Peering Decision Tree

William B. Norton

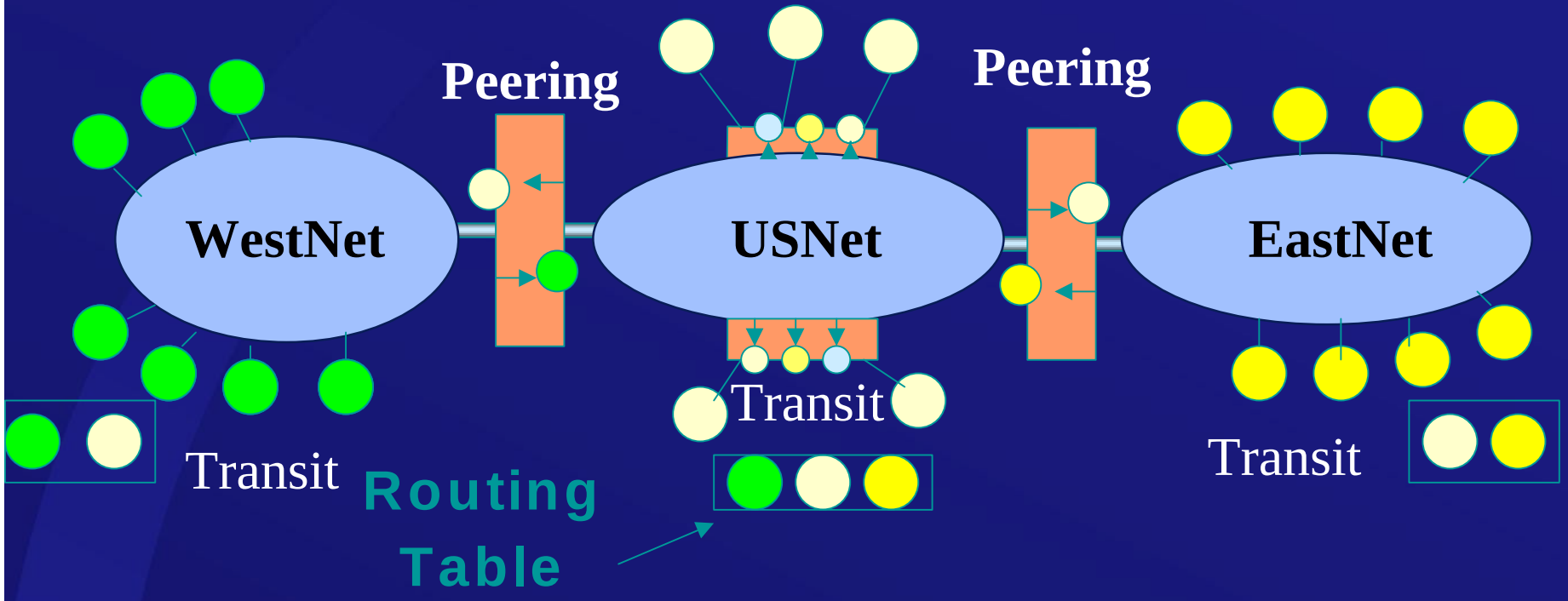
Co-Founder, Chief Technical Liaison

<wbn@equinix.com>

©2000 Equinix, Inc.

Definitions of Peering and Transit

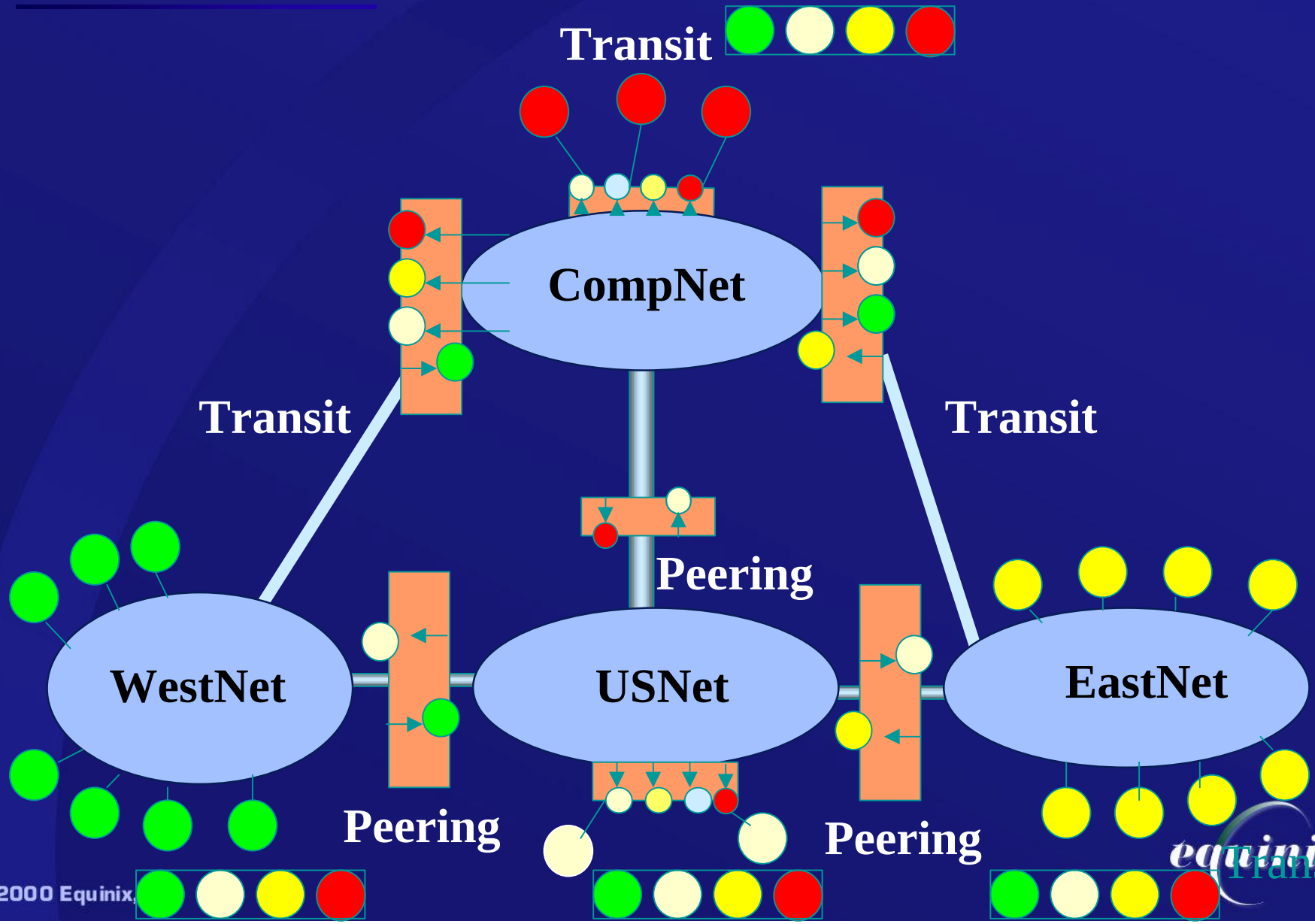
Def: ***Peering*** **is the business relationship whereby ISPs reciprocally announce reachability to each others' transit customers.**



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

©2000 Equinix, Inc.

Example: Peering and Transit



©2000 Equinix,

European Peering Study

Transit	$$$
Partial Transit	$$
Paid Peering	$
Peering	-$

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

©2000 Equinix, Inc.

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

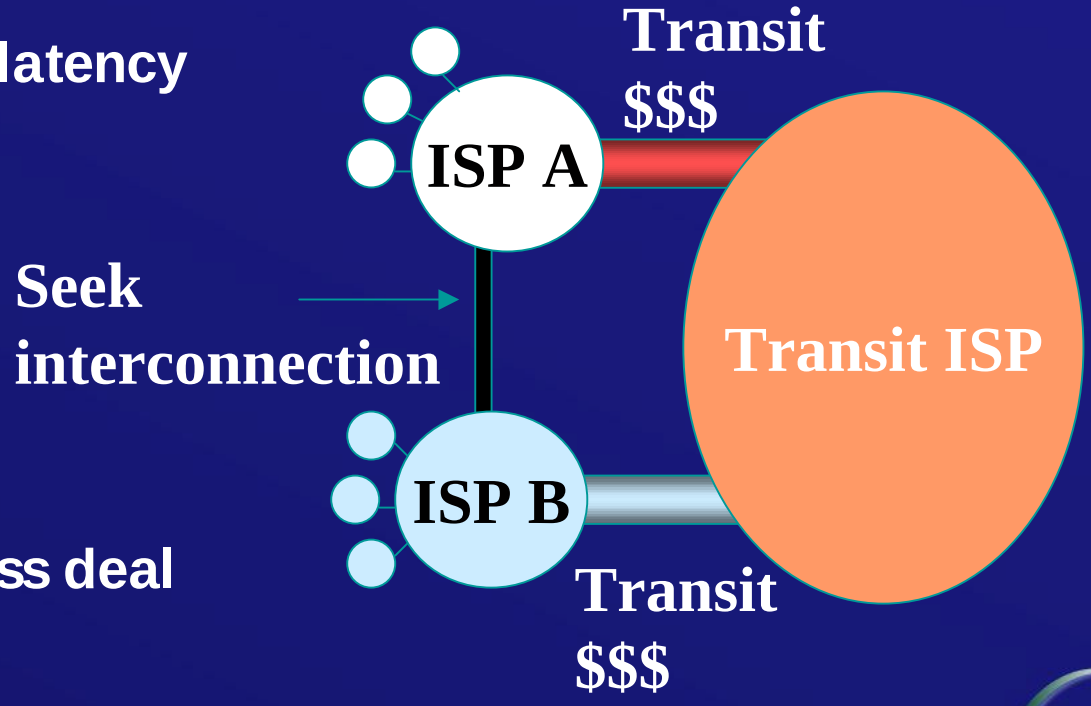
Paper available upon request: wbn@equinix.com
With "Peering White Paper" in Subject

©2000 Equinix, Inc.

