



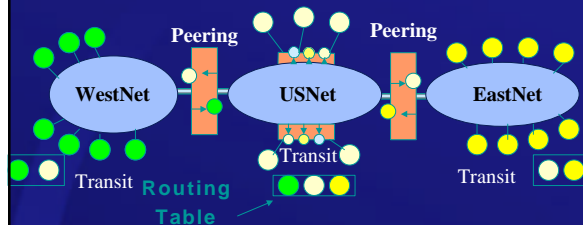
Peering Decision Tree

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Definitions of Peering and Transit

Def: *Peering* is the business relationship whereby ISPs reciprocally announce reachability to each others' transit customers

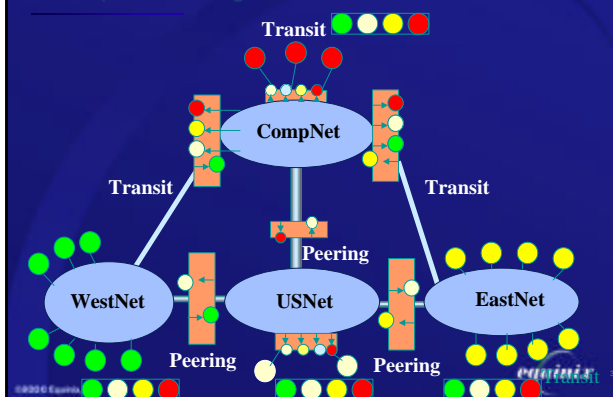


Def: *Transit* is the business relationship whereby one ISP sells access to all destinations in its routing table.

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Example: Peering and Transit



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European Peering Study

Transit	\$\$\$
Partial Transit	\$\$
Paid Peering	\$
Peering	~\$

- Usage-based motivation
- More work to be done here

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Peering Decision Tree Paper

Based on Interviews with 50+ ISP Peering Coordinators,...

"Validated" at NANOG & LINX meetings

3 General Phases of Peering:

- 1) Identification of Potential Peer
- 2) Initial Contact and Qualification
- 3) Implementation Discussions

Paper available upon request: wb@equinix.com
With "Peering White Paper" in Subject

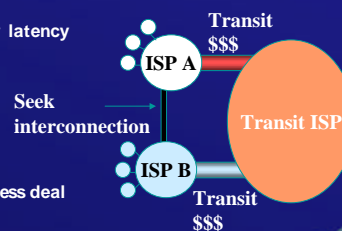
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I. Phase 1: Identification of Peer: Traffic Engineering Data Collection and Analysis

Motivations for peering:

- Financial: Reduce load on expensive Transit service
 - Traffic src/dest
- Measure vs Intuit
- Usage-based Billing
- Engineering: Lower latency
- Result → Top 10 list



- Part of larger business deal
- Transition Strategy

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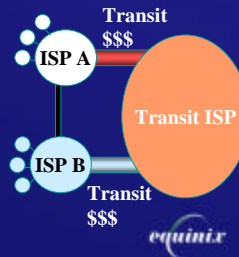
Case Study: Flawed Tier 1 Migration Strategy

Step 1: Buy Transit, Market Services

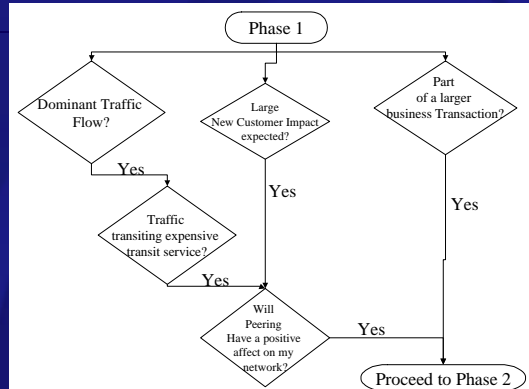
Step 2: Build your own infrastructure, establish Peering to Reduce Transit

Step 3: Convert paid Transit into free Peering

Step 3 difficult. War stories



Phase 1: Identification of Potential Peer



II. Phase 2: **Contact** & Qualification Initial *Peering Discussion*

The most difficult thing...

How to make contact with potential peer ISP?

