Sify: Hyperscale Networks

July 2020

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Hyperscale Networks

For the new-age infrastructure, **Hyperscale** means the ability of the architecture to rapidly scale up to match the increasing demand of enterprise workloads. Hyperscale infrastructure relies on high bandwidth and high availability, especially for key data center sites. In this document, we talk about Hyperscale Cloud, Data Centers and how Interconnection Networks enable a seamless connectivity bridge for executing the Hybrid Cloud Strategy.

The Rise of Fiber

The story of enabling Hyperscale infrastructure started with the exponential increase in deployment of fiber network. For the past two decades in India, continuous Telecom revolutions, have reshaped its journey to digital adoption. Today, all service providers are shifting towards wireline heavy networks and convergence of wireless & wireline is happening at a lightening pace. Governments and service providers are investing in dense fiberization in backhaul and last mile connectivity. Till now, fiber penetration has been restricted to backbone networks in the network value chain; however, as we move to the hyper-connected era, networks would need even more fiber for the increasing cloud adoption.

Cloud-First Strategy needs to have Fast & Secure Connectivity

Businesses in modern times need to be distributed and mobile. That's why, enterprises have been moving their existing workloads and building new data centers in geographically distant locations (geo-clustering). Also, they are leveraging capabilities of cloud for high-performance, non-stop access to critical business applications and information.

Cloud-first has now been a default strategy of most organizations. With increasing awareness of the benefits of cloud adoption around scalability, agility, cost savings and ease of operations, enterprises have either already adopted or are in their early stages of cloud adoption. However, their investments and cloud adoption journey can get hampered if the underlying Data Center and Network infrastructure is not equally fast and secure.

Today, any IT infrastructure is incomplete without a well-crafted cloud architecture. Most of it revolves around a workload optimized hybrid multi cloud, which utilizes best of private, public and multiple clouds. Such architectures require you to have very fast and secure connectivity, which highlights the significance of robust network and data center interconnects and cloud interconnects between geo-clustered data centers and cloud.

Interconnection Networks Ensure Seamless Cloud Adoption

Interconnections are one of the prime enablers of the cloud adoption strategy. Connecting multiple clouds individually over traditional Wide Area Network (WAN) is operationally complex, costly and undermines many benefits of cloud by impacting cross-cloud application interaction and performance, scalability, visibility and control. Also, using public internet for managing increasing data volume for the cloud, increases latency and data risk for users, both of which are a key-concerns for data hosting. This is where the development of a robust interconnection network portfolio helps alleviate these concerns and justifies the overall TCO for benefits of cloud and data center infrastructure.

A successful cloud adoption for going digital would require integrating and controlling multiple cloud-based services orchestrated across a multitude of applications. Apart from enabling integration and control for hybrid multi-cloud environments, interconnection between data centers helps in:

- **Secure and segment cloud traffic for greater optimization with high-bandwidth, low- latency virtualized connections** - simplifying multiple cloud connectivity and reducing provisioning time.
- Improving **cross-cloud control and visibility** by leveraging partner ecosystems' monitoring tools.
- Reaching geographically spread customers with enhanced **quality of experience.**

Key drivers for interconnection today are:

1. The emergence of private Internet Exchanges (IX's)
2. Custom-built Data Center Interconnect networks to optimize latency and support scale (with 10G and 100G wave lengths)
3. Cloud Interconnection (i.e. availability of Express Route, Direct Connect and Fast Connect like services).

Emergence of Carrier-Neutral Internet Exchange

An Internet exchange (IX) is the physical infrastructure through which Internet service providers (ISPs) and content delivery networks (CDNs) exchange Internet traffic between their networks. The primary purpose of an IXP is to allow networks to interconnect directly, via the exchange, rather than through one or more third-party networks. The primary advantages of direct interconnection are cost, latency, and bandwidth.