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

©2000 Equinix, Inc.

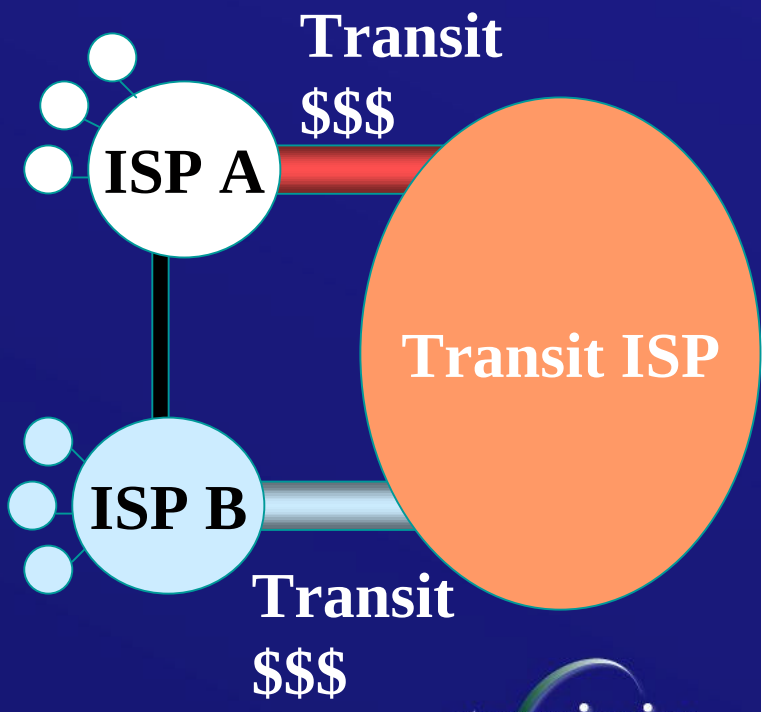
Case Study: Flawed Tier 1 Migration Strategy

Step 1: Buy Transit, Market Services

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

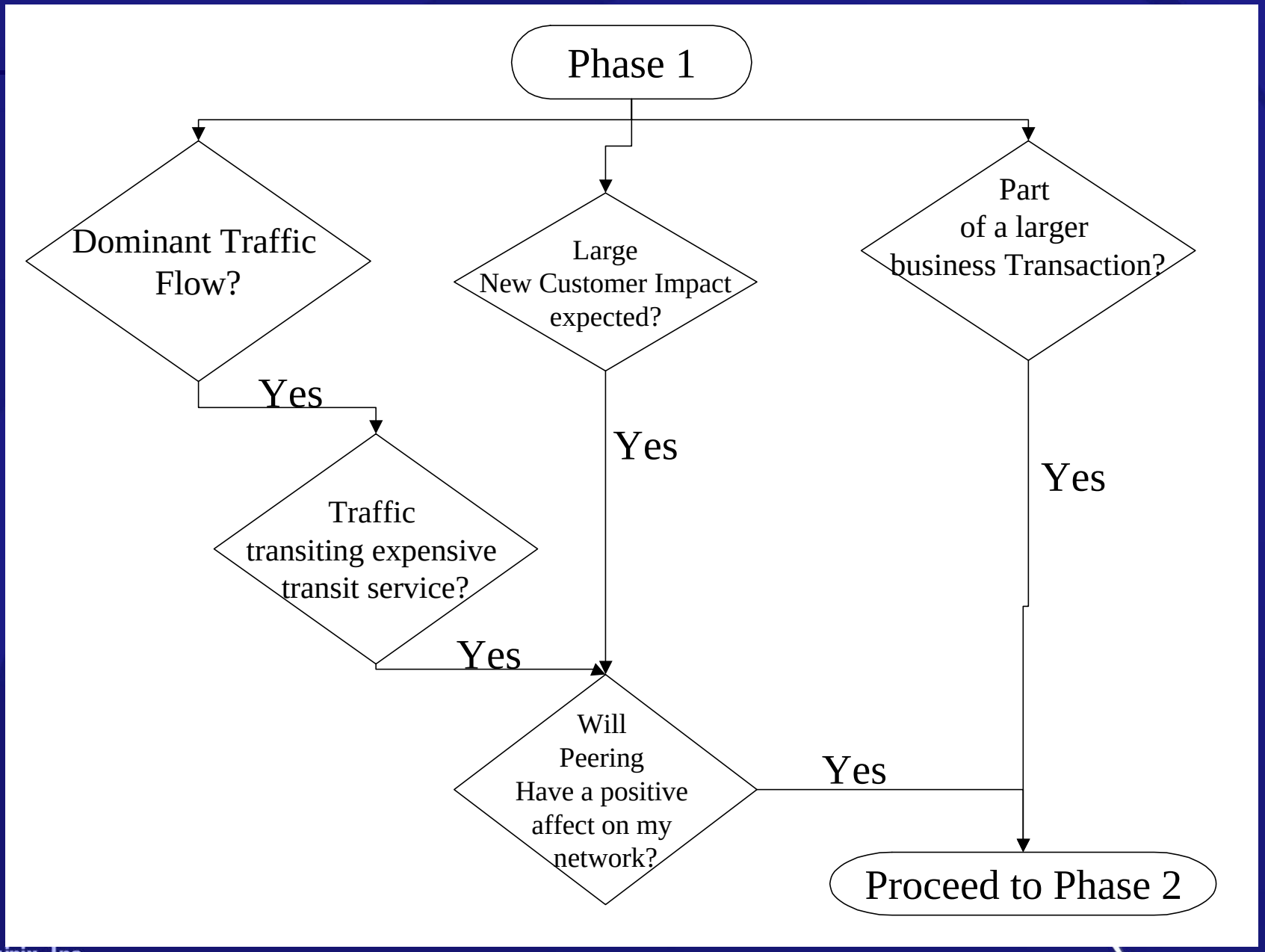
Step 3: Convert paid Transit into free Peering

Step 3 difficult. War stories



©2000 Equinix, Inc.

Phase 1: Identification of Potential Peer



©2000 Equinix, Inc.

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**

©2000 Equinix, Inc.

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

©2000 Equinix, Inc.

