



26 December 2023

Ms. Vandana Sethi
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New Delhi – 110 002

Subject: Tata Communications Ltd. comments to TRAI Consultation Paper on 'Digital Transformation through 5G Ecosystem'

Dear ~~Madam~~

This is with reference to the TRAI Consultation Paper No. 24/2023 dated 29-09-2023 on 'Digital Transformation through 5G Ecosystem'.

In this regard, please find enclosed herewith Tata Communication Limited's comments for your kind consideration as Annexure.

We request you to kindly consider our submissions while finalizing the recommendations and would be happy to provide any additional information, if required.

Thanking You,

Yours Sincerely,
For Tata Communications Limited,

Alka Selot Asthana
Vice President and Head Regulatory Affairs
(Authorized Signatory)

Enclosed: As mentioned above

TATA COMMUNICATIONS

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**Tata Communications Limited's response to TRAI Consultation Paper on
'Digital Transformation through 5G Ecosystem'**

At the outset, we thank TRAI for providing us with an opportunity to share our comments/inputs on this forward-looking consultation paper on Digital Transformation through 5G Ecosystem. TRAI has importantly highlighted in the paper that despite the considerable rollout of 5G done by TSPs, the development and deployment of new use cases for consumers and enterprises is essential to fully realize the potential of 5G technology. The new use cases and related applications also dependent upon the other associated technologies such as IOT, AI, ML, AR/VR/MR (Mixed Reality), Metaverse etc. in addition to 5G services so that end to end 5G Ecosystem can be strengthened to reap optimal benefits from the 5G technology. Various innovative agencies and research-oriented entities are exploring new ways to apply these technologies put together as a part of 5G Ecosystem to not only address the challenges of social and economic development but also becoming instrumental in the success of Industrial revolution (Industry 4.0). which is a platform for ensuring successfully digital transformation of Enterprises and Industries.

In today's world, Enterprises are becoming increasingly distributed and autonomous. The applications and services they deliver are increasingly demanding high bandwidth, as well as reliable, deterministic communications over wide areas under different conditions and multiple networks. Enterprises and enterprise networks are increasingly demanding more spectrum, more bandwidth and lower latency. Vertical industries each present their own set of unique requirements on communications networks and no one technology or operating model will meet the connectivity needs of the Enterprise. The requirement of Enterprises would be quite complex and complicated involving use of multiple technologies and platforms wherein 5G being an underlying platform for these technologies, customization of such underlying platform by TSP within its public network may not be feasible neither desirable. Thus, in our view, 5G technology is most suited for various use cases to be deployed as a part of 5G Ecosystem for Enterprises and Industries.

Tata Communications, being a global Digital Ecosystem enabler, provides various digital platforms, solutions, and connectivity services to different Enterprises by focusing on convergence of platforms, connectivity, and services. The world is gradually migrating from a connected to hyperconnected sphere, where various devices, platforms, technologies belonging to different ecosystems can literally converse, share intelligence and insights with each other and provide very high levels of experience and value to consumers and enterprises. We believe that a digital transition of Enterprises and MSMEs is going to accelerate further with advancement of technologies and with empowering hyperconnected ecosystems through a digital fabric leading to greater participation in digital inclusion.

Industry 4.0 is one of the key drivers for Private networks. It is an automation and data exchange solution based on IoT, AI, cloud computing and robotics to make industrial operations efficient and affordable. Accelerating Industry 4.0 is one of the key missions specified by DoT in NDCP policy 2018. In order to achieve that, we need to focus on specific network requirements of industry 4.0.



In India, deployment of Captive Non-public Network by Enterprise is at nascent stage. The ecosystem for CNPN use cases are dependent upon the availability of wireless spectrum to Enterprises in an affordable manner instead of relying on Fiber connectivity. There are advantages of private networks working on dedicated spectrum over fixed line network / fiber such as it would be less expensive to modify a deployed network, there would not be any limit of number of devices which can be connected and minimal downtime during network modifications. Presently, despite of having CNPN license framework in place, there is no take-off of deployment of CNPN by Enterprises due to the fact that Enterprises are struggling to either getting Spectrum on lease from Access Service Providers or deployment of CNPN by Access Service provider for Enterprises due to non-commercial viability.

Concentrating the 5G technology and its deployment in the hands of a few individuals or a few companies will not help the Enterprises to realize the optimal benefits of 5G because the market has to open up, there has to be a discovery, people have to see the benefits, then people can get the benefits. Thus, there is a need for putting in place a robust policy framework and collaborative efforts required among stakeholders to ensure participation of individuals and Enterprises in digital economic activities in order to address the gaps in digital inclusion which are likely to arise due to emerging technologies and deploy the 5G based use cases for ensuring greater economies of scale and to achieve optimal operational efficiency. TRAI in the paper has pointed out that the core competency of TSPs today is in providing network connectivity. To realize the potential benefits of 5G, the network needs to transform into a digital platform and be delivered as a service in the digital marketplace. Most of the implementations of 5G use cases will be brownfield implementations where the 5G solution needs to seamlessly integrate with existing business processes, IT systems and operational technologies.

As rightly pointed out by TRAI in the paper that 5G along with the associated technologies is expected to create new value through hyper-connectivity and become a catalyst for digital transformation across industries. Sectors such as healthcare, energy & utilities, manufacturing, and retail are expected to benefit the most from large-scale 5G adoption. For example, 5G can provide the backbone for IoT and AI applications that require high bandwidth and low latency. IoT and AI can generate and analyze huge amounts of data that can be used to create immersive and personalized experiences in the metaverse. Metaverse can offer a platform for showcasing and monetizing the innovations and solutions enabled by 5G, IoT and AI. India has a unique opportunity to leverage its strengths in digital infrastructure, talent pool, entrepreneurial ecosystem to become a global leader in digital transformation. By harnessing the potential of 5G, IoT, AI and metaverse, India can accelerate its economic growth, social development and global competitiveness.

