TRAI Consultation Paper - Digital Transformation through 5G Ecosystem

PREAMBLE

1. At the outset, we would like to thank TRAI to bring out this Consultation paper on "Digital Transformation through 5G Ecosystem" and giving us an opportunity to provide our response / comments on the same. We appreciate the Authority for its constant efforts for the growth of digital infrastructure in the Country which carries utmost importance in a fast-digitizing nation like ours. The last date of submission was 30-10-2023 and extended till 27-11-2023.
2. This Consultation Paper identify the policy challenges and suggest the right policy framework for faster adoption and effective utilisation of new technologies for the holistic and sustainable development of the economy driven by 5G ecosystem.
3. It has been pointed out by TRAI that India is undergoing a rapid digital transformation and after launch of 5G network in India on 01-10-2022, India is poised to unlock new opportunities due to the growth and innovation of latest 5G technologies, Internet of Things (IoT), Artificial Intelligence (AI), Augmented/Virtual Reality (AR/VR) and Metaverse etc. So, an updated 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.

Given below are preliminary DIPA's Views on TRAI's Consultation paper on "Digital Transformation through 5G Ecosystem"; however, DIPA will provide detailed feedback during the Open House Discussion.

• **5G Ecosystem Collaboration:** The 5G ecosystem involves diverse stakeholders, such as government agencies, regulators, telecom operators, infrastructure providers, tech companies, academia, and industry partners. Effective collaboration among these entities is crucial for expediting the development and deployment of innovative 5G solutions. Cross-sector collaboration brings benefits like streamlined approval processes, fostering innovative use cases, facilitating knowledge exchange, enabling tailored solutions, encouraging research collaborations, and supporting government-private partnerships.

• **Barriers to 5G Ecosystem Development in India:** Several barriers impede the development of the 5G ecosystem in India, including approval delays, a fiber infrastructure bottleneck, uneven coverage, a shortage of skilled professionals, low awareness, and cost barriers. These obstacles hinder infrastructure deployment, limit high-bandwidth applications, and restrict accessibility and adoption.

• **Policy Interventions to Overcome Barriers:** To overcome these challenges, essential policy interventions include expediting approvals, encouraging investment in fiber optic backhaul, expanding 5G network coverage, incentivizing small cell technology deployment, investing in skill development programs, fostering collaboration between stakeholders, conducting awareness campaigns, and exploring financial incentives.

• **Awareness and Adoption Strategies for 5G in Rural Areas:** Ensuring 5G adoption reaches rural areas involves strategies like nationwide campaigns through various media channels, creating localized educational materials in local languages, prioritizing rural infrastructure deployment, encouraging partnerships for efficiency, exploring innovative solutions for remote areas, supporting startups with funding and mentorship, launching digital literacy programs, and fostering educational collaboration between institutions and industries.

• **Encouraging IoT-Enabled Smart Applications:** Encouraging the development of IoT-enabled smart applications involves offering financial incentives such as grants and tax breaks, providing regulatory support through streamlined approval processes, recognizing and awarding companies contributing to IoT applications, and ensuring a conducive environment for IoT startups to thrive.

Conclusion: By implementing these comprehensive measures, India can overcome barriers, bridge the digital divide, and leverage 5G and IoT technologies for economic growth, job creation, and societal transformation.

****

TRAI Consultation Paper - Digital Transformation through 5G Ecosystem

TRAI released a Consultation Paper on suo-moto basis, to identify the policy challenges and suggest the right policy framework for faster adoption and effective utilisation of new technologies for the holistic and sustainable development of the economy driven by 5G ecosystem.

It has been pointed out by TRAI that India is undergoing a rapid digital transformation and after launch of 5G network in India on 01-10-2022, India is poised to unlock new opportunities due to the growth and innovation of latest 5G technologies, Internet of Things (IoT), Artificial Intelligence (AI), Augmented/Virtual Reality (AR/VR) and Metaverse etc. So, an updated 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.

Last date of submission was 30-10-2023 which has been extended till 26-12-2023.

ISSUES FOR CONSULTATION-

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.

DIPA's response: The 5G ecosystem is complex and involves multiple stakeholders, including government agencies, regulators, telecommunications operators, Infra Providers, technology companies, academia, and industry partners. Effective collaboration among these stakeholders is crucial to accelerate the development and deployment of innovative 5G solutions.

