14th October 2022

Advisor (QoS)
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
Jawahar Lal Nehru Marg, (Old Minto Road)
New Delhi – 110002

Subject: Consultation Paper on "Leveraging Artificial Intelligence and Big Data in Telecommunication Sector".

Dear Sir,

This is in reference to the Consultation Paper issued by the Authority on 5th August 2022 regarding "Leveraging Artificial Intelligence and Big Data in Telecommunication Sector".

Accordingly, we, TTL hereby submit the comments to the issues raised in the above-mentioned Consultation Paper.

We believe TTL response will be given due consideration.

Thanking you and assuring you of our best attention always.

Thanking you,

Yours sincerely,

Satya Yadav
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At the outset, Tata Teleservices Limited and Tata Teleservices (Maharashtra) Limited [together called "**TTL**'] thank the Authority for releasing the Consultation Paper on "**Leveraging Artificial Intelligence and Big Data in Telecommunication Sector**" and calling for stake holders' comments.

In this respect we, TTL, would like to submit our response to the issues and concerns as mentioned in the Consultation Paper is as follows:

Q.1. What may be the most appropriate definition of Artificial Intelligence (AI)? What are the broad requirements to develop and deploy AI models in a telecom sector? Whether any major challenges are faced by the telecom service providers in adopting AI? Please justify your response with rationale and global practices, if any.

Ans:

a) In a simple term, AI can be defined as a science and engineering which uses computing logic with datasets to enable problem solving via reasoning and learnings from its experience.

b) In a Telecom sector, AI could potentially be useful in Customer servicing through Virtual Assistance solutions (e.g., interactive chatbots). The AI model can also learn based on the customer data and propose churn propensity. Another critical use case is in the area of Service Assurance, i.e., to find correlation between alarms raised in Telecom network spread across multiple domain and multi-vendor Network Element scenarios. AI promises accuracy in Network and Service Impact analysis.

c) The technology is still evolving, the investments in existing network domains limits AI use cases mainly at the core. The AI models at the edge computing is yet to be implemented along with relevant chipset enhancements which might have faster results in learning data patterns. However, at the core, the simplest use cases are customer usage patterns (via CDRs) keeping Customer privacy via anonymizing the customer data.

Q.2. Whether the big data in the telecom sector may be utilised for developing AI models? For efficient and effective handling of big data, whether there is a need for adoption of special programming models or software frameworks? Please justify your response with suitable examples and global practices, if any.

Ans:

Big data is a norm today irrespective of sectors. In wireless technology utility value if more due to the volume of data and in enterprise the utility value comes from varied data/ complex data. Big data would definitely be of great utility in developing AI models which can be customized for industries / sectors. The benefit of all such models flows back to the industry either through enhanced products/ infrastructure/ proactive customer service. The more the data can be standardized the need for special programming may come down. However, if we have to achieve the N+1 norm in customer experience then adoption of special programming needs to be done at some point of time.

Q.3. Whether deployment of 5G and beyond technologies will help to accelerate adoption of AI in all the sectors and vice versa? Please justify your response with suitable illustrations including global practices, if any.

Ans:

The 5G and beyond technology promises higher multi-Gbps peak data speeds, ultra lower latency, massive network capacity, better reliability, availability and Quality of Experience (QoE). The AI/ML along with NDAF does offer computation e.g. Load-level, service experience and prediction for a network slice instance and applications respectively. It can also perform UE anomaly detection, behaviour prediction etc. The software based network in 5G coupled with AI will work coherently to automate network functions and take proactive steps. The acceleration comes from more and more devices getting onboarded onto 5G ecosystem because of the advantages it offers. These devices will generate enormous amount of data which further makes it important to have AI based network automation.

Q.4. Do you think that a number of terminologies such as Trustworthy AI, Responsible AI, Explainable AI etc. have evolved to describe various aspects of AI but they overlap and do not have any standardised meanings? If yes, whether there is a need to define or harmonise these terms? Please justify your response with rationale and global practices, if any.

Ans:

There will be different use cases and scenarios across various sectors other than telecom. Depending on the use cases and organizational requirements, the terminologies like Responsible AI, Explainable AI, and Trustworthy AI can help build trust and reduce the risks and challenges that go along with them. Further, the terminologies such as Trustworthy AI, Responsible AI, Explainable AI etc., should not be looked at from the perspective of telecom sector only.

