Responses for "Regulatory Framework for Promoting Data Economy Through Establishment of Data Centres, Content Delivery Networks, and Interconnect Exchanges in India."

1. **What long term policy measures are required to facilitate growth of CDN industry in India?**

   CDN industry in India is still at a nascent stage - here are a few instances of industry policy measures from established CDN markets like USA and EU which could help in domestic market growth and expansion -

- **CDN - Internet Access Compartmentalization**: We advocate that CDN industry should continue to stay independent and outside the purview of licensing and regulatory obligations governing broadband Internet access services (IT Act, 2000). This is in line with the established precedent set in the USA.

  Relevant link - https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order, Pg 10, Para 2

- **Absolute Deregulation from Net Neutrality**: The EU has classified the CDN provides an 'interconnection service' and has kept the industry outside the purview of net neutrality regulations. We endorse this stance in principle as net neutrality does not concern the delivery of internet traffic across Internet network nodes.

  Relevant link - https://berec.europa.eu/eng/netneutrality/regulation/

- **Uniform Mutual Access**: We support uniform and absolute autonomy to CDNs to establish mutual strategic partnerships with ISPs and content providers based on sound business feasibility and favorable economics, in line with the precedent practice in the USA.

  Relevant link - https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order,Pg 102, Para 2

- **Non-obligatory Disclosure of Commercial Terms**: We advocate non-disclosure of commercial terms of a strategic partnership to keep the CDN industry profitable and competitive. To this date, established CDN markets such as USA and EU do not mandate CDN providers to disclose commercial terms of agreements with ISPs/content providers.

  Relevant link - https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order, Pg 242, Para 5

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- **Deterrence to Anticompetitive Practices**: CDNs have a business dependency on upstream stakeholders such as ISP / content providers that makes them vulnerable to anticompetitive business practices. We propose the introduction of appropriate checks aimed at insulating a CDN service provider from any financial and / or business risk originating as a consequence of unfair business practices of any such kind. This concern has been flagged by the FCC in USA.

  Relevant link - https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order, Pg 325, Para 1

- **Network Peering Policy**: With regards to the introduction of vCDNs by ISPs in India (as cited by TRAI's CP, Dec 21) - we solicit clarity on network peering policy in potential conflict-of-interest situations (between private vCDN owned by an ISP/content provider and a third party CDN contractually bound to serve the same ISP/content provider).

- **Peering Fees Regulation**: We propose introduction of appropriate checks necessary to hedge CDN service providers from exposure to arbitrarily high peering fees. We also solicit discussion and consensus-building on settlement-free peering as a business measure to accelerate the growth of smaller CDN service providers. These concerns have been flagged by the FCC in USA.

  Relevant link - https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order, Pg 151, Para 1
  https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order, Pg 285, Para 1

- **Paid Prioritization**: FCC has supported permitting paid prioritization in the provision of CDN and edge services as this allows small and new edge providers to compete against large, established CDN service providers and ISPs in the USA. We endorse this stance as it would promote growth and granularize the domestic CDN industry in India.

  Relevant link - https://www.fcc.gov/document/fcc-releases-restoring-internet-freedom-order, Pg 148, Para 1

- **Peering Dispute Protection**: Dispute between two ISPs may result in mutual 'de-peering' that can adversely impact business operations for a CDN and expose it to financial losses / penalties. In this regard, we propose a suitable protection mechanism that hedges the business risk of CDN service providers from peering disputes of any such kind. Instances of mutual de-peering of two access networks have occurred in the USA in the past few years.

  Relevant links - Sprint-Cogent Dispute Puts Small Rip in Fabric of Internet (pcworld.com)
  Level 3, Cogent resolve peering dispute, renew deal | Computerworld

- **Interconnection Policy**: We advocate complete autonomy to CDN providers to establish peering relationships with ISPs and/or private CDNs at IXPs. A suitable dispute resolution policy is appreciated to facilitate quicker redressal in cases of conflict-of-interest situations.

2. **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?**

   We support the status quo of complete deregulation in the CDN industry in line with established CDN markets such as USA and the EU. This is because a CDN:
   - Reduces latency and congestion across major Internet network chokepoints
   - Augments overall efficiency in Internet traffic delivery to the end-user
   - Does not operate a licensed service unlike a wireless spectrum
   - Does not slow down any applications or has the market power to do so

   Because CDN's role is limited to facilitating efficient delivery of Internet traffic, thus there is no basis for the applicability of regulation in the CDN industry.

3. **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.**

   As discussed above, we support a deregulated CDN industry.

