VIL Comments to the TRAI Consultation Paper on
"Rating of Buildings or Areas for Digital Connectivity"

At the outset, we are thankful to the Authority for giving us this opportunity to provide our comments to the TRAI Consultation Paper on "Rating of Buildings or Areas for Digital Connectivity" dated 25.03.2022.

Preamble

1. We appreciate constant efforts being carried out by TRAI and the Government to build robust and constantly evolving infrastructure to improve the quality of service for the end users. The network connectivity supported by this infrastructure has played a crucial role in combating COVID-19 pandemic by enabling quick and easy accessibility across all the support systems of the country.

2. Through this forward looking consultation paper, TRAI has initiated another step to not only provide mere connectivity but also ensure the "meaningful connectivity" for the end users.

3. Designing Digital Connectivity Infrastructure (DCI) for buildings is an interdisciplinary subject and requires involvement of experts from various entities like telecom wireless and wireline domains, involvement of architects who design buildings, engineers, infrastructure providers, multiple regulatory bodies, etc. Therefore, it's important that TRAI and DoT undertakes collaborative and consultative approach to onboard all other stakeholders including relevant Government departments, regulators and entities.

Key Submissions:

1. The Property Manager should be responsible for deployment of DCI for their respective project (to the extent permissible under Government/DoT and regulatory norms) and may also maintain it by itself or get services of other agencies to operate and maintain. DCI is vital in today's scenario and its provision should be made mandatory like other utilities such as gas, water and electricity for a building.

2. **The Property Managers should be mandated to adopt transparent and non-discriminatory approach as well as not to enter into any exclusive tie-up or tie-ups with differential commercials, with any telecom service provider or any IP-I. Similarly, the TSPs should also be mandated not to enter into any exclusive tie-ups with any Property**

Manager for the use of DCI. This will be helpful to take care of monopolization related concerns.

3. The role of TSP emanates from the telecom license and would continue to be the same. There should not be any CAPEX obligation on the TSP as the cost of setting up the DCI will anyhow involve multiple fields like electricity, power, fiber, cellular connectivity, etc. which will be passed to the user.

4. DCI Evaluators shall be responsible to provide the DCI ratings and certification to the building/infrastructure projects as per the set criteria which should be available in the public domains.

5. The existing council ("Council of Architecture") with additional mandate will be appropriate to lay down eligibility of DCI Engineers, DCI Designers and DCI Evaluators, regulate their minimum qualifications etc. The same should be based on guidance from telecom authorities like DoT and TRAI.

6. **The rating should be calculated based on assessment of network coverage of all the TSPs serving that geographical area and should accordingly be pro-rated and reflect in the final rating. Therefore, Rating of a building where assessment of coverage of all TSPs is done and found good, should always be higher (on a pro-rated basis) than the Rating of a building where assessment of few TSPs (less than available TSPs) is done and found good.**

7. The ratings for the buildings shall be implemented in a phase-wise manner. In the phase 1, rating should be mandatory for all **Government buildings, stadiums, railway stations, bus terminals/depots, underground metro stations, central/state/private universities (deemed universities), shopping malls with substantial space/footfall, indoor stadiums etc.** The ratings should be introduced for buildings based on the **criteria of a minimum height of 15-20 m from ground or two floors below ground.** For rest of the buildings, the rating should be on voluntary basis in phase 1.

8. The ratings should be valid for a time period of 5 years, post which Property Manager should have a mandatory obligation to get it renewed. The rating shall also be available on the web-portal as an authentic source of information for general public.

9. **We request TRAI to publish the draft Recommendations on this consultation paper and provide opportunity to all relevant stakeholders for giving comments on the same.**

In regard to the questions raised in the consultation paper, we would like to submit our question-wise comments as follows, for Authority's kind consideration:

Question-wise Comments

Q.1: How can an ecosystem be created to design, deploy and evaluate DCI with good connectivity in a cohesive and timely manner? What would be the typical role and responsibilities of actors of the ecosystem? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 1:

1. Before we share our comments on the creation of new ecosystem, it is important to look at the present ecosystem and stakeholders involved in creation of DCI in buildings.

2. **Current Stakeholders in DCI creation and challenges involved:**

   a. Over the past few years, India has experienced a massive surge in indoor voice and data consumption. Being a developing and densely populated country, there is still a huge gap in meeting the connectivity requirements of the users as the demand is rising exponentially on a regular basis and the same requires frequent augmentation of network capacity.

   b. DCI is vital in today's scenario and its provision should be made mandatory like other utilities such as gas, water and electricity for a building.

   c. Pandemic in past two years has led to shift in consumption patterns and there is substantial increase in voice and data consumption from the residential areas/buildings owing to work from home facilities. This has put lot of focus on the DCI in buildings since, most of the existing buildings as well as new projects, do not have plan adequately for infrastructure needs of digital connectivity.

   d. Further, there is also another challenge for creation of infrastructure i.e. the rules / guidelines / policy goals pertaining to the deployment of networks or infrastructure creation are laid by Central Government, however, there is a significant dependence of the execution of the same at state level as the ownership of assets i.e. land/buildings is primarily held by the State Government / Agencies.

e. Moreover, for such challenges of DCI in the buildings and lack of awareness amongst the building planners and managers, it is the user of the building premise who ends up receiving inadequate service experience. The options for the building premise users are limited considering (i) huge cost of moving to another building premise (ii) connectivity in general would not be good for all TSPs (iii) forced to select another TSP if the building premise manager does an exclusive tie-up. Further, there is no transparent and reliable channel for consumer awareness on the connectivity in a building premise.

f. This often results into clash of ownership with the property managers and having given the property to the end users, they are often found reluctant in creating/augmenting DCI. It is also important to note that telecom licensee are obligated to provide street coverage and due to inherent challenges involved in in-building connectivity, it is not obligated upon the TSPs.