In this regard, we echo TRAI's views that an equally innovative policy and regulatory framework is required to address the challenges and issues involved in development and deployment of use cases based on these new technologies to meet the digital transformation requirements of Enterprises and Industry.

With the above submissions, we are hereby providing our inputs on the issues raised in the Consultation Paper:



Q.1. Is there a need for additional measures to further strengthen the cross-sector collaboration for development and adoption of 5G use-cases in India? If answer is yes, please submit your suggestions with reasons and justifications. Please also provide the best practices and lessons learnt from other countries and India to support your comments.

Tata Communications Response:

Yes, there is a need for additional measures to further strengthen the cross-sector collaboration for development and adoption of 5G use-cases in India. We believe that this will enable faster development and adoption of 5G use cases in India. The following measures could be implemented:

- Raise awareness of adoption of 5G Use cases by educating Enterprises about the benefits of 5G.
- Launch a 5G applications fund, to provide financial support to businesses that are developing innovative 5G use cases.
- Establish a national 5G innovation hub, to bring together representatives from government, industry, and academia to collaborate on research, development, and testing of 5G use cases.
- Create a 5G testing and experimentation platform, to provide a sandbox environment for businesses to develop and test 5G applications.
- Develop a 5G talent pipeline, involving working with educational institutions to develop training programs for 5G skills.

Following are the possible use cases enabling digital transformation of the Enterprises –

TATA COMMUNICATIONS		POSSIBLE USE CASES		
Industry Agnostic	Manufacturing and Mining	Stadiums and Venues	Ports	
<ul style="list-style-type: none"> • Video Surveillance • Environmental monitoring • Edge based analytics • Smart warehousing • Employee Safety • Predictive maintenance 	<ul style="list-style-type: none"> • Industrial IoT based automation • Predictive maintenance • Automated inspection & quality control • Industrial Robotics & Cobots • Remote operations 	<ul style="list-style-type: none"> • Fan engagement • Crowd management & safety • Immersive experience • Remote production • Personalized consumption 	<ul style="list-style-type: none"> • Connected GSEs • Smart cargo and material handling • AGVs and robotics • Asset tracking • Preventive maintenance 	
Horizontal Technology	Campus Mobility and Logistics	Agriculture	Hospitals	
<ul style="list-style-type: none"> • AR/VR based applications • Drone applications • Mobility related applications • Autonomous vehicles • Asset tracking 	<ul style="list-style-type: none"> • Smart yard management • Passenger management & safety • Smart cargo and material handling • Remote operations • Predictive and preventive maintenance 	<ul style="list-style-type: none"> • Massive sensor network • Irrigation and water management • Optimized & targeted feed • Localized treatment for weeds • Geo fencing and safety 	<ul style="list-style-type: none"> • Smart wards • Remote surgical training • Asset tracking - eHealth devices • Video surveillance • Push-to-talk communication 	

In our view, we should approach the 5G ecosystem in two parts – one which is inside the campus of the target Enterprise entity and the other which requires movement into the public areas. For public areas, the process of getting the 5G based mobile connections in bulk with enterprise level eKYC and pre-configured eSIMs shall be enabled.



The Licensed Service Providers who are non-Access Service providers and have relevant technologies and experience in 5G use cases should be encouraged to participate in the use-case development with either direct support from the government or at a committed support from the mobile operators. While the development of use-cases can happen from any corner of the country, operationalizing the same requires a mobile network and subscription to the same. This is critical to ensure that the mobile operators do not monopolize the wide deployment of the use-cases. It should be made easy for ISPs, NLD/ILD operators etc., to obtain a mobile access license to do wholesale contracts with the mobile operators and resell the same for enterprise use-cases. Another area to look at is that each of these ecosystems should be independently let to grow without the need for an intervention from DoT. This will provide autonomy for the use-case development and fair participation of many companies without the need for a telecom operator to be a part of each of the use-case. Once the use-case is developed, deployment always requires the participation of the telecom operators.

In the case of campus private networks, the key enabler is the easy availability of cost-effective contention free spectrum. Many advanced economies have identified this as the clear need and have set up procedures for enterprises to obtain spectrum directly from the government and set up a captive network of their own. This is the key enabler that the government has to unblock. Currently the telecom operators are in a monopolistic situation to grant or deny spectrum at any cost that they please. This has been limiting the number of active implementations of private networks in the country. A light touch regulation that helps businesses to adopt 5G inside and outside the campus would be the key enabler for digital transformations to take place.

India can avail benefits by adopting the following best practices and lessons learned from other countries.

- a) China is making rapid progress in 5G deployment. The country has a large market for 5G applications and is investing heavily in 5G infrastructure.
- b) South Korea is a global leader in 5G deployment. The country has a strong ecosystem of government, industry, and academia that is collaborating on the development and adoption of 5G use cases.
- c) Finland is a pioneer in the development of 5G use cases. The country has a number of successful 5G trials underway, and it is home to a number of innovative 5G startups.

India can learn from these countries by adopting their best practices and by avoiding their mistakes. India should focus on developing 5G use cases that are relevant to the needs of our economy and society. Learning from the experiences of countries like China, India must be vigilant against repeating errors, particularly those related to enabling a single company's monopolistic control over the 5G market. By implementing the measures outlined above and by learning from the best practices of other countries, India can further strengthen cross-sector collaboration for the development and adoption of 5G use cases.