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

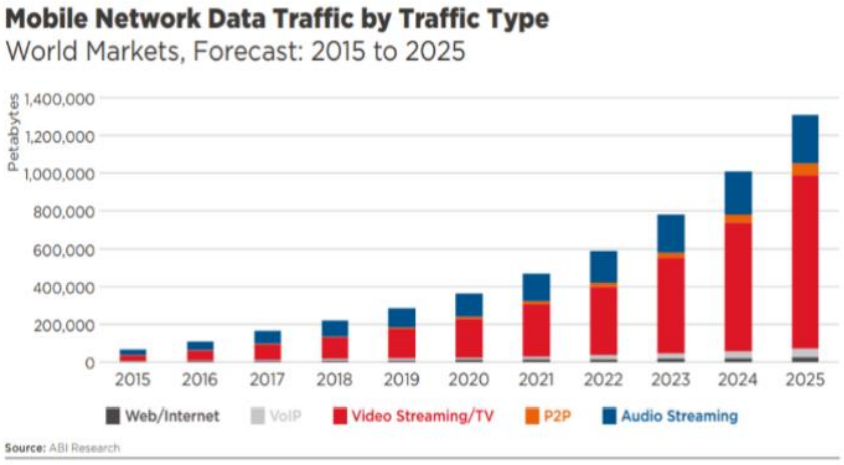
   We do not support registration/licensing in the CDN industry as:
   - Licensing fees will financially burden smaller CDN service providers facing high overheads such as egress and rental expenses and thus affect profitability
   - There is no precedent of licensing in developed CDN markets such as USA and the EU
   - Licensing will stifle innovation and restrict private investments in the CDN industry thus impacting its future growth

5. **What are the challenges in terms of cost for growth of CDN?**
   Following cost items impact long-term growth and profitability of a CDN business:

   - **Capex -** Considering the nascent state of electronics equipment manufacturing industry in India, key components of the physical infrastructure deployed by CDN (routers, switches) are imported from overseas markets - this acts as a high barrier to market entry for new players.

- **Co-location Fees -** Expenses paid by the CDN service provider to host its servers on-premises at an ISP/IXP DC. This can either be structured as a fixed fee payment or be exercised through a revenue-sharing arrangement.

- **Egress Charges** - Fee paid out by CDNs as 'transit' across the Internet backbone and cache its CDN server network. Egress charges have become the major cost line item for CDN service providers (contributing approx. 70 to 80% of total OPEX.), driven by a continued increase in OTT driven data consumption and is expected to increase in the future.



Source - TRAI Consultation Paper on DC, CDN, and IXP - Dec 21

- **Energy** - Outflow to ensure uninterrupted and stable electricity uptime that is critical for smooth functionality and glitch-free operation of a CDN service on a 24x7x365 basis. Accounts for 15-16% of total opex.

- **Rentals -** Expense paid by a CDN service provider to rent out space to install and deploy its CDN infrastructure in a shared IXP/ISP setup.

- **Repairs and Maintenance** - Outflow allocated towards upkeep and maintenance of CDN infrastructure on a continuous basis. This subsumes both charges allocated towards the purchase of spares and manpower.

6. **What are the suggestions for offsetting such costs to CDN providers?**

Govt. support is required to encourage market entry of new players and ensure a level playing field for smaller operators in the CDN services industry. Initiatives directed at promoting long-term business sustainability of the CDN services industry can be broadly grouped across four key areas (listed below).

Infrastructure Access Support

- **Affordable Access to Govt. Network Infrastructure -** Affordable lease-hold access to digital infrastructure assets (OFC network, server farms etc.) established under public initiatives such as BBNL / CSC would enable CDN operators to avoid high upfront CAPEX in the establishment of CDN infrastructure and facilitate long term profitability from a unit economics perspective.

- **Subsidized Access to Govt. Data Center Infrastructure -** Allowing host access in data centers run by public telecom entities (such as BSNL, MTNL) and nodal state agencies would reduce the dependency of CDN and edge service providers on telco DCs/IXPs. Subsidies directed at various opex. Headers such as egress charges, rentals, energy expenses, etc. would help CDN operators invested in Government. DCs to keep better cost control and maintain viability of doing business.

Funding Support

- **Inclusion of CDN as priority sector under MSME classification -** CDN is a sunrise sector and structurally capital intensive. Active credit support is required from the public sector to attain a threshold scale for large-scale private investments to become feasible. Inclusion of CDN as priority sector under the 'Infrastructure Development Program' would open up access to affordable Govt. credit and ensure the necessary handholding required to scale up the market for CDN services in India.