g. Considering role of telecom connectivity and consumers dependence on it has increased due to 4G in past years and especially due to pandemic, it is important that the property managers realize this and take creation of DCI as an opportunity and not as an obligation. This will help them create value in the DCI and open up another value proposition i.e. when their building is compared with other buildings by potential users, on the DCI parameter. Moreover, ubiquitous connectivity for voice and data, would also help the property managers to examine and deploy various IoT solutions, which can bring efficiencies, provide other value services and reduce cost for their governance and services to the end consumers.

h. Any TSP or other party alone cannot take up this mammoth task of providing and creating DCI for such buildings. The same requires all the stakeholders to come forward and share the responsibilities and the costs of providing DCI to such buildings.

i. So, if property managers join this ecosystem of DCI creation, it would become win-win for all stakeholders i.e. Property managers, end users and TSPs. Besides, cost of creation of DCI will be fraction as compared to the cost of project or cost for creation of other utilities. As mentioned by TRAI, deploying a network inside a building is a complex and multi-dimensional process and requires coordinated efforts from Property Managers, Infrastructure developers, RWAs, TSPs, etc. Collaborative engagement at an early development stage of the building project can very well address and help mitigate the connectivity issues. The same will require a platform for ease of co-ordination amongst the relevant stakeholders for cohesive working.

j. Thus, it is important to create an ecosystem involving various stakeholders including property managers, for designing, deploying and evaluating DCI with good connectivity, in a cohesive and timely manner.

3. <u>**Probable Ecosystem – Creation and Stakeholders:**</u>

a. In this regard, we support the thought process of TRAI that building a DCI requires collaborative partnerships with co-designing and co-creation being some of the broad elements of such partnerships. Therefore, authorities and entities need to become collaborative partners in building the network and reaping benefits from it rather than taxing and charging for laying such networks and considering it as the revenue generation opportunity.

b. Due to constant development in the landscape and skyline of the cities, in-building coverage cannot be ensured during the design, planning and deployment stages of the network through macro coverage. The areas or buildings which were well covered at one point of time start facing severe connectivity issues as soon as a new building (high rise) comes up in that area creating issues in the areas shadowed by the new building. This is a major issue in providing a quality network considering the issues faced by TSPs in acquisition of suitable sites and infrastructure creation in the cities.

c. **Therefore, there should be a new ecosystem which should unlock the role of property managers for creation of DCI and improving experience for the end users. For this, Property managers would need support from independent parties, for designing, deployment and evaluation of said infrastructure, besides TSPs for provisioning of suitable network equipment.**

d. In our view, it would need multiple entities participation for effective functioning of this ecosystem, suggested as follows:

  i. Entity owning / managing / in possession of the Property (Building)
  ii. Entity designing the DCI based on various parameters
  iii. Entity deploying the DCI
  iv. Entity evaluating the DCI and giving ratings
  v. Telecom service providers
  vi. Authority providing eligibility for entities designing, deploying and evaluating.
  vii. Authority deploying Common portal for governance, exchange of information and rating to the building
  viii. Authority providing norms / guiding principles / standards for rating of DCI

4. **Roles and Responsibilities of Stakeholders:** The entities like Property Manager, DCI Engineer, DCI Designer and DCI Evaluator being the actors of the ecosystem will have different roles to play in achieving the objective of DCI. Some of the roles and responsibilities for these entities of the new ecosystem envisaged by us are as below:

   a. **Property Manager:** This can be any RWA or Real Estate developer or Government/PSU/PSE or any other legal authority/manager who has a right to control/monitor the property or has right of possession/ownership over the property. The Property Manager should be the owner of the DCI for that particular project (to the extent permissible under Government/DoT and regulatory norms) and may also run it himself or get services of other agencies to run it on his behalf. The Property Manager shall have to hire the services of other stakeholders like DCI designers, DCI evaluators etc. to design the DCI. The property manager is also responsible to take the design inputs from DCI designer into account in the designing the building and providing required ducts, telecom space and other requirements as indicated by DCI designers. He should also be responsible for the lifecycle management and upgradation of the DCI network for the properties under his authority. Further, RoW, being the fundamental requisite for TSPs to deploy their networks within the building premises for creation of DCI, we would like to submit that no charges should be levied on the TSPs for such access rights within the building (RoW) by the Property Manager.

   b. **DCI Designers:** These can be the certified professionals having the required competence who shall be responsible for gathering the user requirements with the help of property manager and network requirements with the help of TSP operating in the area to design the customized network design to meet the requirements of the users of the property. DCI designers shall be responsible for providing inputs regarding the design and various requirements such as telecom space, ducts, active and passive equipment etc. to the property manager which can be considered during the planning, design and procurement stage of the infrastructure being built. They should also be responsible to supervise the implementation by DCI Engineers to ensure that the designs are implemented to his satisfaction and the results are delivered in terms of meeting the user requirements considering the design inputs.

   c. **DCI Engineers:** These certified professionals with required competence shall be responsible for implementing the designs as prepared by DCI designers during the final stages of the project. They should work in close interaction with DCI designers to effectively implement the designed solution and deliver the network with performance and user requirements as envisaged by the DCI designer while designing the solution. The TSPs or IP-1s can also be the DCI Engineer by default.

d. **DCI Evaluators:** DCI Evaluators will be the empaneled agencies who will provide the services post the implementation of the solution by DCI Engineers and verify the same as per set processes and benchmarks based on the building type and geographical area. The property managers shall be the ones seeking such services from them. Further, DCI Evaluators shall be responsible to provide the DCI ratings and certification to the building/infra structure projects as per the set criteria which should be available in the public domains. Ratings of the buildings shall also be available on a web-portal for general public consideration while evaluating that property.

e. **Telecom Service Provider (TSP):** The role of TSP emanates from the telecom license and would continue to be the same.