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

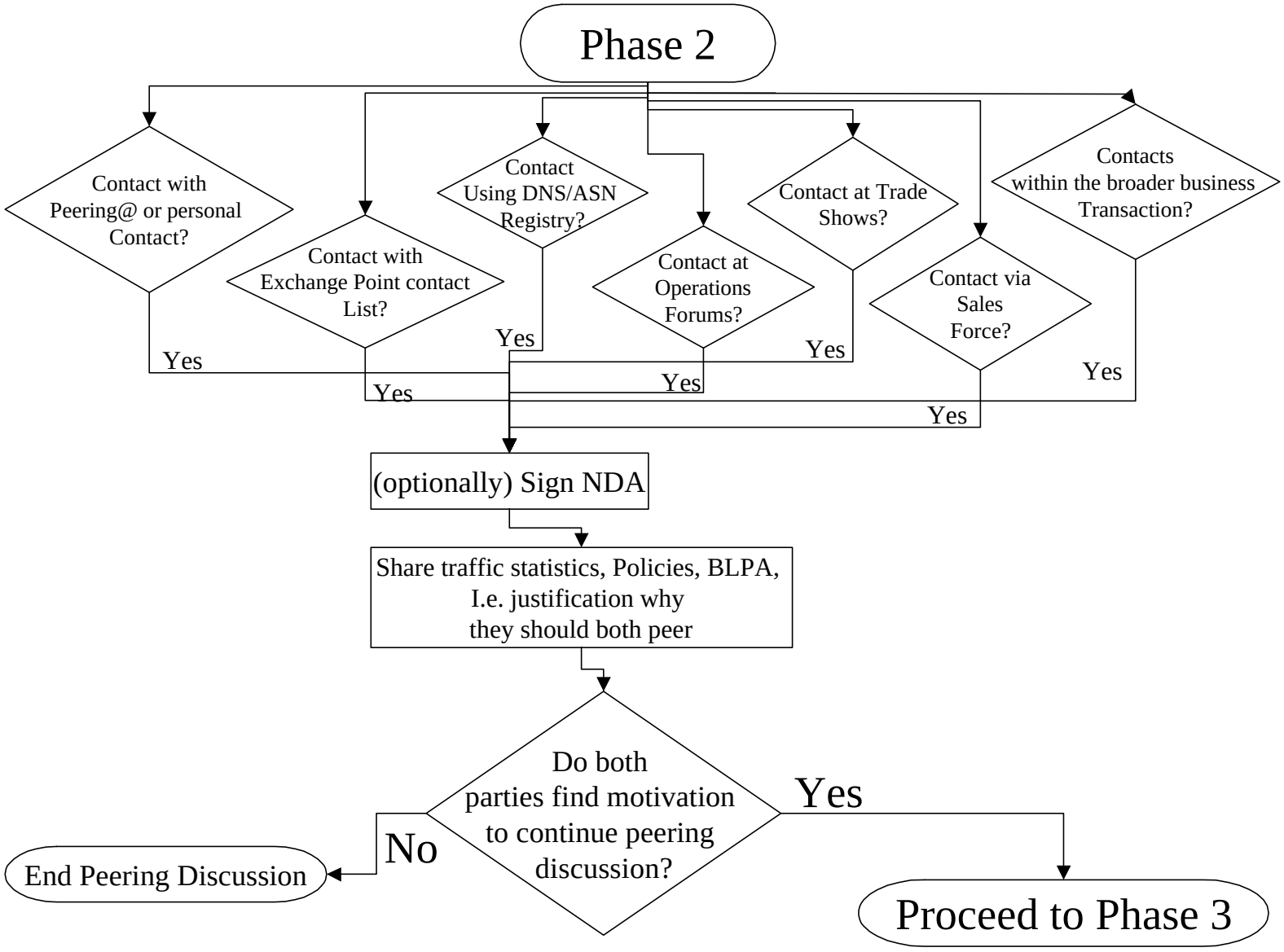
  (e.g. Must be at *n* Public Peering Points, xMbps, private peering migration strategy, etc.)

Either Party may walk away…..

If still interested, implementation discussion…

©2000 Equinix, Inc.

Phase 2: Contact and Qualification



©2000 Equinix, Inc.

III. Phase 3: Implementation Discussions

How to interconnect?

Direct Circuit-based Interconnection

VS.

Exchange-Based Interconnection

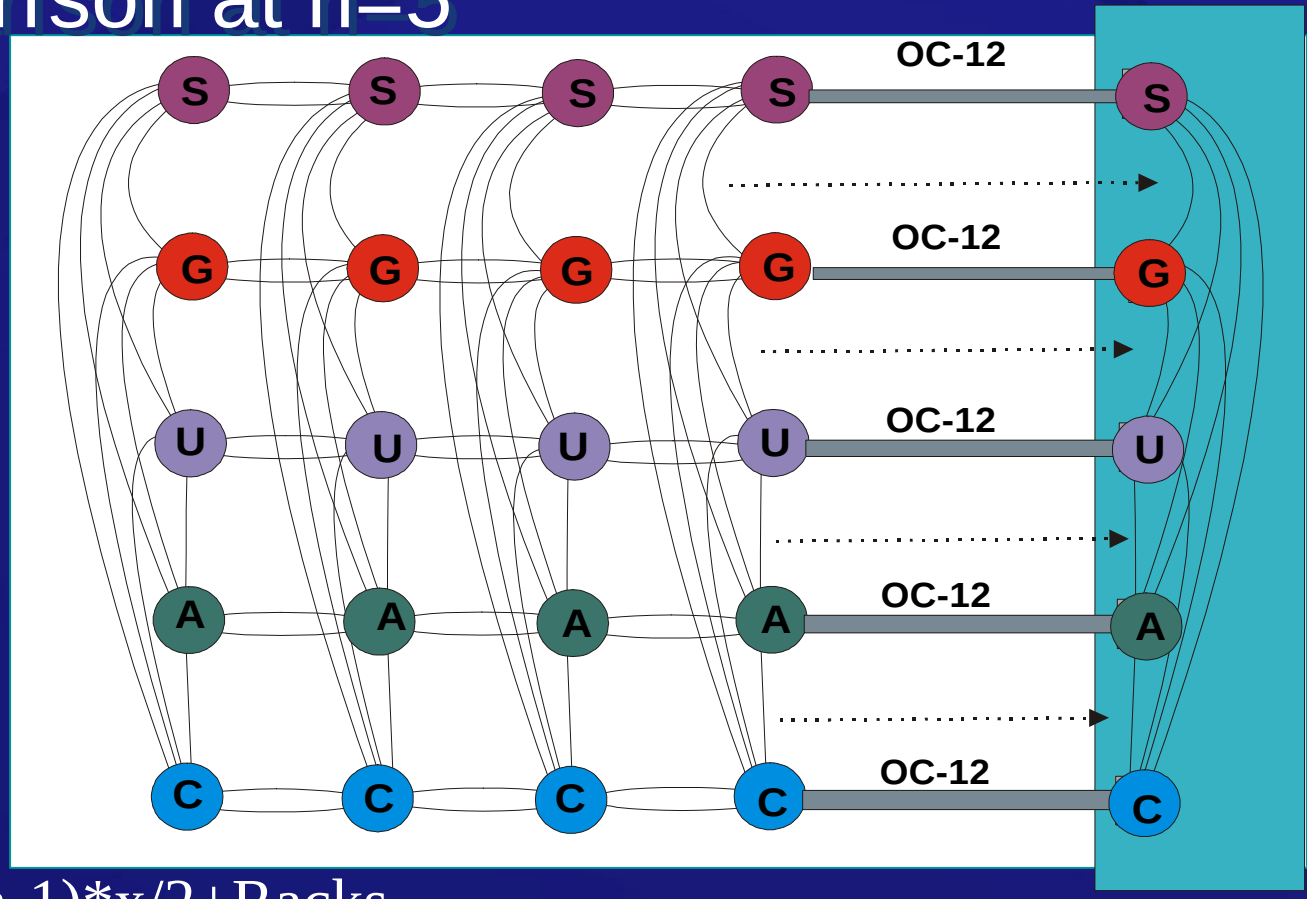
White Paper available:

"Interconnection Strategies for ISPs"

Email request to: <wbn@equinix.com>

©2000 Equinix, Inc.

Cost Comparison at n=5



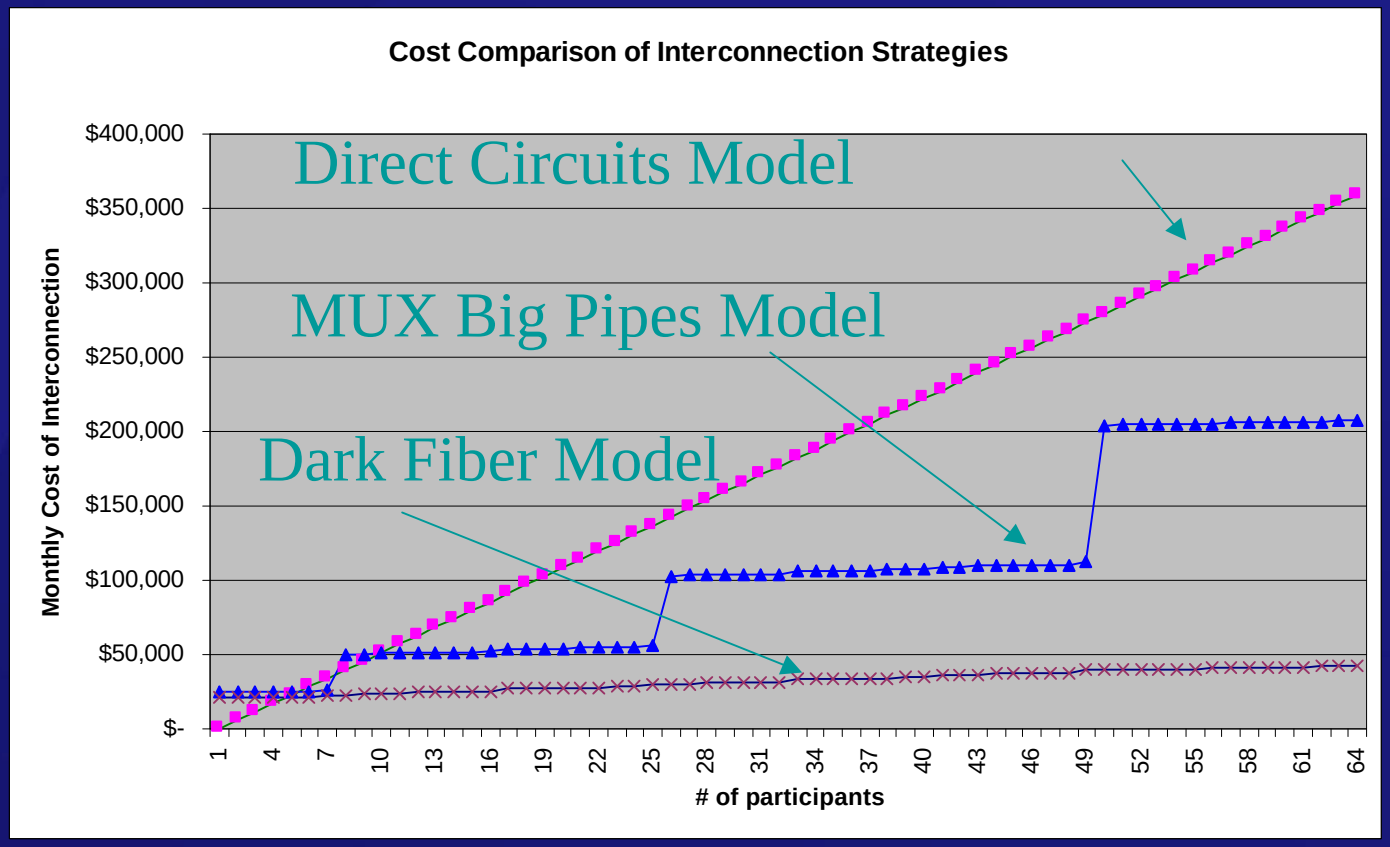
costDCfn()=(n-1)*C/2
C=OC-3 @ $11,400
n=5
costDC=(4)*$11,400/2
costDC=**$22,800/mo**

