Q.1: What are the growth prospects for Data Centres in India? What are the economic/financial /infrastructure/other challenges being faced for setting up a Data Centre business in the country?

India is at an inflection point in terms of becoming a truly digital economy. Driven by a multitude of factors such explosion of data due to massive digitisation efforts led by the pandemic; internet penetration to the last mile; cloud adoption; transformation of business processes with emerging technologies such as AI/ML, IoT, Big Data and Analytics, 5G, etc; evolving digital customer engagements and so on. These trends are not limited to certain sectors, instead they encompass every organisation across sectors and sizes including Governments at all levels. The Data Protection Bill, which may soon become an act, may result into massive on-shoring of Indian citizen's data (as stored on the servers of social media platforms, gaming platforms etc, where Indian users for a significant % of users) from offshore data centres to Indian data centres, and that in itself creates a massive opportunity for the Indian data centre industry.

Challenges:

- Land sourcing (process, delays, cost esp. since most data centres come up in and around major cities)
- Lots of approvals at central, state, local level, across ministries. No single window (lack of ease of doing business)
- Dependence on telco operators for high quality bulk fibre between various data centres and cable landing stations
- Issues related to banking of solar power with utilities (so that higher power can be generated during day time and then utilised at night time)
- High cost of battery for storage of solar energy
- Higher Power cost compared to developed countries which are data center havens (like US, Singapore)
- Significant import component in data centre MEP and IT equipment, leading to higher costs
- Data Centre are unique building designs, very different from commercial buildings and hence a separate building code should be there for approval of data centre buildings

Q.2: What measures are required for accelerating growth of Data Centres in India? The primary focus to accelerate the growth of data centers starts with building a conducive environment for the industry. This can be ensured with certain best practices:

- The proposed data center park policy of Meity and Data centre polices as adopted by some of the state governments like Uttar Pradesh are in the right direction, however, the Government should soon pass the same and formulate rules to put these policies

into execution. The same stands for the Data Protection Bill. Once these frameworks are established, DC operators and Investors will get a clear picture of the future.

- Government should come out with a single / simple countrywide framework for open access policy whereby industry can wheel power from anywhere to anywhere else without any overburden of state specific rules, and without too much overhead costs.
- Government should allow DC operators to lay their own fibre between various data centre (across each other data centres) and cable landing stations
- Government should formulate a National DC Council under the Chairmanship of Secretary Meity to establish a formal consultation mechanism between government and industry
- Government should promote indigenous manufacturing of equipment / components as used in data Centres and establish incentivising polices for the same.
- Government should encourage educational institutions to have data centre specific certification courses, to prepare the young talent for the Data centre industry.
- Government should also look in resolving some of the other issues as highlighted in our response to Q.1. (as not covered above or as not already covered in proposed DC policy)

Q.3: How Data Centre operators and global players can be incentivized for attracting potential investments in India?

Same as above (response against Q.2)

Q.4: What initiatives, as compared to that of other Asia Pacific countries, are required to be undertaken in India for facilitating ease of doing business (EoDB) and promoting Data Centres?

Local, state, and central governments should look at easing out the approval processes and have a single-window clearance mechanism for various approvals. From the initiation of a data center project to its going-live for commercial use, there are more than 40 to 50 approvals required, a count which may vary depending upon multiple factors. A data center which otherwise that can be launched in 15-18 months, can take anywhere from 24 to 30 months due to multiplicity, latency, and complexity of these approvals. A single-window clearance to facilitate all these approvals will go in a long way.

Q.5: What specific incentive measures should be implemented by the Central and/or the State Governments to expand the Data Centre market to meet the growth demand of Tier-2 and Tier-3 cities and least focused regions? Is there a need of special incentives for establishment of Data Centres and disaster recovery sites in Tier-2 and Tier-3 cities in India? Do justify your answer with detailed comments.

Tier 2 and Tier 3 cities remain largely untapped in terms of data center investments; however, they are now being identified as key locations for setting up Edge Data Center networks and Disaster Recovery sites. Yotta Infrastructure, for instance, has plans to invest Rs.900 crore over three-four years to set up 100 Edge data centers across the country. In the first phase, we will be looking at Tier 2 and Tier 3 cities like Nagpur, Coimbatore, Ranchi, Jaipur among others.

Data center development has to be done in a holistic manner i.e. ensuring the growth of each element of the larger ecosystem, including Edge data centers and disaster recovery facilities. The incentives laid out under the existing data center policies can be extended to networks of edge data centres and disaster recovery sites. However, Tier 2 and Tier 3 cities have their own set of constraints such as resilient / redundant / bulk fiber connectivity and power infrastructure.

Efforts to strengthen connectivity and power infrastructure by encouraging investments in these areas can drastically boost data center growth in smaller cities. This can be achieved by forging more public-private partnerships and leveraging the strengths of each and every stakeholder, collecting building a robust network of data infrastructure in all parts of the country.

Q.6: Will creation of Data Centre Parks/Data Centre Special Economic Zones provide the necessary ecosystem for promoting setting up of more Data Centres in India? What challenges are anticipated/observed in setting up of new Data Parks/zones? What facilities/additional incentives should be provided at these parks/zones? Do give justification.

As mentioned earlier, the key to bridging the existing demand and supply gap lies in building data centers at scale. Setting up small data center buildings is no longer the relevant approach; instead, data center players must build large data center parks with multiple buildings.