Strengthening cross-sector collaboration will bring several benefits to India's 5G development. Some of them are:

- Collaboration can streamline the approval process for 5G infrastructure, reduce regulatory hurdles.
- By bringing together diverse expertise and perspectives, collaboration can foster the development of innovative and relevant 5G use cases.
- Open communication and knowledge exchange among stakeholders can accelerate the development of 5G technologies and solutions.
- Encourage collaboration between telecommunications companies and industry partners to develop tailored 5G solutions for specific sectors, such as manufacturing, healthcare, and education.

- Encourage research collaborations between universities and technology companies to drive innovation and develop cutting-edge 5G solutions.

- Encourage government agencies to partner with private companies to co-fund 5G pilot projects and demonstration trials.

Best practices / Lessons learned from other countries:

- South Korea has established a strong 5G ecosystem through government-led initiatives, industry partnerships, and active participation from academia.

- China has made significant progress in 5G development due to its focus on standardization, collaboration among state-owned enterprises, and investment in 5G infrastructure.

Best practices / Lessons learned from India:

- The success of India's digital transformation initiatives, such as Aadhaar and UPI, demonstrates the potential for cross-sector collaboration in the technology domain.

- The Indian government's initiatives, such as the National Digital Communications Policy 2018 and the 5G Test bed and Pilot Project Scheme, have laid the groundwork for 5G development and collaboration.

By adopting these additional measures and learning from the experiences of other countries, India can further strengthen cross-sector collaboration and accelerate the development and adoption of 5G use cases, unlocking the transformative potential of 5G for India's economy and society.

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.

DIPA's Response: Yes, there are several potential barriers to developing a robust ecosystem for 5G use cases in India. Some of them are:

- Delay in RoW applications approval, exorbitant charges for regularization of towers, impose of property tax etc can hinder 5G infrastructure deployment.

- Insufficient fiber infrastructure can present a bottleneck for high-bandwidth 5G applications.
- Uneven coverage across rural and urban areas can limit the accessibility and adoption of 5G services.
- A shortage of trained professionals with 5G expertise can hinder the development and deployment of complex 5G solutions.

- Low awareness among industries and consumers about 5G's potential can lead to delayed adoption and limited demand for 5G services.

- Consumers may be hesitant to adopt 5G due to the high cost of compatible devices.

Possible policy and regulatory interventions to overcome these barriers:

- Implementing measures to expedite permit approvals and reduce bureaucratic delays in infrastructure deployment.
- Encouraging investment in fiber Optic backhaul, expanding 5G network coverage, and incentivizing the deployment of small cell technology.
- Investing in skilling programs and training initiatives for professionals in 5G network deployment, operation, and application development.
- Encouraging collaboration between research institutions, industry sectors, and developers to share knowledge and expertise on 5G use cases.
- Educating consumers and businesses about the benefits and applications of 5G technology to drive greater adoption.
- Exploring options for subsidies, tax breaks, and innovative financing models to incentivize 5G infrastructure investments and adoption.

Examples of measures taken by other countries:

- South Korea: Provided financial incentives for 5G infrastructure development and offered tax breaks for 5G-related research and development.
- China: Partnered with leading technology companies to establish 5G research centers and promote open collaboration on 5G technologies.

By addressing these barriers, India can create a conducive environment for 5G ecosystem development, encouraging further investments, fostering innovation, and accelerating the adoption of 5G technologies for societal and economic benefits.

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?

DIPA's Response: To create awareness and promote the use of 5G technology and its infrastructure among citizens, especially those in rural and remote areas, and to harness its potential for economic growth and job creation, a comprehensive approach encompassing policy measures, infrastructure development, and targeted initiatives is essential. Some of the steps in this direction are:

- Implement nationwide campaigns to educate the public about the benefits, applications, and potential impact of 5G technology through utilizing various media channels, including television, radio, print etc to reach a wider audience.

- Create localized educational materials tailored to the specific needs and interests of rural communities. Translate materials into local languages and use relatable examples to enhance understanding and adoption.