f. **Authority providing eligibility:** The existing council ("Council of Architecture") with additional mandate will be appropriate to lay down eligibility of DCI Engineers, DCI Designers and DCI Evaluators, regulate their minimum qualifications etc. The TSPs and IP-1s can also act as DCI Engineers without any additional eligibility from Council of Architecture. The same should be based on guidance from telecom authorities like DoT and TRAI

g. **Authority deploying Common portal and Norms / Guiding principles / Standards for Rating:** For common portal and norms / guiding principles / standards for rating, it would require deliberations and collaboration between multi-sector authorities. In our view, the common portal and norms / guiding principles / standards for rating should be issued by telecom body i.e. DoT or TRAI, in consultation with other sectoral authorities like Ministry of Housing and urban affairs, RERA, Ministry of Civil Aviation, Ministry of Railways etc. However, in interest of Ease of Doing Business, this authority should not do any examination before issuing rating certificate. The certificate should be issued solely basis the evaluation done by DCI Evaluators, for which norms / guiding principles / standards should be issued by this Authority and it should have some checks and confirmation from the DCI evaluator, before providing the rating certificate.

Q.2. How would the ecosystem proposed in response to Question no.1 ensure that created infrastructure does not get monopolized? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 2:

1. The proposed ecosystem of DCI, as explained in comments to question no. 1, will create huge value for all the stakeholders thereby, providing connectivity and convenience to the general public being end user of the same.

2. In any infrastructure project, on one hand the policy framework should provide for incentives and steps to encourage investment leading to creation of infrastructure, and on the other hand, it should also create enough measures to curb monopolies so that public good can be achieved.

3. In the instant proposed framework, there could be two scenarios which could invite discussions for monopolistic practices:

   a) Property Manager giving rights of DCI infrastructure creation/use to a single IP-I registration holder.

   b) Property Manager providing right of usage of DCI to one/selected TSP.

4. In our view, scenario mentioned at point no. *3a* above, would not lead to monopolistic practices as business of IP-I lies in servicing telecom service providers. Further, under the IP-I registration guidelines, they are also bound to provide infrastructure to telecom service providers, on a non-discriminatory basis.

5. However, under the scenario mentioned at point no. *3b* above, there is likelihood that some of the property managers may provide right of use of DCI to one of the TSP, based on commercial interests or otherwise. In such scenario, the said TSP selected by Property Manager, would have exclusive control and access to building DCI and thus, would be able to penetrate and provide deep coverage to the users of the said building, as compared to other TSPs. In such scenario, the said TSP may directly/indirectly force the users of the building for changing their connections from other TSPs to the said TSP. Such users may then be left to the mercy of said TSP on tariffs and other areas and would be indirectly devoid of porting out their numbers to TSP of their choice.

6. **Thus, to ensure the DCI is created and put to use in a non-discriminatory manner, the Property Managers should be mandated to adopt transparent and non-discriminatory approach as well as not to enter into any exclusive tie-up or tie-ups with differential commercials, with any telecom service provider or any IP-I. Similarly, the telecom service providers should also be mandated not to enter into any exclusive tie-ups with any Property Manager for the use of DCI.**

7. It is very important for the Government to ensure this from the start itself such that infrastructure so created can be optimally utilized and consumers of all TSPs should get equal chance to get benefitted.

Q.3. How would the ecosystem proposed in response to Question no.1 enable DCI Designers to factor in the digital connectivity requirements of the existing and/or prospective users of the network? How can such requirements be gathered at the stage of construction of a new building or at the time of upgradation or expansion in case of pre-existing DCI? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 3:

1. As rightly indicated, securing the digital connectivity requirement of the prospective users would be challenging during the design and planning phase of the project. Hence, DCI designer shall provide inputs to the property designer in two parts.

2. In first part, the inputs should relate to provisioning of required telecom space, ducts from the telecom spaces to individual offices/flats/rooms which are required during the design, planning and construction of the building.

3. In second part, when the inputs from users are available at later stage of the project, the collated user requirement aspects can be catered in the second part of the inputs from the DCI designers which will have the active and passive equipment details, connectivity and other requirements which drive the experience of the users and help meet their requirements.

Q.4. How would the ecosystem proposed in response to Question no.1 enable DCI Evaluators to get requisite information to evaluate and ensure that the designed or deployed network would meet the requirements of end users? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 4:

1. DCI evaluators can have the set criteria available in public domain for rating the infrastructure project. The property manager can be mandated to collect the user

requirements of the respective project in prescribed format and fashion which shall be provided to DCI evaluators during the evaluation process.

2. This will facilitate the verification of the same by the DCI evaluators to ensure that the DCI network designed and deployed is meeting the requirement of the end users and appropriate ratings can be assigned to the property.

Q.5. How would the ecosystem proposed in response to Question no.1 ensure that upgrades and expansion of the DCI are done from time to time and continue to meet rising demands? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 5:

1. The property manager being the front end of the users of the property, shall seek the feedback from users on routine basis. Based on this feedback and consultation with the DCI designer, the upgrades or expansion requirements if any arising at the later stage can be planned and executed. This is similar to RWAs seeking the feedback and issues from the residents and providing solutions to mitigate the issues raised by them.

2. To promote regular upgrades and expansion of DCI to meet rising demands and technology advancement, an incentive based method can be adopted to encourage the Property Managers for the same. We suggest that Authority should explore possibilities of financial incentives for building in form of tax concessions incase such buildings acquire a certain level of rating.

Q.6. How would the ecosystem proposed in response to Question no.1 ensure that the TSPs' networks are planned, designed, deployed, and upgraded to serve the DCI requirements in a timely manner? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 6:

1. The primary objective of the network designed by the TSPs is to provide the best experience to the users in the geographical areas with the infrastructure in place at the time of design or planning. However, due to constant development in the landscapes and skyline of the cities, in-building coverage cannot be ensured during the design, planning

and deployment stages of the network through macro coverage. The areas or buildings which were well covered at one point of time, start facing severe issues as soon as a new building (high rise) comes up in that area creating issues in the areas shadowed by the new building. Any such new construction creates a major issue in providing a quality network considering the issues faced by TSPs in acquisition of suitable sites in cities.