costExchfn()=BDC+(n-1)*x/2+Racks
BDC=OC-12 @ $23,000
n=5, 1 Rack@$1500
costExch=$23,000+(4)(200/2)+$1500
costExch=**$24,900/mo**

More expensive to use Exchange-Based Interconnection Strategy at n=5. N>5?

©2000 Equinix, Inc.

Exchange-based vs. Direct Circuit Interconnection



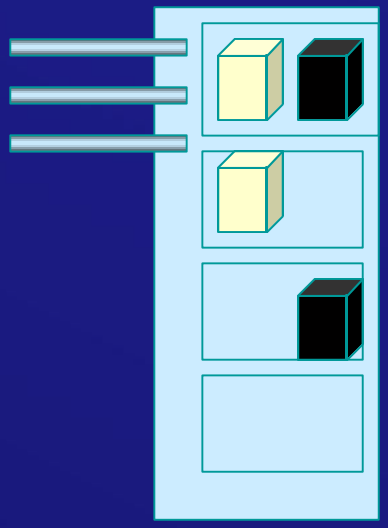
For "Interconnection Strategies for ISPs" e-mail wbn@equinix.com

See http://www.nanog.org/mtg-9905/norton.html for slides

©2000 Equinix, Inc.

9 Exchange Selection Criteria

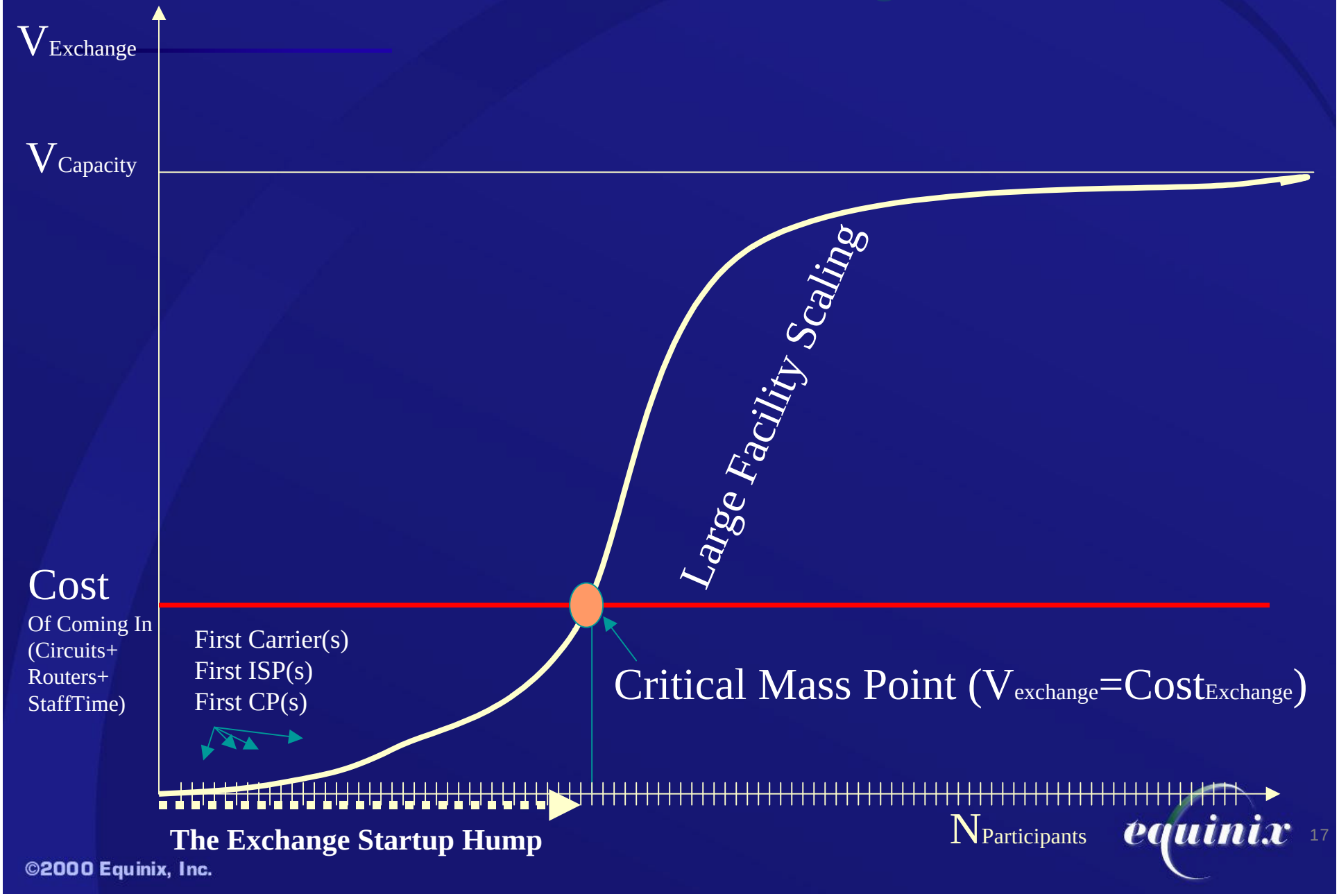
- Telecommunications Access Issues
- Deployment Issues (getting in & up)
- ISP Current Presences (there yet?)
- Operations Issues (restrictions?)
- Business Issues (neutrality/alignment)
- Cost Issues ($$)
- Credibility Issue (backing,attraction) →
- Exchange Population (side effect)
- Existing vs. Emerging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