Just like the government is attracting manufacturing in India via its 'Make in India' program, state and central governments should also roll out special incentives including cheaper land, waiver of stamp duties, cheaper power, waiver of electrical duty, reducing VAT & excise on diesel or bringing the same under GST umbrella, zero or lesser import duties on components and long-term income tax rebates for data center operators, and investors.

For extending these benefits and to create this infrastructure ecosystem, one way can be developed specific areas in key cities (DC SEZ). Alternate way is the extend all these benefits to industry players but leave the decision to choose the DC site to the players (since so many times, there are multiple DC locations required in same city and also so many times, the site selection criteria by different hyperscalers may be different and any one specific DC SEZ may not suit some large hyperscale needs, thus negating the whole purpose of creating such

special zone on large scale. Also, since some of the benefits asked by industry are already available in SEZs, the government can extend the additional sector-specific benefits requested by the data center industry under the existing SEZ act/rules itself and promote data centers in SEZs.

Q.7: What should be the draft broad guidelines to be issued for Data Centre buildings, so as to facilitate specialized construction and safety approvals?

Data centers, running the most critical and sensitive applications of its customers which include not only cloud operators and OTTs but also banks, financial institutions, enterprises and governments are hosting thousands and thousands of devices and consuming power which is almost 20X of a regular commercial building, are very specialised buildings and are supposed to operate 24x7, all year basis without any disruption, whether it is a natural disaster or a manmade failure, whether it is a Mumbai flood situation of July 2005 or a global pandemic situation induced by Covid 19, they are supposed to operate, come what may.

Data centers are made for hosting equipment and not for people. They are supposed to operate automatically even if there is no person in the building to attend to. And hence, they follow many design, engineering and operational practices which are different and more advanced compared to regular commercial buildings. And hence it is important to recognise and categorise data center buildings under a separate category in the "National Building Code" when it comes to defining the guidelines related to core and shell construction, fire safety, physical security, set back areas, parking requirements, redundancy of active electricity feeders etc.

Some of the specific elements to be taken care of are as follows:

- Floor to Ceiling height of 5.5 meter and above (without charging extra FSI for the same)
- Load Bearing capacity >1500 Kg per sq. meter (with importance factor of 1.5)
- Need for a Utility building to house generators and other associated utilities to support DC load (without charging extra FSI for the same)
- Parking requirements to be 10% of what are normally specified for an equivalent sized commercial building
- Least number of windows (as per requirement of Fire Code)
- Special platform structure on top of terrace to place Chillers / HVAC system (without charging extra FSI for the same)
- Need for storage of underground diesel fuel (in excess of 1 L litres for a middle sized DC of 5 MW IT load)
- Boundary walls of the DC park to be > 14 ft.
- Need to establish own substation (with 2 express feeders) in the DC park to take care of high-power demand etc

Q.8: Is there a need to develop India-specific building standards for construction of Data Centres operating in India? If yes, which body should be entrusted with the task? Do provide detailed justification in this regard.

India's is looking at becoming a global data center hub. Furthermore, with the pace of digitisation being witnessed in the country along with massive strides being taken to become a trillion-dollar digital economy, the industry's approach should be global in nature. Owing to several regional developments such as Singapore moratorium on building new data centers, many global customers are turning to India to host their data center operations. Hence, it becomes even more imperative to adhere to global standards instead of setting up new, India-specific building standards.

However, unlike many of the developed countries (US, Europe etc) where data centres came up in faraway cities with ample amount of land available at minimal costs (coupled with redundant bulk fiber connectivity and power infrastructure at those places), in India, Data centres have come up in main cities or on outskirts of the main cities and situation is expected to be so at least for some years unless requisite ecosystem is readily available in tier II cities. Due to this, the cost of land is generally high and to maximise the usage of the same, DC developers make multi storeyed heavy density (MW per sq. ft. of land) data centre buildings, and not simple G+2 low density (MW per sq. ft. of land) structures as prevalent is most of the other developed countries. This unique situation mandates that the building code for data centres in India should be developed by drawings from best global practices and incorporating the unique local requirements as per the needs of building multi storey high density DC buildings.

This job should be entrusted to the same body (BIS) which has developed the National Building Code for all types of buildings in India. However, BIS should consult with a proposed body "DCIC" under Meity. Think tanks from the Indian data center industry should come together and form a Data Center Industry Council (DCIC) under the chairmanship of honourable IT minister. The role of this Council shall be to monitor the global data center market, best practices, trends and customer needs and advise the government (including BIS on building code for data centre) on various policy, standards and regulatory matters relating to the data center industry.

Q.9: Till India-specific standards are announced, what standards should be followed as an interim measure?

Basis the demand of the industry, many state governments like Uttar Pradesh have come up with state specific data centre policies which incorporate many of these demands relating to unique building designs of data centres.

As of now the industry has to impress upon every state government and their local municipal bodies to bring about these changes, and that takes a whole lot of precious time and efforts.

An attempt should be done by Meity to work with the concerned central ministry which in turn can work with the concerned ministries at various state governments to come up with a paper which incorporates the specific demands of the data centre operators (relating to building designs), and which can be then made applicable for all the states, who may issue their own fresh local DC policies incorporating these demands.

Q.10: Should there be a standard-based certification framework for the Data Centres? If yes, what body should be entrusted with the task?

As mentioned above, in line with the objective to become a global data center hub, the Indian data center industry must adhere to global standards and certifications which thereby help in attracting global customers to the Indian market. Hence there should be standards based certification framework for data centres. The Uptime Institute of USA has established stringent standards across different categories of data centers. These standards validate a data centre's capabilities to ensure high uptime, high performance under at any given point of time, under any circumstances**.** The global standard bodies like Uptime Institute should be entrusted to do this task in India under a long-term arrangement between GoI and Uptime. A GoI body like STQC should entrusted to do an audit / overall governance of the adoption of this framework.