2. Since, there is no feedback mechanism to TSP on the upcoming infrastructure projects, the same cannot be considered during the design phase. Even if the mechanism is setup to provide this information to TSP, new infrastructure projects / big buildings takes several years (Typically 5 to 7 years) from conceptualization to being ready for users which is a long period considering the rapid technological advancements happening in the telecom space. Hence, the said planning will not help mitigate this issue. Also, there might be an impact due to other infrastructure project coming up in the area in the said time frame.

3. **To overcome the issue, there will be requirement of an online portal which will simplify the activities like designing, planning, developing, real estate approvals, etc. Further, these details pertaining to users and their requirements, etc. will assist the stakeholders to build a business case and put it to action.**

Q.7. How can an ecosystem be created to build capacity requirements of skilled professionals such as DCI Designers, DCI Engineers, DCI Evaluators? What would be the typical role and responsibilities of actors of the ecosystem? Please justify your response with rationale and suitable examples, if any.

And

Q.8. How would the ecosystem proposed in response to Question no.7 ensure that relevant training courses are available in the country? Please justify your response with rationale and suitable examples, if any.

And

Q.9. Whether the training courses proposed in response to Question no. 8 are already being offered by any organisation or institution that can be recognized for the purpose? If yes, please provide a list of organisations offering such courses. If not, how specialized courses can be designed to meet the requirements? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 7, 8 and 9:

1. To create the ecosystem to build capacity requirements of skilled professionals, there is a need to specify training and certification courses for persons responsible to design and deploy DCI as it requires specialized knowledge in the domain of telecom wireline and wireless which current architects might not be equipped with.

2. Experts designing DCI will definitely require academic qualifications in the domain as well as the skills to design specialized in-building solutions for digital connectivity.

3. The Architects Act promulgated in 1972 already provides a statutory mechanism to facilitate the practicing architects in the country and connected matters. It prepares a register of qualified Architects and regulates the profession of Architecture and lays down the minimum standards of architectural education in India. Similar method can be adopted for building up the capacity of DCI Designers, DCI Engineers, DCI Evaluators.

4. In telecom domain, there are various training and certification courses to plan, design and deploy DCI. List of some of such courses are offered by various organizations such as BICSI, iNARTE, CTNS etc. Telecommunications Certification Organization (TCO) offers various courses which may be recognized for the purpose of skilling. Some such courses are as listed below: TCO provides knowledge skills certification in the areas of telecommunications, VoIP, networking, IP, MPLS and wireless technologies, and works with training organizations to develop courses for the certifications.

   - Certified Telecommunications Network Specialist (CTNS)
   - Certified Telecommunications Subject Matter Expert (CTSME)
   - Certified Telecommunications Analyst (CTA)
   - Certified VoIP Analyst (CVA)
   - Certified Wireless Analyst (CWA)
   - Certified IP Telecom Network Specialist (CIPTS)

5. However, there is definitely a need to examine content of such courses and their suitability in India specific environment.

6. In our view, a short certification course can be adopted for building up the capacity of DCI Designers, DCI Engineers, DCI Evaluators.

7. As of now, we believe that the DCI is not part of the architecture course, hence, the same may kindly be taken into consideration. However, for DCI, we would like to submit that

there can be a specific Certification course, but a full time degree program is not required. Also, such certification courses should be voluntary and not mandatory.

Q.10. Is there a need to establish a council on the lines of "Council of Architecture" (CoA) to regulate minimum qualifications, additional specialized courses and practice of DCI profession in the country? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 10:

1. There is no need to form any additional council on the lines of "Council of Architecture" (CoA) to regulate minimum qualifications, additional specialized courses and practice of DCI profession in the country. The existing council with additional mandate will be appropriate to administer and ensure that quality DCI is being created for the users.

Q.11. Whether the requirements of additional specialized courses and practices of profession would vary depending upon the size of work or kind of work involved in a particular DCI project? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 11:

1. These additional specialized courses and practices of profession would definitely vary depending upon the size of work or kind of work involved in a particular DCI project as the role of all the actors of ecosystem is different for each project and will vary across cities/metros based on user requirements and technologies. However, there may be some minimum qualification requirement which may be common between the DCI Evaluators, DCI Engineers and DCI Creators.

2. However, for DCI, we would again like to submit that there can be a specific Certification course and a full time degree program is not required.

Q.12. Whether creation of a digital platform to hire services of professionals would help Property Managers in creation of DCI? Should there be a feedback mechanism to assess

quality of services delivered by professionals? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 12:

1. The digital platforms created to hire services of professionals will definitely ease out all the process and stakeholders in creation of DCI. It would help the Property Managers in creation of DCI. These platforms will work as a marketplace for all of them to connect at a single place.

2. Further, these platforms should be designed in a way that they also facilitate feedback mechanism, to assess the quality of services delivered by professionals. However, only registered/approved professionals shall be allowed to provide their services through the platform. The platforms should enable user (direct users or end consumers) to be able to provide reviews/ratings for the services based on various parameters and the same shall be displayed in the form of ratings of the professional, to support selection of such professionals by other users in future. For example, DCI Designers can be assessed on the basis of requirements, role, timelines, quality, cost, implementation, etc.

Q.13. Whether creation of a digital platform for procurement of certified products would help Property Managers in creation of DCI? How would the certified products for the purpose of DCI be identified and updated on the platform? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 13:

1. To ensure that property managers use standard products to build the solutions, the digital platform will also assure the certification of products related to the in-building solutions which is a major requisite in deployment of DCI.