Realizing the importance of Interconnection, Sify was the first ISP in India to have started a Carrier-Neutral Internet exchange in collaboration with Amsterdam Internet Exchange, in short termed as AMS-IX. AMS-IX solved the issue of localized data which means all Internet traffic need not go outside India, if the content is available in India. AMS-IX is an Internet Exchange Eco-System created by Sify to facilitate bilateral peering between the ISPs and Content Providers in a common physical eco-system. AMS-IX is available in Mumbai and shortly getting extended to Kolkata. AMS-IX is available for peering at Sify Data Centers in Rabale and GPX.

Significance of Adjacent Interconnected Data Centers

The right cloud adoption strategy will always leverage advantages of adjacent interconnected data centers. Hosting in such environments enables speedy migrations/deployments and faster time to market for your applications, saving you cost and time while also providing you a competitive edge. Dedicated connectivity between such data centers keeps your infrastructure compliant by keeping data in private control.

Apart from adjacency, carrier-neutrality of data centers and data center interconnect is important for localization and optimization of traffic. The low latency at the edge and added flexibility to choose your network provider, improve the end customers' experience. Therefore, Sify has adjacent data centers in Airoli and Rabale at Mumbai, connected by Sify Metro-X-Connect. Additionally, Sify has 48 interconnected data centers.

For Example : Sify Interconnect network between AWS Mumbai Data Center Region Public Cloud and Sify Airoli Private Cloud Data Center enables customers to establish direct connectivity between their private infrastructure and AWS Cloud environments and fully realize the benefits of hybrid cloud—moving application, middleware and database workloads seamlessly between private infrastructure and AWS Cloud—in a reliable, low-latency and secure experience. The result is, improved application performance, lower latency, higher throughput, network-level security protection and reduced costs—all in a highly scalable solution.

Types of Cloud Interconnection Networks

Traditionally, there have been multiple ways to connect to the cloud, each having its pros and cons in terms of speed, cloud ecosystem, price, security and performance.

Public Internet

The public internet is the simplest and most readily available method to connect multiple clouds. However, the latency and bandwidth of the public internet aren't predictable, and the quality of service varies depending on the internet service

provider (ISP) and your contract with the ISP. The cost isn't predictable either. Also, this method is the least secure of the available methods.

IPsec VPN

IPsec VPN tunnels provide more secure connectivity. Each packet is encrypted before it is transported. The encrypted packet is encapsulated to form a new IP packet, which has different header information than the original packet. The internal IP addresses of the networks and nodes at either end of the tunnel are hidden from external users. So, the risk of information theft is lower when compared with traffic traversing the public internet.

However, as IPsec VPN tunnels still use the public internet, the latency and bandwidth aren't predictable. The quality of service varies depending on the ISP.

Direct Connections

Modern day direct cloud interconnects can support higher bandwidth when compared to internet-based connections. Such connections are dedicated and private, so the networking experience is more reliable, and the latency is predictable. As direct connections bypass the public internet, the traffic to and from the cloud is secure. They are cost-efficient as no separate large internet bandwidth expansion investments are needed. It also guards against data leakage and DDoS attacks. They ensure transfer of large data sets and process transactions, higher performance of cloud applications, and reduced packet loss. It's a much better alternative to the unstable performance of public network. Sify has cloud interconnects for all major cloud providers – AWS (Direct Connect), Azure (ExpressRoute) and Oracle (FastConnect).

The Future Belongs to Cloud Interconnection

Traditionally, **Data Center Interconnect networks** have focused on bandwidth and latency to ensure business continuity and disaster recovery. However, the move to the cloud demands new objectives and requirements. The **Cloud Interconnect** provides some key capabilities to meet the dynamic nature of cloud, such as:

- **Scalable, flexible bandwidth**: Mobility, personal devices, new applications and explosive data growth demand more scalable and flexible bandwidth. Cloud interconnect solutions deliver very high bandwidth and can increase or decrease bandwidth, as needed.