Q.2. Do you anticipate any barriers in development of ecosystem for 5G use cases, which need to be addressed? If yes, please identify those barriers and suggest the possible policy and regulatory interventions including incentives to overcome such barriers. Please also provide the details of the measures taken by other countries to remove such barriers.



Tata Communications Response:

Availability of cost-effective, hassle-free spectrum is a key barrier for developing 5G ecosystems for Enterprise digital transformation. The 5G ecosystem involves numerous stakeholders with diverse needs and interests. Lack of collaboration and knowledge sharing can lead to market fragmentation and inefficiency. Globally there are 16 countries which have set aside a dedicated and light touch license spectrum for deployment of industrial 5G Use cases. Except India all Economies have made some provision to proliferate and leverage 5G as a catalyst for industrial transformation.

The present regulatory and licensing framework does not deal with the need of spectrum for ISPs and Enterprise Service Providers to meet the requirements of Broadband & B2B market and largely focused on the growth of mobility services. The Current terms and pricing for spectrum auction make it un-viable for non-access telecom service providers / ISPs to participate in auction.

In India, deployment of Captive Non-public Network by Enterprise is at nascent stage. Current provision in India context allows only TSPs to build a 5G network for enterprises. While telco developed country like South Korea have kept TSPs outside of the enterprise 5G deployment. The ecosystem for CNPN use cases are dependent upon the availability of wireless spectrum to Enterprises in an affordable manner instead of relying on Fiber connectivity. There are advantages of private networks working on dedicated spectrum over fixed line network / fiber such as it would be less expensive to modify a deployed network, there would not be any limit of number of devices which can be connected and minimal downtime during network modifications. Presently, despite of having CNPN license framework in place, there is no take-off of deployment of CNPN by Enterprises due to the fact that Enterprises are struggling to either getting Spectrum on lease from Access Service Providers or deployment of CNPN by Access Service provider for Enterprises due to non-commercial viability.

Threat to public consumers quality & ineffective spectrum utilization: To deploy a private network through TSPs, spectrum leasing, Primary license holder cannot operate in that region due to non-coexistence. If an operator decides to lease some of its spectrum to a third party, then it will not be able to serve in that region. There would be "no coverage islands" for public consumers. This not only hampers the rights of public consumers but also deterrent to nationwide coverage.

Interference management: Setting up a network based on leased spectrum is technically very difficult. Enterprises which need mission critical applications need an interference free network. Interference from nearby public networks may hamper the overall purpose of the private network.

Streamlined standardization processes among PAN India: Encouraging collaboration among industry and government to accelerate standardization and ensure interoperability. Adopting standard ROW Rules with by all LSAs will help to deploy the infrastructure needed to ensure 5G connectivity.



Concentrating the 5G technology and its deployment in the hands of a few individuals or a few companies will not help the Enterprises to realize the optimal benefits of 5G because the market has to open up, there has to be a discovery, people have to see the benefits, then people can get the benefits. Thus, there is a need for putting in place a robust policy framework and collaborative efforts required among stakeholders to ensure participation of individuals and Enterprises in digital economic activities in order to address the gaps in digital inclusion which are likely to arise due to emerging technologies and deploy the 5G based use cases for ensuring greater economies of scale and to achieve optimal operational efficiency. TRAI in the paper has pointed out that the core competency of TSPs today is in providing network connectivity. To realize the potential benefits of 5G, the network needs to transform into a digital platform and be delivered as a service in the digital marketplace. Most of the implementations of 5G use cases will be brownfield implementations where the 5G solution needs to seamlessly integrate with existing business processes, IT systems and operational technologies.

This is an opportune time for the Government to bring further policy reforms to allocate spectrum for deployment of CNPN services directly to the Enterprises to create necessary ecosystem to enable Industrial applications and use cases instead of only relying on the MNO. Pricing for such a spectrum allocation can be recommended by TRAI.

Q.3. What are the policy measures required to create awareness and promote use of 5G technology and its infrastructure so that the citizens including those residing in rural and remote areas may benefit from the 5G use cases and services to create new economic activities and increase employment opportunities and thereby promote economic growth of the country?

Tata Communications Response:

To promote awareness and facilitate the widespread adoption of 5G Use cases especially in rural and remote areas, following are the suggested policy measures –

1. Education and Awareness Campaigns- Launching nationwide campaigns to educate citizens about the benefits of 5G technology and its potential applications, incentives, to telecom operators to actively participate in educational initiatives, such as workshops and community outreach programs.
2. Infrastructure Development Incentives, by offering incentives and subsidies to telecom operators for expanding 5G infrastructure in rural and remote areas, incentives like Tax breaks, reduced license fees, or subsidies for building and maintaining 5G infrastructure in underserved regions.
3. Public-private partnerships, facilitating partnerships between government agencies, private sector entities, and local communities to deploy 5G infrastructure and create a supportive regulatory framework, offer financial incentives, and encourage collaboration through public-private partnerships.
4. Skill Development Programs, to implement training programs to enhance the skills of the local workforce in 5G-related technologies, by giving subsidies for training programs, collaboration with educational institutions, and support for vocational training centers in rural areas.