2. Currently, Telecom Engineering Centre (TEC), DoT is entrusted with the task of mandatory testing requirements in case of telecom products. TEC may also take up certification of products related to in-building solutions.

3. The catalogue of such certified products can be made available in public domain through said digital platform so that network designers consider the same while designing solutions and procurement of the same. The same is required so that the network equipment are always in sync with the TSP's network, unlike, in the case of illegal

repeaters and boosters which have been a matter of concern since long and cause major disruptions to mobile signals and connectivity.

4. Also, there shall be clear bifurcation between Property Manager and the TSP regarding the list of equipment which can be deployed for in-building solution and who can bear its cost. In case, the equipment can only be sourced and deployed by the TSP, then the cost of such radiating equipment shall be paid/reimbursed to the TSP through a commercial arrangement between the TSP and interested party. No CAPEX shall be incurred by the TSP as the cost of setting up the DCI will anyhow involve multiple fields like electricity, power, fiber, cellular connectivity, etc. which will be passed to the user.

5. Further, RoW, being the fundamental requisite for TSPs to deploy their networks within the building premises for creation of DCI, we would like to submit that no charges should be levied on the TSPs for such access rights within the building (RoW) by the Property Manager.

Q.14. What may be the possible models of DCI ownership and its upkeep? Whether co-ownership models would help in aligning incentives in realising connectivity that would meet expectations of the end users from time to time? Should there be a need to specify terms and conditions for entities owning and responsible for upkeep of DCI to function in a fair, transparent and non-discriminatory manner? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 14:

1. There may be various models of DCI ownership and its upkeep, however, the Property Manager (supported by DCI designer and DCI engineers) shall be responsible for the following activities:

   a. Laying ducts from the telecom area throughout the building.
   b. Appropriate sizing of the ducts to enable routing of RF, fiber and other cables to the individual premises.
   c. Laying cables (RF, fiber etc.) as per the design requirements provided by DCI designer.
   d. Mounting and connecting distributed antennas (& radios for active DAS) to the cable network as per the DCI designer.
   e. Provisioning of DC Power & Backup in the telecom area as per requirement of the TSP (in addition to the DCI equipment).

f. Adequate space availability for TSP HW (upto three minimum) in the telecom chamber.

g. Availability of AC of adequate size for cooling of TSP equipment in the equipment room.

h. Availability of fiber, DAS Connectivity Panels (properly labelled) to enable connectivity in the equipment room. Standard connectivity shall be available as arranged with the TSP.

i. Security and safety of the DCI as well as the TSP equipment.

2. The Property Manager shall be the one to possess the ownership of the DCI for that particular project. However, as mentioned in response to question no. 1, the Property Manager can be any RWA or Real Estate developer or Government/PSU/PSE or any other legal authority/manager who has a right to control/monitor the property or has right of possession/ownership over the property. He may also run it himself or get services of other agencies to run it on his behalf.

3. The ownership model that would help in aligning incentives in realizing connectivity to meet expectations of the end users from time to time shall be in line with ease of doing business and shall not turn out to be a compliance burden for the TSPs.

Q.15. As one solution might not be suitable for all types of buildings, whether current requirements stipulated in the National Building Code of India, 2016 would be required to be evolved and prescribed ab initio to make it more appropriate for DCI requirements? Please justify your response with rationale and suitable examples, if any.

And

Q.16. Whether NBC needs to prescribe a separate classification of buildings for the purpose of DCI? If yes, which factors should be considered to make such a classification? If not, how to accommodate DCI specific requirements in the existing classification of buildings by the NBC? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 15 and 16:

1. Though the requirements for telecom and ICT have been introduced in National Building Code for project management, design and supervision, however no separate concept of preparation of plan and designs, approval thereof and certification is prescribed. Rather general practices which are applicable for civil and electrical work are followed.

2. We would recommend that the Telecom and ICT i.e. DCI requires a separate classification on the line of classification of buildings for "Fire and Safety". Buildings can be specifically classified for DCI on the basis of various factors like area, height, density, type of construction and type of use.

3. The building intelligence and performance shall be evaluated based on an expertly curated, objective and holistic framework at least across six major criteria, including power and energy, health and well-being, life and property safety, connectivity, cybersecurity and sustainability.

Q.17. Whether there is a need to include DCI Professionals as Persons on Record as typically done in building bye laws or development regulations? Or registration with the Council proposed in Question no. 10 would suffice to practice profession across the country as followed in the case of Architects? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 17:

1. Yes, there is a need to include DCI Professionals as Persons on Record as typically done in building bye laws or development regulations. The same is essential to cater to development regulations related to DCI.

2. We believe that the registration with the council nominated should suffice to practice profession across the country.

3. Further, we would like to highlight that the professionals presently referred in NBC for telecom or ICT planning and installations may have limited competencies only and are not experts in telecom or ICT domain considering advanced technologies. Designing such wireless systems require in depth knowledge of multiple topics or activities like radio propagation models, capacity calculation on air interface, and hands-on experience on coverage prediction tools, drive or walk test tools, etc.

4. The process of taking Persons on Record should be easy, digital and with a nominal cost. TSPs being licensee under the Telegraph Act, should not have an obligation to be Persons on Record, for them to act as DCI Engineer.

Q.18. How can the clearances or approvals required for DCI at various stages of construction of building may be incorporated in building bye laws? In typical building bye laws, there are provisions for getting clearances from central government e.g., in case of civil aviation, defense and telecom being a central subject, what role can be played by the central government in giving such clearances or granting such approvals? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 18:

1. Various amendments will be required in prevalent building bye laws at state and central levels for the clearances or approvals required for DCI at various stages of construction of building.

2. TRAI and DoT should support and play an active role in getting incorporated in building bye laws and the authority should also facilitate the clearances or approvals at central/state levels required for DCI at various stages of construction of building.