Exchange

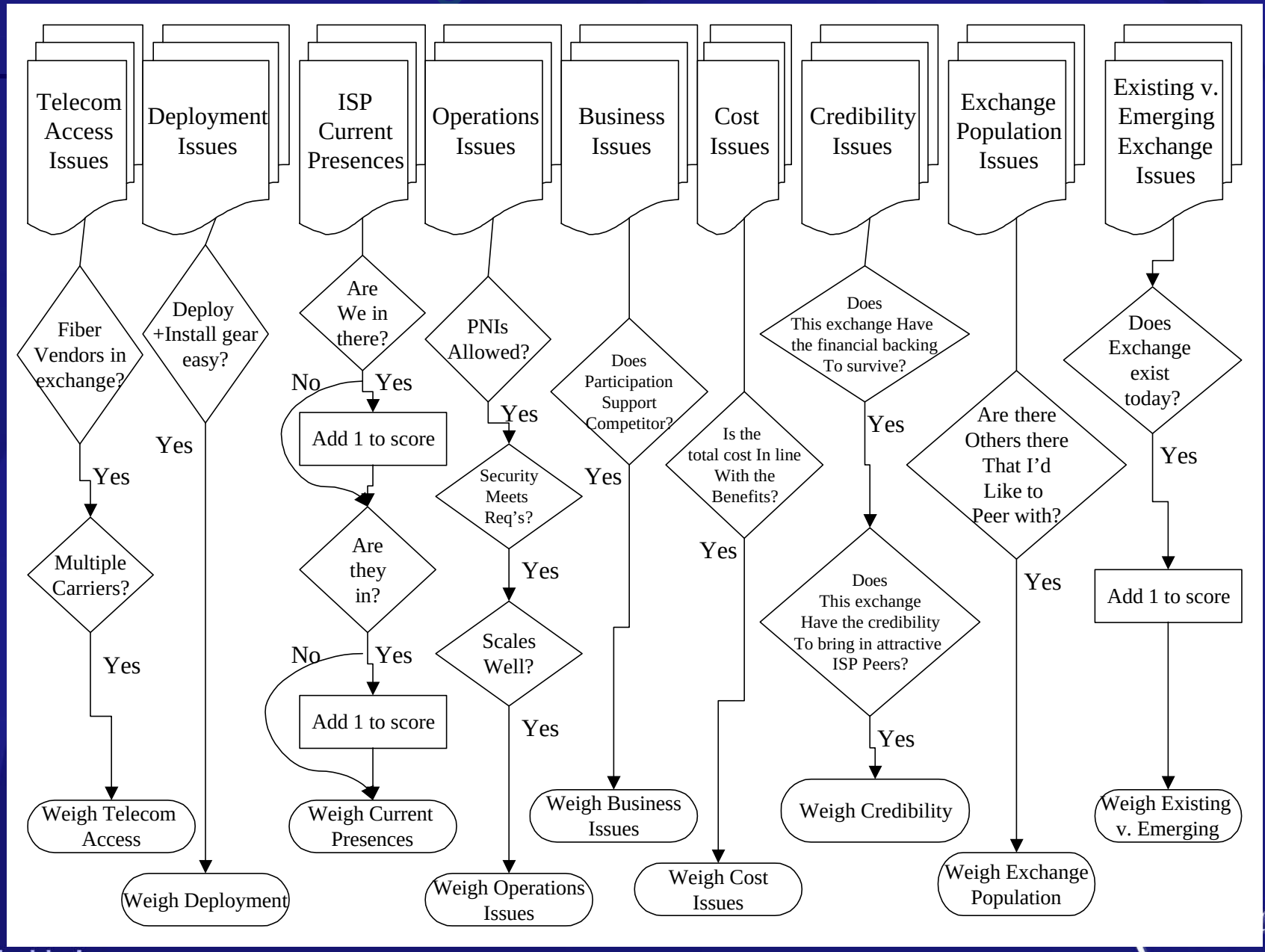
©2000 Equinix, Inc.

Value of the Internet Exchange



©2000 Equinix, Inc.

Phase 3: Exchange Criteria



©2000 Equinix, Inc.

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)

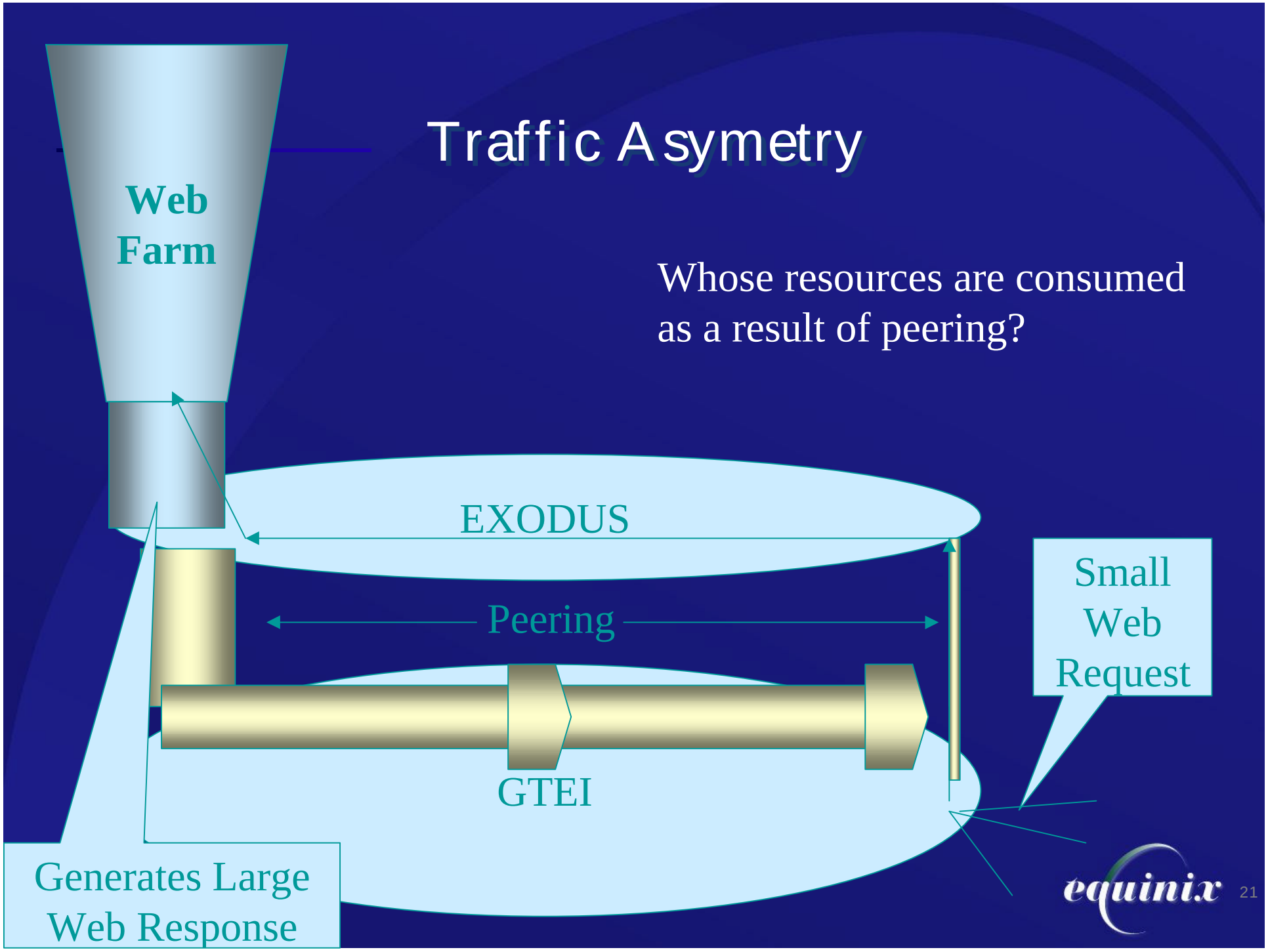
©2000 Equinix, Inc.

Thanks to!

Thanks to those who helped with the latest draft (1.3): Ren Nowlin (Onyx), Joe Payne (IXC), Dave Diaz (NetRail), Jake Khuon (Frontier GlobalCenter), Patricia Taylor-Dolan (Level 3 Communications), Cathy Wittbrodt (Excite@Home), John Curran (NextLink), Jeff Rizzo and Dan Gisi (Equinix), Tom Ryan (NewEdge), Alex Bligh (GX Network), Steve Meuse (GTE), Keith Mitchell (LINX), Aaron Dudek (Sprint), Waqar Kahn (Qwest), Brian Dickson (TeleGlobe)

