

The Great (Public vs. Private) Peering Debate

Peering at 10G

William B. Norton

Co-Founder & Chief Technical Liaison

Equinix, Inc.

Early DRAFT

Early DRAFT

The Great (Public vs. Private) Peering Debate

Peering at 10G

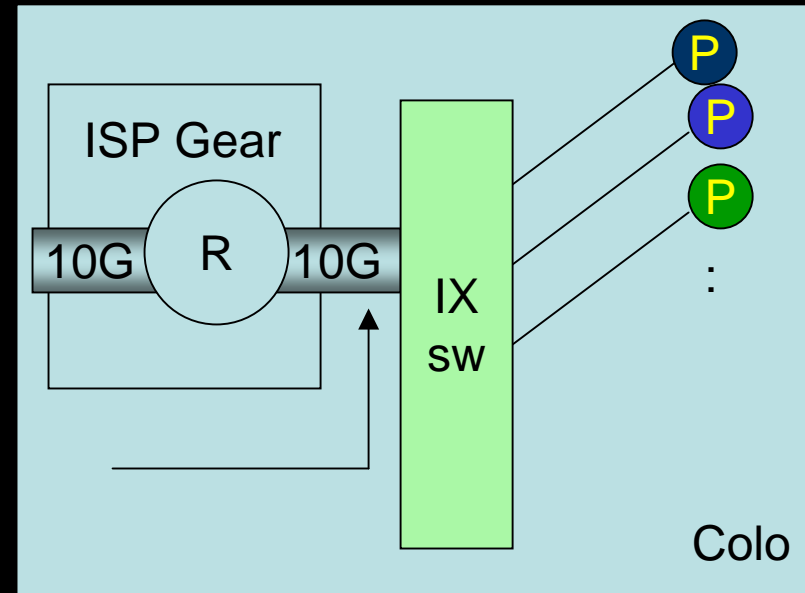
Research Question

Does 10Gbps Public Peering make sense (financially)?

- **Private Peering (GigE) is the next best alternative**
- **Perception: 10G router HW is too expensive**
- **10G Public vs. 1G Private Peering**

Public Peering Model

1. Router w/ 2 10Ge Interface Card
2. 10G Public Peering Port
3. Colo Modeling...



Assumption: We are ignoring the transport cost into the IX

10G Public Peering Modeling Assumptions

1) Juniper M320			
First 10G Peering Capacity			
2*10G LAN PIC	\$282,000		
Fixible PIC concentrator	\$80,000		
Chassis (20Gbps per slot, 8 slots)	\$145,000		
Total Initial	\$507,000		
less 35% discount	\$329,550.00	\$9,154.17	per month