Q.11: Should incentives to Data Centres be linked to the certification framework?

Considering the numerous requirements of setting up a data center facility – from land, power, infrastructure, workforce, approvals, capital requirements, regulatory compliances, etc – incentives play a crucial role in eliminating complex processes and provide value-added benefits to data center companies to provide a robust data infrastructure.

While certifications are key to ensuring highest standards, linking of incentives to certifications can help data center players who invest in building their capabilities.

The Uptime Institute based Certification standards should be made applicable to data centres in India and can be used as benchmarks to extend benefits/incentives to the players.

Q.12: Are there any specific aspects of the disaster recovery standard in respect of Data Centres that needs to be addressed? If so, then provide complete details with justification.

The type of infrastructure as is required for hosting the primary site, is also required for hosting the disaster recovery site. Accordingly, all the aspects as applicable to data centres, as mentioned in the above responses, should also be applicable for the data centres which host the disaster recovery sites. Additionally, government of India should encourage the development of data centres across the various regions of the country, show that if a primary

site is hosted in a data centre in one region, the disaster recovery site for the same is hosted in a data centre in another region which comes under a different seismic zone.

Q.13: Whether trusted source procurement should be mandated for Data Centre equipment? Whether Data Centres should be mandated to have security certifications based on third-party Audits? Which body should be entrusted with the task? Should security certifications be linked to incentives? If so, please give details with justifications.

Equipment – both MEP as well as IT equipment, form the core component of data center infrastructure and operations. With data center companies focusing on building high quality data center parks, and hosting the critical data of their customers, which might include Global enterprises, hyperscalers, Domestic enterprises, Central, state and local Governments; who in turn host the personal and non-personal data of their end consumers, sourcing highly secure equipment is uncompromisable.

As a best practice, data center companies on their own (and / or on demands of their end customers) conduct extensive evaluation of OEMs before sourcing any equipment from quality, performance and security point of view. This helps them maintain security and quality, improve efficiency, reduce operational costs and most importantly provide seamless services to customers.

However, considering the utmost security implications for the country and its citizens, and considering the geopolitical environment India is in, trusted source procurement should be mandated for data centre equipment. For this government of India can either define the certification framework on its own, using bodies like STQC, or may depend on existing global security certifications. The incentives to be extended to the data centres must be linked to the adoption of security certifications.

Q.14: What regulatory or other limitations are the Data Centre companies facing with regards to the availability of captive fiber optic cable connectivity, and how is it impacting the Data Centre deployment in the hinterland? How can the rolling out of captive high-quality fiber networks be incentivized, specifically for providing connectivity to the upcoming Data Centres/data parks? Do justify.

Data centres host the ever-growing bulk content of hyper scale cloud customers, various global and domestic enterprises, social media operators, start-ups working on advanced AI and ML use cases, and the governments at the Central, state and local levels. Needless to say, that to ensure high reliability, the data need to be replicated across multiple data centres within the same city and also across different cities. This needs very high-quality connectivity infrastructure between the data centres in terms of speed, latency, resiliency and capacity. Also the data centres need to connect to the international fiber lending stations, since there is a need to exchange data with the rest of the word as well, and this also requires high-quality connectivity infrastructure as described above. Also, if India has to develop data

centres in remote areas, it is imperative that those data centres are connected to the other data centres in the country and also to various internet exchange points through a very high-quality connectivity infrastructure.

As on today the data centre operators are fully dependent on the telecom operators for all these connectivity needs. This telecom infrastructure available from the telecom operators is not only "not suitable" for data centres' requirements, from a bulk, high-speed, redundant connectivity point of you, but also is extremely costly, simply because telecom operators had created their networks more to serve the needs of wireless consumers of the country, and not for the purpose of bulk connectivity of data centres.

Datacentre operators should be allowed to lay their own fiber among themselves and also to connect to the international fiber lending stations and also to the various interest exchange points and the nodes of the content delivery networks. For this data centre operators need to be extended the licensing framework as is available under IP1, ISP, NLD and ILD licences, only for the inter connectivity between data centre and some other specific points of interest for the bulk data exchange, as mentioned above.

Q.15: What are the necessary measures required for providing alternative fiber access (like dark fiber) to the Data Centre operators? Whether captive use of dark fiber for DCs should be allowed? If so, please justify.

Yes, as discussed in our response to question number 14, data centre operators should be allowed to lay tag fiber or should be allowed to lease dark fiber from the operators. Data centres should also be allowed to lead this fiber and provide bulk connectivity to the customers between data centres or between data centres and cable landing stations or between data centres and other points of interest which are heavy data users like content delivery networks and internet exchange points. This shall allow the operators to create very redundant, resilient, low literacy and low unit cost networks, most suitable for the cloud and content operators who look forward to providing high availability and lowest latency to their end users by being present in Multiple data centres and replicating data among them.

Q.16: What are the challenges faced while accessing international connectivity through cable landing stations? What measures, including incentive provisions, be taken for improving the reliable connectivity to CLS?

International landing stations should be truly carrier neutral So that once the infrastructure is built, it can be used by multiple operators on cost sharing basis. Multiple dry-side local Loop providers should be allowed to terminate their fibre in the cable landing Station. The cross connect at the cable and station should be at a reasonable cost.