- E-mail person or peering@<ispdomain>.net
- Exchange point participant list
- Tech-c/admin-c from DNS/ASN registries
- Engineering Forums NANOG, IETF, RIPE, etc.
- Trade shows: speakers and booth staff
- Target ISP sales force
- Target ISP NOC

Peering Contact Database

- Initiated at NANOG 17 : [Get me your card](#)
 - Handwrite: PeeringEmailTo: peering@<ispdomain>.net if avail
 - Handwrite: AS Number
 - Cross out stuff you don't want in spreadsheet
 - This process ≠ ISPs Will Peer
- I e-mail Peering Contact Database to all ~monthly
- Peering White Paper? Write 'PWP' on card or E-mail: wbn@equinix.com

II. Phase 2: **Contact** & Qualification, Initial *Peering Discussion*

Once contact is made...

- Sometimes Mutual NDA
- Exchange BiLateral Peering Agreement (BLPA)
- Traffic Data justification shared

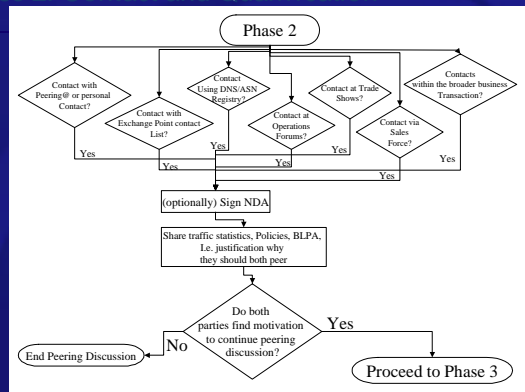
One basis: Peering iff PeeringCost < TransitSavings?

- Requirements Exchange (e.g. Must be at n Public Peering Points, xMbps, private peering migration strategy, etc.)

Either Party may walk away....

If still interested, implementation discussion...

Phase 2: Contact and Qualification



III. Phase 3: Implementation Discussions

How to interconnect?

Direct Circuit-based Interconnection V.S. Exchange-Based Interconnection

White Paper available:

"Interconnection Strategies for ISPs"

Email request to: <wnb@equinix.com>



Cost Comparison at n=5

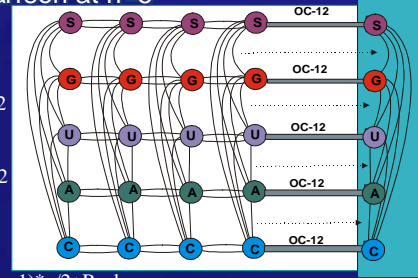
$$\text{costDCfn} = (n-1) * C/2$$

$$C = \text{OC-3 @ } \$11,400$$

$$n=5$$

$$\text{costDC} = (4) * \$11,400/2$$

$$\text{costDC} = \$22,800/\text{mo}$$



$$\text{costExchfn} = \text{BDC} + (n-1) * x/2 + \text{Racks}$$

$$\text{BDC} = \text{OC-12 @ } \$23,000$$

$$n=5, 1 \text{ Rack @ } \$1500$$

$$\text{costExch} = \$23,000 + (4)(200/2) + \$1500$$

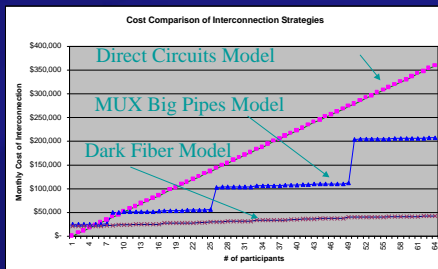
$$\text{costExch} = \$24,900/\text{mo}$$

More expensive to use Exchange-Based

Interconnection Strategy at n=5, N>5?



Exchange-based vs. Direct Circuit Interconnection

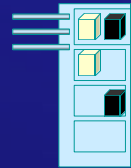


For "Interconnection Strategies for ISPs" e-mail wnb@equinix.com
See <http://www.nanog.org/mtg-9905/norton.html> for slides