- **Multi-site, multi-technology, multi-cloud:** Cloud interconnect solutions help share data, distribute applications and balance workloads across different cloud types, and between locations and cloud providers. They provide multi-layer, integrated IP and optical capabilities with high performance, reliability and quality of service, as well as multiple client interfaces to accommodate legacy and future requirements.
- **Agile, dynamic provisioning:** Cloud interconnect solutions support orchestration of network resources across cloud boundaries to ramp up resources, as and when required (and then ramp them down again). This means they can provision bandwidth and orchestrate network resources dynamically, quickly and easily — between different locations, across multiple data centers, and across different clouds and cloud providers.

Sify's Investments into Fiber Assets and Interconnection Networks

Sify realizes the importance of all the diverse requirements in adopting a hybrid multi-cloud environment. That's why, in its pursuit of transforming its customers' business, Sify has made significant investments focused on Hyperscale Infrastructure, comprising:

- Fiber rollout in Metro Cities - 10000+ kms of Fiber in all major cities of India
- Future-ready network build - seamless scale to 400G & beyond
- Edge data centers in 45 cities
- New data center rollouts and cloud-ready infrastructure
- 51 Connected data centers
- 1000+ Connected Buildings
- Cloud Interconnect services (AWS, Azure, Oracle)

Metro-XConnect between Airoli and Rabale DC

Keeping the need of modern architecture in mind, Sify has introduced Metro-XConnect - a pre-built 10G ethernet infrastructure which integrates Airoli and Rabale Data Centers seamlessly into one virtual Campus. It is designed to act as a catalyst to accelerate the deployment of hybrid multi-cloud environments including AWS and Oracle Cloud Infrastructure. It provides customers with the option of collocating in a cloud-adjacent data center to build a unique hybrid multi-cloud environment. The unique technical and commercials benefits of these solutions, provide our customers with a very compelling Total Cost of Ownership for their IT landscape.

Benefits of Sify Metro-XConnect

Sify's Metro-XConnect service enables modern IT landscapes and configurations by addressing the pain points through the following benefits:

- To enable fast execution between different workloads and their components, Metro-XConnect provides a guaranteed low latency of less than 100 microseconds for one-way.
- It enables access to network resources at both Campuses at Cross Connect level prices (i.e., Telco's, IX's (AMS-IX), AWS Direct Connect, Oracle FastConnect)
- For high reliability, it has been designed for mission-critical applications at 99.99% availability. It uses 3 diverse fiber paths.
- To ensure uninterrupted operations, it provides fast and guaranteed turn up time of two weeks for any service.

Sify Hyperscale Networks Service Portfolio

Dedicated Ethernet Private Line

- Build over low latency Un-Contended network with unlimited MAC with Jumbo Frames support
- Multiple protection path on the Domestic and International Circuits
- Bandwidth options ranging from 1G, 10G & n*10G
- Service Coverage in all the key cities including international destinations like London and Singapore
- **Varied choice of Interface hand-off**
  - 10GBase-LX (fibre, SM, 1310nm, full duplex)
  - 1000Base-LX (fibre, SM, 1310nm, full duplex)
  - 1000Base-TX (copper, RJ45, full duplex)
- **Strategic partnership with multiple providers in Singapore and London extending DEPL services from India to International locations**
  - Strategic partnerships with key players like Singtel, Telstra, and Superloop help us extend our DEPL service into Singapore
  - 17+ data centers in Singapore are onboarded for DEPL service
  - Protection available over multiple cable systems – BBG, AAE1
  - Strategic partnerships with Colt, Eu networks and Verizon help us extend the service across Europe
  - All major data centers in London onboarded for the service
  - Protection available over EIG, GBI cable systems
- **Typical Use case and Customer target segments**
  - Customers looking for completely transparent Layer 1 circuits to run their network on top
  - Banking & Financial Institutions looking at building backbone links