5. Digital Literacy Programs, to enhance digital literacy, ensuring that citizens in rural and remote areas can fully utilize 5G services, subsidies for digital literacy training centers, partnerships with NGOs for community-based training, and awareness campaigns in local languages.
6. Affordable Connectivity, to regulate and incentivize telecom operators to provide affordable 5G connectivity services in rural areas, regulatory support to ensure that 5G services are priced affordably for rural populations.
7. Research and Development Support, by investing in research and development initiatives to explore and develop 5G use cases tailored to the needs of rural communities, granting tax credits, or subsidies for companies engaged in R&D for 5G applications in agriculture, healthcare, education, and other relevant sectors.
8. Monitoring and Evaluation, by establishing mechanisms for continuous monitoring and evaluation of the effectiveness of 5G deployment in rural areas, recognition and additional support for successful initiatives, with periodic assessments to refine policies based on real-world outcomes.
9. Regulatory Support, to create supportive regulatory environment that encourages innovation and investment in 5G technology, streamline regulatory processes, reduce bureaucratic hurdles, and provide clarity on licensing requirements for 5G deployment.
10. There must be a balance between licensed, unlicensed and light touch license provision.
11. Ease of import, relevant body shall ease out the import permissions for doing trials and experimentation for both outdoor as well as indoor testing.

Further, it may also be noted that connectivity is the backbone of any communication. Earlier communication was primarily for human-to-human exchange but with the advent of industrial revolution and new technologies there is need of machine-to-machine communications also. There is a paradigm shift in industrial communication where cellular connectivity is offering cutting edge use cases. These use cases not only bring economic benefits but also operational efficiency.

Q.4. What are the policy measures required to promote use of IoT technology and its infrastructure so that the citizens including those residing in rural and remote areas may benefit from these 5G enabled IoT smart applications and services to create new economic activities and increase employment opportunities and thereby promote economic growth of the country?

Tata Communications Response:

Promoting the use of IoT (Internet of Things) technology and its infrastructure, particularly in rural and remote areas, to enable 5G-enabled IoT smart applications requires a combination of policy measures to ensure accessibility, affordability and security. Here are some key policy measures that can help facilitate the adoption and benefits of IoT technology in these areas.

1. **Spectrum Allocation:** Dedicated spectrum allocation for industrial network at an affordable cost.



2. **IoT Devices:** Provide financial incentives or subsidies for IoT device manufacturers to produce cost-effective solutions that are accessible to citizens in rural and remote areas.
3. **Rural Entrepreneurship and Start-up Support:** Encourage the establishment of IoT-related startups and businesses in rural areas by providing funding, mentorship, and business development support.
4. **Flexible Regulatory Policy:** Simplify regulatory processes for deploying IoT infrastructure, including permitting and licensing procedures.
5. **Research and Development:** Invest in R&D programs that focus on IoT technologies and their applications in agriculture, healthcare, education, and other areas relevant to rural communities.
6. **Monitoring and Evaluation:** Regularly review the impact of IoT initiatives in rural and remote areas to make sure that they are delivering the intended benefits and adjust policies accordingly.

Q.5. What initiatives are required to be taken by the Government to spread awareness among the citizens about IoT enabled smart applications? Should the private companies / startups developing these applications need to be engaged in this exercise through some incentivization schemes?

Tata Communications Response:

Spreading awareness among citizens about IoT-enabled smart applications is crucial for their adoption and maximizing the benefits of IoT. To achieve this goal, Governments can take various initiatives and partnering with private enterprises and startups can prove exceptionally beneficial. Here are some key strategic approaches.

1. **Public Awareness Campaigns:** The government can launch awareness campaigns through various media channels including social media and community events to educate citizens about the potential & benefit of IoT.
2. **Workshops and Seminars:** Organize workshops, seminars, and webinars on IoT-related topics, featuring experts and industry leaders. These events can help citizens to understand the practical applications of IoT.
3. **User-Friendly Interfaces:** Encourage private companies to develop user-friendly interfaces for their IoT applications. Ease of use is crucial for widespread adoption.
4. **Customer Support and Training:** Private companies should offer robust customer support and training to ensure that users can make the most of IoT applications.
5. **Affordability:** Promote the development of cost-effective IoT solutions that are accessible to a broader range of citizens, including those with constrained financial resources.
6. **Recognition and Awards:** Recognize and reward private companies and startups that contribute to spreading awareness and developing innovative, impactful IoT solutions.



Q.6. Industry 4.0 encompasses Artificial intelligence, Robotics, Big data, and the Internet of things and set to change the nature of jobs.

- a) What measures would you suggest for upskilling the top management and owners of industries?**
- b) What measures would you suggest for upskilling the workforce of industries?**
- c) What kind of public private partnership models can be adopted for this upskilling task?**

Please reply with proper justification and reasons and also by referring to the global best practices in this regard.

Tata Communications Response:

Industry 4.0, the fourth industrial revolution, can be achieved by the convergence of four important technologies viz Artificial Intelligence, Robotics, Big Data, and the Internet of Things (IoT). On one side, revolution 4.0 is transforming industries and creating new opportunities, but it also presents challenges, in terms of workforce upskilling and reskilling. Industry 4.0 is also one of the key drivers for Private networks. It is an automation and data exchange solution based on IoT, AI, cloud computing and robotics to make industrial operations efficient and affordable. Accelerating Industry 4.0 is one of the key missions specified by DoT in NDCP policy 2018. In order to achieve that, we need to focus on specific network requirements of industry 4.0.

In view of above context, following are the suggestions for upskilling the top management and owners of industries:

(a) Upskilling Top Management and Owners:

1. Executive Education Programs, to encourage top management and owners to participate in executive education programs that focus on Industry 4.0 technologies, their impact on industries, and strategies for adapting to the changing landscape. Industry-Specific Training Courses needs to be arranged on the application of Industry 4.0 technologies in the respective industries, equipping top management with the knowledge to make informed decisions.
2. Industry-Academia Collaborations, collaborations between industries and academic institutions to develop and offer customized executive education programs tailored to the specific needs of different industries.
3. Industry Forums and Conferences, to discuss Industry 4.0 trends, allowing top management to stay updated on the latest developments and exchange best practices.
4. Mentorship and Coaching Programs, to connect experienced Industry 4.0 experts with top management, facilitating knowledge transfer and personalized guidance.