2) **10G Public Peering Port at IX: \$10,000 per month**

3) **Colocation: \$1,000 per month**

Total Cost of 10G Public Peering: \$20,154 per month

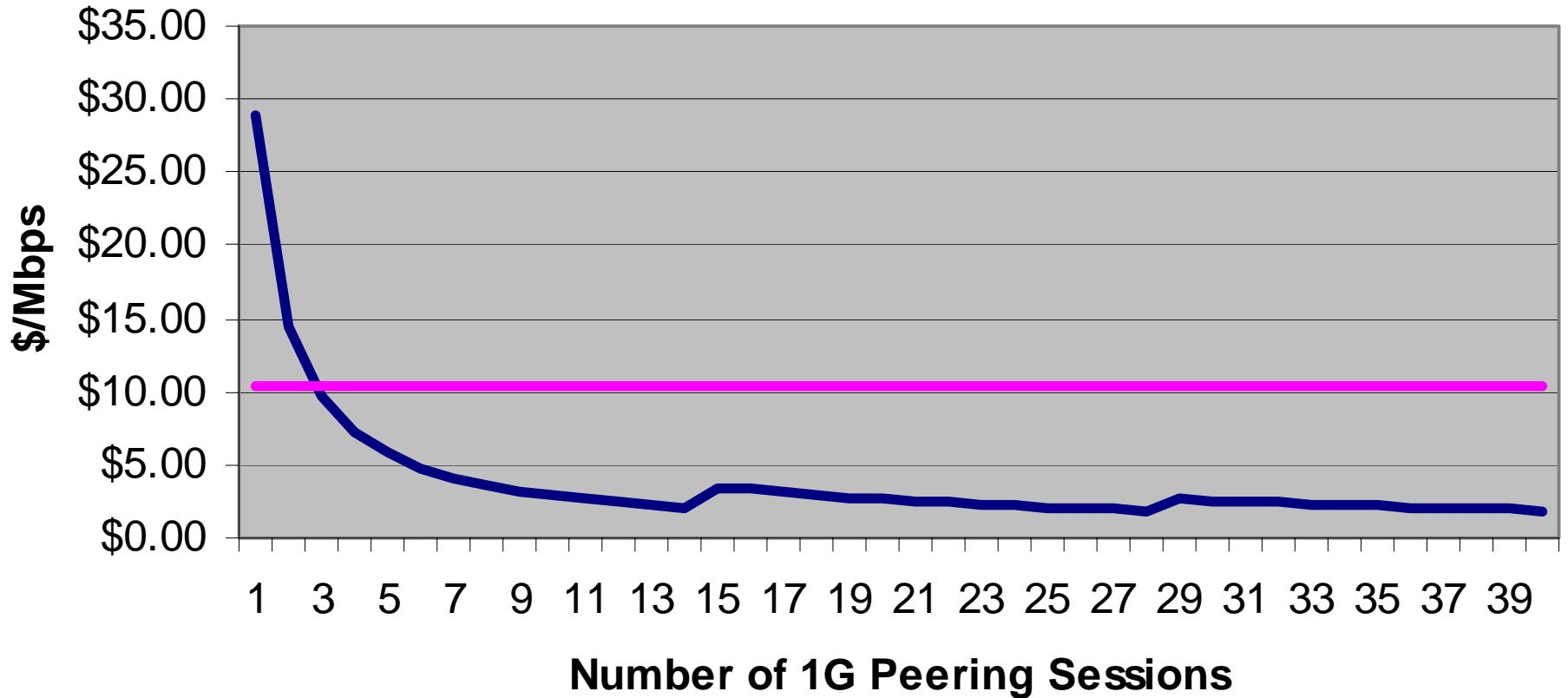
Assumption: 36 month amortization of capital equipment

10G Public Peering Scaling

# Peering Sessions	Effective Peering Bandwidth (in Mbps)	+ Requires Ingress Port	10G Peering Monthly Port(s) fees	1 Rack Monthly Colo Fee	Equipment Monthly Costs	Best Public Peering \$/Mbps
1	700	10GE	\$10,000	\$1,000	\$9,154	\$28.79
2	1400	10GE	\$10,000	\$1,000	\$9,154	\$14.40
3	2100	10GE	\$10,000	\$1,000	\$9,154	\$9.60
4	2800	10GE	\$10,000	\$1,000	\$9,154	\$7.20
5	3500	10GE	\$10,000	\$1,000	\$9,154	\$5.76
6	4200	10GE	\$10,000	\$1,000	\$9,154	\$4.80
7	4900	10GE	\$10,000	\$1,000	\$9,154	\$4.11
8	5600	10GE	\$10,000	\$1,000	\$9,154	\$3.60
9	6300	10GE	\$10,000	\$1,000	\$9,154	\$3.20
10	7000	10GE	\$10,000	\$1,000	\$9,154	\$2.88
11	7700	10GE	\$10,000	\$1,000	\$9,154	\$2.62
12	8400	10GE	\$10,000	\$1,000	\$9,154	\$2.40
Add 2 nd 10GEs	9100	10GE	\$10,000	\$1,000	\$9,154	\$2.21
	9800	10GE	\$10,000	\$1,000	\$9,154	\$2.06
	10500	2*10GE	\$20,000	\$1,000	\$15,690	\$3.49
	11200	2*10GE	\$20,000	\$1,000	\$15,690	\$3.28
	11900	2*10GE	\$20,000	\$1,000	\$15,690	\$3.08
	12600	2*10GE	\$20,000	\$1,000	\$15,690	\$2.91

