6GHz band should be delicensed for reasons elaborated in response to previous questions .

As regards to specific response to the above question, BIF respectfully submits that any valuation of the upper-6 GHz band should go beyond cross-band benchmarks and adopt approaches that reflect India-specific technical constraints, ecosystem readiness, and public-interest outcomes.

BIF wishes to suggest an approach that should be consistent with TRAI's objectives of efficient spectrum use, fair competition, consumer benefit, and evidence-based, transparent decision-making, BIF therefore recommends the following process:

- Adopt the "social-welfare" + "effective-MHz-pop" + "real-options" trio as the primary valuation toolkit.
- Center the license-exempt factual data in all analysis to avoid systematic overvaluation of exclusivity.
- If results are highly sensitive to assumptions or show low/negative net welfare for IMT, assign a de minimis reserve and defer licensing, prioritizing license-exempt LPI & VLPI now.

<u>Recommendations</u>

BIF respectfully submits that the economic case for deploying and operating IMT networks in the upper 6 GHz band remains highly uncertain, particularly considering coexistence obligations and the dense, high-cost topologies likely required. Device and service affordability is a further constraint: 6 GHz-capable IMT handsets and associated services are expected to be priced beyond the reach of most Indian consumers in the near term, risking low adoption and idle investment with zero RoI. **In these circumstances, TRAI should not rush to auction the upper 6 GHz for IMT when the claimed benefits are unproven and immediate, broad-**

based gains can be readily realized through license-exempt Wi-Fi 7. Accordingly, we recommend:

1. Defer any IMT auction in the upper-6 GHz band and adopt a milestone-based review tied to ecosystem maturity, coexistence feasibility, and demonstrable consumer-welfare gains.
2. Prioritize license-exempt authorization to deliver near-term capacity, affordability, and competition benefits to households, SMEs, and enterprises across India.
3. Reassess the upper 6 GHz auction for IMT only when objective milestones are met—including widespread availability, affordable devices, proven protection of incumbents under real-world conditions, and clear evidence that exclusive IMT use would substantively improve total social welfare versus other alternatives.

This prudent, evidence-led direction aligns with TRAI's objectives of fair competition, consumer protection, efficient spectrum use, and transparency, while delivering tangible benefits to India's digital economy without imposing premature costs on consumers.

Q36. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for 600 MHz bands? If yes, which spectrum bands be related, what efficiency factor or formula should be used and what is the basis for the same? Please justify your suggestions.

BIF RESPONSE

No.

Q37. Should the auction determined price of other countries in 600 MHz band serve as a basis of valuation of 600 MHz band in India? What methodology should be followed for using this auction determined price as a basis for valuation? Support your suggestions with justifications and country-wise auction data.

BIF RESPONSE

Basing the valuation of India's 600 MHz band solely on auction prices from other countries is not advisable. While international benchmarks can be a useful reference, India's specific market conditions, including economic factors, technological ecosystem, and spectrum availability, significantly impact the band's value.

Reasons for not using international prices directly

- **Country-specific ecosystems:** The state of a country's telecom market and technology ecosystem directly influences demand and price. In India, a lack of a developed device ecosystem for the 600 MHz band led to a lack of bidders in

the 2022 auction, despite the band's potential benefits for improving coverage. In contrast, a more mature 600 MHz ecosystem in the US has led to widespread adoption.

- **Spectrum valuation methodology:** BIF wishes to state that international spectrum auction prices, even when adjusted, are a poor basis for setting reserve prices in India. Perhaps it is advisable to use methodologies more appropriate to the Indian market, such as the revenue surplus approach.

- **Market dynamics and competition:** India's telecom sector has seen significant consolidation, which can lower demand and drive auction prices closer to the reserve price. High reserve prices, which may be based on optimistic foreign benchmarks, have contributed to large quantities of spectrum going unsold in past Indian auctions. In contrast, a competitive market with multiple bidders can drive prices higher.

- **Economic disparity:** Direct price comparisons are unreliable due to major differences in economic conditions between countries. Basis market analysis, it is believed that Indian spectrum has been historically far more expensive than in the US, partly due to the high growth potential assigned to the Indian market.

- **Regulatory context and existing allocations:** Other countries have different regulatory landscapes, with some using the 600 MHz band for television or other services. In India, there are ongoing discussions regarding the reallocation of spectrum from public broadcasters for telecom use. These different existing uses affect the spectrum's availability and valuation.

For India to determine an appropriate valuation for the 600 MHz band, factors more relevant to the domestic market should be considered. These include:

- **The Indian device ecosystem:** The level of development and adoption of smartphones and other devices that support the 600 MHz band.

- **Domestic market conditions:** The overall economic climate and financial health of India's telecom companies, who will be the potential bidders.