(b) Up-skilling the Workforce:



1. Skill Gap Analysis, to identify the specific skills required for Industry 4.0 jobs and compare them to the existing skills of the workforce.
2. Tailored Training Programs, to address the identified skill gaps, providing targeted training on Industry 4.0 technologies and their application in specific job roles.
3. On-the-Job Training and Apprenticeships, to allow workers to learn from experienced professionals while gaining hands-on experience with Industry 4.0 technologies.
4. Online Learning Platforms and Resources, that offer Industry 4.0 training courses, allowing workers to learn at their own pace and convenience.
5. Industry Certifications and Micro-credentials, to encourage workers to pursue industry certifications and micro-credentials in Industry 4.0 technologies, demonstrating their proficiency and enhancing their employability.

(b) Public-Private Partnership Models:

1. Industry-Led Consortia, to bring together companies, academia, and government agencies to collaborate on upskilling initiatives and share best practices.
2. Co-funded Training Programs, the government and industry partners share the costs of developing and delivering upskilling programs.
3. Skills Voucher Schemes, to provide financial assistance to workers for upskilling courses related to Industry 4.0 technologies.
4. Tax Incentives for Up-skilling, provide tax incentives to companies that invest in upskilling their workforce, encouraging them to prioritize employee development.

Q.7. What are the policy, regulatory and other challenges faced by MSMEs in India in adoption of Industry 4.0. Kindly suggest measures to address these challenges. Provide detailed justification with reasons along with the best practices in other countries.

Tata Communications Response:

The adoption of Industry 4.0 technologies in India by Micro, Small, and Medium Enterprises (MSMEs) is crucial for their growth and competitiveness. However, several policy, regulatory, and other challenges hinder this process.

For example - Poor infrastructure, such as unreliable power supply and inadequate internet connectivity, can impede the adoption of Industry 4.0 technologies. In current scenario if any MSME wants to setup a cellular private network for its own use without dependency on any TSP



then there is no provision for same. DoT has provisioned to set up a private network for MSMEs through TSPs only. This is one of the major bottlenecks and a hindrance in adoption of 5G and new use cases in MSME environment.

Many countries have implemented successful strategies to address these challenges. Sixteen countries in the world have set aside a dedicated and affordable spectrum for industrial connectivity.

In our view, the successful adoption of Industry 4.0 technologies by Indian MSMEs requires a holistic approach, involving government support, private sector collaboration, and a clear regulatory framework.

Q.8. What additional measures are required to strengthen the National Trust Centre (NTC) framework for complete security testing and certification of IoT devices (hardware as well as software) under DoT / TEC. What modifications in roles and responsibilities are required to make NTC more effective? Kindly provide your comments with justification in line with the global best practices

Tata Communications Response:

Integration of National Trust Centre (NTC) Framework with Global Trust Repositories, CTIA and NIST Cybersecurity Certification framework is pretty much essential for complete security testing and certification of IoT Devices.

Implementing Security by Design should be factored in the entire lifecycle of IoT – Manufacturing (OEMs), Certification (Government agency) and Deployment (Service Providers/System Integrators/Enterprises).

Q.9. IoT security challenges and requirements vary significantly across different industry verticals. Is there a need to develop sector-specific IoT security and privacy guidelines?

Tata Communications Response:

There should be only one common security framework and privacy guidelines to be implemented across all the Industry Verticals to avoid sector specific siloed security guidelines which leads to complexity and expanding threat vectors. Thus, there is no need to develop sector specific IoT security and privacy guidelines.

Q.10. If answer to Q.9 is yes, is there a need for a common framework and methodology for developing such sector-specific guidelines.

Tata Communications Response:

Yes, a common framework for sector specific IoT security and privacy guidelines is essential for creating a secure and trusted IoT ecosystem. It provides a structured approach that can be adapted to different sectors while promoting collaboration, efficiency, and ongoing improvement in the face of evolving security challenges.



A common framework for developing sector specific IoT security and privacy guidelines should include the following.

- a) A definition of the scope of the guidelines.
- b) A set of principles that should guide the development of the guidelines.
- c) A methodology for identifying and assessing the security and privacy risks associated with IoT devices in each industry vertical.
- d) A set of recommended security and privacy controls for each industry vertical.
- e) A process for reviewing and updating the guidelines on a regular basis.

The development of a common framework for sector specific IoT security and privacy guidelines would be a valuable resource for industry stakeholders, government officials, and security experts. It would help to ensure that IoT devices are developed, deployed, and used in a secure and responsible manner.

Q.11. Please suggest regulatory and policy interventions required to ensure privacy of the massive amount of sensitive user data generated by IoT applications specifically in light of the Digital Personal Data Protection Act, 2023. Kindly provide justifications along with the global best practices.

Tata Communications Response:

IoT market characteristics posing specific privacy challenges which are as follows:

- Number of Devices
- Diversity of Devices
- Non-personal devices tracking personal data
- Reporting breaches in time
- Security risks
- Complex value chains and risk of reputational damage

Many countries have successfully instituted robust data protection laws and regulations, setting noteworthy benchmarks for ensuring privacy within the Internet of Things (IoT) ecosystem. These legislations stand out as exemplars of comprehensive frameworks designed to safeguard individual privacy, providing valuable insights and best practices that can serve as a foundation for guiding similar efforts globally in the evolving landscape of IoT security and privacy.

