

Response to TRAI Consultation Paper on Auction of Spectrum in frequency bands identified for IMT/5G

At the outset, we thank TRAI for providing an opportunity to submit our comments on this important consultation paper which is instrumental for accelerated implementation of Industry 4.0 applications.

ITC Limited is one of India's foremost private sector companies with a diversified presence in FMCG, Hotels, Packaging, Paperboards & Specialty Papers and Agri-Business. ITC's aspiration to be an exemplar in sustainability practices is manifest in its status as the only company in the world, of its size and diversity, to be carbon, water and solid waste recycling positive. In addition, ITC's businesses and value chains create sustainable livelihoods for more than 6 million people, a majority of whom represent the poorest in rural India.

ITC Limited being an Enterprise, will have comments only on the issues dealing with Private Cellular Networks covered under TRAI Consultation Paper which are as follows:

Issues related to Spectrum for Private Cellular Networks

Q.68 To facilitate the TSPs to meet the demand for Private Cellular Networks, whether any change(s) in the licensing/policy framework, are required to be made. If yes, what changes are required to be made? Kindly justify your response.

Response:

In our view, dedicated spectrum should be reserved for the enterprise who can have control to apply and deploy a private network in order to fulfil - affordability, reliability, continuity, flexibility, and security requirement of the business.

ITC should be allowed to build the private cellular network with their in-house capabilities for Industry 4.0 initiative to harness the full benefits of Industry 4.0 to the economy in a time bound manner. Spectrum for private 5G networks to the Industry should be allocated directly by the Spectrum managing agency (government backed entity) in various geographies on administrative basis at nominal fee.

Q.69 To meet the demand for spectrum in globally harmonized IMT bands for private captive networks, whether the TSPs should be permitted to give access spectrum on lease to an enterprise (for localized captive use), for a specific duration and geographic location? Kindly justify your response.

Response:

Sub-leasing of spectrum should be considered very carefully, as additional measures are needed to ensure that enterprise networks do not overlap with any public network or interfere with other enterprise networks.

Spectrum managing agency (government backed entity) can be formed, should be equipped with sufficient spectrum resources to satisfy enterprise requirements. The allocation of spectrum should follow careful assessment of how much spectrum enterprises actually need and should remain flexible to a degree that it can react to future increases in demand for spectrum.

Even after implementing these additional measures, spectrum sub-leasing may bring lot of complexity in administering the lease policy. Some of those challenges are -

1. It may be difficult for industries to get spectrum from TSPs due to unavailability of network in their geographical area.
2. There could be a dilemma for the TSPs to balance between the public network roll-out at the location and the private network demands.
3. The price charged by the TSPs may work as a deterrent as TSPs can form a monopoly in specific regions based on their licenses.
4. Spectrum sub-leasing to be highly monitored to make sure continuity of operations and provide best Quality of Service (QoS).

Due to the above complexities and ambiguities around the leasing process, spectrum leasing is not a viable option for Enterprises to deploy private networks. We are of the view that TRAI should suggest a policy framework which gives private entities an option to obtain spectrum directly from the Govt. for allocation of spectrum to Enterprises for private 5G network to meet their business requirements at nominal cost.

Q.70 In case spectrum leasing is permitted,

i. Whether the enterprise be permitted to take spectrum on lease from more than one TSPs?

Response:

We would reiterate our views that leasing of spectrum from TSPs for private 5G network should not be considered and allocation of spectrum to Enterprises for private 5G networks should be done directly by the Govt./Central Agency. We would further like to submit that allowing enterprises to lease spectrum assets from different TSPs would unnecessarily increase the complication for network deployment, add to their costs, and consequentially act as an additional barrier to network deployment. Some of the challenges with this are -

- **Lack of Benefits for enterprises** – Enterprise benefits from leasing spectrum from a TSP would be marginal, as most TSPs are expected to have sufficient spectrum assets in different bands to serve different connectivity needs, which enables them to lease the spectrum
- **Higher cost and complexity** - Allowing to multisource spectrum assets would complicate network deployment and management for the implementing enterprise unnecessarily. Cost of the infrastructure is expected to increase substantially due to the complexity of carrier aggregation.
- **Lack of accountability** – Multisource spectrum leasing can open up a whole set of new issues to be solved, such as SLA governance, issue ownership and resolution accountability.
- **Governance difficulties** – Central authority regulating sub-leasing activities will face difficulties in monitoring and governing multi-source sub-leasing due to its complex nature.