- **Reserve pricing methodology:** The use of a valuation method that reflects the true economic and business case value of the spectrum in India, such as the revenue surplus approach.

- **Auction variables:** Factors like the timing of the auction, the amount of spectrum on offer, and the size of the bidding blocks.

- **Ensuring utilization:** Setting a price that avoids leaving valuable spectrum idle. The focus should be on maximizing the overall economic and social benefits, not just short-term auction revenue

Q38. If the above approach is considered appropriate, should the international auction-determined prices be normalized to account for cross-country differences such as population, GDP, purchasing power parity (PPP), subscriber base, and other relevant factors? If so, should normalization be carried out by using the ratio of auction prices of 600MHz band vs other sub GHz spectrum bands within the same country to neutralize the impact of cross-country differences? Alternatively, please suggest any other suitable normalization methodology that may be adopted in this context.

BIF RESPONSE

Yes, international auction prices should be normalized to account for cross-country differences such as purchasing power, market size, and other relevant factors. Simple, unadjusted auction prices are often misleading, especially when comparing telecom spectrum auctions, because they ignore fundamental economic disparities between nations.

Normalization creates a more accurate basis for comparison and analysis, as unadjusted prices can reflect market conditions unique to a specific country rather than the intrinsic value of the auctioned asset. Factors to consider include:

- **Purchasing Power Parity (PPP):** Comparing prices using nominal exchange rates can be skewed, especially between high-income and developing countries. PPP-adjusted prices offer a better measure of actual value by accounting for differences in price levels across countries. For example, a high auction price in a developed nation with a high cost of living may have a different real economic impact than the same nominal price in a developing country.

- **GDP and GDP per capita:** These indicators provide context on the economic capacity of a country and its potential market size. Normalizing auction prices relative to GDP or GDP per capita can help gauge the relative financial burden and value placed on the auctioned asset within a particular economy.

- **Population and subscriber base:** Particularly for telecom spectrum auctions, the number of potential users is critical for valuation. A high auction price is more justifiable in a country with a large, dense population and a large subscriber base than in a nation with a smaller, more rural population.

Normalizing the price per MHz per capita or per subscriber provides a more meaningful metric for comparison.

- **Auction design and regulation:** The structure of the auction itself can significantly influence the final price. Differences in reserve prices, payment terms, license duration, and regulations affect outcomes and should be factored into cross-country comparisons. For instance, a high initial reserve price can reduce bidder turnout and increase the final price, which can be counterproductive to the goal of efficient allocation.

- **Market competition:** The number of potential bidders and the level of market competition are key determinants of auction prices. Auction designs that limit competition or create uncertainty can lead to inflated prices. Comparing results without adjusting for these structural differences can be misleading.

Proper normalization offers several benefits, especially for policymakers and regulators:

- **Informed decision-making:** Normalizing prices provides a clearer picture of market realities and helps prevent flawed comparisons. This is especially crucial when evaluating the success of past auctions or setting reserve prices for future ones.

- **Promoting competition and efficiency:** By understanding how market conditions affect price, regulators can design auction frameworks that promote genuine competition, attract bidders, and avoid artificially high prices that can hinder market development.

- **Consumer welfare:** Normalized data can help balance revenue goals with consumer interests. Artificially inflated auction prices can lead to higher consumer costs and stifle network investment, hindering the development of digital services.

Therefore, normalization is a critical step for accurately comparing auction outcomes across different international markets and creating more effective public policy.

Q39. Apart from the approaches highlighted above which other valuation approaches may be adopted for the valuation of 600 MHz band? Please provide detailed information.

BIF RESPONSE

Kindly refer to our response to Question No. 37 above

Q40. Should the value of 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz, 6425- 6725 MHz & 7025-7125 MHz and 600 MHz bands be determined using a single valuation approach? If yes, please indicate which single valuation approach or method should be adopted in each case and provide detailed justification

BIF RESPONSE

No, a single valuation approach should not be used for all these spectrum bands; each band has unique characteristics that require a specific valuation method, potentially using a combination of approaches for a final value. The specific characteristics that drive different valuations include propagation, coverage, existing ecosystem, and market demand, which means a single approach would not accurately reflect the value of each distinct band.

For Bands with Established Ecosystems

- **800 MHz and 1800 MHz:**
    - **Pros:** Proven technology and existing 4G/5G ecosystem, leading to established market prices from prior auctions.
    - **Cons:** Limited spectrum availability in some cases, with high demand driving up prices.
- **900 MHz and 2100 MHz:**
    - **Pros:** Established use cases with strong demand for both capacity and coverage.
    - **Cons:** Can be expensive due to high demand and limited availability.