Q.5. Which are the applications of AI and BD already being used by the TSPs in their networks to improve Quality of Service, Traffic Management, Spectrum Management and for Security purposes? Please list out all such applications along with the level of maturity of such applications. Please specify whether they are at trial stage or pilot stage or have reached the deployment stage? Details should include type of AI models, methods to access data, and procedures to ensure quality of data.

Ans:

TTL has mainly traditional wireline network without virtualization on transport & access part, so no specific use cases of AI for QoS, traffic management and Spectrum management at present.

Q.6. What are the major challenges faced by the telecom industry, including policy and regulatory, in developing, deploying, and scaling applications of AI listed in the response to Q.5? How can such challenges be overcome? Please justify your response with rationale and suitable examples, if any.

Ans:

We understand that the Government of India proposes to come out with a new Data Protection Bill and a Digital India Bill. These bills should provide the required legal framework and clarity for compliance and adoption of AI in India. Further, absence of Data Protection Bill is a major challenge towards adoption of AI. The Data Protection Bill will lay down how the data is to be utilised, restrictions on the use of personal data without consent of citizens, propose a framework that would regulate cross-border transfer of data, and accountability of data fiduciaries handling such data, removal of personal data among other things. Absence of these guidelines leads to lack of clarity and creates a blind spot for TSPs.

Q.7. In which areas of other sectors including broadcasting, existing and future capabilities of the telecom networks can be used to leverage AI and BD? Please justify your response with rationale and suitable examples if any.

Ans:

a) Any sector which wants to build use cases around customer usage patterns (in compliance with privacy laws), will have to consume datasets of those customers and build AI models to learn the patterns, e.g., banking industry might need Telco credit score which potentially is generated via AI models acting on customer usage data sets.

b) In compliance with regulatory and privacy laws, the location parameters of the end devices/subscribers to be modelled for traffic management or marketing agencies.

Q.8. Whether risks and concerns such as privacy, security, bias, unethical use of AI etc. are restricting or likely to restrict the adoption of AI? List out all such risks and concerns associated with the adoption of AI. Please justify your response with rationale and suitable examples, if any.

Ans:

Privacy is paramount while building AI models on customer datasets, Telcos have to ensure anonymization of customer data to protect privacy. So use cases have to be carefully defined considering customer identity is not compromised.

Q.9. What measures are suggested to be taken to address the risks and concerns listed in response to Q.8? Which are the areas where regulatory interventions may help to address these risks and concerns? Please justify your response with rationale and suitable examples, if any.

Ans:

The anonymization of customer identity attributes are adopted to protect privacy. Regulatory interventions may be needed for creating policies, to allow AI modelling on customer's data which has provided consent.

Q.10. What measures do you suggest to instil trust and confidence regarding a robust and safe AI system among customers, TSPs and other related entities/stakeholders? Whether adopting general principles such as Responsible AI and ethical principles at the time of designing and operationalising the AI models will help in developing ethical solutions and instilling trust and confidence in the users? What may be such principles and who should formulate these and how compliance can be ensured? Please justify your response with rationale and suitable examples, if any.

Ans:

The adoption of Responsible, Trustworthy AI will adhere to ethics, laws and regulation etc. So essentially the models trained will have positive effect on the overall outcome (or use cases). In a telecom domain, largely data generated is related to customer (or end subscriber/devices), however the AI computation will be done by TSPs. If the outcome or the trained models have to be shared across other industries then standardization and regulatory governance with policy have to be made defined.

Q.11. Whether there is a need of telecom/ICT sector specific or a common authority or a body or an institution to check and ensure compliance of national level and sector specific requirements for AI? If yes, what should be the composition, roles and responsibilities of such authority or body or institution? Please justify your response with rationale and suitable examples or best practices, if any.

Ans:

Yes, a common governing body is essential to overlook the cross-industry data sharing (data democratization) use cases and ensuring compliance.

However, at the same time we would like to reiterate that the adoption of AI is still in very initial stages in India and the ecosystem is still evolving. Hence NO compliance requirement should be proposed on the industry at this stage.