In view of above, it is again reiterated that allocation of spectrum directly to Enterprises would be the most suitable solution wherein as per their requirement, Enterprises can approach DoT/Central agency for spectrum allocation.

If above is not possible, enterprise must be given an option to take spectrum sub-lease from more than one TSP.

ii. What mechanism may be prescribed to keep the Government informed about such spectrum leasing i.e., prior approval or prior intimation?

Response:

Leasing of spectrum from TSPs for private 5G network ideally should be avoided and allocation of spectrum to Enterprises for private 5G networks should be done directly by the Govt./Central Agency.

However, if at all TSPs would be allowed to sub-lease their spectrum to Enterprises for private 5G network, then TRAI could implement a policy that requires TSPs to report any subleasing agreement between themselves and an enterprise customer to the government once it is in place. Government should release a separate guideline on technical and management compliance and both the parties should be mandated to comply those norms.

iii. What timeline should be prescribed (in number of days) before the tentative date of leasing for submitting a joint request by the TSPs along with the enterprise, for approval/intimation from/to the Government?

Time-bound process: Policy framework should include time bound approvals which can expedite the overall allotment process so that enterprises can take the spectrum. There should be simple process for application and allocation, and complete end to end process should be completed

within 30 days with formal spectrum (frequency channel and other technical details) allocation to the end enterprise / industry vertical.

iv. Whether the spectrum leasing guidelines should prescribe duration of lease, charges for leasing, adherence of spectrum cap provisions, roll out obligations, compliance obligations. If yes, what terms and conditions should be prescribed?

In case spectrum on lease is permitted to be given to the private entities by TSPs, the guidelines for the same may include the following:

- **Pricing** – Pricing cap needs to be applied to private networks to ensure enterprises can easily acquire the spectrum on sub-lease.
- **Duration** - A duration of 10 years is advisable, as it provides all parties with necessary reliability for long-term planning, with possibility of cancelling in case of any business environment changes. Flexibility should be provided in the duration.
- **QoS** – It should be the responsibility and liberty of TSPs to set out their own terms & conditions for sub-leasing arrangements. In case of public networks, both the parties should adhere to the pre and post impact analysis on public network. Rights of public consumer shall be protected with QoS regulations.
- **Rollout obligation** - For effective utilization of spectrum, there must be rollout obligation of within 12 months after leasing the spectrum at the enterprise premises.
- **Compliance Obligation** – Enterprises responsibilities must be explicitly defined and identified in case spectrum being bought directly from government. Enterprise responsibility should be nil in case of sub-leasing from TSP.

v. What other associated terms and conditions may be prescribed?

vi. Any other suggestion relevant to leasing of spectrum may also be made in detail.

(Kindly justify your response)

Response to v & vi:

No comments in view of our submission made in Q 69 and Q 70 (i) & (ii).

Q.71 Whether some spectrum should be earmarked for localized private captive networks in India? Kindly justify your response

Response:

Global developments are corroborating the fact that private cellular networks would be the founding stones for the industrial revolution. To realize the full potential of this 5G-based

revolution, spectrum access should be available to large enterprises as well as SMEs to ensure mass adoption. Hence, spectrum allocation and governance framework need to be such that even a small enterprise should be able to avail and use it.

There are a few incentives which will ensure SMEs adopt for private networks –

- **Affordability** – Spectrum should be available either free of costs or alternatively at nominal (annual or one time) fees to ensure fair opportunity to SMEs.
- **Ease of governance** – Application process needs to be simple allowing easy use of spectrum across the geographies including rural areas.
- **Flexible period** – Spectrum allocation period is needed to use the spectrum according to need of SMEs.