Therefore, it is recommended to adopt the global best practices from the following:

- EU GDPR (the General Data Protection Regulation (GDPR) within the European Union)
- US - FTC Privacy Act and DOC (NIST and NTIA)
- Japan APPI

Most privacy frameworks, including legislation and self-regulatory initiatives, are based on the same set of global privacy principles. These principles describe the way in which mobile consumers' privacy should be respected and protected when they use mobile applications and services that access, use or collect their personal data. The principles do not replace or supersede



applicable law but are based on recognized and internationally accepted standards on privacy and data protection. They seek to strike a balance between protecting an individual's privacy and ensuring they are treated fairly while enabling organizations to achieve commercial, public policy and societal goals. Generally speaking, they are flexible enough to accommodate new technologies and business methods as they arise. Widely accepted privacy principles can be applied to the IoT to protect individuals without the need for sector-specific legislation, however, device manufacturers, service providers, and other players in the IoT ecosystem should be aware of the IoT-specific privacy considerations.

By adopting similar regulatory and policy measures, India can effectively safeguard the privacy of its citizens in the context of the DPDPA and ensure a responsible and secure IoT ecosystem that respects individual privacy rights.

Areas requiring special attention:

When IoT Data is considered “personal”?

While implementing the service it is important to consider a number of relevant questions:

- a) Does the service collect information that can, directly or indirectly identify a specific user?
- b) How data will be used?
- c) Will data be permanently stored and if not how long will it be kept for?
- d) Will data be shared with third parties? Who are they and for what reason do they access data?

Who is the “data controller”?

Given that there are both confidentiality and data protection obligations to consider, it is helpful to identify the responsibilities of the different players in the ecosystem.

Notice and Choice/Consent

How do you provide notice and obtain consent in situations where:

- a) There may be passive collection of data.
- b) There may not be a screen on which to present a notice or a companion application.
- c) There may not be a first-person, direct relationship with the individual.

Q.12. What additional policy and regulatory measures are required to encourage research and development of IoT use cases in various sectors? Is there a need to incentivize startups for research and development of IoT enabled use cases in various industry verticals? If yes, kindly suggest measures for the same.

Tata Communications Response:

Additional policy and regulatory measures are required to develop a conducive environment for innovation, to stimulate collaborative efforts, and encourage substantial investment in solutions driven by IoT technologies, in order to create a supportive environment for innovation, foster collaboration, and promote investment in IoT-driven solutions. Encouraging research and development of IoT use cases in various sectors is crucial for promoting innovation. Policy and regulatory measures can play a significant role in promoting IoT development, and incentivizing startups can further accelerate this process.



Following are some suggestive measures that can be considered:

Regulatory Framework:

- Interoperability Standards: Establish interoperability standards to ensure that devices from different manufacturers can work together seamlessly.
- Spectrum Allocation: Ensure adequate and suitable spectrum allocation for IoT devices, as wireless communication is fundamental to IoT. This may require coordination with international bodies that deal with the spectrum.

Incentives:

- Incentivizing startups and encouraging IoT research and development is essential for harnessing the full potential of IoT across various industries.
- Research Grants and Subsidies: Provide research grants and subsidies to startups and research institutions engaged in IoT development. These funds can help cover the high upfront costs of IoT research.
- Tax Incentives: Offer tax breaks or credits for companies that invest in IoT research and development. This can lower the financial burden on startups and encourage established businesses to innovate.

Q.13. What measures should be taken to encourage centres of excellence to handhold startups working in the development of use cases and applications in 5G and beyond technologies? How can the domestic and foreign investors be encouraged to invest for funding the startups for these kinds of development activities?

Tata Communications Response:

To encourage centres of excellence to handhold startups working in the development of use cases and applications in 5G and beyond technologies, following measures can be taken.

- Funding and Grants: The Government shall provide funding and grants to the CoE which are working to develop use cases in 5G. Public private partnership can boost the new use cases innovation.
- Ease in import of telecom equipment: Relevant body shall ease out the import permissions for doing trials and experimentation for both outdoor as well as indoor testing.
- Enterprises / Companies other than licensed service providers shall be allowed to hold and deploy wireless equipment.
- Incentivize private LABs working in 5G use case.

For promoting investments from domestic and foreign investors, Government should provide Tax Incentives for such Investors who invest in 5G and beyond startups to stimulate private sector participation.

Q.14. Whether there is a need to make changes in relevant laws to handle various issues, including liability regime and effective mechanism for redressal and compensation in case



of accidents, damages, or malfunctions involving IoT, drones, or robotic systems. If yes, give detailed suggestions.

Tata Communications Response:

There is a need to make changes in relevant laws to handle various issues, including liability regime and effective mechanism for redressal and compensation in case of accidents, damages, or malfunctions involving IoT, drones, or robotic systems.

The new Bill “Telecommunication 2023” has not specifically addressed the requirements of new and emerging fields in the Telecommunication sector such as CNPN Services, Machine to Machine (M2M), Internet of Things (IoT) and other technologies which has paved the way for Fourth Industrial Revolution (Industry 4.0). Due to the absence of clarity, this legislation may not be able to address the issues which are currently faced for these services leading to business opportunity losses.

The Bill has also did not include administrative allocation of spectrum for CNPN licensee (Enterprise) which also had a risk of losing business opportunities in Private Networks services.

Q.15. Is there a need to have a separate security mechanism for multiaccess Edge Computing (MEC)? If yes, please give your inputs and suggestions with regard to policies, rules, regulations and guidelines.

Tata Communications Response:

There is a need for a separate security mechanism for Multiaccess Edge Computing (MEC). MEC is a decentralized computing architecture where computation is performed closer to the edge of the network, bringing numerous benefits in terms of reduced latency and improved performance. However, the distributed nature of MEC also introduces new security challenges that need to be addressed.