Assumption: Aggregation Efficiency ~1.5:1

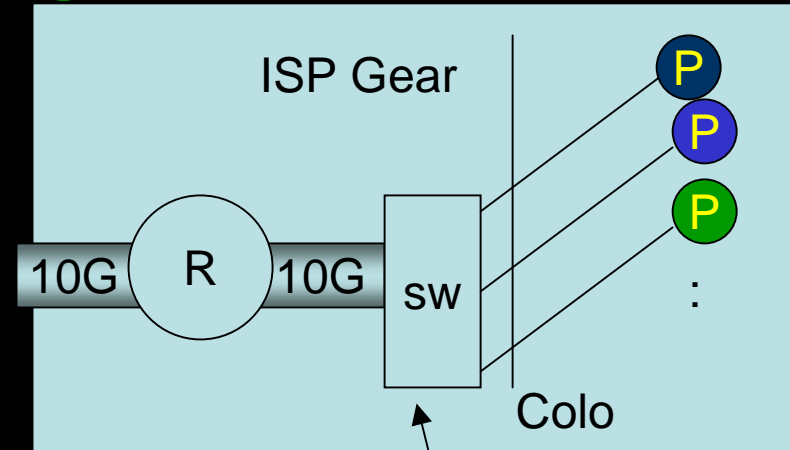
Graphically



Assumption: If Peering towards 10G, probably buying transit ~\$10/Mbps

Private Peering Model

- Router w/10G NICs
- ~~10G Public Peering Port~~
- Colo w.\$250/mo XCs



Add Private Peering Switch

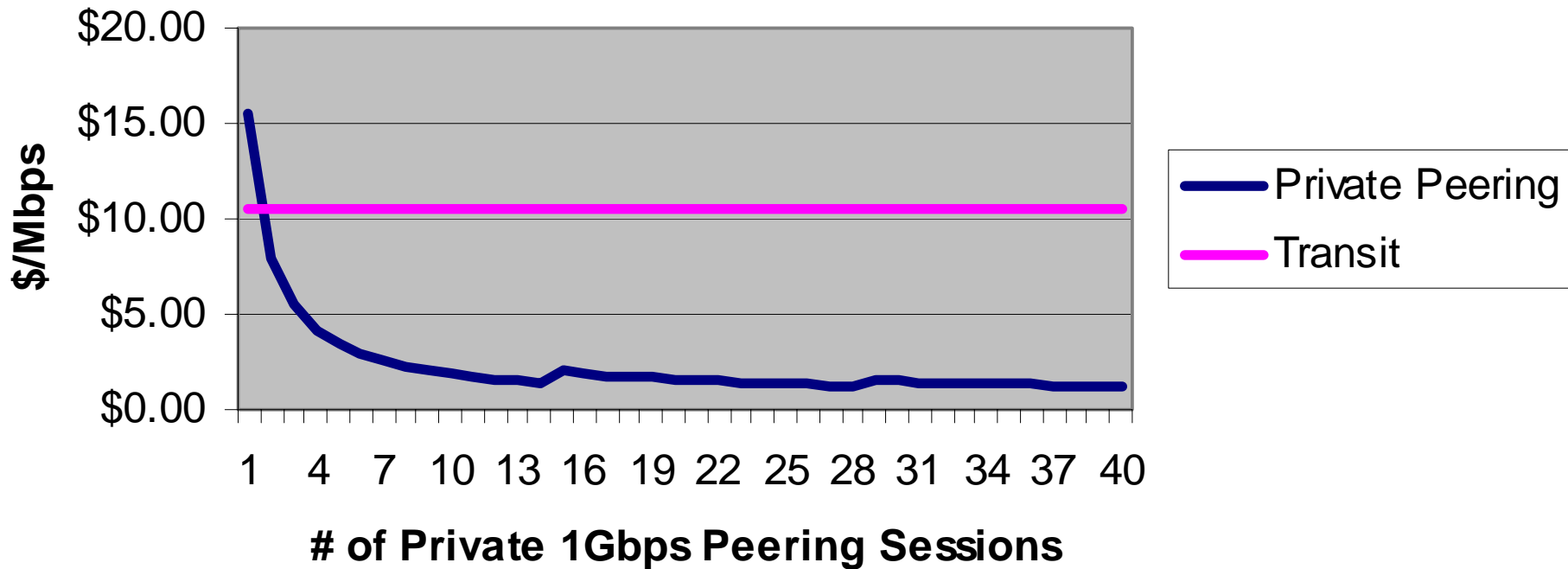
Private Peering Configuration			
Foundry SuperX			
<u>For first 24 ports</u>			
Foundry 8 slot chassis	\$14,995		
Fast Iron 24-port GE SFP mini-GBIC	\$6,995		
FastIron 2 port 10GE XFP	\$5,995		
Total Initial	\$27,985		
less 35% discount	\$18,190.25	\$505.28	per month