Q.12. In response to Q.11, if yes, under which present legal framework or law such authority or body or institution can be constituted and what kind of amendments will be required in the said law? Or whether a new law to handle AI and related technologies is a better option? Please justify your response with rationale and suitable examples or best practices, if any.

Ans:

We would like to submit here that a cross sectoral multi-stakeholder body cutting across various sectors, and thus having representation from all sectors of the economy, should be set-up to further develop and refine the guidelines / principles for adoption of AI in India.

At the cost of repetition, we emphasize that all sectors of the economy should be a part of this cross sectoral multi-stakeholder body and the same should not be limited to IT and Telecom.

Further, the roles and responsibilities of this cross sectoral multi-stakeholder body may be laid out in the proposed new Data Protection Bill.

Q.13. Whether telecom/ICT industry is facing constraints such as access to data, lack of computing infrastructure, lack of standards, and R&D in the adoption of AI and BD technologies? Please list out all such constraints with adequate details.

Ans:

The legacy transport and access network generate limited data to leverage full potential of AI models. At present use cases are limited to building models based on customer data usage, customer servicing and service assurance (via correlating alarms from various domains). Once the complete network is virtualized then specific AI models can be created to cater to the network optimization & service performance. AI skills for R&D can be augmented at pace with the transformation of network domains into a fully virtual network.

Q.14. What measures are required to make data and computing infrastructure available and accessible to developers and also to make data/AI models interoperable and compatible? Please respond along with examples, best practices and explanatory notes.

Ans:

At present the relevant datasets for Telco usecases are being made accessible to the AI models, which are being worked upon by respective developers of those usecases. The current systems are not designed to share the computing infrastructure with larger developer community across the industries.

Q.15. Whether there is a gap between requirement and availability of skilled AI workforce? If so, what measures are required to be taken to ensure availability of adequate skilled workforce in AI domain? Please respond along with suggestions with supporting details and best practices.

Ans:

AI/ML programs are at nascent stage in our business. To start with, partner development resource & skills are utilized for building specific usescases on AI models. Majority of these usecases are of optimization of tasks, once a maturity in the models are reached and results are promising then further usecases can be implemented and resources can be augmented accordingly.

Q.16. What initiatives do you suggest to democratise data required to develop AI models in the telecom sector? Please justify your response with rationale and suitable examples, if any.

Ans:

Regulation for common data sharing framework have to be made available. So that every participating entities can share respective data sets across industry domain and leverage advantages of related or inter-related AI models. For e.g. Telecom can make available the AI modelling dataset under the ambit of law and regulation to marketing agency for building campaigns relevant for telecom customers.

There could be other various cross sector usecases along with Telecom datasets. Data democratization in any industry today is a norm and a mandate to be implemented including telecom. However, telecom operators concentrating on enterprise segment would need data as an input from different industries to serve them better. Telecom sector related data democratization would limit the organization to develop AI models more in the retail segment than in the enterprise segment. Various sectors like banking, hospitals, education etc, need customized telecom/ genetic solutions that can be developed, provided their needs are understood better by the operators through synthetic data generated from their business. This can internally also be done by telecom within their servicing domain of their customer, however, it would be limited and restricted to those set of customers.

Q.17. Whether the authority or body or institution as suggested in response to Q.11 may also be entrusted with the task to manage and oversee collection, cataloguing and storage of data? Whether such authority or body or institution need to be entrusted to generate and make available synthetic data? Please justify your response with rationale and suitable examples, if any.

Ans:

Market intelligence/ information can definitely be generated by such authorities (if constituted) which would help the nation at large. Infact if the data can be shared and stored, then the governing body can also be empowered to generate synthetic data which again flows back into the system to develop the industry/ nation at large. For eg: in the medical field there have been lot of enhancements made on a surgical side which increases the success/ accuracy rate of surgeries performed using machine

learning. The authority or body need not be restricted to telecom sector. All sectors should have a common body which increases the inter-operability of needs and developments across.

Q.18. Whether the legal framework as envisaged in para 3.5.3 and Q.12 should also enable and provide for digitalisation, sharing and monetisation for effective use of the data in AI without affecting privacy and security of the data? Please justify your response with rationale and suitable examples, if any.