The ISG MEC published a comprehensive set of specifications for security. ETSI ISG MEC standardizes a variety of MEC services by specifying implementation agnostic, RESTful APIs using HTTP. There are many challenges related to security that need to be considered in future standardization work: Infrastructure security and protection from physical to virtual and application levels, Data protection and User security which includes data encryption - at rest, in transit and in motion.

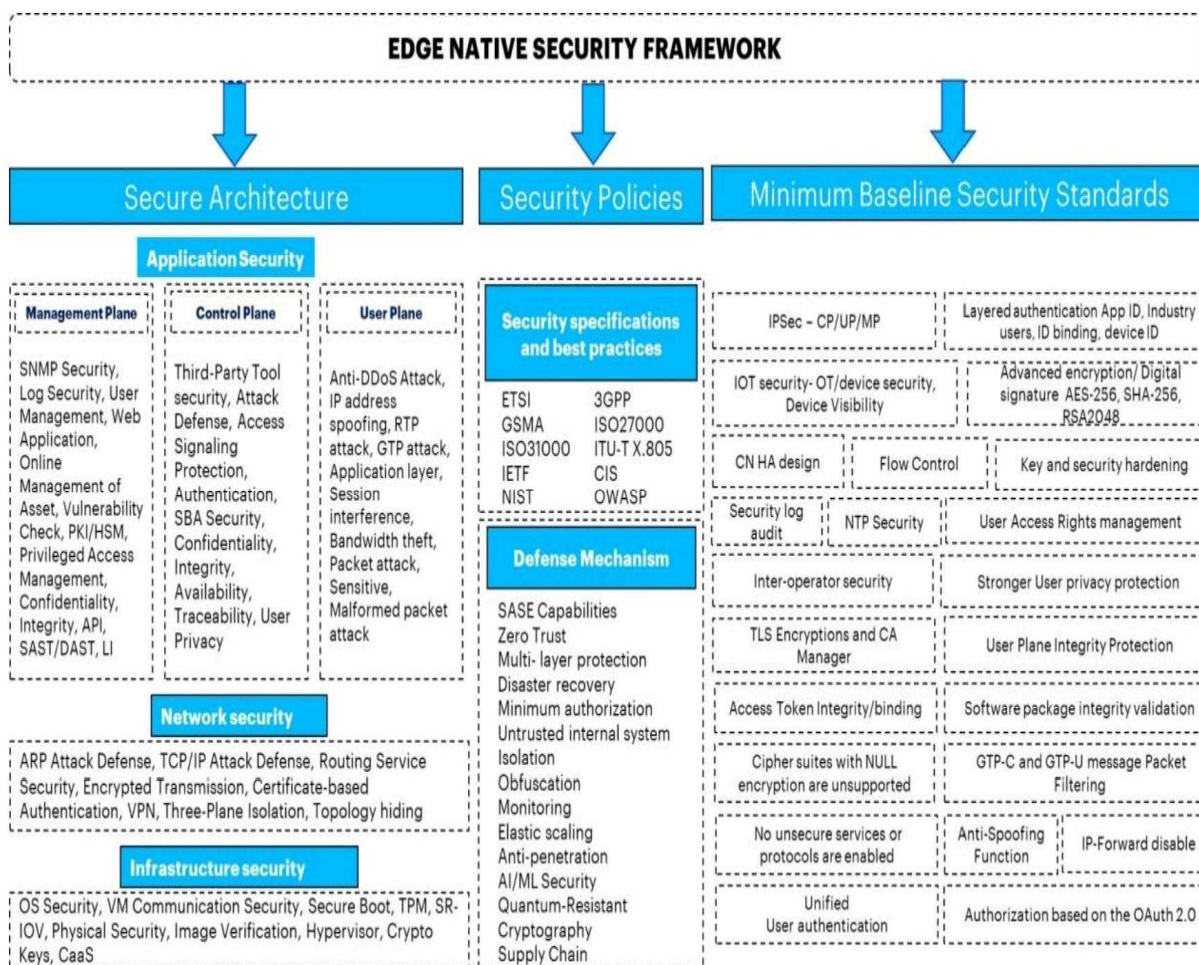
In particular, ETSI specifications have studied many security issues in virtualization environment, as stated in ETSI GS NFV-SEC 001 v1.1.1 and ETSI GS NFV-SEC 009 v1.1.1, which provide guidelines for multi-layer administrations, secure crash along with performance isolation, etc. These guidelines could also be good references for the edge environment, because ETSI MEC architecture shares some commonality with the ETSI NFV one, and also introduced an architectural variant called MEC in NFV as defined in ETSI GS MEC.

The establishment of a uniform level of security policies, procedures, and Minimum Baseline Security Standard (MBSS) for all network elements is extremely important for edge native application design.



In particular, the structural heterogeneity and distribution of the edge network, the diverse ecosystem in computing nodes and devices, results in a coarse degree of data access management, and malicious actors may penetrate the core of the edge device. Untrusted computing nodes joining the network may hack user data at the edge network and interrupt the operation. Additionally, because of the performance limitations of edge nodes, these devices can hardly resist to network attacks, such as man-in-the-middle attacks and denial of service attacks, which leads to the breakdown of the edge network and instability. For edge security, building a secure supply-chain is vital, vendor compliance is a necessity, security assurance, vulnerability, integrity of any third-party elements together with trust and privacy of far edge devices like IoT ecosystem is also extremely important. Attacks and issues that compromise privacy and security often occur in three conditions of edge networks: the infrastructure layer security, network layer, and application layer.

Figure below provides a possible Edge Native security Framework (thus not necessarily related to an ETSI MEC standard), which can be considered as reference for edge native application design.