Relevant link - https://msme.gov.in/infrastructure-development-program

- **Inclusion of network hardware/infrastructure procurement under UDAAN or any other equivalent MSME credit guarantee schemes/initiatives -** Funding thesis concerned with procurement of specialized network hardware (routers, switches etc.) should be included under MSME credit guarantee schemes such as UDAAN or any other equivalent initiatives that would enable CDN service providers to operate with reduced upfront investments into CAPEX and keep the business model sustainable for future market and capability expansion. **Relevant link -** https://cgtmse.in/

- **Establishing Govt. led procurement platform for network hardware -** Govt. can consider setting up a standalone procurement platform on the Govt. e-Marketplace (GeM) and provide direct subsidies to CDN service providers for procurement of specialized network

hardware (routers, switches etc.). This would also reduce the financial burden of high upfront CAPEX and ensure viability on a unit-economics basis.

Relevant link - https://www.startupindia.gov.in/content/sih/en/public_procurement.html

Taxation Support

- **Tax Holidays -** Current tax holiday scheme for startups under the 'Startup India' program is inflexible with a fixed tax holiday tenure of three years from the date of incorporation. Since CDN as an industry is capital intensive with long gestation periods to sustainability, Govt. could explore rolling out customized and extendable tax holidays directed at startups operating in the CDN services space.

Relevant link: https://www.startupindia.gov.in/content/sih/en/startupgov/startup-recognition-page.html

- **Tax Concessions/Benefits -** Govt. can extend corporate tax concessions to startups and MSME enterprises operating in the CDN industry via both indirect (CAPEX) and direct tax routes. This would facilitate market expansion and ensure the overall sustainability and profitability of the industry.

Guaranteed Consumption Support

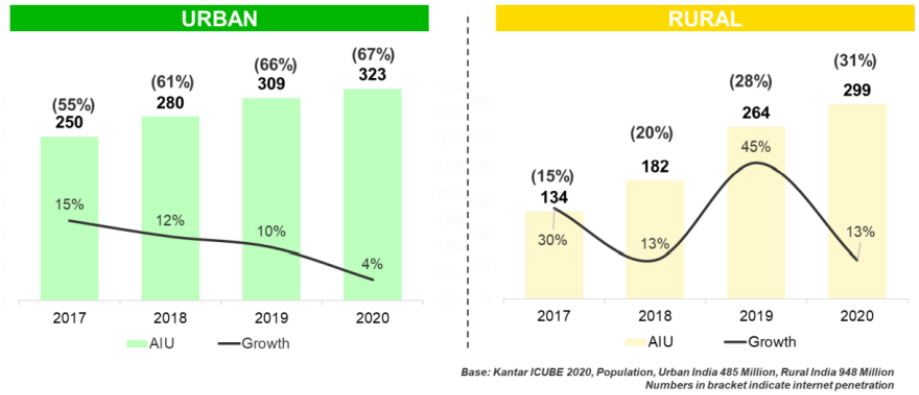
- Govt. supported schemes such as National Agriculture Market (e-NAM), E-Gram Swaraj Yojana, Government e-Marketplace (GeM), Consumer App, or any such digital service delivery focused mobile apps have an inherent propensity for high-volume data consumption. These apps would be direct beneficiaries of a robust CDN infrastructure as and when the platform is set up and operationalized in the backend. Govt. could explore establishing strategic partnerships with CDN service providers that can incorporate the following nuances
    - 'Pre-commitment' of a minimum or threshold data consumption measured in terms of offload volume/egress or any such applicable and quantifiable metric.
    - Structured partnerships through long-term, scalable, and extendable commercial agreements

The above initiatives would result in a steady and secured income stream for startups/smaller CDN service providers and would supplement their core revenues as they gradually build up scale and penetrate the market.

Relevant links-
https://www.enam.gov.in/web/
https://egramswaraj.gov.in/
https://gem.gov.in/
https://consumerhelpline.gov.in/apps/consumerapp/

7. **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 the 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?**

Internet penetration is expected to grow significantly from ~61% in 2021 to 93% by 2026, as cited by your consultation paper. Research states that only 31% of rural population in India has internet access. Tier 2 cities and rural India thus form an underserved market and can bring in the *next hundred million* users. A sound and well-functioning ecosystem of digital communication infrastructure would go a long away in realizing this objective.



Source - Internet Adoption in India Report, Kantar ICUBE (Jun-21)

CDNs are typically co-located on the DC premises of an ISP/content provider/IXP. Citing your consultation paper, it can be observed from the below plot that DC footprint in India is concentrated at a handful of cities and urban centres such as Delhi NCR, Bengaluru and Mumbai. This effectively constrains a CDN service provider to address underserved / unserved markets located in rural hinterlands as the cost to serve increases with increase in distance between infrastructure and the end-user.