Q.19. Is there a need to introduce a special class of Infrastructure Providers to create, operate and maintain DCI for a building or cluster of buildings in ownership models suggested in response to Question No. 14? What should be the terms and conditions for such special Infrastructure Providers? Should such terms and conditions vary depending upon type, size and usage of buildings? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 19:

There is no need of any separate or special class of infrastructure providers. The existing category of IP-I registration should be fine.

Q.20. What are the initiatives or practices being taken in other jurisdictions outside India with regard to rating of buildings from a DCI perspective? Please share details and suggest how similar processes can be created in India?

VIL Comments to Q. No. 20:

1. The examples of the initiatives or practices being taken outside India by private organizations or by consortium of telecom industry or by building councils with regard to rating of buildings from a DCI perspective are mentioned in the consultation paper and some of them are listed as under:

   a) WiredScore certification is a global organization that provides digital connectivity certification basis the rating of quality and resilience of digital infrastructure in the buildings. It is operating in multiple countries and regions including USA, Canada, Australia, UK, and Europe.

   b) Underwriters Laboratory (UL) and the Telecommunications Industry Association (TIA) recently announced provision of a joint program for assessing smart buildings in the USA. SPIRE Smart Building Program offers both self-certification programs as well as Verified Assessment Ratings completed jointly by Underwriters Laboratory (UL) and Telecommunications Industry Association (TIA) that measures the effectiveness and security of smart buildings based on six primary criteria of life and property safety, health and well-being, connectivity, power and energy, cyber security and sustainability.

Q.21. Is there a need to introduce Rating of buildings from the perspective of DCI that may help in nudging the Property Managers to strive for collaboration with other stakeholders to meet the digital connectivity expectations of the users of the building? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 21:

1. Yes, the rating of buildings shall be introduced from the perspective of DCI that may help in nudging the Property Managers to strive for collaboration with other stakeholders to meet the digital connectivity expectations of the users of the building. This is very much required so that the users are able to distinguish the available options of different types of properties and choose in a transparent manner.

2. Verification of the networks of all the TSPs operating in the area shall be one of the major criteria in the evaluation process of the DCI. **The rating should be calculated based on assessment of network coverage of all the TSPs serving that geographical area and should accordingly be pro-rated and reflect in the final rating. Therefore, Rating of a building where assessment of coverage of all TSPs is done and found good, should always be higher (on a pro-rated basis) than the Rating of a building where assessment**

of few TSPs (less than available TSPs) is done and found good. The same will facilitate curbing of the TSPs' monopoly to install infrastructure through exclusive contracts with the owners/builders. Also, this criteria will include all the subscribers irrespective of their TSP, ruling out any bias/disadvantage to them.

3. Also, the ratings shall be made available on the digital platform on the basis of scientific calculations done by the DCI Evaluator, based on the norms / guiding principles / standards laid out.

4. The ratings shall also be communicated to the end user through the agreement/documents pertaining to the services being offered to the user.

Q.22. In case, rating is introduced as a voluntary scheme, is there a need to monitor the progress? If progress is not satisfactory, would there be a need to launch campaigns and awareness drive to encourage Property Managers to come forward for rating? Please justify your response with rationale and suitable examples, if any.

And

Q.23. Should the voluntary scheme of rating be extended to cover cities, towns and villages and even states? Would such a scheme help in encouraging local and state authorities to facilitate TSPs in creation or in improving outdoor as well as indoor DCI? Please justify your response with rationale and suitable examples, if any.

And

Q.25. Is there a need to make rating a mandatory requirement for specific classes of buildings such as public transport hubs, government buildings or any building of public importance etc.? If yes, which type of buildings should be covered under this category? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 22, 23 and 25:

1. The rating shall not be introduced as a voluntary scheme as the progress of the DCI creation and usage needs to be monitored on a regular basis.

2. To start with, the provision of ratings can be introduced in a phase-wise manner, similar to the phase-wise implementation of creation of DCI which shall depend on various

parameters like type of cities, commercial/residential, no. of floors, Floor Space Index (FSI), height of the building, etc. The creation of DCI can be started with high rise buildings, metros, high population density areas.

3. **In first phase, DCI creation and ratings should be mandatory for all building complexes of new Government buildings, stadiums, railway stations, bus terminals/depots, underground metro stations, central/state/private universities (deemed universities), shopping malls with substantial space/ footfall, indoor stadiums etc.** The ratings should be introduced for buildings based on the **criteria of a minimum height of 15-20 m from ground or two floors below ground.** This should be obtained by Property managers of the said buildings within two years of start of this framework.

4. The voluntary scheme of rating can be extended to cover cities, towns and villages and even states post various phases.

5. For already existing buildings or infrastructure, the ratings can be introduced on voluntary basis during the initial phases of implementation of this framework.

Q.24. If in response to the Question No. 23 answer is yes then what framework should be introduced to rate cities, towns, villages and states, and how weightages can be assigned to different aspects of indoor and outdoor connectivity? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 24:

1. To rate cities, towns, villages and states, with respect to different aspects of indoor and outdoor connectivity, a framework needs to be designed which can compare the outdoor connectivity across cities/metros considering the population density and infrastructure availability in that area.

2. TRAI also carries out drive tests of outdoor areas to ascertain quality of services. Same can also be evolved and upgraded and can be used by DCI evaluators, for determining ratings of outdoor connectivity in cities. In our view, indoor connectivity cannot be compared across cities.

Q.26. What should be the time plan to rate buildings falling under the mandatory category and is there a need to prioritize some buildings within the mandatory category to make it more effective? Whether existing buildings falling under such classes are required to be dealt differently? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 26:

1. We believe the buildings shall be rated based on the phase-wise implementation and creation of DCI. In the phase 1, the ratings shall be valid for a time period of 5 years, however, the same shall be subject to any extension basis deemed fit.