Switched Ethernet Services – EVPL & EPL

(1) Ethernet Virtual Private Line

- Cost-effective network solution connecting 2 offices between cities, with Data replication between the office sites
- Pan India coverage with Support for QinQ (0x8100/0x88a8)
- Mac address Limitation, MTU size of 1500 with L2 Protocol Transparency
- Transparent forward of customer's unicast and multicast traffic
- Choice of Bandwidth ranging from 2 Mbps to 1000 Mbps
- **Varied choices of Interface hand-off**
    - 100Base-TX (copper, RJ45, full duplex) – Fast Ethernet Interface
    - 1000Base-LX (fibre, SM, 1310nm, full duplex)
    - 1000Base-TX (copper, RJ45, full duplex)

Typical Use case and Customer target segments

- Media & Entertainment segment

Service Feature	EVPL	EPL	DEPL
Backbone	IP MPLS	IP MPLS	Dedicated Backbone
Access	Sify Fiber, Sify Wireless, 3rd Party	Sify Fiber, 3rd Party	Sify Fiber, 3rd Party
Technology	EoMPLS	EoMPLS	MPLS TP
MAC Transparency	MAC Limit - 50	MAC Limit - 16000	Unlimited MACs
Protocol Transparency	Limited	All L2 Protocol Transparent	All L2 Protocol Transparent
MTU Support	1500	1500 (Jumbo frame can be supported)	9000
Coverage	Pan-India	Delhi, Mumbai, Chennai, Bengaluru, Hyderabad, Kolkata, Pune	Delhi, Mumbai, Chennai, Bengaluru, Hyderabad, Kolkata, Pune, London and Singapore

AMS-IX

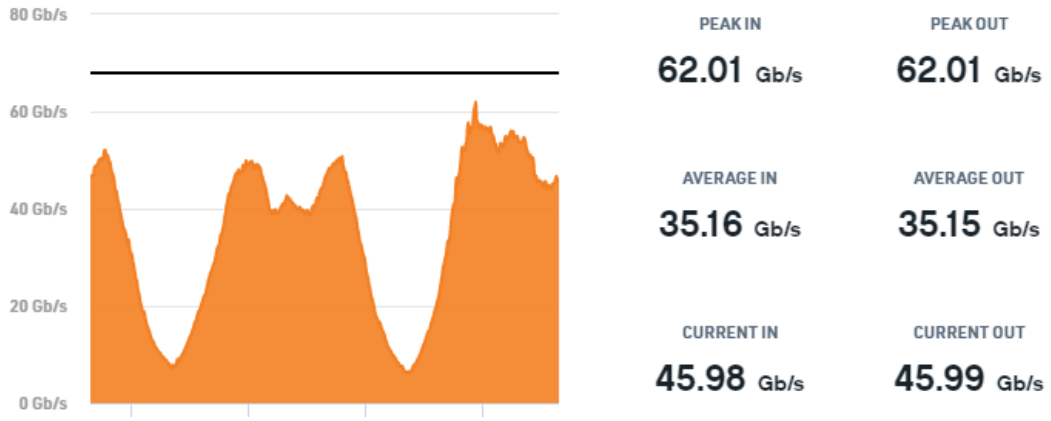
AMS-IX Peering service enables you to interconnect with a multitude of networks directly. Content Providers and ISP's can exchange internet traffic using only one connection and cross connect.

Sify has partnered with Amsterdam Internet Exchange to offering Internet Exchange Services in India with current AMS-IX peering platform being delivered out of Sify Data Center at Rabale, Mumbai and GPX Mumbai, and soon getting extended to Kolkata.
AMS-IX offers the following services:

- **Internet Peering -** An ecosystem to connect ISPs and Content Providers
- **Private Inter Connection -** A secure and cost-effective solution to interconnect directly with your peers, customers, suppliers or business partners
- **Closed User Group** - A Closed User Group (CUG) is an interconnection environment for a specific group of parties that have a common interconnection requirement. Typically, one of these requirements is that interconnection is realized outside of the public Internet.
- **IX-As a Service**

Typical Target Customers: Content Providers, Content Delivery Networks, Cloud Service Providers, ISPs.

Total of 37 ASNs connected on AMS-IX and growing.