9 Exchange Selection Criteria

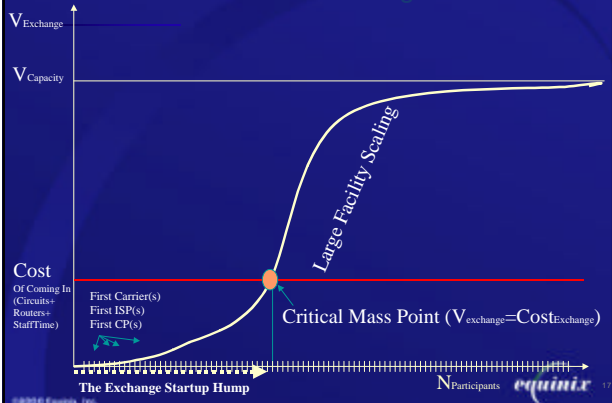
- Telecommunications Access Issues
- Deployment Issues (getting in & up)
- ISP Current Presences (there yet?)
- Operations Issues (restrictions?)
- Business Issues (neutrality/alignment)
- Cost Issues (\$\$)
- Credibility Issue (backing, attraction) →
- Exchange Population (side effect)
- Existing vs. Emerging Exchange?



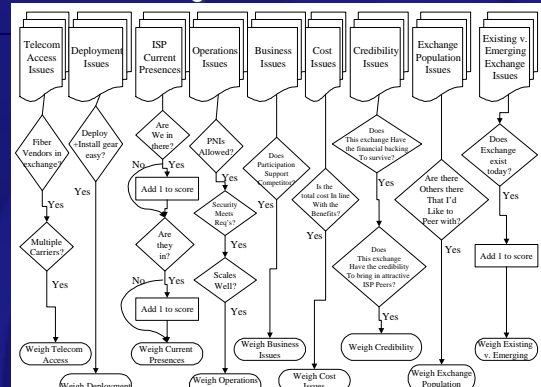
Exchange



Value of the Internet Exchange



Phase 3: Exchange Criteria



IV. Summary

Findings from Interviews

Three phases to peering:

- 1) Identification of Potential Peers
- 2) Contact & Qualification
- 3) Implementation Discussions

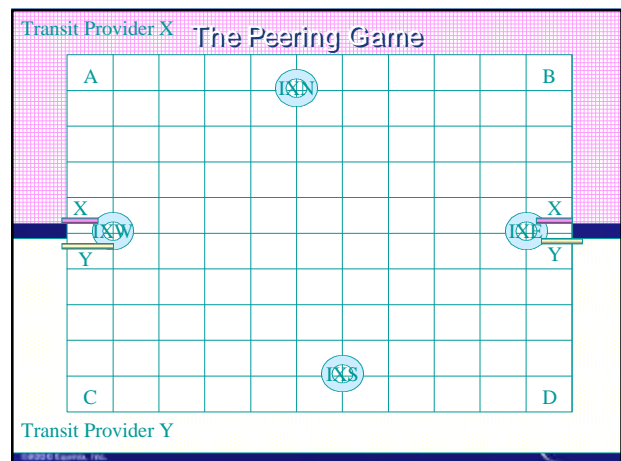
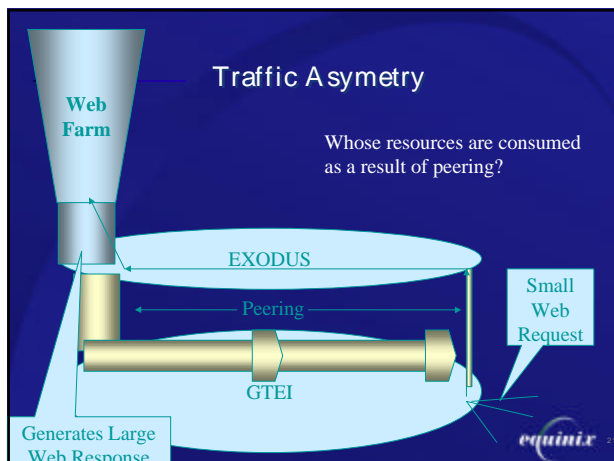
9 Selection Criteria for Exchanges

(Vary in relative weighting of criteria)



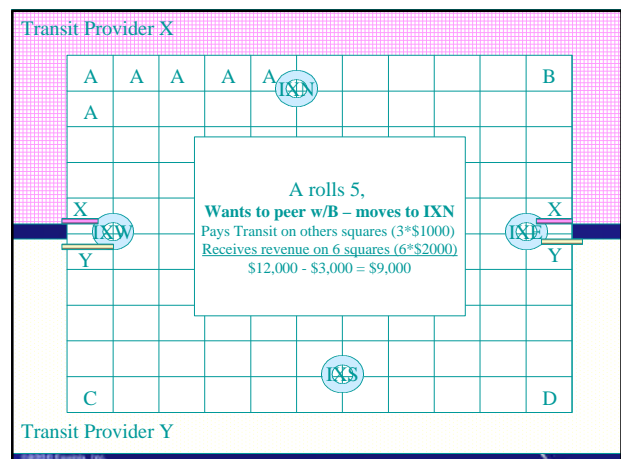
Thanks to!