2. The ratings for the existing buildings falling under such classes shall be made on voluntary basis during the phase 1 of implementation and creation of DCI.

Q.27. Is there a need to designate a nodal official for building(s) falling under the mandatory category to comply with the rating related requirements? What actions are proposed to be taken in case of non-compliance? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 27:

1. We believe each stakeholder involved in the creation of DCI shall designate a nodal official for building(s) falling under the mandatory category to comply with the rating related requirements. The same will ensure proper coordination and that the development is being monitored regularly across all the stakeholders working towards the creation and maintenance of DCI.

2. In case of non-compliance, the governing authority shall define the penal clauses for the Property Managers. However, the authority shall assess such action considering that the ecosystem has got developed and there are reasonable number of DCI Designers, DCI Engineers, DCI Evaluators, etc. available in the marketplace.

Q.28. Is there a need to amend legal provisions under various laws, bye laws dealing with development of land and buildings or areas including forest areas, cantonment areas, port areas, panchayat areas, municipal areas etc. to facilitate creation of DCI and ratings of the

buildings or areas? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 28:

1. Yes, there is a need to amend legal provisions under various laws, bye laws dealing with development of land and buildings or areas including forest areas, cantonment areas, port areas, panchayat areas, municipal areas etc. to facilitate creation of DCI and ratings of the buildings or areas.

2. Such legal provisions will be very much required to give teeth to this framework, enforce DCI creation, unlock the value of DCI in a building through ratings and provide enriched experience of advanced technologies to the end users.

Q.29. In case a voluntary scheme for rating is to be introduced or rating is notified as mandatory for specific classes of buildings then what should be the role of TRAI or DoT? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 29:

1. In our view, the norms / guiding principles / standards to be used for determination of ratings, should be prescribed by a telecom body i.e. TRAI or DoT. Formulation of norms /guiding principles / standards would require collaboration between multi-sector Government bodies/regulators for obtaining their comments to such rules and guiding principles. However, there should not be additional approvals for obtaining ratings and same should be provided basis DCI Evaluators' report, which should meet these norms / guiding principles / standards.

2. Further, as the matter pertains to assessment of quality of services, TRAI can take lead for such multi-sector collaboration.

Q.30. Whether creation of "Regulatory Sandbox" to carry out experiments or demonstrate capabilities of innovative solutions to improve digital connectivity would be helpful to make changes in existing policies, laws or regulations? What should be the terms and conditions to establish a regulatory sandbox? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 30:

1. IBS Solutions are being deployed since last few decades improving the DCI in the select buildings and solutions are available from various companies for catering to varying degrees of user experience.

2. As such, in our view, "Regulatory Sandbox" may not be required for the same and market demand will trigger the innovations in the solutions offering to improve the digital connectivity and also encourage new entities or player in the field to provide the required solutions.

Q.31. Is there a need to establish a Certificate Issuing Authority to award ratings to buildings from DCI perspective? If yes, what should be the structure of such an authority? If not, who can be assigned the role to perform this function? Please justify your response with rationale and suitable examples, if any.

And

Q.32. Whether the authority suggested in response to Question no. 31 may use reports from DCI evaluators to award ratings? To ensure reliability of reports from DCI Evaluators, should Certificate Issuing Authority need to conduct periodic audits of DCI evaluators? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 31 & 32:

1. There shall be a Certificate Issuing Authority to award ratings to buildings from DCI perspective. This will ease the process for users to choose the Property Manager based on the ratings.

2. The DCI Evaluators who fulfill the eligibility, should be allowed to give rating to the buildings based on the rules/guiding principles as laid by the TRAI/DoT (as referred to in comments to question no. 29. Based on their ratings and declarations on the portal of having met the rules and guiding principles, the certificate should be issued instantaneously without any separate approval process.

Q.33. What should be the terms and conditions for using ratings awarded to a building(s) from a DCI perspective? What should be the validity period of awarded ratings? Do you envisage any situations under which an awardee of ratings might be required to get the ratings renewed before the validity period? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 33:

1. The ratings awarded to a building(s) from a DCI perspective will be highly dependent on the technology landscape of the place.

2. The ratings awarded by the authority shall be valid for a period for 5 years. The same shall be renewed on mandatory basis post the expiration.

Q.34. Whether in the initial stages of introduction of the rating system, validity should be for a shorter time period, and later it may be increased as evaluation system matures? Should the validity period be dependent on the type of buildings? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 34:

1. The ratings awarded by the authority shall be valid for a period for 5 years in the initial stages of introduction of the rating system as the same will put a humongous load on the system initially and may discourage them to seek the ratings. The same shall be renewed on mandatory basis post the expiration.

2. We believe that DCI is not dependent on type of buildings. It depends on the requirement of end user which will remain constant. Hence, the validity period is independent of the type of buildings.

Q.35. Whether the process of renewal of rating should be the same as the process defined to get rated first time or it may be incremental? Or renewal process may be dependent upon the grounds on which it is being renewed e.g. expiry of validity period, introduction of new technology, introduction of new spectrum band(s), introduction of new services(s) etc.? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 35:

1. The process of renewal of rating should be incremental but evaluation criteria which was prevalent at the time of testing shall remain the same.

2. The ratings shall evaluate all prevalent technologies, however, evaluation criteria may be revised from time to time based on the technology landscape. The DCI shall be rated for each technology being offered in the market. Further, the DCI evaluator should not be static.

Q.36. Whether the provisions to make an appeal should be introduced to give an opportunity to the applicant to make representation against the decisions of the Certificate Issuing Authority? What should be the time frame for preferring the appeal in case of disagreement with the rating assigned and its disposal? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 36:

1. There is no need for appellate mechanism as the Property Manager itself is hiring the DCI Evaluator and the certificate is issued on the basis of rating provided by DCI Evaluator.