Table 2.1: Number of Data Centres operating in India as of September 2021

Location	No. of DCs
Delhi-NCR	26
Bengaluru	31
Chennai	14
Pune	10
Mumbai	25
Ahmedabad	8
Kolkata	9
Hyderabad	11
Other cities	38

(Source: datacentermap.com/India/)

Figure 2.3: Data Centres area map

De-centralization of CDN services into regional / rural areas is feasible from a technological standpoint but constrained by business feasibility. CDN use cases such as education and telehealth / telemedicine are relevant from a rural deployment perspective. However, such specific use cases of digital delivery require long gestation periods before attaining a critical mass of users and thus active financial support is required during the initial stage of a CDN services provider's lifecycle to ensure sustainability of business.

In this regard, we would like to highlight our suggestions included under 'Funding' and 'Infrastructure Access' support as a response to the preceding question.

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

Full-scale operationalization of BharatNet can boost interconnectivity between ISP and CDN in rural areas. From its inception in 2011, only ~60% of total GPs in India were service ready (out of total 2.5 Lakh GPs in India) as of Aug-21, whereas only 34% had the basic fibre-optic infrastructure in place. Successful completion of BBNL project would facilitate establishment of localized DCs and edge DCs and manifest in better connectivity between CDNs and ISPs in regional areas.

Relevant link - https://www.deccanherald.com/specials/insight/bharatnet-digital-indias-biggest-miss-1015076.html

Govt. can also consider utilizing edge infrastructure of CDN service operators deployed in rural POIs such as railway stations, health-centers etc. on an ad-hoc basis until the full-scale operationalization of rural data center infrastructure through BBNL / CSC initiative is achieved.

9. **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?**

There is a need to encourage private investments in the CDN industry, because:

- It requires specialized equipment and knowhow that is not domestically available
- Is exposed to rapid swings in external infrastructure related costs (egress costs, access costs) outside its operational control
- Needs strategic partnerships with ISPs / content providers and is difficult to establish for smaller players with limited financial backing

High upfront capex thus acts as a barrier to market entry for small-scale CDN service providers. Allowing private investments would benefit creation of well-capitalized CDN provider base equipped with necessary resources to cater to the enormous scale of the Indian market.

10. **How can TSPs/ISPs be incentivized to provide CDN services? Please elucidate your views.**

There are several monetary incentives that may encourage ISPs to provide CDN services:

- **Lower Access Costs -** CDN can save 'transit' costs by reducing access instances to core Internet backbone to serve user requests and leverage server redundancy to deliver desired user content.
- **Reduced Transmission Costs -** Consumption of OTT content has risen explosively worldwide (especially post pandemic) - this essentially results in downstream flow of very high volumes of audio / video data. Localized caching of data intensive content over a CDN enables the ISP to serve redundant user requests at lower cost while offering enhanced customer experience.
- **Lower Energy Expenses** - Local caching of high volumes of data through a CDN helps in reduction of energy expenses required to maintain its critical connectivity infrastructure and simultaneously cater to user requests.
- **Lower HVAC Expenses** - Building out a CDN infrastructure enables an ISP to de-localize its data center infrastructure across multiple endpoints. This results in significant cost savings as establishment and maintenance of DC infrastructure requires deployment of extensive building cooling system in case of a large, centralized setup.
- **Customer Churn Costs** - CDN allows an ISP to offload large volumes of data to localized CDN servers located closer to the end-user. This leads to improved internet usage experience and lowers customer dissatisfaction and thus deters network churn. Considering ARPU in India is one of the lowest globally, avoiding customer churn has become a key objective of all the major ISP/TSPs in India.

11. **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.**

Adequately covered in responses above.

About SugarBox Networks

SugarBox Networks is the world's first Hyperlocal Edge Cloud platform that enables Users, Networks (ISPs, Internet Infra providers, etc.) and Digital Services (Apps, Websites, etc.) alike, to harness the power of Local Area Networks. With this technology at its heart, the company is reimagining connectivity for the underserved and unserved globally, in order to make internet accessible, affordable, and reliable for the masses, whilst being economically viable for the internet ecosystem.

SugarBox, co-founded by Rohit Paranjpe, Ripunjay Bararia and Devang Goradia in 2016, installs Edge Servers at places where users are present and prone to access digital services (POIs). These Edges are installed close enough to the users so that they can now be accessed via wired and wireless Local Area Networks, to reduce the amount of internet bandwidth required by users. This disruptive technology also enables Apps and websites to function seamlessly, even when the internet network is patchy or if the network goes off altogether for a while, using its patented technology. *Read more about SugarBox here*