Q.17: Is the extant situation of power supply sufficient to meet the present and futuristic requirements for Data Centres in India? What are the major challenges faced by Data Centre Industry in establishment of Data Centres in naturally cooled regions of India? What are the impediments in and suggested non-conventional measures for ensuring continuous availability of power to companies interested in establishing Data Centres in the country? What incentivization policy measures can be offered to meet electricity requirements for Data Centres?

While the power generating capacity, both thermal as less green, is sufficient in the country, there are feasibility and procedural issues relating to the last mile distribution connectivity to take bulk power to Data Centres, and regulatory and procedural issues relating to access to the green energy. Getting two Redundant HT connections to data centre Is a time-consuming and costly affair. There are constraints and overhead costs in terms of access to green energy on open access model, and there are constraints in terms of the maximum capacity of the solar power plant which can be commissioned and the allowability of banking of power.

The major challenge in establishment of data centres in naturally cold regions is availability of resilient redundant and low literacy fiber.

To ensure continuous availability of power to data centre operators, few steps can be taken as follows:

- State commitment to deliver redundant HT/EHV connections to the Data centre operators in a time bound manner
- No restriction on the size of the solar power plant to be created for captive use of data centre operators
- Banking of power with the state utility should be allowed so that the power generated in excess during the daytime can be utilised during the night time by the data centre operator
- Government to take all the right steps to ensure lower cost of energy storage batteries. So that the excess power generated during daytime from solar power plants can be utilised during the night-time by the data centre operators
- Deemed distribution license should be made available to the data centre Park operators by default.

Q.18: Should certification for green Data Centres be introduced in India? What should be the requirement, and which body may look after the work of deciding norms and issuing certificates?

Given that the data centres are big energy guzzlers, represent about 3% of the total power consumed across the world, a figure which might go to 7 to 10% as per some reports, there has to be ways and mechanisms established to control the usage of power in the data centres and also to ensure green power in the data centres. For this, one way is for the government to link the incentives and penalties to the usage of green energy and also to the Lower PUE in the data centres.

Taking cue from Leadership in Energy and Environmental Design (LEED), developed by the US Green Building Council, India can introduce its own set of rating framework for the design, construction, operation and maintenance of green data centers that represent high levels of environmentally sustainable construction with efficient utilisation of resources.

Some of the re-requisites for obtaining green data center certification should include:

- Energy-efficient advanced cooling systems
- Maintenance of low PUE
- Use of clean power backup
- Use of renewable energy
- Sustainable design and construction

Q.19: Are there any challenges/restrictions imposed by the States/DISCOMs to buy renewable energy? Please elaborate. Please suggest measures to incentivize green Data Centres in India?

Yes, there are state specific challenges/restrictions. It can be by way of not allowing commissioning of solar power plants with a capacity which is in excess of the maximum demand of the data Centre, or by way of not allowing the banking of the power with the state utility, or by way of imposing heavy overheads for wheeling the power Into the data centre from a remote location, or by not allowing the solar power generated in any other state to be consumed into the state in which the data centre is located.

Considering the large amount of energy consumed by data centers, a policy in this direction at a national level is required to aid in setting up of captive power plants based on renewable energy sources by data centers. A single window mechanism should be created to grant all statutory approvals and permits, as required for setting up captive power plants based on renewable energy including Land Acquisition, Project Registration with State Energy Development Agency, Grant of Connectivity by STU, Non-agriculture Permission for land, Right of Way Approval for setting up Transmission Lines, Grant of Open Access by Distribution Licensees and more. A policy in this direction will lead to a significant reduction

in carbon emissions and provide a roadmap for sustainable growth of the data center industry on renewable power.

Some progressive steps being taken:

- States like Telangana and Uttar Pradesh are establishing dual power grids to data center operators for uninterrupted power supply
- Exemption on electricity duty is provided as per Maharashtra's and Uttar Pradesh state policies.
- Data center players are being allowed to deploy off-site solar farms to generate renewable power which they can wheel into their data center
- Data centers who consume more than 1MW can directly access power from the solar energy provider
- Emerging large players like Yotta are planning a big push towards creation of natural gas and/or fuel-cell based captive tri-generation power plants to power their data center parks
- Deemed distribution license is being provided to DC park operators by Uttar Pradesh
- Many state governments like Uttar Pradesh and also the MeitY's proposed DC policy allows for capital subsidy / cash back based on usage of green energy and other progressive performance parameters

Many or all of the incentives / benefits as mentioned above should be linked to the usage of green energy by the data centre operator.

Q.20: What supportive mechanisms can be provided to Data Centre backup power generators?

The alternate solutions to lower dependency on backup power generators include:

- Lithium-ion batteries, which consumes less space, provides more energy, and requires fewer charge cycles. Although this involves high investment and capital cost, but it is more energy-efficient and consumes less power. However these batteries today are used only for providing backup to UPSs for 10-15 minutes (during change over from main power source to DG backup source and vice versa) and not as permanent long duration backup source to the data centre, for which DCs still continues to be dependent on Diesel generators. Hence one way to solve this issue is for government to encourage mass production of energy storage batteries within the country at economical costs so that these batteries can replace DG sets.
- Usage of Gas based generators / dual fuel generators. For this, it is essential that a reliable / redundant supply of gas be made available in bulk to data centre parks, cost of in-situ gas storage be made lower by lowering import duties / GST, cost of duel fuel generators be made lower to encourage their usage (so that in general, only

gas is used as a backup source, and only in rare circumstances of gas not being available, diesel fuel is used for backup power generation)

Q.21: Availability of Water is essential for cooling of Data Centres, how the requirement can be met for continuous availability of water to the Data Centres? Are there any alternate solutions? Please elaborate.