Scaling 1G Private Peering

# gigE cross connects	Effective Peering Bandwidth (in Mbps)	+ Requires Ingress Port	+Cross Connect Fee	1 Rack Colo Fee	Equipment Monthly Costs	Best Private Peering \$/Mbps
1	700	10GE	\$ 250.00	\$1,000	\$9,659	\$15.58
2	1400	10GE	\$ 500.00	\$1,000	\$9,659	\$7.97
3	2100	10GE	\$ 750.00	\$1,000	\$9,659	\$5.43
4	2800	10GE	\$ 1,000.00	\$1,000	\$9,659	\$4.16
5	3500	10GE	\$ 1,250.00	\$1,000	\$9,659	\$3.40
6	4200	10GE	\$ 1,500.00	\$1,000	\$9,659	\$2.90
7	4900	10GE	\$ 1,750.00	\$1,000	\$9,659	\$2.53
8	5600	10GE	\$ 2,000.00	\$1,000	\$9,659	\$2.26
9	6300	10GE	\$ 2,250.00	\$1,000	\$9,659	\$2.05
10	7000	10GE	\$ 2,500.00	\$1,000	\$9,659	\$1.88
11	7700	10GE	\$ 2,750.00	\$1,000	\$9,659	\$1.74
12	8400	10GE	\$ 3,000.00	\$1,000	\$9,659	\$1.63
13	9100	10GE	\$ 3,250.00	\$1,000	\$9,659	\$1.53
14	9800	10GE	\$ 3,500.00	\$1,000	\$9,659	\$1.44
15	10500	2*10GE	\$ 3,750.00	\$1,000	\$16,196	\$1.99
16	11200	2*10GE	\$ 4,000.00	\$1,000	\$16,196	\$1.89
17	11900	2*10GE	\$ 4,250.00	\$1,000	\$16,196	\$1.80

Graphically

1G Private Peering vs. Transit



Strongest Arguments: Public Peering is Better than Private Peering

1. Aggregation Benefits

- **Peaks+Valleys=Efficiency**
- **Large Gradations=headroom**

2. Ease of Administration

- **Easy+Fast**
- **Trial Peering**
- **No additional Cost/No Signing Authority**
- **Financial Predictability**
- **Scales Large (950M) Peering Sessions**