Prioritize the deployment of 5G infrastructure in rural and remote areas through government financial incentives to bridge the digital divide and ensure equitable access to advanced technologies. The Digital Bharat Nidhi is a newly established fund in India, replacing the Universal Service Obligation Fund (USOF) under the Telecommunications Bill 2023. It will promote and accelerate the development of digital infrastructure and services across India, particularly in rural and underserved areas and will contribute in bridging the digital divide. The initial corpus of the Digital Bharat Nidhi is expected to be around Rs 40,000 crore (approximately USD 5 billion.

- Encourage infrastructure sharing and partnerships between telecommunications operators, Infra Providers to optimize resource utilization and reduce deployment costs particularly in rural areas.

- Explore alternative deployment solutions: Investigate innovative deployment solutions, to extend 5G coverage to remote and difficult-to-reach areas.

- Provide funding, technical assistance, and mentorship to startups and entrepreneurs developing 5G applications relevant to rural contexts, such as precision agriculture, e-health, and remote education.

- Organize pilot projects and showcase successful implementations of 5G use cases in rural areas to demonstrate their tangible benefits and encourage wider adoption.

- Launch comprehensive digital literacy programs in rural areas to equip citizens with the basic skills to navigate the digital world and utilize 5G technology effectively.

- Foster collaboration between educational institutions and industry partners to develop 5G-centric curriculum and training programs that align with the needs of the emerging 5G workforce.

By implementing these policy measures, India can bridge the digital divide, empower rural communities with 5G technology, and harness its potential for economic growth, job creation, and societal transformation.

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?

DIPA's Response: Same as mentioned above.

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?

DIPA's Response: Government may take same steps as mentioned above in Q.3 to spread awareness among the citizens about IoT enabled smart applications. However, the private companies / startups developing these applications need to be encouraged through some incentivization schemes.

The government should offer financial incentives to companies that develop and promote IoT-enabled smart applications for rural communities in terms of grants, subsidies, or tax breaks.

The government should provide regulatory support to companies that are developing IoT-enabled smart applications through streamlining the approval process for new technologies or providing regulatory waivers.

The government should recognize and award companies that are making significant contributions to the development and adoption of IoT-enabled smart applications through public recognition, industry awards, or financial prizes.

By implementing these measures, the government can effectively spread awareness about IoT-enabled smart applications and encourage their adoption among citizens, particularly those in rural and remote areas. This will help to bridge the digital divide, promote economic growth, and create new opportunities for employment and innovation.

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.

DIPA's response: Industry 4.0 is transforming the nature of work, requiring industries to adapt and their workforce to be equipped with the necessary skills to thrive in this new era. Upskilling both top management and the workforce is crucial for industries to remain competitive and embrace the opportunities presented by Industry 4.0.

(a) Some measures for Upskilling the Top Management and Owners of Industries for the transformative impact of Industry 4.0 are:

- Encourage top management to embrace a culture of innovation and experimentation, allowing for exploration of new technologies and business models.

- Equip top management with the ability to anticipate future trends and make informed decisions in the face of rapid technological advancements.

- Encourage participation in industry-wide dialogue and collaboration to share insights and develop collective strategies for navigating Industry 4.0.

- Engage external consultants and experts to provide insights into emerging technologies and best practices for Industry 4.0 adoption.

- Offer regular training programs and workshops on Industry 4.0 technologies, such as AI, robotics, big data, and IoT, to enhance their understanding and decision-making capabilities.

- Foster a culture of continuous learning and encourage top management to stay updated on the latest advancements in Industry 4.0 technologies.

(b) Some measures for Upskilling the Workforce for the demands of Industry 4.0 are:

- Offer basic digital literacy training to ensure all employees have the essential skills to navigate the digital world and utilize digital tools effectively.

- Integrate digital literacy training into employee onboarding programs to ensure new hires have the necessary skills from the start.

- Conduct thorough skill gap assessments to identify the specific technical skills required for Industry 4.0 adoption and the existing gaps among the workforce.

- Develop targeted training programs tailored to the specific skill needs of different job roles and departments, covering topics such as AI, robotics, data analysis, and IoT applications.

- Recognize and reward employees who actively pursue upskilling and reskilling opportunities, motivating others to invest in their professional development.

(c) Some measures for Public-Private Partnership Models for Effective upskilling for Industry 4.0 are:

- The government can provide financial support / issue skills vouchers that workers can redeem for training courses or certifications related to Industry 4.0 skills.

- Industries can form partnerships with educational institutions to develop and deliver customized training programs tailored to the specific needs of their workforce.