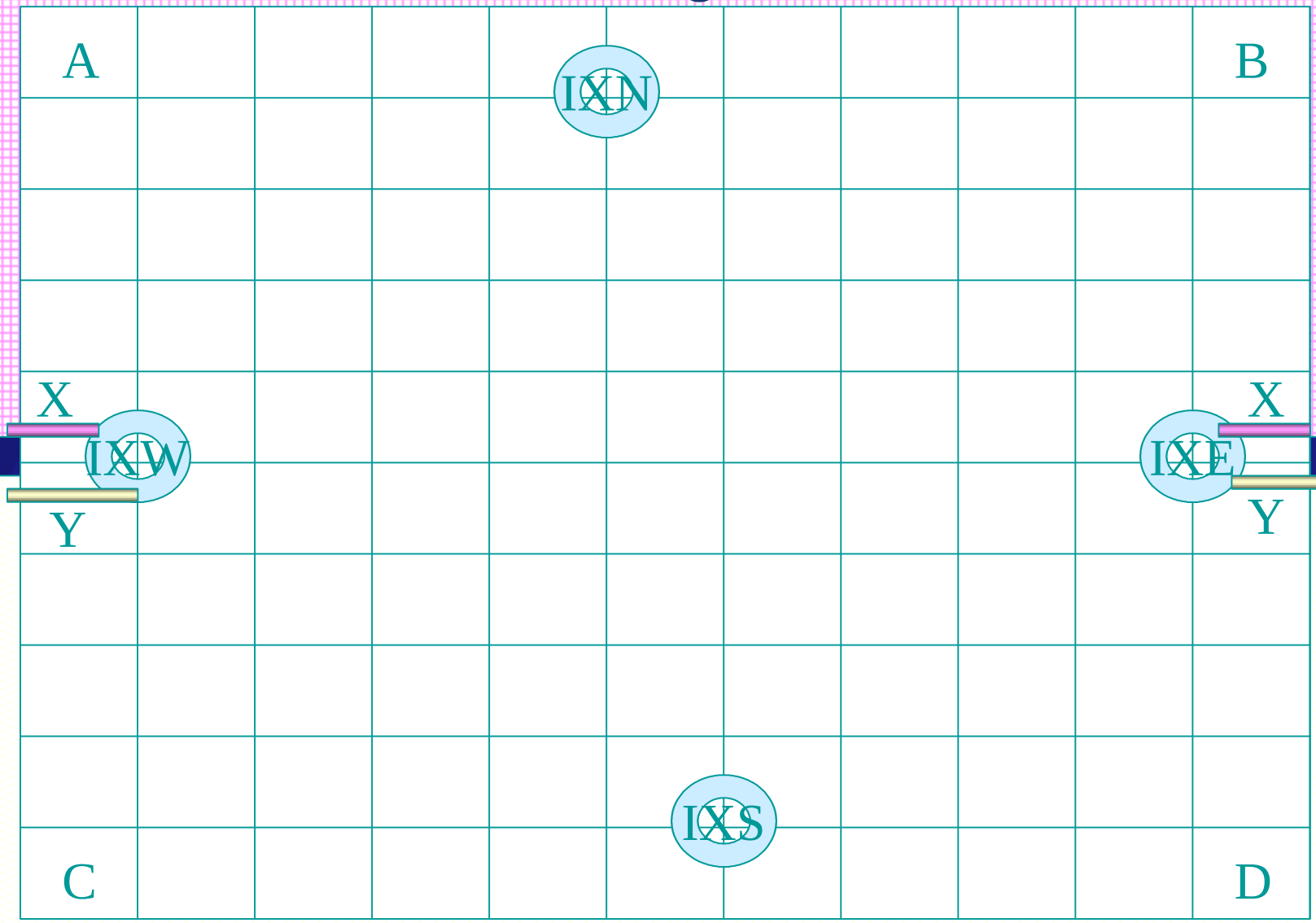
©2000 Equinix, Inc.

Traffic Asymetry



The Peering Game

Transit Provider X



Transit Provider Y

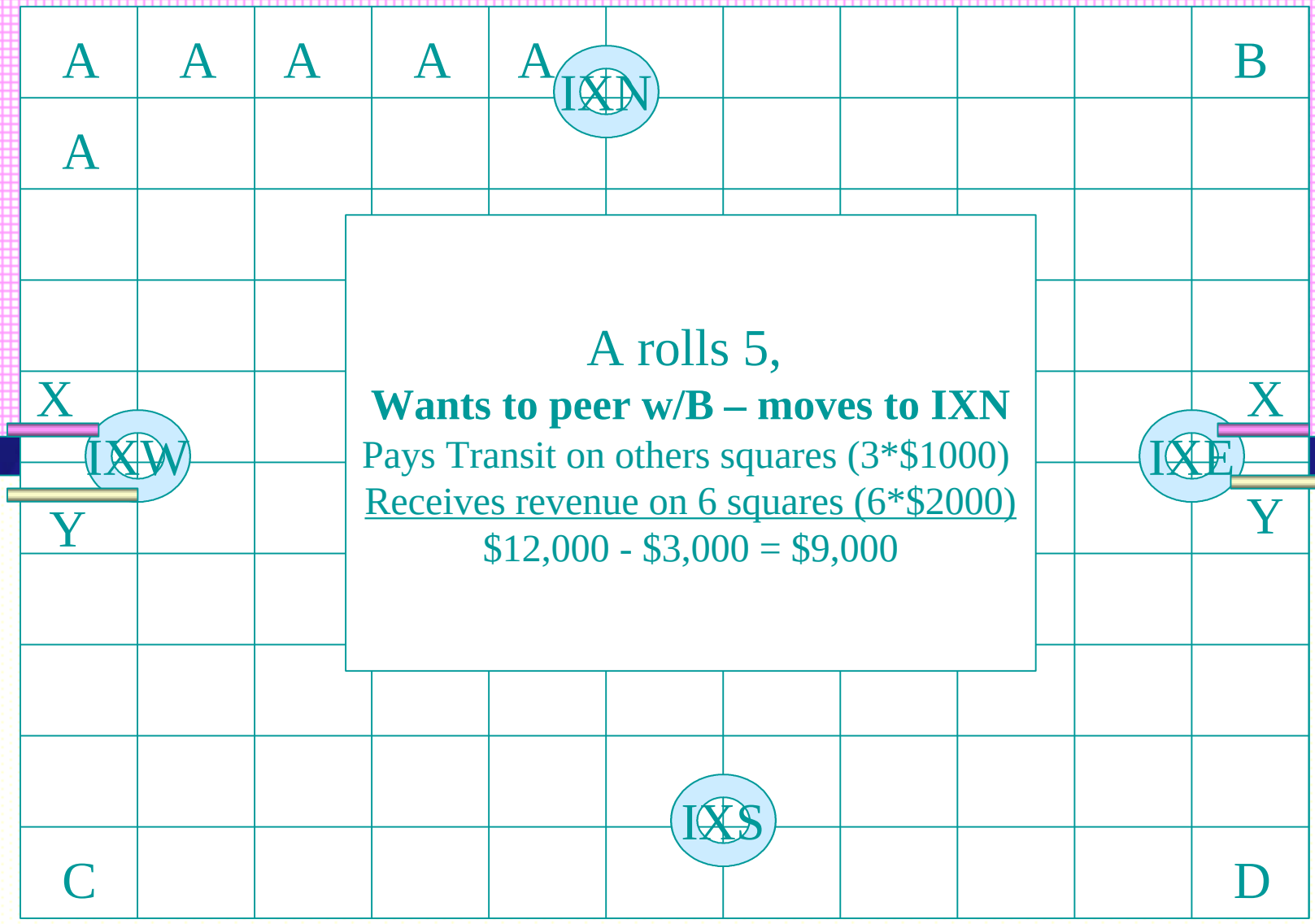
©2000 Equinix, Inc.

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

©2000 Equinix, Inc.

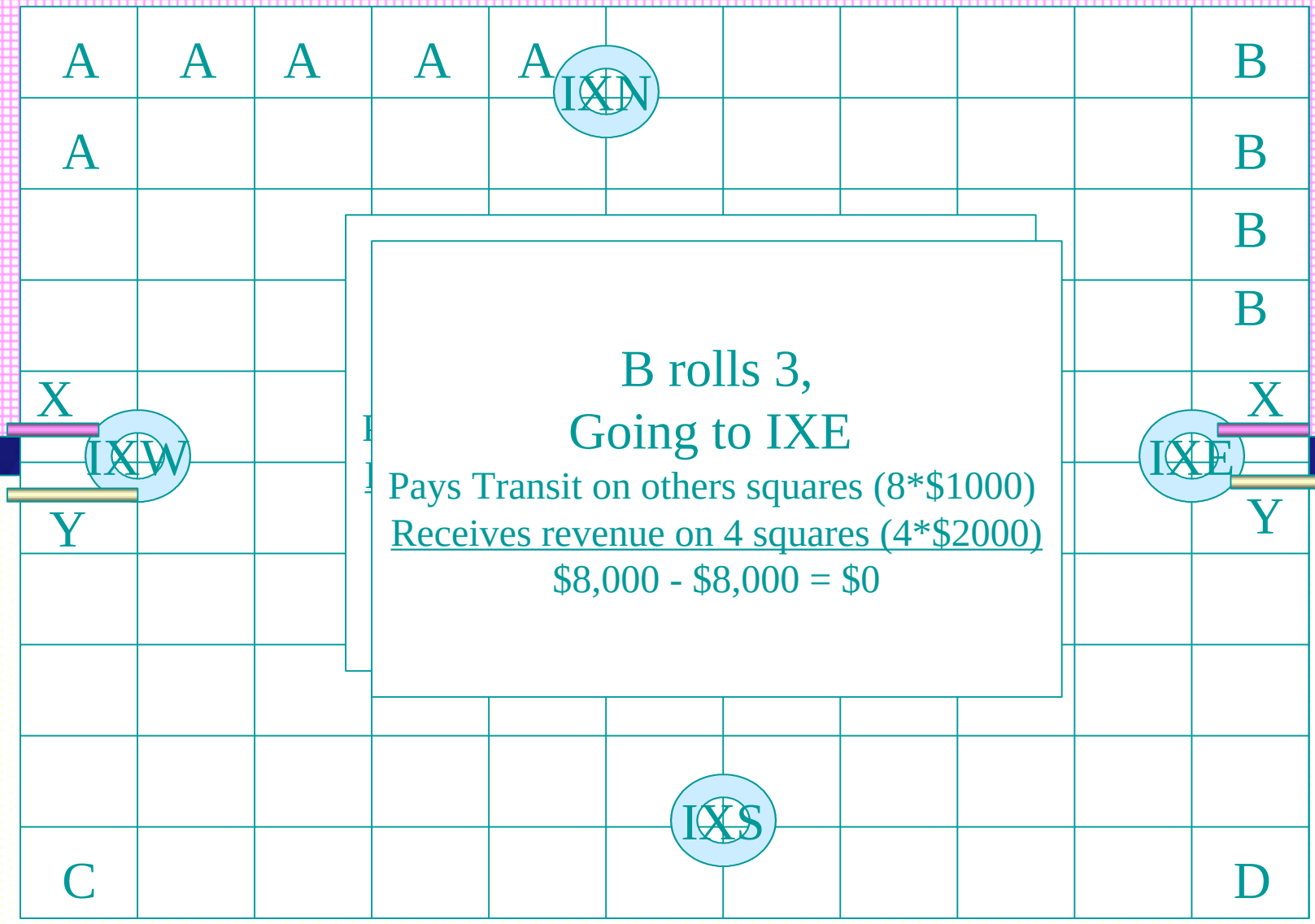
Transit Provider X



Transit Provider Y

©2000 Equinix, Inc.