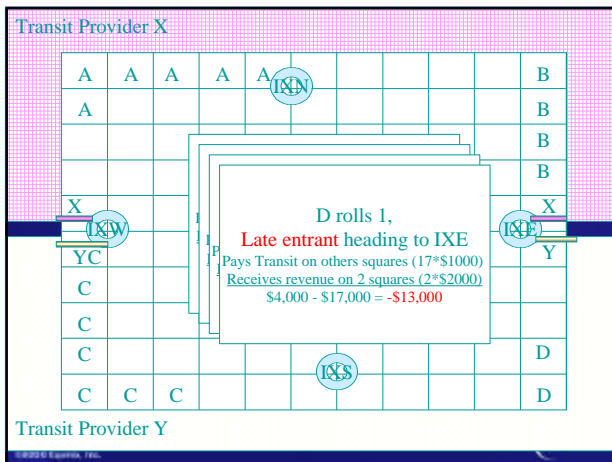
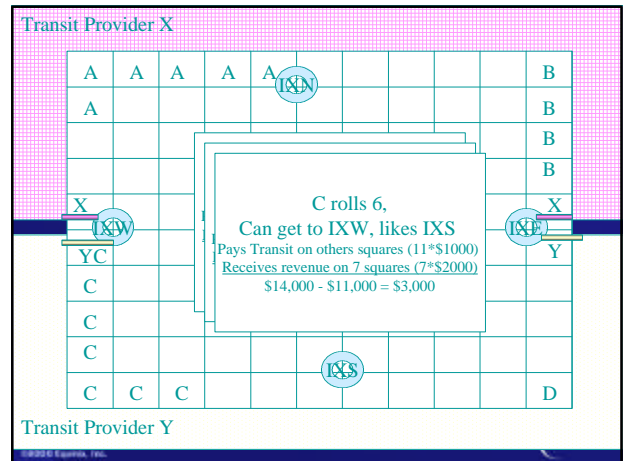
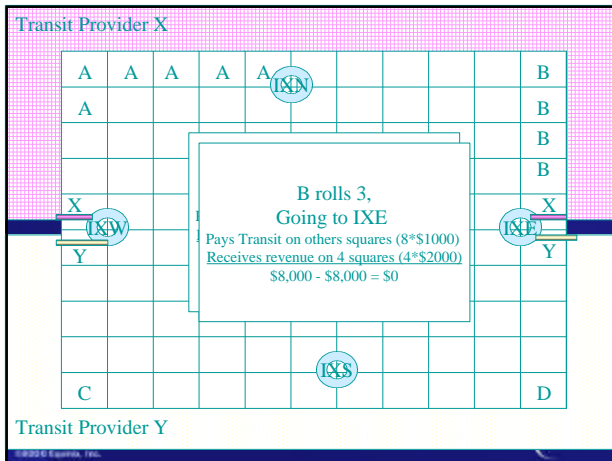
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The Peering Simulation Game Rules

- Goal: Maximize bank holdings. Make money by acquiring customers by expanding ISP network and reduce transit costs by peering
- Play: select a card and expand your network by selecting that many adjacent "squares" of regional customers
- Gain transit revenue of \$2000 for each customer square
- Pay transit cost of \$1000 for each square of traffic that other ISPs own
- If at Exchange Point, two ISPs can negotiate peering:
 - \$2000 recurring cost and loss of 2 turns, ISPs negotiate cost sharing
 - Peering ISPs do not have to pay transit for each others squares





Scoreboard after Round 1

- ISP A: \$9,000
- ISP B: \$0
- ISPC: \$3,000
- ISPD: -\$13,000
- On to Round 2 →