- The government can provide tax incentives to companies that invest in upskilling their employees.

- Industries can collaborate with educational institutions to establish apprenticeship programs that provide hands-on training in Industry 4.0 technologies.

Global Best Practices in Upskilling for Industry 4.0: Several countries have implemented successful initiatives to upskill their workforce for Industry 4.0. Here are few examples:

- Germany: The German government has launched a national strategy to promote Industry 4.0, including funding for training programs and research initiatives.

- South Korea: The South Korean government has invested heavily in research and development for Industry 4.0 and has established a national network of industrial training centers.

- Finland: The Finnish government has implemented a competency-based education system that aligns with the skills required for Industry 4.0.

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.

DIPA's Response: Micro, Small and Medium Enterprises (MSMEs) play a crucial role in India's economy, contributing significantly to employment, manufacturing output, and exports. However, MSMEs face several policy, regulatory, and other challenges in adopting Industry 4.0 technologies and practices. Some of them are:

- MSMEs often have limited financial resources to invest in expensive Industry 4.0 technologies, such as IoT sensors, robotics, or cloud computing solutions which hinders their ability to adopt and implement Industry 4.0 practices.

- Many MSMEs lack the in-house technical expertise required to understand, evaluate, and implement Industry 4.0 technologies which lead to difficulties in selecting the right technologies, integrating them with existing systems, and maximizing their benefits.

- The demand for skilled workers with expertise in Industry 4.0 technologies is increasing, and MSMEs may face challenges in recruiting and retaining such talent. This skills shortage can hinder their ability to effectively implement and utilize Industry 4.0 solutions.

- Complex regulations and unclear policy guidelines like data ownership, intellectual property rights, and cybersecurity standards can create uncertainty and hinder MSMEs' adoption of Industry 4.0 technologies.

Some measures to address these challenges and to promote Industry 4.0 Adoption in MSMEs are:

- The government should provide financial support to MSMEs, such as subsidies, grants, or low-interest loans. This will help MSMEs to overcome the initial investment barriers and make Industry 4.0 more accessible.

- Implement comprehensive skill development and training programs tailored to Industry 4.0 requirements for MSMEs with focus on upskilling the existing workforce and preparing new entrants with the necessary skills to operate and manage Industry 4.0 technologies.

- Foster collaboration between industry and academia to develop Industry 4.0-ready curricula and training programs. This collaboration can bridge the gap between theoretical knowledge and practical application, preparing graduates for the specific needs of Industry 4.0 in MSMEs.

- Simplify and streamline regulations related to Industry 4.0 adoption for MSMEs. Provide clear policy guidelines and address regulatory ambiguity to reduce uncertainty and encourage MSMEs to embrace Industry 4.0 technologies.

Global Best Practices for Industry 4.0 Adoption in MSMEs:

- Singapore offers an Industry 4.0 Readiness Assessment to help MSMEs assess their readiness for Industry 4.0 adoption and provides a Digital Transformation Grant to support their implementation of Industry 4.0 technologies.

- South Korea's Smart Factory Demonstration Project provides financial support to MSMEs for establishing pilot smart factory projects, showcasing the benefits of Industry 4.0 adoption.

- Italy's Smart Manufacturing Academy offers training programs for MSMEs on Industry 4.0 technologies, focusing on digital transformation, data analytics, and cybersecurity.

By implementing these measures and learning from global best practices, India can create an enabling environment for MSMEs to overcome the challenges in adopting Industry 4.0 technologies and accelerate their digital transformation journey. This will enhance their competitiveness, productivity, and innovation, contributing significantly to India's economic growth and industrial development in the era of Industry 4.0.

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

DIPA's Response: No comment.

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?

DIPA's Response: No comment.

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.

DIPA's Response: No comment.

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.

DIPA's Response: No comment.

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.

DIPA's Response: To foster research and development (R&D) of IoT use cases across various sectors, additional policy and regulatory measures are essential. These measures should aim to create a supportive environment that encourages innovation, collaboration, and investment in IoT-driven solutions. Some Policy Measures are:

- Develop clear and well-defined IoT standards and guidelines to ensure interoperability and compatibility among IoT devices and platforms. This will reduce development costs and facilitate the integration of IoT solutions into existing systems.