Global Cloud Inter-Connect

GlobalCloudConnect equips an enterprise to connect its on-premises data centers with cloud workloads, over a secure and deterministic network offering enterprise grade performance by leveraging one of the largest MPLS backbone and high-performance data centers service provider in the country.

GlobalCloudConnect (GCC) is designed over a network designed specifically for the cloud using MPLS as its underlying technology. With Sify's 1600+ PoPs in the country, GCC brings the cloud closer to enterprises, facilitating better and cost-efficient networks to the cloud.

Service Features

- Layer 3/Layer 2 Inter-Connections
- Hybrid Setup
- Cloud to Cloud networking
- Traffic Engineering

Service Variants

- **AWS Direct Connect Services**
  - Inter-Connect with AWS Direct Connect available in Mumbai (2 PoPs), Chennai, Bangalore, Delhi (Only for Dedicated Inter-Connect), Hyderabad (Only for dedicated Inter-Connect)
  - Sify offers the following types of Inter-Connection
    - Hosted Direct Connect
    - Dedicated Direct Connect
- **Microsoft Express Route Services**
  - Azure Private Peering & Public Peering
  - Microsoft Office365 Peering
  - Site Access in India at Chennai and Mumbai
- **Google Cloud Inter-Connect Service**
  - GCI services provide connectivity between a customer's on-premises network and the Google Cloud network edge, allowing the customer to extend their private network into their cloud network.
  - GCI Services are offered over Layer 2 Inter-Connections, where BGP routing is taken care by the customer and layer 3 Inter-Connections, where BGP comes under Sify's scope
- **Oracle Fast Connect**
  - Oracle's FastConnect provides an easy, elastic, and economical way to create a dedicated and private connection with higher bandwidth options, a more reliable and consistent networking experience when compared to internet-based connections.
  - Fast Connect Inter-Connect available in Layer 2 and Layer 3 Inter-Connection models.

Why Sify?

Sify is the largest Information and Communications Technology service provider in India, serving 10,000+ businesses across multiple industries with its impeccable Cloud and Data Center services, Network services, Security services, Digital services, and Application services. Our industry-wide experience of working with diverse clients, skilled workforce to manage varied network transformation projects, and a partner ecosystem of extremely competent OEMs make us the most trusted choice for India Inc.

The following points make a compelling argument for Sify as the right partner for hyperscale infrastructure:

- Terabit scale Fully Meshed Metro ROADM Network in all major metro cities.
- Interconnecting 47+ DCs, Submarine CLS, Cloud On-Ramps and NLD Gateways
- Market-leading 99.99% SLA
    - Data Center Interconnect optimized fabric design
    - Photonic & Electrical layer redundancy
- Seamless Scalability
    - Delivers 80x100G or 8Tb capacity, scalable to 16Tb
    - On-demand wavelength provisioning
    - Support for 400G Line side
- Managed DWDM build-outs for custom hyperscale networks
    - Supports individual customer designs and OEM preferences
    - Dedicated network nodes
    - Syslog Access for real-time network visibility
- 20 years of experience - in build, own, operate of carrier-neutral data centers
- Multiyear experience - of managing Hyperscale, Internet Exchange customers
- 9 operational data centers - with 52 MW IT Power in key cities
- Roadmap - to add 106 MW in next 4 years
- Truly carrier-neutral - More than 90% of fiber links are from non-Sify Telecom Providers
- Rich Interconnect Ecosystem - Hyperscale cloud, Multiple Internet Exchanges, Content IP Peering Nodes & ISP Interconnect
- Multiple Internet Exchange - ecosystem facilitating OTTs and ISPs interconnect via portal
- Self Service Portal - for Cross Connects and rack space: deployment in 2-5 Business days

Our network services for modern businesses are designed to help customers harness the true potential of cutting-edge cloud, digital and network technologies to help them accomplish transformation goals and meet dynamic business requirements capably. With Sify as your partner, you are well-positioned to achieve key business objectives of availability, scalability, security, and resilience.

For more information about
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