Ans:

Legal framework would be the most important aspect in digitizing and democratizing data. The ROI and monitization aspects are the most difficult aspects of any such initiatives. The legal and monitization framework has to be well thought and signed off by all participants for avoiding any issues in future with respect to revenue generation and breach of privacy/ security. To start with the governing body can restrict the use of AI / ML sharing with the respective participant (which may not help much from a growth perspective), however will give sufficient time for the industry to understand the security and privacy norms. Post a certain period NDAs can be signed and a larger framework for use and sharing of such synthetic data can be looked at from scaling up perspectibe.

Q.19. (a) Which are the currently used privacy enhancing and privacy preserving technologies facilitating adoption of AI and BD? Are there any challenges in using these technologies? How these challenges can be addressed? (b) Which are the potential technologies likely to be available in near future to further strengthen privacy? Please justify your response with rationale and suitable examples, if any.

Ans:

There are various ways in which data can be preserved. This should be a variable feature which can be enhanced as and when there is a technological advancement. For eg: the initial start can be with Pseudonymization or synthetic data generation or federated learning (one of these), then a couple of years later, this should have the flexibility of replaceability with the enhanced technology which is more secure and upgraded then.

Q.20. Whether the list of technologies provided in response to Q.19 are adequate to handle all the perceived risks and concerns in the AI domain? Or is there a need to develop new privacy preserving architecture? Please justify your response with rationale and suitable examples, if any.

Ans:

AI/ ML is a continuous learning process. there can never be a perfect privacy preserving architecture that will be fool-proof and sustainable forever. The thought process should be to begin somewhere with bare minimum privacy preserving norm and quickly (at rapid speed) keep enhancing the architecture to address the gaps that are identified from time to time. This is a cyclical process.

Q.21. Whether the next generation telecom network architectures such as AI at edge, federated learning, TinyML or their combination can offer solutions to meet both privacy as well as intelligence requirements? Please justify your response with rationale and suitable examples, if any.

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Q.22. What type of technological advancements are happening for running the AI models on the end user devices to overcome constraints in respect of processor, memory, battery etc.? Whether special tools, programming languages, and skills are required to be developed to build such AI models? Please justify your response with rationale and suitable examples, if any.

Ans: Once the new Data protection bill is put in place by the Government, which lays down various principles and guidelines, technologies such as AI at edge, federated learning, TinyML or their combination will be able to provide solutions which meet both privacy and security requirements as defined by the Bill.

Q.23. Considering availability of new privacy preserving architectures as suggested in response to Q.19 and Q.20, what is the likelihood of emergence of new business and operational models? Whether such models will raise issues related to ownership and responsibilities? What do you suggest to address these issues? Please justify your response with rationale and suitable examples, if any.

Ans:

Data privacy and ownership issues are always a big threat to the organizations/ industry. The organization and governing bodies together need to sign up and take the equal ownership for the same. The benefits of data sharing and the growth thereby has a larger benefit to the economy than keeping the data within the industry for the want of breach of data security. A cautious, well thought, well protected governing bodies and frequent check/ controls/ industry units can create a better and a more convenient nation for the public at large to live in and operate.

Q.24. Whether the concept of "Operator Platform" would help in providing AI based solutions in a unified and more equitable manner? Apart from popular federated use cases of edge cloud federation, Cloud XR, Cloud Gaming, whether this concept may also be applied for public service delivery and in making public policies that are data-driven? Whether there is a need to take initiatives for developing and demonstrating advantages of concept of "Operator Platform"? If so, what steps and measures are suggested to launch such initiatives? Please justify your response with rationale and suitable examples, if any.

Ans: NA

Q.25. Whether there is a need to create AI-specific infrastructure for the purpose of startups and enterprises in the telecom sector to develop and run AI models in an optimised manner? Whether such an infrastructure should cover various real-world scenarios such as cloud AI, edge AI and on-device AI? Please justify your response with rationale and suitable examples, if any.

Ans:

For telecom sector to think in the direction of AI, the current regulation needs have to completely move to paperless from paper. Standardization needs to be happen for all operators at large. Traditional telecom regulations and services are very different from AI based infrastructure needs by start-ups. As much as telecom industry wants to get into the AI zone, the relaxation / standardization of regulation becomes important so that there are no interpretation issues or gaps in understanding.