3. Public Peering as Selection Criteria

4. Only reasonable way to peer between colos

Strongest Arguments: Private Peering is Better than Public Peering

1. Easier to Monitor

- No NetFlow needed!
- No Blind Over Subscription Problem

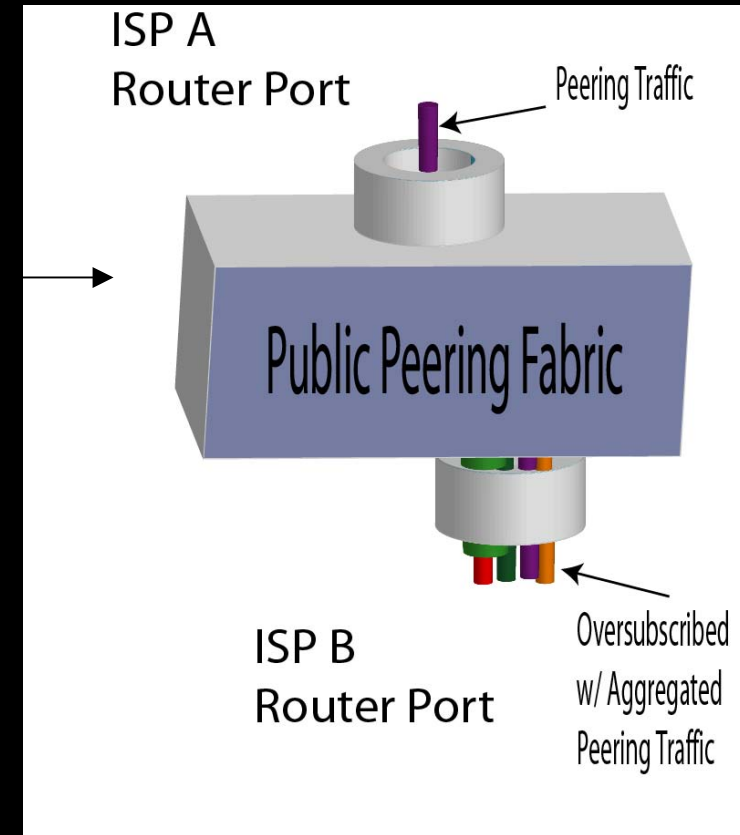
2. More Secure

3. Cheap

