Internet Exchange Points: The Golden Key to Growth of India's Digital Economy

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Years ago, on taking charge of the UK Telecom Authority, Sir Donald Cruickshank was asked his three top most priorities for propelling the sector and he is believed to have promptly replied, "Interconnection, Interconnection and Interconnection!" This clearly underlines the tremendous importance of interconnection and holds true even more forcefully in today's Internet world. Modern day-to-day living and working are totally unimaginable without good internet connectivity - not the old vanilla net connectivity but an always-on broadband connection. Customers today demand a cost-effective broadband of high-speed and consistency. However, even with all these characteristics present, the connection would have very little value if it does not enable accessing any consumer in the total universe of all net users, whichever net provider they belong to. With more interconnectivity between operators and traffic streams, the utility and value of a network rises remarkably and exponentially. Economists refer to this as 'the externalities' factor. Hence, interconnection between all internet service providers [ISPs] is of paramount importance to achieve effective communication and utilisation of the internet. It is here that the role of internet exchange points (IXPs) assumes extremely critical importance.

IXPs are game-changers for delivering lightning-fast cost-effective internet to users. They bring together ISPs, other ISPs, and CDNs at physical hotspots for seamless traffic exchange. IXPs promote competition and innovation in the internet industry, enabling the development of new applications and services. They also play a big role in promoting digital inclusion by facilitating the growth of local internet communities. IXPs are key to making the internet fast, cheap, and accessible, driving economic growth and promoting digital equality.

The above becomes all the more important in the context of India's digital landscape today which is impressive in the growth achieved and maintained. Today over half of the population of India is an active internet user.[1] The Covid-19 pandemic has undoubtedly expedited the adoption of the internet, highlighting the growing importance of online services like remote work, distance education and telehealth. But despite significant strides, even as of June'23, India ranks 55 out of 140 countries in mobile broadband speed and 83 in fixed broadband speed[2] and our internet affordability lags behind global averages.[3] Wireline subscriptions in India also remain scarce, accounting for only 4% of all broadband subscriptions in the country.[4] To fully unlock India's digital potential, we need to drive investment in internet infrastructure and revisit the regulatory framework that governs it.

IXPs are the key internet infrastructure points where players such as Internet Service Providers (ISPs) and CDNs connect with each other.[5] IXPs enhance network performance, reducing latency and improving connectivity, while offering cost-saving benefits by facilitating localised traffic exchange,

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[1] https://www.iamai.in/sites/default/files/research/Internet%20in%20India%202022_Print%20version.pdf

[2] https://www.speedtest.net/global-index

[3] https://surfshark.com/dql2022/dql-compare?table=true&country1=IN&country2=BR&country3=MY&country4=ID

[4] https://www.trai.gov.in/sites/default/files/PR_No.58of2023_0.pdf

[5] https://www.cloudflare.com/en-gb/learning/cdn/glossary/internet-exchange-point-ixp/

eliminating the need for expensive ILD & NLD long-distance connections.[6] Suppose two ISPs in Mumbai want to exchange data between their networks: without a local IXP, the data traffic would probably need to travel via international links or through multiple intermediate providers, leading to increased costs and low latency. However, by connecting to a local IXP like NIXI or Extreme IX within Mumbai, the ISPs can directly exchange data within the city's infrastructure, eliminating the need for costly long-distance connections and reducing the reliance on international links. As a result, the consumers stand to benefit as it reduces significantly time to access locally available and cached content at CDNs, thereby enabling better QoE for consumers.

Unfortunately, India lags behind in the adoption of IXPs compared to many developed countries. Australia, for instance, has approximately 10 IXPs per 10 million people, when India has less than 1 IXP per 10 million people.[7] The IXP landscape in India features considerable underutilisation and generates lower revenues due to limited peering between networks, such as ISPs and CDNs. India's IXP utilisation stands at around 22.6%, while countries like Indonesia, Brazil, and Russia boast rates closer to or greater than 50%.[8],[9] As of December 2022, India has 32 IXPs, with 103 facilities across the country. However, it is estimated that out of the 25Tbps internet traffic in India in 2022, only a fraction, approximately 3% flowed through IXPs[SS1]. (Source: https://www.medianama.com/2020/08/223-internet-exchange-india/).