For Bands with Capacity-Focused Use Cases

- **2300 MHz and 2500 MHz:**
    - **Pros:** Suitable for high-capacity, short-range deployments in dense urban areas, potentially with lower costs compared to lower bands.
    - **Cons:** Poorer indoor and geographical coverage compared to lower bands, requires a larger number of base stations to achieve comparable coverage.
    - **Valuation:** Based on comparisons to other bands (e.g., 2500 MHz valued at a percentage of 2300 MHz price) to reflect its lower performance.

For New and Emerging Bands

- **3300 MHz:**
    - **Pros:** A newer band with a focus on 5G capacity, but with its own set of propagation characteristics that make it valuable.

- **Cons:** Less developed ecosystem compared to established bands, with more research and development needed for optimal use.
- **Valuation:** Should be based on a valuation approach that reflects its characteristics, possibly in relation to the value of other bands.

- **600 MHz:**
  - **Pros:** Excellent propagation characteristics for broad coverage, which can be more cost-effective for operators in some areas.
  - **Cons:** Underdeveloped equipment ecosystem, limited global deployment, and may not be a priority for many operators in the short term.
  - **Valuation:** Requires a fresh evaluation after the ecosystem develops and global deployment increases, as its current value is uncertain.

Why a single approach is not recommended

- **Different Use Cases:**

  Bands such as 600 MHz and 3.3 GHz have unique technical characteristics that make them more suitable for certain uses (e.g., 600 MHz for broad coverage, 3.3 GHz for high capacity) compared to each other or other bands.

- **Ecosystem Development:**

  A new band's value is heavily influenced by the maturity of its supporting equipment ecosystem. This is why bands like 600 MHz are being re-evaluated after initial deployments were slow.

- **Market Dynamics:**
  The market price is a key factor. A single approach cannot account for the varying demand and supply dynamics across different bands, which is a core part of determining value

Q41. In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of the above spectrum bands, or some other approach like taking weighted mean etc. should be followed? Please support your answer with detailed justification.

BIF RESPONSE

Kindly refer to our response to Q40 as above

Q42. What ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz, 6425- 6725 MHz & 7025-7125 MHz and 600 MHz bands and why? Please support your answer with detailed justification.

BIF RESPONSE

BIF recommends that the ratio should be 50%

Justification:

Keeping in view the muted or lukewarm demand which was reflected in terms of participation during the previous auction (June 2024) when Government failed to sell most of the spectrum, it is recommended that the Reserve Price be kept at 50%

The ratio of reserve price to spectrum valuation is typically recommended by TRAI to be around 70% for setting the reserve price in an auction, with adjustments made for factors like market conditions and past auction results. The specific ratio can be influenced by the auction's outcome, where a higher reserve price is set when demand is strong, and a lower one is used if previous auctions had low participation or failed to sell the spectrum.

Factors influencing the ratio

- **Market realities:**

  The valuation should reflect current market conditions, demand, and competition.

- **Past auction performance:**

  The outcomes of previous auctions, including how much spectrum was sold and at what price, are used to inform the current auction's reserve price.

- **Spectrum availability:**

  The amount of spectrum available in a given band influences its valuation. A shortage of spectrum can drive up its value, leading to a higher reserve price.

- **International benchmarks:**

  International prices and market benchmarks are often used as a reference point in the valuation process.

- **Adjustments for low participation:**
  - **50% discount:** If there are no bidders, **a 50% discount on the valuation may be applied.**

- **30% discount:** If the spectrum is sold at the reserve price in a previous auction, a 30% discount might be considered.

Why this approach is used

- **Balancing revenue and market discovery:**

  The approach aims to strike a balance between generating revenue for the government and ensuring a fair market price through competitive bidding.

- **Encouraging participation:**

  By adjusting the reserve price based on market signals, regulators can encourage participation and prevent the auction from failing.

- **Efficient spectrum allocation:**
  Setting a reserve price based on a fair valuation helps ensure that spectrum is allocated to those who can best use it and are willing to pay a fair market price.

Q43. What should the payment terms and associated conditions for the assignment of 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz bands, 6425- 6725 MHz & 7025-7125 MHz bands and 600 MHz bands relating to: (i) Upfront payment (ii) Moratorium period (iii) Total number of instalments to recover deferred payment (iv) Applicable interest rate for protecting the NPV of bid amount Please support your answer with detailed justification.

BIF RESPONSE

Payment terms and associated conditions for assignment of spectrum in existing bands should be kept the same as in the previous auctions .

BIF is not in favour of auction of the upper 6GHz band and is of the firm opinion that it should be fully delicensed.

As regards the 600MHz band , BIF is of the opinion that the payment terms be kept the same as was done during the previous auction in 2022 when the same band was put up for auction.

Q44. Any other suggestion relevant to the subject may be submitted with detailed justification.

BIF RESPONSE

No Comments