- $\$200/40\text{Mbps} = \$5/\text{Mbps}$

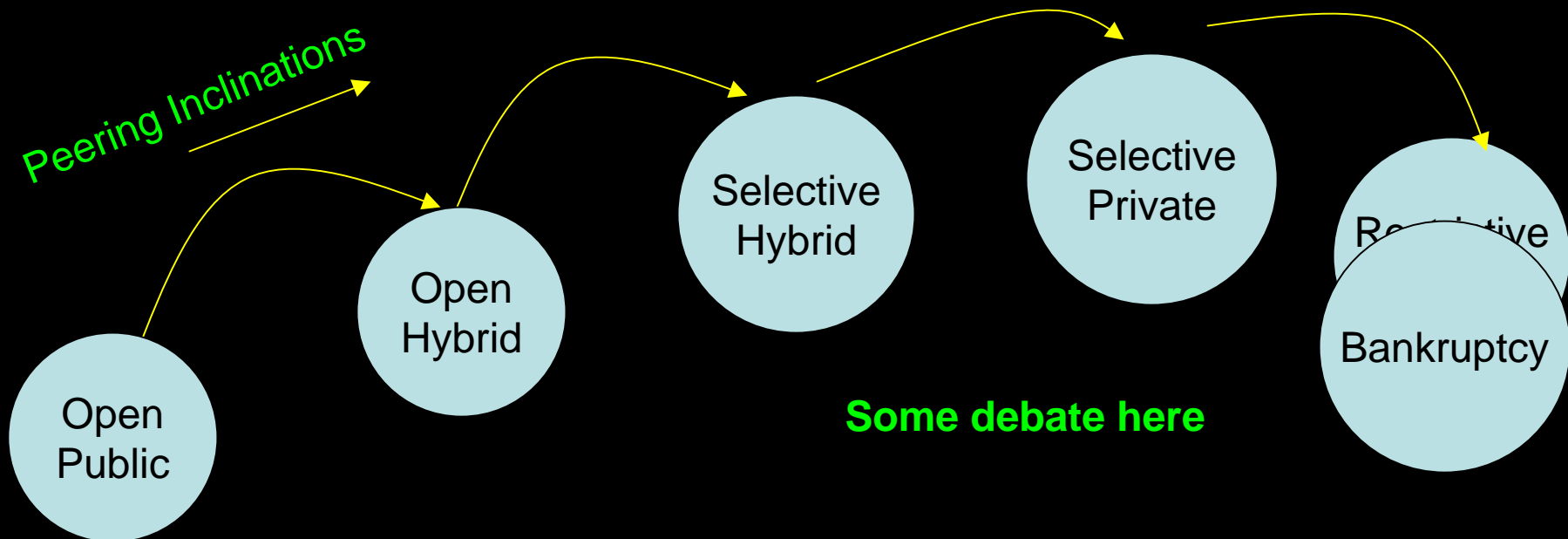
4. More Reliable + Easier to Debug

5. Signals a more attractive peer



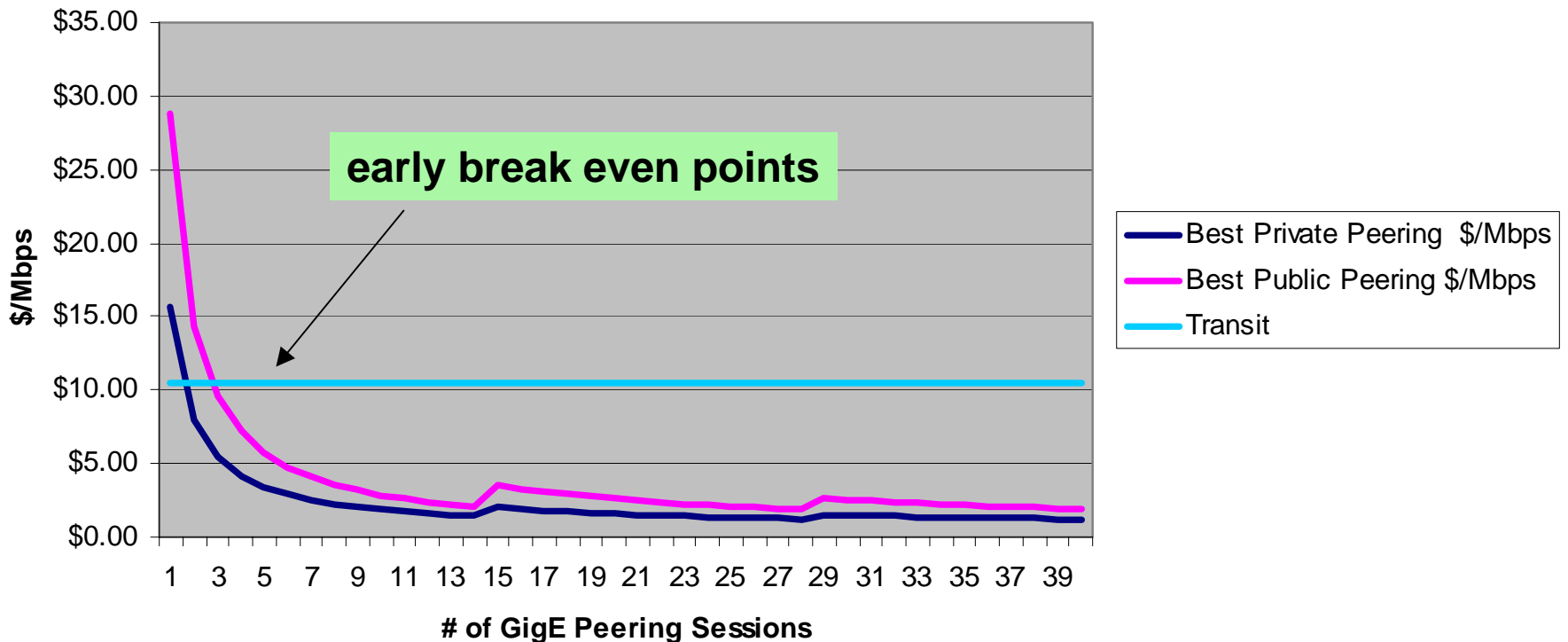
Religion: Hybrid Approach

- Publicly peer small sessions
- Privately peer large sessions at 40%
- Vijay Gill's Peering Lifecycle Argument