Although NIXI was set up in 2003 "*for peering of ISPs among themselves for the purpose of routing the domestic traffic within the country*", the TRAI, in consultation paper published in 2011, noted that the number of IXPs that had joined NIXI remained low, leading to its underutilisation. As of 2021, India has 449 ISP operators of which only 91 were connected to NIXI, exchanging a maximum internet traffic of 245 Gbps. (Source: TRAI CP 16.12.2021)

Adding to the challenge is the lack of regulatory clarity for IXPs. IXPs in India have so far been operating without a licence but there is currently a recommendation from TRAI, shared with DoT, which suggests bringing IXPs under a standalone authorisation within the UL telecom licence framework. This recommendation needs a rethink. IXPs are set up to merely facilitate the flow of traffic and do not have any oversight on the nature of the content being exchanged. Therefore, attempting to licence IXPs could undermine the government's stated goal to increase the reach of the internet.

To fully unleash the potential of India's digital economy, it is crucial that we carefully assess regulatory requirements on internet infrastructure and resist onerous obligations. In the context of IXPs, the rationale for light regulation is twofold. Firstly, ISPs that are members of IXPs are already regulated under licences that include stringent national security obligations. Moreover, as traffic passing through the IXPs is encrypted, there is no risk of unauthorised access to the data, ensuring data privacy and sovereignty. Secondly, IXPs operate as small companies with limited revenue and team sizes, mainly

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[6] https://www.internetsociety.org/policybriefs/ixps/

[7] https://trai.gov.in/sites/default/files/CP_16122021_0.pdf

[8] https://www.pch.net/ixp/dir#!mt-sort=prts%2Cdesc!mt-pivot=prts!mt-filters=%7B%22ctry%22%3A%5B%22dropdown%22%2C%22%22%2C%22India%22%5D%7D

[9] https://ixpdb.euro-ix.net/en/

focusing on routing traffic rather than high-margin revenue generation from the ultimate end consumers. Consequently, the revenue generated from IXP licensing is minimal, making the imposition of regulatory burdens impractical.

It's no coincidence that countries with high fixed broadband penetration, such as Canada, UK and Finland, also boast thriving IXP ecosystems. This success may be attributed to clear regulations and less burdensome licensing requirements. For instance, in Finland, IXPs simply need to submit a notification without the need for an individual licence. Similarly, Canada doesn't demand a licence for establishing an IXP, with the Canadian Internet Registration Authority (CIRA) even offering valuable support to help local ISPs set up IXPs in their cities.[10] In the UK, IXPs usually don't require a licence unless they utilise spectrum or need access to public or private land, but they must inform Ofcom as an "essential service."

India's digital economy is poised to reach a momentous milestone of $1 trillion by the year 2026, accounting for an impressive 13-14% of the nation's GDP.[11] It is heartening to note that in its 2021 consultation paper on a regulatory framework for promoting the data economy, TRAI rightly included IXPs in its list of key drivers to boost the digital economy ecosystem, thereby acknowledging its potential to transform the socio-economic landscape of the country.[12] Given this context, easing regulatory burdens on IXPs is crucial to harness India's digital economy potential and bridge the digital divide. It is important to not only utilise cutting-edge technologies and infrastructure such as IXPs, but to also develop robust frameworks and facilitating policies that supports the growth and progress of digital transformation. The internet ecosystem is a very complex and delicate system that was developed by its founding fathers with the vision of Openness, Transparency and minimum Regulation. Over regulation can easily imped its progress by discouraging investment and perpetuating an unbalanced/inadequate competition that favours established players. Thus, a supportive regulatory environment, with the lightest possible regulation, is essential for IXPs to thrive and help provide efficient and economical internet connectivity to the vast consumer base in India that is both very quality-conscious and highly price sensitive. This will help create a conducive framework to power India's social and economic progress, and allow India a platform to establish itself as a leader in the digital economy.

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[10] https://www.trai.gov.in/sites/default/files/20140820111515802087final-Cisco-06.pdf

[11] https://services.google.com/fh/files/blogs/india_economy_report_2023.pdf

[12] https://www.trai.gov.in/sites/default/files/CP_16122021_0.pdf