- Create or support the development of IoT test beds and pilot projects that provide researchers and startups with access to real-world environments to test and validate their IoT solutions.

- Establish dedicated IoT Centers of Excellence to foster collaboration between academia, industry, and government to advance IoT research and development.

- Streamline the regulatory approval process for IoT devices and applications to reduce time-to-market and encourage innovation.

Yes, there is need to incentivize startups for research and development of IoT enabled use cases. Some recommendations are:

- Establish dedicated funding programs and grants specifically for IoT startups engaged in research and development of IoT-enabled use cases.

- Provide tax incentives, like tax breaks, deductions, or credits for IoT-related expenses, for startups that invest in IoT R&D.

- Organize regular IoT innovation competitions to showcase promising IoT startups and provide them with recognition and funding opportunities.

- Encourage public-private partnerships to co-fund and support IoT startups working on innovative use cases.

Examples of Global Best Practices:

- The Horizon Europe Program provides funding for IoT research and development projects across various sectors.

- Germany has established a network of IoT testbeds and pilots to facilitate the development and testing of IoT solutions.

- Singapore's Smart Nation Initiative promotes IoT adoption and innovation through various initiatives, including funding, testbeds, and talent development.

By implementing these policy and regulatory measures, incentivizing startups, and learning from global best practices, India can foster a vibrant ecosystem for IoT research and development, leading to the creation of innovative and impactful IoT use cases across various sectors. This will drive economic growth, enhance productivity, and improve the quality of life for citizens.

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?

DIPA's Response: To encourage centres of excellence to handhold startups working in the development of use cases and applications in 5G and beyond technologies, the government can provide funding and resources for these centres. Additionally, the government can create an ecosystem that supports innovation and experimentation, and promote collaboration between academia and industry. Best practices include providing tax breaks and subsidies for startups and investors, and creating a regulatory framework that balances innovation, competition, diversity, and public interest.

To encourage domestic and foreign investors to invest in funding startups for these kinds of development activities, the government can provide incentives such as tax breaks and subsidies. Additionally, the government can create an environment that is conducive to investment by providing a stable regulatory framework, reducing bureaucratic hurdles, and promoting transparency and accountability. Best practices include creating a startup-friendly environment, providing access to cutting-edge technology, and fostering collaboration between startups and established companies.

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.

DIPA's Response: No Comments.

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.

DIPA's Response: No Comments.

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?

DIPA's Response: The convergence of digital services is rapidly blurring the line between telecommunications and other services. The technologies used for digital communications have changed greatly over the past few years, and telecommunication network architecture is also changing to meet new requirements for a number of new technologies and services/applications viz. 5G, massive Internet of things, Artificial Intelligence, Augmented/Virtual Reality, Metaverse, etc.

To create awareness and promote the use of Metaverse, policy measures should be taken to ensure that citizens, including those residing in rural and remote areas, can benefit from Metaverse use cases and services to create new economic activities and increase employment opportunities, thereby promoting economic growth of the country.

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:

i. How can users control their personal information and identity in the metaverse?

ii. How can users protect themselves from cyberattacks, harassment and manipulation in the metaverse?

iii. How can users trust the content and services they access in the metaverse?

iv. 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?

DIPA's Response: Policymakers and regulators should take a proactive approach by employing various regulatory strategies such as the incentive-based strategy, and competition/anti-trust laws to address policy issues that may arise in the metaverse. The regulatory framework should address the following issues:

i. Personal information and identity control: The regulatory framework should ensure that users have control over their personal information and identity in the metaverse. This can be achieved by implementing data protection and privacy laws that require companies to obtain user consent before collecting, processing, or sharing their personal information.

ii. Cyberattacks, harassment, and manipulation protection: The regulatory framework should also protect users from cyberattacks, harassment, and manipulation in the metaverse. This can be achieved by implementing cybersecurity laws that require companies to implement security measures to protect user data and prevent cyberattacks. Additionally, the framework should include provisions that prohibit harassment and manipulation in the metaverse.

iii. Content and services trust: The regulatory framework should ensure that users can trust the content and services they access in the metaverse. This can be achieved by implementing laws that require companies to provide accurate and truthful information about their products and services. Additionally, the framework should include provisions that prohibit false advertising and misleading marketing practices.

iv. Data privacy and security: The regulatory framework should ensure that data privacy and security are maintained in the metaverse, especially when users may have multiple digital identities and avatars across different platforms and jurisdictions. This can be achieved by implementing data protection and privacy laws that require companies to implement security measures to protect user data and prevent unauthorized access. Additionally, the framework should include provisions that require companies to notify users in case of a data breach.