Q.26. Whether the emerging trends of development of foundational AI models such as GPT-3, Gopher etc. are leading to democratisation of AI space by offering fine-tuned or derived AI models? Whether such a trend will also help in reducing costs for the AI developers? Whether similar

approach will help in development of large-scale AI model for the telecom sector? Please justify your response with rationale and suitable examples, if any.

Ans:

Models will evolve with time and driven by market forces and competition, new models which help in saving time and costs will emerge. Existing models may be used and it may be best to train other models on them. However, the telecom sector and other sectors of the economy cannot be tied down to the existing models.

Q.27. Whether there is a need to establish experimental campuses where startups, innovators, and researchers can develop or demonstrate technological capabilities, innovative business and operational models? Whether participation of users at the time of design and development is also required for enhancing the chances of success of products or solutions? Whether such a setup will reduce the burden on developers and enable them to focus on their core competence areas? Please justify your response with rationale and suitable examples, if any.

Ans:

Incubation of ideas/ thoughts and institutionalizing such models are always required and to be done at a smaller scale so that enhancements and deployments would be cost effective. Digitization of developing AI models would be cost effective, however the payback periods would definitely be longer. However, if there is a centralized standard set-up, it helps is working out economies of scale.

Q.28. Whether experiments are required to be backed by regulatory provisions such as regulatory sandbox to protect experimenters from any violation of existing regulations? Whether participation of government entities or authorities during experimentation will help them to learn and identify changes required in the existing regulations or introducing new regulations? Please justify your response with rationale and suitable examples, if any.

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Q.29. In response to Q.27 and Q.28, whether establishing such a campus under government patronage will enable easy accessibility of public resources such as spectrum, numbering and other resources to the researchers? Whether it would be in mutual interest of established private players as well as startups, innovators and enterprises to participate in such experiments? Please justify your response with rationale and suitable examples, if any.

Ans:

Setting up of experimental campuses where start-ups, innovators, and researchers can develop or demonstrate technological capabilities will be a good initiative that will provide impetus to new and innovative products and solutions which leverage Big Data and AI.

Further, we believe that establishing such a campus under government patronage will enable easy accessibility of public resources such as spectrum, numbering, and other resources to the researchers.

We believe that Regulatory Sandbox will provide necessary environment to test and demonstrate the AI solutions for the industry. It will also protect developers during experimentation stage, from any probable violation of existing regulations. It would also be helpful for policy makers to review existing regulations and address such concerns using alternative ways. Creation of Regulatory Sandbox will thus play a positive role in nurturing the entire ecosystem.

Q.30. Whether active participation in the international challenge programs such as ITU AI/ML 5G challenge will help India's telecom industry in adopting AI? Whether similar programs are also required to be launched at the national level? Whether such programs will help to curate problem statements or help in enabling, creating, training and deploying AI/ML models for Indian telecom networks? What steps or measures do you suggest to encourage active participation at international level and setting up of such programs at national level? Please justify your response with rationale and suitable examples, if any.

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Q.31. Whether AI/ML developers should launch bounty programs to establish trust in the public about robustness of measures taken by them to protect privacy in their products or solutions? Whether conduction of such programs will help companies or firms to improve their products or solutions? Whether such programs should be conducted under the supervision of the government or an institution established/assigned for this purpose? Please justify your response with rationale and suitable examples, if any.

Ans:

MeitY introduced and implemented numerous programs to deploy rising technologies like Artificial Intelligence, Machine Learning, Blockchain, IoT, Robotics, and Big Data for the collective good of millions of Indians.

"AI pe Charcha" was yet another initiative of MeitY launched in 2021 which involved a series of panel discussions with leaders from the government as well as the industry from across the globe. During the events, the academicians and researchers shared their views and experiences on AI, breakthrough innovations, related case studies and practices as well as the challenges faced by AI.

Thus, we have various programs in India. In addition to the same participation in the international programs such as ITU AI/ML, 5G challenge will help the industry in adopting AI.

Since the implementation of AI will affect all economic sectors, even though the telecom sector can make a contribution, it cannot manage these programmes on its own. Along with academic institutions, MeitY should be in charge of these programmes, though it might be preferable to run them under the direction of the government or a specific institution.