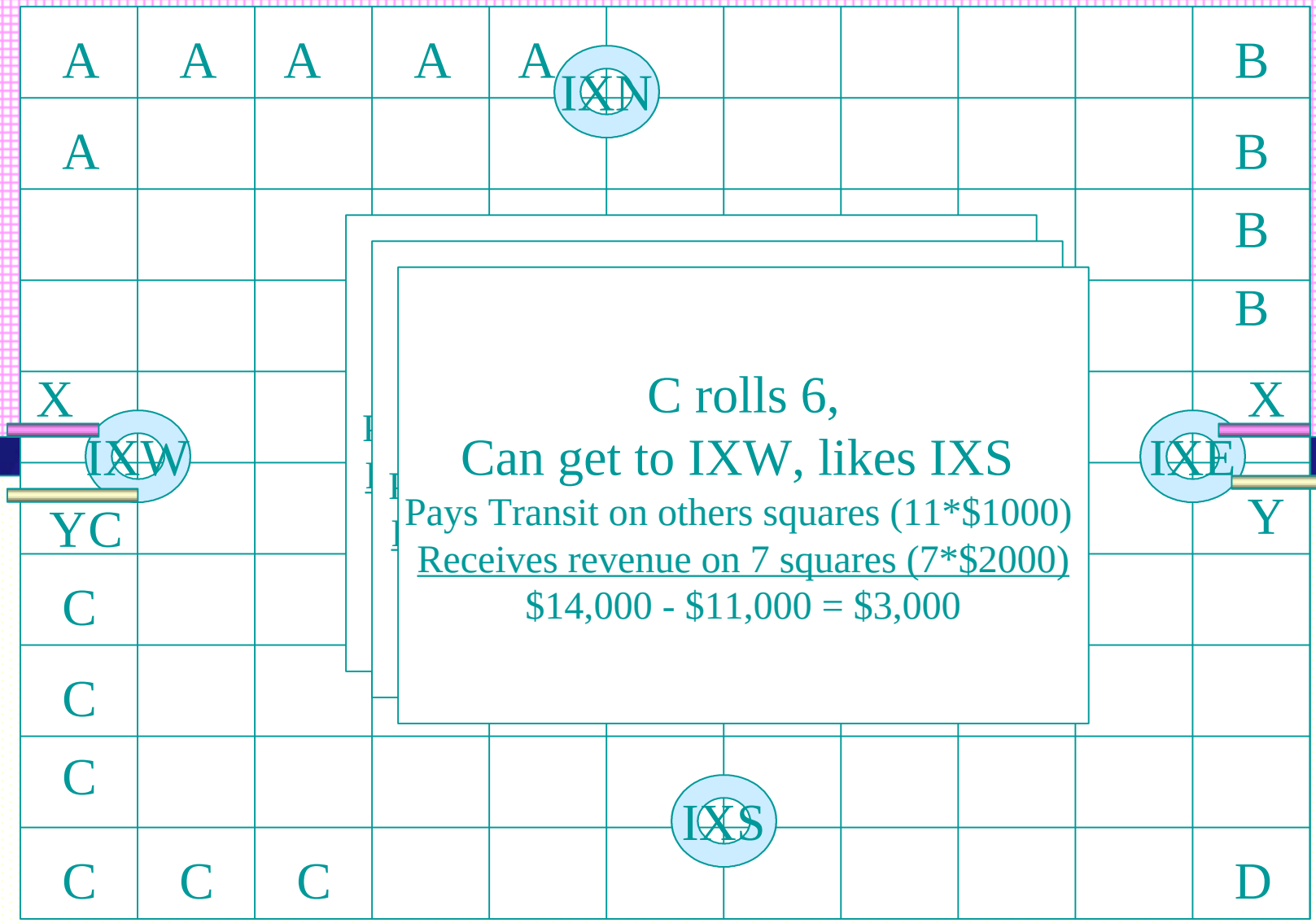
Transit Provider X



Transit Provider Y

©2000 Equinix, Inc.

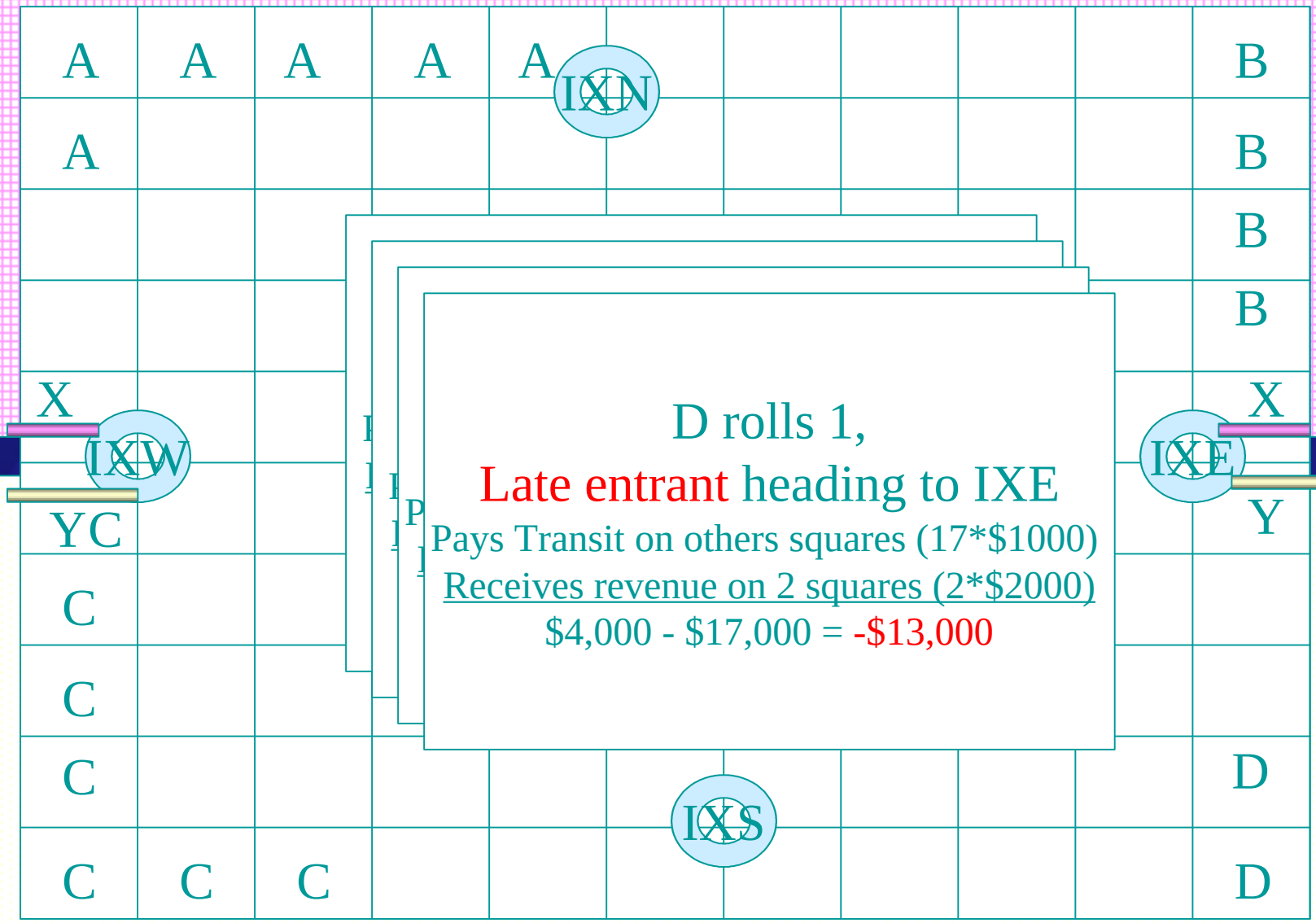
Transit Provider X



Transit Provider Y

©2000 Equinix, Inc.