In order to fulfil all these criteria, we suggest light touch registration framework for the Enterprises to allocate the spectrum for private networks with following conditions:

- **Light touch regulation for spectrum allocation** – Spectrum should be allocated directly to enterprises in an administrative allocation under registration mechanism with geographic allocation for captive use.
- **Affordable** – Licenses need to be allocated either free of costs or alternatively at nominal (annual or one time) fees to ensure fair opportunity to all the sizes of enterprises and Industry verticals in India. Like Germany, India can set licensing fee based on various parameters like coverage area, frequency, bandwidth, rural or urban location, license duration etc.
- **Ease of governance** – Allocation process needs to be simple registration based allowing easy use of spectrum across the geographies including rural areas.
- **Flexible period** – Licensing period for private networks needs to be flexible where the companies can acquire license as per their needs. This is necessary to ensure need-based spectrum allocation and optimal spectrum utilization
- **Reuse of Spectrum** - Since Spectrum is expected to be allocated for specific campus/ localized area, hence it suggested to allocate same spectrum to multiple enterprises or Industry verticals at different locations to achieve optimal spectrum efficiency.

Direct allocation of spectrum at reasonable price would provide multiple benefits to the enterprise / industry verticals. Few of those benefits are -

- **Control:** It will provide complete control to them on their private network without any dependency on telco operator or others and full freedom to unleash the potential for Industry 4.0 transformation.
- **Innovation:** It will enable significant opportunity to innovate and create prudent use cases relevant to their industry and business.

- **Flexibility:** It will provide flexibility to create relevant network topology and architecture needed for their business within their campuses.

In view of the above, we recommend the reservation of spectrum for private 5G networks and allocation of the same directly to the Enterprises. Further, it is recommended that some part of spectrum in sub-6GHz band (at least 100MHz) and mm-wave band (minimum 400MHz) should be reserved for private 5G networks for potential Industrial applications and to be allocated administratively under registration mechanism to the Enterprises directly (to be used within their campus) at nominal fee for private, captive and local network deployments in 5G technology in line with global practices to enable Industry 4.0. Ideally the identified spectrum should be contiguous within the band to keep the costs of private network deployments minimal. Further, reuse of allocated spectrum should also be ensured as spectrum is expected to be allocated for specific campus/ localized area, thus it suggested to allocate same spectrum to multiple enterprises or Industry verticals at different locations to achieve optimal spectrum efficiency.

Q.72 In case it is decided to earmark some spectrum for localized private captive networks, whether some quantum of spectrum be earmarked (dedicatedly) from the spectrum frequencies earmarked for IMT services and/or spectrum frequencies earmarked for non-IMT services on location-specific basis (which can coexist with cellular-based private captive networks on shared basis)? Kindly justify your response with reasons.

Response:

There is a huge demand arising for private networks across India, private network economy is going to be multi-fold in coming few years. Hence there must be proper allocation & reservation of spectrum for private use.

There can be multiple ways a regulatory body can allocate spectrum for a private network setup. This can be either through

- Dedicated reserved spectrum for private enterprises
- Allowing TSPs to lease their spectrum to private enterprises
- shared spectrum uses in some blocks with other incumbent services (FSS/P2P)

However, leasing through TSP has its own trade-offs which are well acknowledged and highlighted in consultation paper itself (Page no 103).

1. It may be difficult for industries to get spectrum from TSPs
2. The price charged by the TSPs may work as a deterrent
3. Certainty on continuity of operations could become an issue
4. High order dependence on the TSPs

5. TSPs network tends to be highly interfered due to improper network optimization, environmental (Ducting) interference which is not suitable for mission critical applications.
6. Compromised quality of service for public network

As a general global trend among most of the developed countries, either a separate spectrum block has been reserved and dedicated for private network setup and/or allowed shared spectrum usage by private enterprises and incumbent in coexistence manner. We recommend TRAI to make flexible norms like USA's CBRS, where some spectrum band for private networks will be shared with incumbents based on the geographical location and some will be dedicated only for private network usage. This will ensure optimal utilization of this scarce resource.