Q.32. Whether the telecom industry is required to adopt a Machine Learning Operations (MLOps) environment to develop, train, validate and store ML models? Whether there is also a need to establish a DataOps feature store to help MLOps for training purposes? What standardisation is required in terms of interoperability and compatibility for MLOps to function in a federated manner? Please justify your response with rationale and suitable examples, if any.

Ans:

As the technology evolves and market matures, TSPs may adopt a Machine Learning Operations (MLOps) environment to develop, train, validate and store ML models on a need basis, determined by customer needs and market requirements**.**

Q.33. Whether active participation in the international bootcamp programs such as MIT Bootcamps, Design Thinking Bootcamp by Stanford University etc. will help India's telecom industry workforce to find international developers community, navigate challenges and learn from experiences of others? Whether similar programs are also required to be launched at the national level? What steps or measures do you suggest to encourage active participation at the international level and setting up of such programs at the national level? Please justify your response with rationale and suitable examples, if any.

Ans:

Academic institutes in India should organise various bootcamps which will help India's workforce from all sectors of the economy to interact with international developers' community, navigate challenges and learn from experiences of others.

Active participation from India in the various international bootcamp programs may also be encouraged as the same will help the industry workforce to gain knowledge and learn from experiences.

Active participation in these programs may be encouraged by creating awareness about these programs.

Q.34. Whether the courses or programs related to AI/ML currently being offered by various institutions and universities in India are adequate to meet the capacity and competence required to develop and deploy AI solutions or products in the telecom networks? If not, what additional steps or measures are suggested to fill the gap? Please justify your response with rationale and suitable examples, if any.

Ans:

Awareness and adoption is left to the individuals and organizations. If there is a collective drive at a nation level, it automatically elevates everyone/ every organization to the next level. For Eg: GST implementation.

Q.35. Whether establishing a system for accreditation of AI products and solutions will help buyers to purchase such solutions or products? If yes, what should be the process of accreditation and who should be authorised or assigned with the task of accrediting such products or solutions? Please justify your response with rationale and suitable examples, if any.

Ans: NIL

Q.36. Whether creating a framework to prepare a list of prequalified suppliers of AI products or solutions will help industry including government agencies to procure AI products or solutions? Whether there is a need to formulate a standard Code of Conduct or guidelines for AI related procurements? What should be the typical elements of such a Code of Conduct or guidelines including guidelines on trusted source and who should be tasked to formulate such a Code of Conduct or guidelines? Please justify your response with rationale and suitable examples, if any.

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Q.37. Whether there is a need to prepare and publish a compendium of guidance, toolkits and use cases related to AI and BD, to foster adoption in the telecom sector? If yes, what should be the

process to prepare such a compendium and who should be assigned this task? Please justify your response with rationale and global best practices, if any.

Ans:

We reiterate that a cross sectoral multi-stakeholder body, cutting across various sectors, and thus having representation from all sectors of the economy, should be set-up to further develop and refine the guidelines/ principles for adoption of AI in India.

This multi-stakeholder body should be responsible laying down the Code of Conduct or guidelines for AI related procurements and also publish a compendium of guidance, toolkits and use cases related to AI and BD.

Q.38. Whether there is a need to establish telecom industry-academia linkages specifically for AI and BD to accelerate the development and deployment of AI products and solutions? Whether there is a need to establish Centres of Excellence (CoEs) for this purpose or it can be achieved by enhancing the role of existing TCoE? Please justify your response with rationale and global best practices, if any.

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Q.39. Whether there is a need to establish telecom industry-academia linkages specifically for AI and BD for AI related skill development? Please give the suggestions for strengthening the industry-academia linkages for identification of the skill development courses. Please justify your response with rationale and global best practices, if any.

Ans:

Industry academia & technological advancements are intertwined. One cannot exist or work in silo without the other. Hence industry academia linkages specifically for AI and BD are mandatory. However, the methodology or way of keeping this linkages active can be customized. The Centres of excellence cannot be independent of the industry. The knowledge has to be constantly flowing from the industry. Hence there can be a consortium linked with the existing TCoE which would standardize and form a framework / guideline.

Q.40. Any other issue which is relevant to this subject? Please suggest with justification.

Ans:

N.A.