To ensure lesser usage of precious resource like water, Data centres should use water only in close loop i.e. air cooled chillers coupled with adiabatic cooling. Also, liquid cooling should be encouraged to extract heat right from the source (chip) itself using water in closed loop up to the chip level.

Q.22: Whether the existing capacity building framework for vocational or other forms of training sufficient to upskill the young and skilled workforce in India for sustenance of Data Centre operations? What dovetailing measures for academia and industry are suggested to improve the existing capacity building framework, and align it with the emerging technologies to upskill the workforce in India?

Skilled workforce is one of the primary requirements for keeping pace with the evolving digital landscape. In the last decade, vocational skills training has grown by leaps and bounds. With the emergence of online education platforms focusing on new-age digital skills, we have seen fresh talents making inroads into the digital landscape, particularly the data center industry.

Digital technologies are also fast-evolving, thereby requiring constant skilling and reskilling. Technical education institutes need to work increasingly with technology companies to understand the emerging needs and shape talents accordingly.

With digital technologies such as AI/ML, IoT, data science gaining maturity, we are witnessing widespread adoption across sectors, including data centers. Data centers are no longer limited to infrastructure and encompass innovative suite of solutions for every enterprise need. Hence, it's time the academia, education boards and industry partners work together to address the requirements of skilled workforce for today and the future.

One key thing to be done is to introduce data centre specific certifications with some mandatory overall curriculum and various optional / electives to choose from – Core & Shell, MEP (Electrical, mechanical, instrumentation etc), IT (systems, databases, applications, storage and backup & DR etc), Networking, DevOps, data sciences, AI/ML etc. Industry professionals should be encouraged to participate in conducting these courses. Incentives should be given to DCs to hire resources from these certifications.

Q.23: Is non-uniformity in state policies affecting the pan-India growth and promotion of Data Centre industry? Is there a need for promulgation of a unified Data Centre policy in India, which acts as an overarching framework for setting Data Centres across India? What institutional mechanisms can be put in place to ensure smooth coordination between Centre and States for facilitating DC business? Do support your answers with detailed justification.

Every state has realised the potential of the data center industry in the state economy, and some state governments have formulated data center policies to attract investments and enable the growth of data centers. The responses of various state governments to this need have been varied, and it has taken individual / separate efforts by the industry at each state government level to impress upon them to release a DC policy. This effort can be minimised by releasing an overarching policy by the centre, with due contribution / suggestions from various state governments. In this overarching policy, while majority of the policies can be applicable to all states, there can still be flexibility to accommodate state specific variations as per the suggestions of the concerned state government. A unified overarching Data Center Policy like this can help establish standard, uniform, transparent best practices in every state, thus allowing for a more seamless growth and can also ensure data centre growth in cooler / remote regions of the country.

Institutions including think tanks should play a more consultative role at center and state levels, enable engagements on a common platform to devise holistic approaches and solutions to fill the gaps. A Data Center Industry Council (DCIC) chaired by Meity Secretary / Joint Secretary can further act as a facilitator of industry discussions with governments across the country to identify the common and specific challenges and present ways to address the same.

Q.24: What practical issues merit consideration under Centre-State coordination to implement measures for pan-India single-window clearance for Data Centres?

The National Single Window System (NSWS) is a good step in the direction of enabling industry stakeholders to identify and obtain all clearances a through a unified portal. Providing detailed information on the various approvals and licences across more than 28 central ministries/departments and 14 States, NSWS streamlines ease of doing business up to a great extent.

Q.25: Is there a need for Data Centre Infrastructure Management System (DCIM) for Data Centres in India? What policy measures can be put in place to incentivize Data Centre players to adopt the futuristic technologies? Elaborate with justification.

Data centers in India are being at par with global standards. With thousands of complex equipment and system in place, 24x7 monitoring and management of every component in a data center becomes imperative to run uninterrupted operations. DCIM / BMS systems

provide a holistic, centralised view of a data center facility's key performance parameters and lead to increased efficiency. As more and more high-quality data center parks are built across the country, DCIM / BMS systems are becoming a must-have to ensure hassle-free operations for customers.

In addition, data center facilities are required to procure and import equipment critical to operations, such as:

- Electrical systems
- Cooling systems
- Backup power generators
- Hardware and servers
- Network connectivity equipment
- Racks, cabinet and raised floor systems
- Compute and storage Hardware, Peripheral components and software, etc.

Tax exemptions on procurement of the aforementioned equipment and advanced systems like DCIM / BMS helps data centers bring down the operating costs, and transfer the benefits to customers. Moreover, fostering self-reliant capabilities to develop these technologies in India can greatly bring down the costs and also provide fillip to the Make in India vision.

Q.26: What institutional mechanism needs to be put in place to ensure digitization of hard document within a defined timeframe?

- Acceptability of soft copies of documents in the court of law
- Promoting the use of DigiLockers for people to keep their records, and promoting the API connectivity of DG locker to various institutions who need to have limited context based access to such records
- Incentivising the various institutions including financial institutions and the government ministries and departments to accept and release softcopy of documents as records instead of hardcopies
- Ensuring that all business of government at all levels is done in an online workflow driven manner and documents are exchanged online only
- Promoting the use of strong authentication and also strong cyber security mechanisms to instil confidence in the stakeholders about the safety and security of the documents

Q.27: Would there be any security/privacy issues associated with data monetization? What further measures can be taken to boost data monetization in the country?