Q.73 In case it is decided to earmark some quantum of spectrum for private captive networks, either on exclusive or shared basis, then

a) Spectrum under which band(s) (or frequency range) and quantum of spectrum be earmarked for Private Network in each band? Inputs may be provided considering both dedicated and shared spectrum (between geographically distinct users) scenarios.

Response:

Spectrum reservation in unsold bands:

Big chunk of spectrum is lying unsold in different band categories. India may adopt policies just like UK where unused spectrum is allowed to be used by private networks.

Spectrum reservation in IMT bands:

3400MHz - 3425MHz: As mandated in the consultation paper that even though this band is earmarked for IMT, there must be 40-130Km of protection for some locations. Since private network is low power, limited emission, confined boundary network so this band easily comply the technical requirements which makes it suitable to private network allocation. 20MHz block size can be made reserved for private networks.

Coexistence with incumbent services:

3670MHz – 4200MHz: Coexistence of FSS & Private network. Although this band is IMT designated band but as per India scenario this is being used for FSS (Fixed Satellite Station) and coexistence with IMT may not be possible because of higher emission power of regular public cellular network. Private networks can coexist with FSS due to their low power emission and confined geographic operations. This makes a win-win situation for all. This band makes best choice for private networks Due to the virtue of confined geographic operation; same spectrum can be used by multiple private enterprises hence there should not be any scarcity of the

spectrum. We recommend having minimum 100MHz of bandwidth for industrial allocation. Australia has made similar reservation in 3800-4200 band. Further, this band is globally harmonized and 3GPP endorsed band n77 and have significant device ecosystem support. This supports economy of scale.

Mm Wave Bands: 24.25GHz - 27.5GHz & 27.5GHz-29.5GHz: These mm Wave bands specifically called out as 26GHz and 28GHz, are globally harmonized for 5G services. These bands have significant bandwidth of over 4GHz and can meet capacity requirements of country like India. Around 400Mhz to 800MHz can be easily carved out for the private networks without compromising the capacity and other requirements of TSPs/MNOs for deployment in public networks. Some parts of 27.5Ghz - 29.5GHz are also being used for FSS (Fixed Satellite Stations) for uplink services but at very few locations. With suitable measures of co-existence significant part of this band could be freed up for 5G services specifically for private networks which are anyway confined to a specific campus or a location of an enterprise or industrial company.

Provision for unlicensed bands:

NR-U 5-6GHz - 5-6 GHz band should be made liberal to use for both LTE as well NR for private network setups and should be made technology agnostic. Let enterprise decide the best fit technology for their operation. While using the unlicensed band inside an enterprise premises, the maximum power output may be increased to suit applications.

b) What should be the eligibility conditions for assignment of such spectrum to private entities?

Response:

We recommend following eligibility criteria to ensure fair access and optimal usage of spectrum.

1. The applicant should possess the required use-case knowledge and financial resources to build, install and operate a private network.
2. The applicant should be the owner or lessee of the property on which the private network is to be installed.
3. The applicant should be ready to attest that the spectrum allocated will be used only for its captive purposes within its campus, location, factory or premises and private network coverage will be confined within the same.
4. The applicant should agree to licence terms and payment of fees.
5. The applicant should agree to comply to the licensing conditions mandated by regulatory authorities.

c) What should be the assignment methodology, tenure of assignment and its renewal, roll-out obligations?

Response:

In order to enable enterprises and industry verticals to understand and follow the process, spectrum allocation needs to be hassle-free. Spectrum managing agency (government backed entity) should create an easy, transparent, digital, and time bound process for spectrum allocation so that any industry wanting to deploy private network can apply easily. To achieve this goal, we propose following -

- 1. Administrative allocation:** There should be an administrative way of allocating the spectrum which should enable every size and shape of enterprise/ industry vertical to apply on a web-based platform with necessary required documentation.
- 2. Time-bound process:** Policy framework should include time bound approvals which can expedite the overall allotment process so that enterprises can take the spectrum. There should be simple process for application and allocation, and complete end to end process should be completed within 30 days with formal spectrum (frequency channel and other technical details) allocation to the end enterprise / industry vertical.
- 3. Timely rollout:** Enterprises requesting spectrum at a single location should deploy at least 50% of allotted spectrum within 12 months of allocation. Enterprises requesting access for multiple locations should deploy at least 10% network for allotted spectrum within 9-12 months. If an enterprise fails to meet the rollout obligation, spectrum should be considered as unused and should get released immediately to ensure optimal utilization.

d) What should be the pricing mechanism for assignment of spectrum in the band(s) suggested for private entities for localized captive use and what factors should be considered for arriving at valuation of such spectrum?

