Introduction to Peering & Internet Exchange Points

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ISP Lifecycle: Simple Aggregator

Single Transit Provider ——— IXPs

ISP Network

Customers
ISP Lifecycle: Redundancy and LCR

Redundant Transit Providers —— IXPs

ISP Network

Customers
ISP Lifecycle: Local Peer

Redundant Transit Providers —— IXPs

ISP Network

Single IXP

Customers
ISP Lifecycle: Network Service Provider

Redundant Transit Providers — IXPs

Multiple IXPs

NSP Network

Customers
Hot Potato Routing

Redundant Transit Providers

Red NSP Network

Red Customer

IXP

Green NSP Network

Green Customer

IXP
Redundant Transit Providers

Hot Potato Routing

Red Customer sends to Green Customer via Red NSP
Hot Potato Routing

Red NSP delivers at nearest IXP

Redundant Transit Providers

Red Customer

Red NSP Network

IXP

Green Customer

Green NSP Network

IXP

Redundant Transit Providers
Hot Potato Routing

Green NSP backhauls from distant IXP
Hot Potato Routing

Green ISP delivers to Green Customer
Hot Potato Routing

Green Customer replies via Green NSP
Hot Potato Routing

Green NSP delivers at nearest IXP
Hot Potato Routing

Red NSP backhauls from distant IXP
Hot Potato Routing

Red NSP delivers to Red Customer
Hot Potato Routing

Red Network is responsible for its own costs
Hot Potato Routing

Green Network is responsible for its own costs
Hot Potato Routing

Symmetry: Fair sharing of costs
The efficiency of the Internet depends upon this principle:

For any two parties who wish to exchange traffic, there must be a pair of exchanges, one near each party.
The manifestation of this inefficiency:

Countries which haven’t yet built Internet Exchange Points disadvantage themselves, and export capital to countries that already have.
How Internet Exchange Points are Built
Determining Need

Sufficient end-user base?
No existing facility to build upon?
Sufficient degree of locally-destined traffic?
Geographic Location

User population
Fiber facilities or rights-of-way
Founding participants
Density

Centralized in one room
Campus of adjacent buildings
MAN
Frame or ATM cloud
Building Management

Telco hotel
University computing or telecommunications facility
City emergency services facility
In-Building Facilities

Pathways
Power
Cooling
Access and security
Services

Switch fabric
Crossconnects
Route-server
Remote hands
NTP
Web caching
Business Structure

Incorporated or unincorporated?
Staffed or volunteer?
Non-profit or for-profit?
Cooperative or external ownership?
Cost-recovery (predictive or actuals), ad-hoc, or market pricing?
Policies

BLP, MLPA or MMPLA?
Mandatory looking-glass?
Routing and switch-port information
public or members-only?
Secrecy in the event of security problems, failures, or mistakes
Extensible switch fabric?
Thanks, and Questions?

Copies of this presentation can be found in Keynote, PDF, QuickTime and PowerPoint formats at:

http://www.pch.net/resources/tutorials/ix-construction

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