With every step in the digital transformation journey, India is inching closer to becoming a data economy, which is in turn moving the country closer to becoming a trillion-dollar digital economy. Individuals and organisations today generate and consume vast volumes of data.

More people are getting connected to the digital ecosystem, and in the process they contribute to the generation a large data pool.

This data pool can provide rich insights to organisations to provide personalised offerings and elevate customer experiences. In the area of governance too, extracting insights from data can help ensure better delivery of citizen services and improve governance.

Unarguably, data is at the core of everything, and its role will only increase going forward. Business models are getting transformed around data, and data is becoming a great revenue stream for businesses. However, with this disruption, there have been various concerns around data security and data privacy in the recent years.

India is becoming a data economy. Hence, the protection of data becomes of utmost importance. The Data Protection Bill is in the right direction to safeguard and protect Indian citizens data. The Bill gives more control to Indians over their personal information and creates a culture towards respecting individuals' informational privacy.

- Making individuals a stakeholder in the ownership and usage of their data and transferring a proportionate part of the benefit as derived from usage of that data to the concerned individuals shall result in better acceptability in usage of personal data of citizens by institutions and businesses.

- Ensuring that non personal data (anonymised data) is not treated as the sole proprietorship of the business / institution which collects and processes this data and this data is made available to various stakeholders in a controlled manner with due compensation to the collecting / processing body is another way forward to better monetize the data in the country.

Q.28: What long term policy measures are required to facilitate growth of CDN industry in India?

- Easier, faster & cheaper network connectivity penetration in tier 2, 3 & 4 cities.
- Promotion of edge data centres across Tier 2, 3, 4 cities.
- Incentivising the growth of local CDN players
- Allowing CDN players to contract bulk dark fiber / lit fiber capacities from the hosting Data centre operators directly

Q.29: Whether the absence of regulatory framework for CDNs is affecting the growth of CDN in India and creating a non-level-playing field between CDN players and telecom service providers?

Yes, absence of a regulatory framework / licensing framework for CDN players makes them dependent on telecom service providers for all the resources they need, be it point to point

bulk connectivity or internet transit. CDN players cannot lease / lay / procure dark fiber and create their own bulk cost effective high quality managed networks. CDN operators should be allowed to either procure / lay their own networks or should be allowed to collaborate directly with data centre operators for accessing bulk managed fiber and IP transit and Internet exchange services

Q.30: If answer to either of the above question is yes, is there a need to regulate the CDN industry? What type of Governance structure should be prescribed? Do elucidate your views with justification.

Yes, since CDN players are part of a larger ecosystem of content providers and data processors, and also it is proposed that they be allowed to lay / procure their own connectivity needs, they should be brought under the DP bill as data processor and under UL regime from connectivity services point of view.

Q.31: In case a registration/licensing framework is to be prescribed, what should be the terms and conditions for such framework?

- As data processors, it can be same framework as shall be applicable to any data processor in then proposed Data Protection bill
- If they are allowed to lay/procure their own network, then they can be brought under the same regime as the UL licensees are.

Q.32: What are the challenges in terms of cost for growth of CDN? What are the suggestions for offsetting such costs to CDN providers?

- Challenges:
    - Availability of reasonable quality data centre in tier II / III cities
    - Availability of cost-effective data centre in main cities
    - Very costly connectivity from telecom players
    - Initial incentivization to bring in various local ISPs and various global content players to use a CDN node
- Suggestions:
    - Promoting the creation of Edge data centres in the country
    - Promoting deployment of redundant high-capacity fiber deployment to Tier II / III cities
    - Allowing CDN players to lay / procure their own fiber and create their own managed networks
    - Capital subsidy by way of cash backs. Can be linked to usage % of domestic products

Q.33: Do you think CDN growth is impacted due to location constraints? What are the relevant measures required to be taken to mitigate these constraints and facilitate expansion of ecosystem of Digital communication infrastructure and services comprising various stakeholders, including CDN service providers, Data Centre operators, and Interconnect Exchange providers expansion in various Tier-2 cities?

CDN growth is entirely usage based. CDN players will setup nodes where there are more connected customers consuming internet-based content. Example metro cities have high population and large OTT traffic consumption hence multiple and even dedicated OTT player wise CDN nodes can be seen there. Based on the depend the supply will automatically get generated. As the users in remote cities and villages increase including users accessing information material for agriculture and education the boost to CDN nodes presence will happen automatically. Example: we are seeing educational institutes using dedicated CDN nodes inside their campus to access certain content over the Internet.

The constraints for the wide deployment of CDN nodes as well as Internet Exchange nodes are quite similar and have bene described in our response to the query no. 32 above. The suggested solutions for removing these constraints have also been mentioned in our response above.

Q.34: What measures can be taken for improving infrastructure for connectivity between CDNs and ISPs, especially those operating on a regional basis?

- Promoting and incentivising local cable operators / local ISPs to lay fiber over existing ducts / poles
- Mandating lower tariff regime for telecom operators to extend fiber connectivity between CDN operators' nodes and ISP Nodes
- Promoting edge data centres at Tier II / III cities so that such edge data centres become the central aggregating point for all CDN operators to host their nodes and all ISPs to extend their connectivity to. It shall lead to a much more optimised development and deployment of network links connecting various CDNs and various ISPs

Q.35: Is there a need to incentivize the CDN industry to redirect private investments into the sector? What incentives are suggested to promote the development of the CDN industry in India?