Transit Provider X



D rolls 1,

Late entrant heading to IXE

Pays Transit on others squares (17*$1000)

Receives revenue on 2 squares (2*$2000)

$4,000 - $17,000 = -$13,000

Transit Provider Y

©2000 Equinix, Inc.

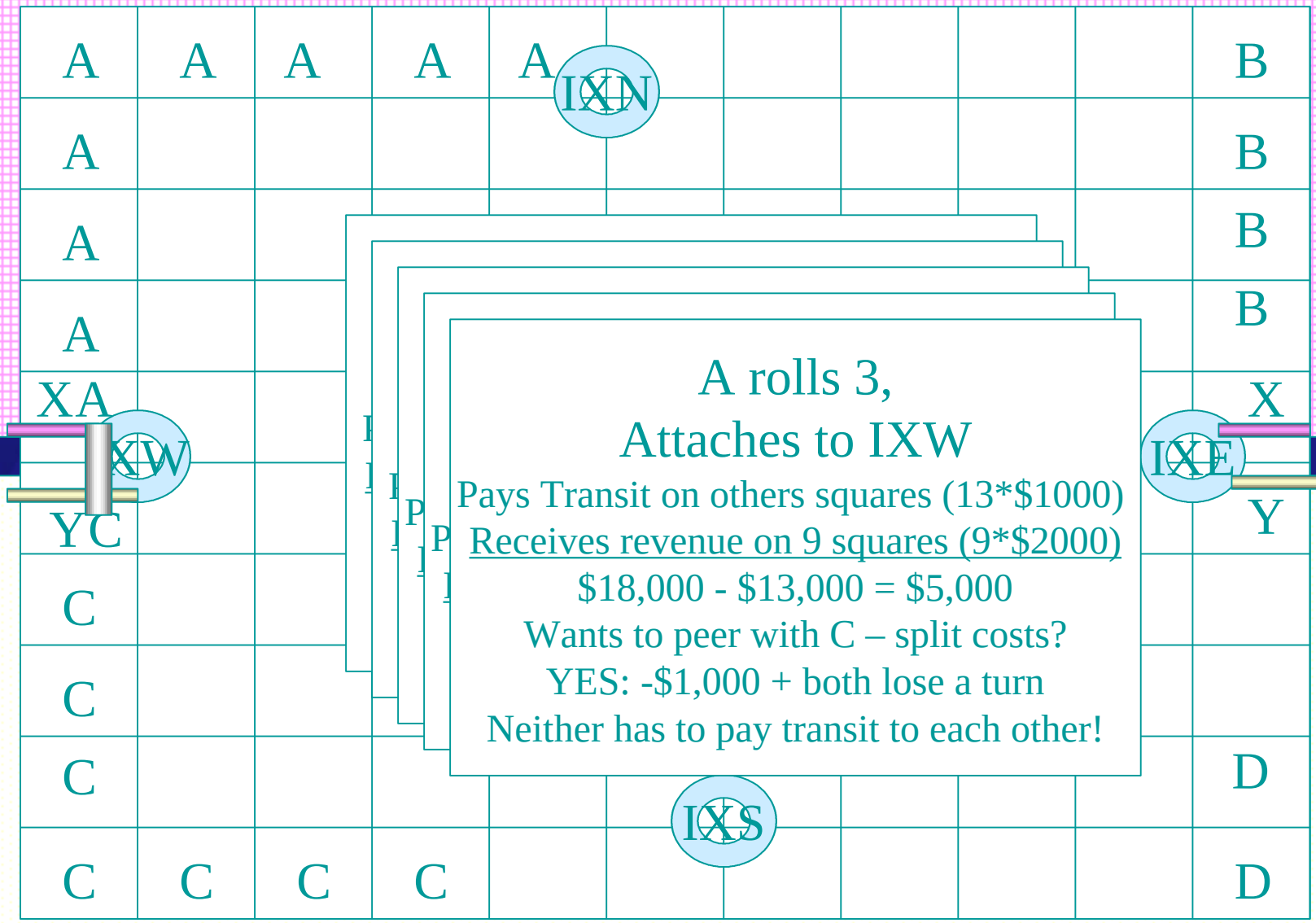
Scoreboard after Round 1

- ISP A: $9,000
- ISP B: $0
- ISPC: $3,000
- ISPD: -$13,000

- On to Round 2→

©2000 Equinix, Inc.

Transit Provider X

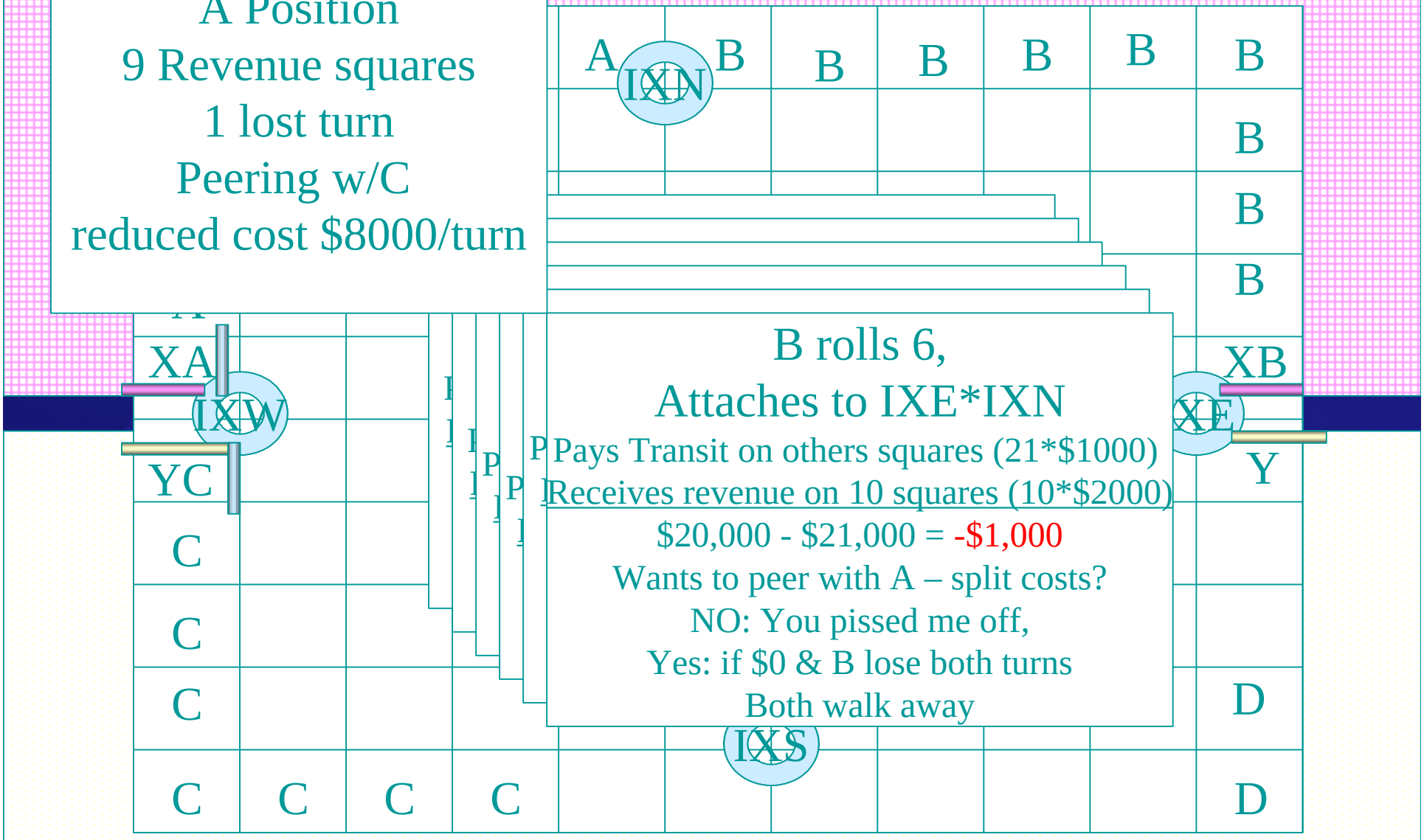


Transit Provider Y

©2000 Equinix, Inc.

Transit Provider X

A Position
9 Revenue squares
1 lost turn
Peering w/C
reduced cost $8000/turn



B rolls 6,
Attaches to IXE*IXN
Pays Transit on others squares (21*$1000)
Receives revenue on 10 squares (10*$2000)
$20,000 - $21,000 = -$1,000
Wants to peer with A – split costs?
NO: You pissed me off,
Yes: if $0 & B lose both turns
Both walk away

Transit Provider Y

©2000 Equinix, Inc.