2. As mentioned in our submission, the DCI Evaluator shall possess the authority to provide the ratings. Hence, in case of disagreement with the rating assigned and its disposal, the Property Manager can be provided the opportunity to request for re-evaluation through a different DCI Evaluator. To minimize the chances of multiple re-evaluations, the Property Manager shall be allowed only 2 re-evaluation requests in 6 months.

Q.37. If somebody is found to be using ratings in an unauthorized manner, what legal actions are proposed to be taken against such entities? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 37:

In such a case when somebody is found to be using ratings in an unauthorized manner, the ratings shall be cancelled and penal action should be taken.

Q.38. Whether creation of a digital platform that allows stakeholders to co-design and co-create DCI would be helpful to realise better, faster and cheaper solutions? Whether technologies and tools such as AI, ML would be helpful in achieving this objective? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 38:

1. With the advancements in digital tools and availability of advanced techniques such as Artificial Intelligence (AI) and Machine Learning (ML), rating can be achieved in a more reliable and authentic manner.

2. With these techniques and tools, contexts may be understood in a better way and may also be considered at the stage of evaluation. These tools can take various inputs like 3D map of the building and can help bring objectivity into the user feedback as the tool will be providing feedback on the same scale and parameters as configured and pre-decided with the required weightage.

3. Subjective assessment as mentioned in the document is more critical in the case of In-building coverage because its highly dependent on the building structure, clutter, height of surrounding buildings, vegetation etc.

4. Digital tools with AI/ML will also help in providing data points by precisely predicting through simulation which may come via better algorithms and availability of detailed information related to building. This may be crucial for making predictions about wireless signals inside building. AI/ML may help in combining information from multiple sources such as network reports, field measurement reports, crowd source apps, prediction tools, survey reports etc.

5. Creating picture of quality inside building after considering multiple sources, network configurations and building and other clutter related information and both objective as well as subjective assessments, may be much more reliable and closer to the perceived quality are very useful for evaluation of the quality.

Q.39. What should be the typical process to rate a building? Whether terminologies and steps involved in the rating process need to be standardized? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 39:

1. The typical process to rate a building shall include both objective assessment and subjective assessment of quality of network and user experience by applying appropriate weightage to each assessment.

2. We are of the opinion that terminologies and steps involved in the rating process need to be standardized and not left to individual perception to bring objectivity in the rating process. Same level of experience can be rated differently by different individual and hence, there is a need to build a standard process and rating mechanism to reach a standard outcome for a particular type of user experience.

Q.40. Whether the process of rating would vary based on the types of buildings? If yes, then what factors or aspects of a building would matter or impact the outcome of rating? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 40:

While the process of rating should be standard, however, the weightages can vary on the type of buildings. Commercial buildings/hospitals/malls with high footfalls require high capacity in addition to proper coverage and also impact the experience of large number of users may warrant different type of weightages to be applied to objective and subjective assessment criteria.

Q.41. Which objective methods should be used to evaluate the DCI? How can various aspects of performance to evaluate the quality can be combined together? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 41:

1. Objective methods can be include Network KPIs, Service KPIs collected for different time and can be merged with the crowdsourced data and field measurements can provide a fair evaluation criteria for objective assessment.

2. All this data has different granularity for e.g. Network KPIs are available at the lowest granularity of a cell, crowdsourced data will provide data basis some grid size which will vary depending on the crowdsourcing data source while the field measurement will be most granular. Hence, weightage can be applied appropriately based on their granularity and relevance.

Q.42. Which subjective methods should be used to evaluate perceived quality of DCI? Whether survey techniques can be improved considering penetration of smartphones? Whether improved techniques can help in providing insights and actionable items to improve DCI? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 42:

1. Subjective methods can include feedback from user device using the standard mobile phone based SW dedicated for the purpose for capturing the objective feedback in addition to the user direct feedback.

2. Weightage of the objective feedback through the SW shall be higher as the user direct feedback will not be just based on the experience in that building but also include the larger geography which may impact the objective rating of the DCI in the building which is being evaluated.

Q.43. Would combining the parametric values or results of objective and subjective methods be helpful in assessing digital connectivity that is closer to the perceived quality of experience? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 43:

Combining the parametric values from the objective and subjective assessment will be helpful in assessing the digital connectivity. There is a limit to the degree of subjective feedback which can be sourced from the users and field measurements. When such subjective assessment is combined with objective assessment KPIs as well as prediction tool based assessment, it will provide the final assessment which will be closer to the perceived quality of experience.

Q.44. How advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML) etc. might be useful to make the evaluation process more nuanced and suitable for the purpose? How can AI/ML models evolve from the inputs of measurement and evaluation being carried out in other parts of the city, state or Country? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 44:

1. Use of the advanced technologies will not only ease the merging the various assessment criteria but also helps in predicting the perceived quality of experience in the building being evaluated considering the geographies, clutter of the region, building map, material used in the construction, height of the surrounding buildings, vegetation etc. which may not be possible to consider them in manual evaluation or without these advance technologies.

2. In addition, advanced technologies will also help in standardizing rating process and mechanism, removing the human errors from the equation while evaluating the building for connectivity and quality of experience.

Q.45. Any other issue which is relevant to this subject? Please justify your response with rationale and suitable examples, if any.

VIL Comments to Q. No. 45:

1. We would like to submit that being a multifarious and forward looking consultation paper, it will have far reaching impact involving technical, network, regulatory, financial and business related aspects for cross-sector stakeholders. Hence, we request TRAI to publish draft Recommendations on this consultation paper and provide opportunity to all relevant stakeholders for giving comments on the same.

2. Further, RoW, being the fundamental requisite for TSPs to deploy their networks within the building premises for creation of DCI, we would like to submit that no charges should be levied on the TSPs for such access rights within the building (RoW) by the Property Manager.

x--- End of Document ---x