Yes, there is an urgent need to put in domestic private enterprise investment and interest into CDN market else foreign players will continue this growth, and localised CDN player being a potential data processor as per DP bill need to encourage, Govt subsidies to create dedicated CDN nodes for educational, manufacturing and agricultural institutes/hubs to start off with. Besides, business case for CDNs can be improved by reducing their costs and improve their potential by way of:

- Promoting the creation of Edge data centres in the country
- Promoting deployment of redundant high capacity fiber deployment to Tier II / III cities
- Allowing CDN players to lay / procure their own fiber and create their own managed networks
- Capital subsidy by way of cash backs. Can be linked to usage % of domestic products

Q.36: How can TSPs/ISPs be incentivized to provide CDN services? Please elucidate your views.

Just like data centres which host the contents of various cloud operators, content operators, Enterprises and governments and which need to be connected to the various telecom service providers and internet service providers to ensure that the end users can use the hosted content and applications irrespective of their broadband / telecom/internet service provider, content delivery network providers also need to be completely carrier neutral.

CDNs should be able to connect to all the local and global internet service providers and the internet exchange providers and also should be able to use the underlying fiber connectivity from any of the telecom service operator. The ownership of CDN being from a telecom service provider/internet service may create a conflict of interest, and may result into CDN provider not being carrier neutral and hence not being very attractive to the content / cloud / enterprise / government customers to whom the CDN operator serves.

Hence ideally, TSPs / ISPs should not be CDN providers, rather they should be incentivised to promote and deliver seamless services to the CDN operators.

Q.37: Are there any other issues that are hampering the development of CDN Industry in India? If there are suggestions for the growth of CDNs in India, the same may be brought out with complete details.

No. the key issues and suggestions have been captured in our response to queries no. 32 to 35 above.

Q.38: Do you think that presently there is lack of clear regulatory framework/guidelines for establishing/operating Interconnect Exchanges in India?

Yes, there is no clear regulatory framework / guidelines for establishing/operating Interconnect Exchanges in India and this non-clarity not only creates confusion leading to in-decisions in starting / expanding internet exchange operations by newer players but also prevents government to extend targeted benefits to the players. Internet Exchange provider also handle and process Internet traffic they way regular ISPs do and hence should be guided / regulated by the same framework.

Q.39: What policy measures are required to promote setting up of more Internet Exchange Points (IXPs) in India? What measures are suggested to encourage competition in the IXP market?

- Promoting edge data centres at Tier II / III cities so that such edge data centres become the central aggregating point for all IXP operators to host their nodes and all ISPs to extend their connectivity to. It shall lead to a much more optimised development and deployment of network links connecting various IXPs and various ISPs and content operators.
- Promoting deployment of redundant high capacity fiber deployment to Tier II / III cities to be used by IXPs to connect to local ISPs and global CDNs and content providers
- Allowing IXPs to lay / procure their own fiber and create their own managed networks
- Capital subsidy by way of cash backs. Can be linked to usage % of domestic products
- Promoting and incentivising local cable operators / local ISPs to lay fiber over existing ducts / poles so that ISPs can connect to the IXPs which are locally available
- Mandating lower tariff regime for telecom operators to extend fiber connectivity between IXP operators' nodes and ISP Nodes

Q.40: Whether there is a need for separate light-touch licensing framework for operating IXPs in India? If yes, what should be the terms and conditions of suggested framework? Do justify your answer.

- There are no clear regulatory framework / guidelines for establishing/operating Interconnect Exchanges in India and this non-clarity not only creates confusion leading to in-decisions in starting / expanding internet exchange operations by newer players but also prevents government to extend targeted benefits to the players.
- Internet Exchange provider also handle and process Internet traffic they way regular ISPs do and hence should be guided / regulated by the same framework.

Q.41: What business models are suitable for IXPs in India? Please elaborate and provide detailed justifications for your answer.

- Revenue based peering basis the differential traffic (upload and download) instead of revenue neutral peering. This shall ensure that while the ISPs save money (by getting routes from the IXPs), they also pay some minimum cost to IXPs and that shall ensue IXPs to generate reasonable profits to justify their investments
- IXPs to have direct backend connects to CDN operators and Cloud Operators and Content operators, so that any ISP / enterprise / customer / data centre operator looking for directly connecting to CDN / Cloud / Content providers can just have a localised connection (cross connect) to the IXP and get a seamless access to these

- CDN / Cloud / content providers without everybody having to lay separate network pipes and subscribe to separate ports to connect to these providers.

Q.42: Whether TSPs/ISPs should be mandated to interconnect at IXPs that exist in an LSA? Do justify your response.

- Yes, for the larger interest of cost-effective broad band connectivity to every single consumer in the country, who may be using various different local ISPs in their geographical region, it is essential (to be made mandatory) that these smaller ISPs are able to get access to the routes of larger ISPs where majority of the content may be hosted.
- However to ensure that larger ISPs are not forced to do it free of cost and take losses, this interconnection should be done on revenue based peering principle, basis the differential traffic (upload and download) instead of revenue neutral peering basis principle. This shall ensure that while the smaller ISPs save money (by getting routes from the larger ISPs), they also pay some minimum cost to larger ISPs and that shall ensue larger ISPs to generate reasonable profits to justify their investments. IXPs as the mediating party which facilitates this interconnection should be allowed to charge a reasonable platform fee for the same.

Q.43: Is there a need for setting up IXP in every state in India? What support Govt. can provide to encourage setting up new IXPs in the states/Tier-2 locations where no IXPs exist presently?