Response:

Spectrum allocation for private networks should be done through an administrative process and should be completely delinked from auction process or even market determined price. Since private networks would be captive networks within a geographical boundary, pricing of the spectrum should be based on duration, required bandwidth, and area to be covered. Globally different countries have devised their own formula to calculate the spectrum pricing, however base factors remain the same.

As an example, Germany has implemented model for price calculation which includes the one-time administrative charges and variable charges based on requirement of network specifications. This formula will ensure even smallest of the enterprise in a rural area can afford a spectrum access.

Fee = One-time administrative charges + $B * t * 5 * (6a1 + a2)$

B - bandwidth in MHz

t - duration of allocation in years

a - area in km²

a1 - settlement and traffic area

a2 – other rural areas

Above is a good model that can be used as a reference.

e) What should be the block size and spectrum cap for different spectrum band(s) suggested in response to point (a) above.

Response:

To ensure fair opportunity for all enterprises and avoid hoarding of spectrum, we propose following block size -

- Sub-6 GHz: 10MHz block size (max 100MHz)
- mmWave: 50MHz block size (max 400 MHz)

f) What should be the broad framework for the process of (i) filing application(s) by enterprise at single location, enterprise at multiple locations, Group of companies. (ii) payment of spectrum charges, (iii) assignment of frequencies, (iv) monitoring of spectrum utilization, (v) timeline for approvals, (vi) Any other

Response:

To ensure fair opportunity for all size of enterprises and avoid hoarding of spectrum, we propose following block size -

- Complete process should be digital and on web-based application where all companies can apply for the required spectrum, with options for single or multiple location application.
- Citizen Service centres (CSC) in rural areas can be leveraged to enable rural business owners (who might not be comfortable with digital process) to get online spectrum access easily.
- There must be provision to pay online for allotted spectrum or renewal of spectrum. After successful application there must be time bound approvals.
- Policy framework should include and mandate the technical requirements which needs to be fulfilled by private network.

g) Any other suggestion on the related issues may also be made with details. (Kindly justify your response with reasons)

Response:

3GPP standards used in 5G has virtualized many components of the network in the latest release. This has enabled different types of enterprises like cloud service providers, industrial automation providers, and software service providers to deploy a 5G network in enterprises. These service providers have expertise in software and good domain knowledge to ensure enterprise use-case needs can be met with their services. Hence, it is essential to allow these services providers in addition to TSPs and SIs to collaborate with enterprises to deploy a private network. This will also help India meet its private network demand more quickly as there will be no dependency on the resources of major players.

Q.74 What steps need to be taken to facilitate identification, development, and proliferation of India specific 5G use cases for different verticals for the benefit of the economy and citizens of the Country? Kindly provide detailed response with rationale.

Response:

5G private networks have brought industrial revolution to enable industries to deploy plethora of industry-specific use cases. It is necessary to try out these use cases in a controlled environment first even for early adopters to validate their profitability and feasibility. These control environments can be a test lab, customer experience center or co-innovation center, rural infrastructure for farmers which can identify and validate different use cases and help customers gain better confidence of this new technology.

As these testbeds also need a spectrum access to deploy a private network, government should permit enterprises to set up a lab in their own premises using an allocation of private network spectrum license. These licenses should be temporary and free of charge in nature or at nominal charges which are limited to specific area. The licensing process needs to be time-bound with 10 days approval period to ensure quick execution. Enterprises should have obligation to deploy test labs within stipulated time to achieve optimal spectrum utilization.