Public 10G vs. Private 1G

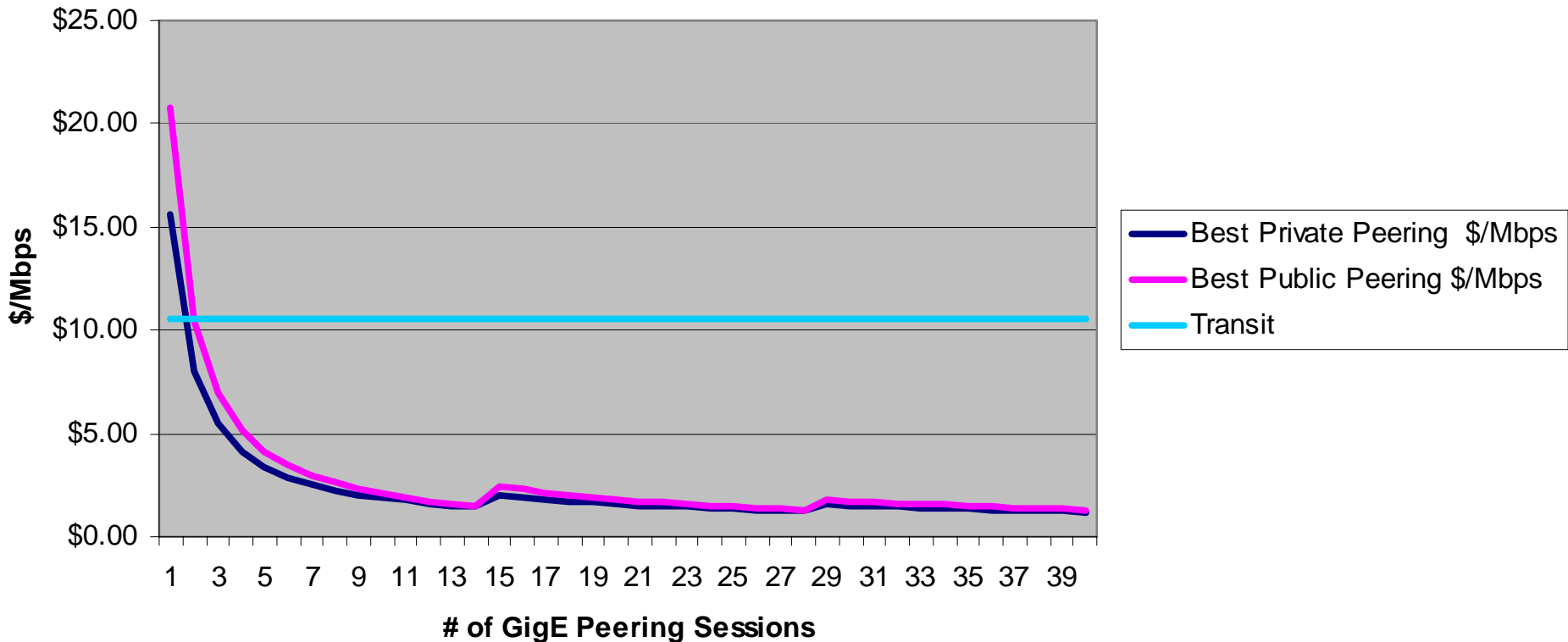
10G Public vs. Private Peering



- 1) Similar curves, early break even points (2 peering sessions)
- 2) As traffic grows, difference shrinks
- 3) European 10G IX Port Fees are less...

What if 10G Port costs \$4400/mo?

10G Public vs. Private Peering



Public Peering Ease of Administration

May not be able to XC

Watch Assumptions: Cost of 10G HW Dropping

Sub 10G Architecture

Assumption: XCs still at \$250/mo for Europe

Transition Peering Dynamics

Historically, two competing dynamics here...

During IX Migrations...Peering migrates

1) Public Peering → Private Peering

- Can't afford the 10G router – let's private peer

2) Private Peering → Public Peering

- Can't trunk or load share across 2 Privates

Acknowledgements

Ren Provo (SBC), Richard Steenbergen (nLayer), James Rice (LoNAP), Todd Underwood (Renesys), Stephen Wilcox (TeleComplete), Vanessa Evans (LINX), Niels (ANS-IX), Chris Malayter (TDS Telecom), Patrick Gilmore (Akamai), Frank Orloski (T-Systems), Vijay Gill (AOL), Vish Yelsangikar (NetFlix), Nathan Hickson (eBay), Steve Feldman (CNet), Lane Patterson (Equinix), Joy Fender, Falk Bornstaedt (T-Systems), Remco Donker (MCI), Danny McPhearson (Arbor Networks)