

# IXP Design Considerations

# Where are we?

## Day 3 : Stage 4

- Building a Demo IXP
  - Some presentation on Route Server
  - Will connect network on the IX

## Day 2 : Stage 3

- Building BGP Concept
  - Introduction to BGP
  - BGP Path control
  - Hands-On Exercise

## Day 1 : Stage 2

- Building the concept of Routing
  - Routing Introduction
  - How Internet Works?
  - Glue it together with Internet context
  - Some Hand-on Exercise

## Day 1 : Stage 1

- Demystifying IXP Concept
  - What is IXP?
  - Value of Peering
  - How to Build an IXP?

# IXP Peering Options

- BLPA (Bi-Lateral Peering Agreement)
  - IXP provides layer-2 connections to ISPs in the form of switch ports
  - Each ISP will make their own peering arrangements directly with other ISPs on the same IXP based on mutual business needs
- MLPA (Multi-Lateral Peering Agreement)
  - IXP provides layer-2 connections to ISPs in the form of switch ports
  - Each ISP will peer with a route server provided by the IXP
  - Route server will collect and distribute routing information among all peers joining the MLPA on the same IXP
- Both MLPA and BLPA can be supported at the same time with Layer 2 infrastructure

# IXP Capital Expenses

- Ethernet Switch(es) – a must
- Route Server(s) – desirable
- Router(s) and server(s) to support other IXP services – optional

# IXP Operating Expenses

- Data Center
  - Rack Space
  - Electricity (with backup)
  - Cooling
  - CCTV Camera and other physical security measures
  - Cross-connects
- Administration and Technical support
- Equipment maintenance
- Internet transit for other IXP services – optional

# IXP Organization Model

- Possible Models include:
  - Donation / sponsorship
  - Cost sharing by participants
  - Membership based organization
  - Volunteers vs Outsourcing vs Staff
- Or any combinations of above
- Neutrality is the most important, even at the beginning
- Long term sustainability is the hard part so sustainable financial model has to be established in due course

# Neutral Location as Starting Point

- May choose one of the followings as starting point:
  - University
  - Technology Park
  - Carrier Neutral Data Center
  - Government Data Center
- Having multiple carrier options is the most important
- Should maintain neutrality continuously
- Expansion to multiple sites can be done gradually, coupled with growth

# Requirements of IXP Site

- Proximity to the networks of the potential members / participants
- Options, availability, capacity and reliability of fiber carriers
- Support for additional fiber carriers
- 24x7 access for IXP authorized support personnel



# Requirements of IXP Site

- Availability and stability of electricity supply, including UPS and backup power generator
- Sufficient cooling facilities
- Good physical security – 24x7 surveillance and access control
- Availability of additional rack space for future growth

# General Guidelines – Governance

- Organisation-wise, multi-stakeholder bottom-up approach is proven to be the best approach for maximum acceptance of the community while government support is critical
- IXP should be as inclusive as possible in order to provide maximum benefits to the whole community which it serves
- Should be fair and consistent to every participant
- Should be open and transparent as much as possible

# General Guidelines - Geography

- IXP should NOT be expanded beyond a metro area so as to avoid competing with participants and to maintain neutrality
- Should start with the biggest city first and gradually set up separate infrastructure in other bigger cities one by one

# Services Offered

- Services offered should not compete with member ISPs (basic IXP)
  - e.g. web hosting at an IXP is a bad idea unless all members agree to it
- IXP operations should make performance and throughput statistics available to members
  - Use tools such as LibreNMS (IXP Manager) to produce IX throughput graphs for member (or public) information

# Services to Offer

- ccTLD DNS
  - the country IXP could host the country's top level DNS
  - e.g. “SE.” TLD is hosted at Netnod IXes in Sweden
  - Offer back up of other country ccTLD DNS
- Root server
  - Anycast instances of root servers (I.root-servers.net, F.root-servers.net etc are present at many IXes)
- gTLD DNS
  - .com & .net are provided by Verisign at many IXes

# Services to Offer

- Route Server
  - Helps scale IXes by providing easier BGP configuration operation for participants
  - Technical detail covered later on
- Looking Glass
  - One way of making the Route Server routes available for global view (e.g. [www.traceroute.org](http://www.traceroute.org))
  - Public or members-only access

# Services to Offer

- Content Redistribution/Caching
  - For example, Akamised update distribution service
- Network Time Protocol
  - Locate a stratum 1 time source (GPS receiver, atomic clock, etc) at IXP
- Routing Registry
  - Used to register the routing policy of the IXP membership (more later)