Q.16. What are the policy measures required to create awareness and promote use of Metaverse, so that the citizens including those residing in rural and remote areas may benefit from the Metaverse use cases and services to create new economic activities and increase employment opportunities and thereby promote economic growth of the country?

Tata Communications Response:

- Generating awareness and conceptualizing application of core technologies of metaverse (viz. augmented reality, virtual reality and mixed reality) for the larger public good are likely to lead to more diverse and widespread adoption, as well as greater opportunities to drive innovation. Policymakers should leverage the resources of industry participants and civil society in its efforts to generate awareness, build capacity, and ensure democratic access to the metaverse.
- Given that the metaverse is still at a nascent stage of development and adoption, the government, through collaborations and partnerships with industry, think tanks, academia, civil society organizations, should fund, facilitate and raise in awareness through campaigns and exhibitions to demonstrate best practices within the industry and to make the public aware of new and existing use cases, how to use the metaverse, and how it may benefit them, and how to protect themselves from potential harms. Industry leaders in other sectors (particularly, non-digital sectors) must also be made aware of the potential of metaverse applications, to enable widespread adoption.
- Increasing innovation in the metaverse must also be accompanied by upskilling of the Indian workforce to be able to meaningfully participate in the growth of the industry. There exists significant opportunities for large-scale employment, given the advent of new job profiles such as metaverse architects, virtual event planners, AR/VR Software Engineers, and more.
- Significant value can be derived from the application of the metaverse in existing digital and physical ecosystems. Policymakers and implementing entities/agencies should work with industry stakeholders and developers to determine how best to integrate these technologies into existing IT systems.
- Ease entry barriers for hardware import and incentivize manufacturing in India to reap the benefits of the metaverse economy and underlying futuristic technologies.

Q.17. Whether there is a need to develop a regulatory framework for the responsible development and use of Metaverse? If yes, kindly suggest how this framework will address the following issues:

- How can users control their personal information and identity in the metaverse?**
- How can users protect themselves from cyberattacks, harassment and manipulation in the metaverse?**
- How can users trust the content and services they access in the metaverse?**
- How can data privacy and security be ensured in the metaverse, especially when users may have multiple digital identities and avatars across different platforms and jurisdictions?**



Tata Communications Response:

Since metaverse is still at a nascent stage of development and adoption in India and therefore existing laws, regulations, standards, and guidelines should suffice. The components of metaverse such as – Internet Connectivity, User Devices, Content and Applications, payments etc. are already well-established services and governed by the respective regulatory and legal framework.

Q.18. Whether there is a need to establish experimental campuses where startups, innovators, and researchers can collaborate and develop or demonstrate technological capabilities, innovative use cases, and operational models for Metaverse? How can the present CoEs be strengthened for this purpose? Justify your response with rationale and suitable best practices, if any.

Tata Communications Response:

Yes, there is a need to establish experimental campuses where startups, innovators, and researchers can collaborate and develop or demonstrate technological capabilities, innovative use cases, and operational models for Metaverse. Given the potential complexities of new technologies, ecosystems such as regulatory sandboxes are ideal to allow metaverse developers to offer products to limited numbers of consumers in a more controlled environment or to engage in experimental governance programs. Experimental ecosystems also enable start-ups and small businesses to test products and gain an early advantage in the market.

Centres of Excellence (CoEs) are perfectly positioned to facilitate these ecosystems in India, as they serve as a platform to bring together the public and private sector to drive co-creation, problem-solving, nurturing innovation and disseminating best practices. Government can strengthen CoEs for the metaverse by promoting their creation and increasing investments in such initiatives.

Q.19. How can India play a leading role in metaverse standardization work being done by ITU? What mechanism should be evolved in India for making effective and significant contribution in Metaverse standardisation? Kindly provide elaborate justifications in support of your response.

Tata Communications Response:

No Comments.

Q.20. (i) What should be the appropriate governance mechanism for the metaverse for balancing innovation, competition, diversity, and public interest? Kindly give your response with reasons along with global best practices.

(ii) Whether there is a need of a national level mechanism to coordinate development of Metaverse standards and guidelines? Kindly give your response with reasons along with global best practices.



Q.21. Whether there is a need to establish a regulatory framework for content moderation in the metaverse, given the diversity of cultural norms and values, as well as the potential for harmful or illegal content such as hate speech, misinformation, cyberbullying, and child exploitation?

Q.22. If answer to Q.21 is yes, please elaborate on the following:

- i. What are the current policies and practices for content moderation on Metaverse platforms?**
- ii. What are the main challenges and gaps in content moderation in the Metaverse?**
- iii. What are the best practices and examples of effective content moderation in the Metaverse or other similar spaces?**
- iv. What are the key principles and values that should guide content moderation in the Metaverse?**
- v. How can stakeholders collaborate and coordinate on content moderation in the Metaverse?**

Q.23. Please suggest the modifications required in the existing legal framework with regard to:

- i. Establishing mechanisms for identifying and registering IPRs in the metaverse.**
- ii. Creating a harmonized and balanced approach for protecting and enforcing IPRs in the metaverse, taking into account the interests of both creators and users of virtual goods and services.**
- iii. Ensuring interoperability and compatibility of IPRs across different virtual environments. Kindly give your response with reasons along with global best practices.**

Tata Communications Response to Q20-23:

Since metaverse is still at a nascent stage of development and adoption in India and therefore existing laws, regulations, standards, and guidelines should suffice.

Q.24. Please comment on any other related issue in promotion of the development, deployment and adoption of 5G use cases, 5G enabled IoT use cases and Metaverse use cases in India. Please support your answer with suitable examples and best practices in India and abroad in this regard.

Tata Communications Response:

No Comments