- Owing to India's vast geography and with over 800 million internet users (with potential to increase this count to every 1 billion+ users and for multiple devices per user also for enabling a mass deployment of Internet of things (IoT), IXPs need to have their presence distributed beyond Tier 1 locations.
- For the larger interest of cost effective broad band connectivity to every single consumer / device / sensor in the country, who may be using various different local ISPs in their geographical region, it is essential (to be made mandatory) that IXPs are established in every single state in the country for a localised exchange of traffic and also for allowing the local smaller ISPs to get access to the routes of larger ISPs where majority of the content may be hosted.

The support from the government can be extended by way of the following:

- Promoting edge data centres at Tier II / III cities so that such edge data centres become the central aggregating point for all IXP operators to host their nodes and all ISPs to extend their connectivity to. It shall lead to a much more optimised development and deployment of network links connecting various IXPs and various ISPs and content operators.

- Promoting deployment of redundant high-capacity fiber deployment to Tier II / III cities to be used by IXPs to connect to local ISPs and global CDNs and content providers
- Allowing IXPs to lay / procure their own fiber and create their own managed networks
- Capital subsidy by way of cash backs. Can be linked to usage % of domestic products
- Promoting and incentivising local cable operators / local ISPs to lay fiber over existing ducts / poles so that ISPs can connect to the IXPs which are locally available
- Mandating lower tariff regime for telecom operators to extend fiber connectivity between IXP operators' nodes and ISP Nodes

Q.44: Whether leased line costs to connect an existing or new IXP is a barrier for ISPs? If yes, what is the suggested way out? What are other limitations for ISPs to connect to IXPs? What are the suggestions to overcome them?

- Promoting edge data centres at Tier II / III cities so that such edge data centres become the central aggregating point for all IXP operators to host their nodes and all ISPs to extend their connectivity to. It shall lead to a much more optimised development and deployment of network links connecting various IXPs and various ISPs and content operators.
- Promoting and incentivising local cable operators / local ISPs to lay fiber over existing ducts / poles so that ISPs can connect to the IXPs which are locally available
- Mandating lower tariff regime for telecom operators to extend fiber connectivity between IXP operators' nodes and ISP Nodes

Q.45: Is the high cost of AS number allocation an impediment for small ISPs to connect to IX? If yes, what is the suggested way out?

Yes, cost and complexity of getting ASN and IP address is definitely one hinderance and obstacle in the overall ISP business model. Diversifying into value added services, connectivity to IXPs at nearest possible node (in same city or state) shall result into better profitability / RoI for the local ISPs. Shifting to IPv6 is the long-term solution but that shall depend upon the overall global adoption of IPv6.

Q.46: What other policy measures are suggested to encourage investment for establishing more number of IXPs? Any other issue relevant with IXP growth may be mentioned.

Subsidy in initial Capex and Opex investments since IXPs business needs both content operators and ISPs to come together on a common platform to exchange traffic. This becomes a chicken and egg situation in initial few quarters. A subsidy in initial investments till the business starts generating profits shall be a great boost and incentive for many operators to get into this business. Edge data centre operators may extend their scope and

may also deploy the infrastructure to become IXPs.

By making the peering at IXPs revenue based (as elaborated in our response to above queries) , by making it mandatory for larger ISPs and content operators to peer at the IXPs and by encouraging IXPs to go after value added services like cloud-connect and CDN-connect, and by encouraging deployment od edge data centres in various cities (which create the needful underlying infrastructure for ICPs to host their nodes), Government shall be able to encourage more and more operators to establish IXPs in the country.

Q.47: How can the TSPs empower their subscribers with enhanced control over their data and ensure secure portability of trusted data between TSPs and other institutions? Provide comments along with detailed justification.

- Explicit permission to be taken from subscribers to use their data (even if it is to be used for creating non-personal data / anonymised data
- Making individuals a stakeholder in the ownership and usage of their data and transferring a proportionate part of the benefit as derived from usage of that data to the concerned individuals shall result in better acceptability in usage of personal data of citizens by TSPs and other institutions and businesses to whom data is shared in a secured / permitted way.
- Encrypted transfer of data, with due permission from / compensation to the end users
- Complete accountability of TSPs / end institutions as data fiduciaries and /or data processors as per the DP Bill need to be ensured.

Q.48: What is the degree of feasibility of implementing DEPA based consent framework structure amongst TSPs for sharing of KYC data between TSPs based on subscriber's consent?

It is desirable for the larger interest of the country and its citizens. And it looks feasible.

Q.49: Are there any other issues related to data ethics that require policy/regulatory intervention apart from the issues that have already been dealt with, in TRAI's recommendations on the issue of 'Privacy, Security and ownership of the Data in the Telecom Sector' dated 16th July 2018 and the draft PDP Bill? Provide full details.

- All personal data – general, sensitive, critical and all anonymised non perianal data of India citizens to be mandatorily processed and stored in India.
- Explicit permission to be taken from subscribers to use their data (even if it is to be used for creating non-personal data / anonymised data
- Making individuals a stakeholder in the ownership and usage of their data and transferring a proportionate part of the benefit as derived from usage of that data to the concerned individuals shall result in better acceptability in usage of personal data

of citizens by TSPs and other institutions and businesses to whom data is shared in a secured / permitted way.

- Encrypted transfer of data, with due permission from / compensation to the end users
- Complete accountability of TSPs / end institutions as data fiduciaries and /or data processors as per the DP Bill need to be ensured.

Q.50: Stakeholders may also provide comments with detailed justifications on other relevant issues, if any.

NA

Regards,
Sunil Gupta
Co-founder & CEO
Yotta Infrastructure