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.

DIPA's 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. To strengthen the present CoEs for this purpose, startups, innovators, and researchers can collaborate with educational institutions to develop and demonstrate technological capabilities, innovative use cases, and operational models for the Metaverse. This can be achieved by creating a conducive environment for innovation and experimentation, providing access to cutting-edge technology, and fostering collaboration between academia and industry. Best practices include creating an ecosystem that supports innovation, providing funding and resources for startups, and promoting collaboration between startups and established companies. Additionally, the government can provide incentives for startups and investors to invest in the Metaverse, such as tax breaks and subsidies.

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.

DIPA's Response: India could play a leading role in building the metaverse by contributing to the standardization work being done by ITU. The ITU Focus Group on metaverse was established under TSAG on 16 December 2022. The group will analyze the technical requirements of the metaverse to identify fundamental enabling technologies in areas from multimedia and network optimization to digital currencies, Internet of Things, digital twins, and environmental sustainability. It will also provide a collaboration platform for dialogue, for identifying stakeholders with whom ITU-T could collaborate, and for enabling the inclusion of non-members to contribute to the technical pre-standardization work.

To make an effective and significant contribution to Metaverse standardization, India should participate in the ITU Focus Group on metaverse and collaborate with other stakeholders to identify the technical requirements of the metaverse. India should also invest in research and development to develop new technologies and services that can be used in the metaverse. Additionally, India should promote the use of the metaverse in various sectors such as education, healthcare, and entertainment to create awareness and generate demand for metaverse services. This will help in the development of a robust metaverse ecosystem in India and enable the country to play a leading role in metaverse standardization work.

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.

DIPA's Response:

(i) The appropriate governance mechanism for the metaverse should balance innovation, competition, diversity, and public interest. Policymakers and regulators should take a proactive approach by employing various regulatory strategies such as the command and control strategy, the incentive-based strategy, and competition/anti-trust laws to address policy issues that may arise in the metaverse. The regulatory framework should ensure that users have control over their personal information and identity in the metaverse. Additionally, the framework should protect users from cyberattacks, harassment, and manipulation in the metaverse. The regulatory framework should also ensure that users can trust the content and services they access in the metaverse. Data privacy and security should be maintained in the metaverse, especially when users may have multiple digital identities and avatars across different platforms and jurisdictions. Best practices include creating an ecosystem that supports innovation, providing funding and resources for startups, and promoting collaboration between startups and established companies.

(ii) There is a need for a national level mechanism to coordinate development of Metaverse standards and guidelines. Regulatory changes have to be made to accelerate the growth of emerging technologies that rely on 5G including the Internet of Things (IoT), Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), Edge Computing, and Metaverse. There is a need to identify the policy challenges and suggest the right policy framework for faster adoption and effective utilization of new technologies for the holistic and sustainable development of the economy driven by the 5G ecosystem. A regulatory framework for the responsible development of the Metaverse can deal with issues like enabling users to control their personal information and identity, protection from cyberattacks, harassment and manipulation, and data privacy and security while using the new-age technology. The regulator has also asked if there is a need for a national level mechanism to coordinate development of Metaverse standards and guidelines.

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?

DIPA's Response: No Comments

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?

DIPA's Response: No Comment.

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.

DIPA's Response: No Comment.

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.

DIPA's Response: 5G technology has the potential to revolutionize the way we live and work. It can enable new use cases across various industries, including the Metaverse. In India, the government has launched bold reforms in the telecommunications sector in the last few years, bringing in a slew of measures to restore sector viability. The "PM Gati Shakti — National Master Plan" is a visionary step to further enhance ease of doing business in India. Traditional policy and regulatory boundaries are getting blurred in a hyper-connected digital world. Seamless coordination between different government departments is expected to bring in significant efficiencies in delivering projects — reduce wasteful expenditure, faster go-to-market, simplification of processes. Regulatory enablers are required to accelerate the growth of emerging technologies that rely on 5G including the Internet of Things (IoT), Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), Edge Computing, and Metaverse.

****