Peering Evolution
Trends in Internetwork Peering

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Evolution?

- This is a speculative talk about where we are now, and where we are going.
- Speculative == Not so much hard data
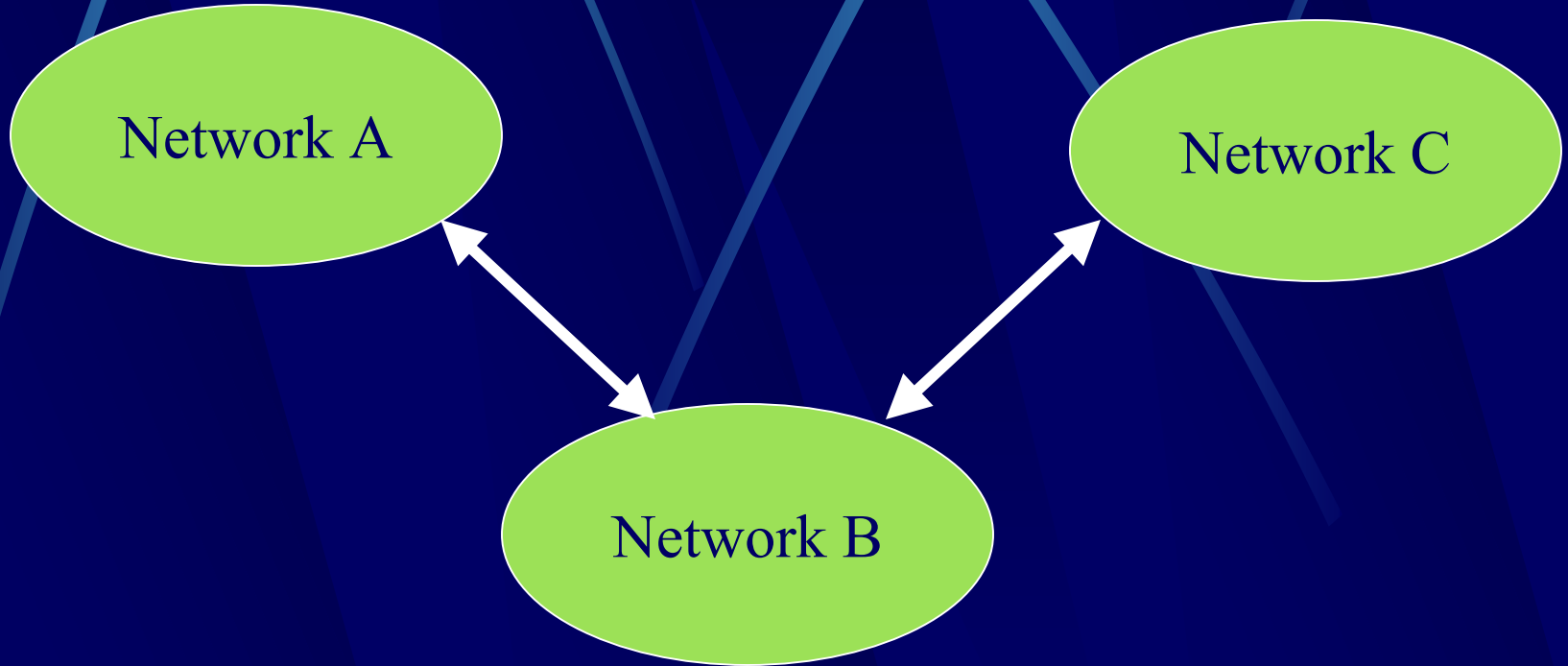- Please participate! Ask questions!

Evolution?

- What is Peering
- A Brief History of Peering
- How networks peer today
- The future of internetwork peering.

What is Peering?

Many Definitions – lets just concentrate on one…

Peering is the mutual agreement between IP networks to exchange data amongst themselves, ONLY, for no fee, charge, or settlement.

Free-Love Peering

- Early days of the true Internet
- Post-NSFNet
- Early backbone networks sought methods of interconnections
- During this period, the "classic" public peering points became reality
  - FDDI NAPs
  - Later, ATM NAPs
- "Hey buddy, you want to peer? Sure!"

Age of Restrictive Peering
Portents of Doom

- Codification of Peering Requirements
  - Network Size
  - Bi-costal, number of locations
  - Traffic
  - International

Age of Restrictive Peering
Portents of Doom

- At large networks, the rise of peering committees.
  - Sales
  - Network Planning
  - Business Development
- Revenue Orientation

End of Traditional Peering
Landmark Events

- UUNet De-Peering - April/May 1997
- Decisions of various IP Backbones to cease Public Peering
- Shutdown of MAE-East-FDDI – February 2001
- Cable and Wireless De-Peering– May 2001
- Gradual (and smarter) Sprint Depeering – 2001/2002

Who's Peering Now?

- Traditional Tier 1 Backbones - those still in business
- Major US Access Players - Dial ISPs, MSOs, RBOCs
- PTTs - Telia, Telecom Italia, France Telecom, British Telecom, DT, and others
- Some content providers

Why and How?

- Private peering between large providers is at OC-12 and OC-48 levels, domestically.

- FDDI and ATM peering are deprecated. ATM peering has been proven to be economically unfeasible.

- Gigabit Ethernet public peering has proven to be successful - more so in Europe, than the US. Equinix and PAIX are leading US IXs. LINX is the largest public IX in the world.

Current Peering Modalities

- Open Peering
- The Donut Model
- Selective Peering
- Traditional Tier 1 Peering

Peering Modalities
Open Peering

- Smaller Providers - many times these are web hosters or Universities

- Limited Exchange Point Presence

- Will peer with anyone - motivation is lower transit costs

- Generally a mistake for larger providers - causes strain on OPEX, backhaul.

Peering Modalities
Donut Peering

- I like donuts as much as the next guy, but what's all this talk about donuts and peering?

- The current "hot idea" in peering is the donut – networks with open peering going "around the core" to peer.

- Generally only requirements are multiple locations.

- Many folks trying this approach are regionals.

Peering Modalities
Donut Peering

- Will the Donut Model of Peering make me a Tier 1?

- Not so fast, Donut-Fans. That first 50% of peering will be a breeze. But that last half will kill you, and may not be reachable through the donut approach.

- But Why? Because more open peering at the start means you may not have sufficient traffic levels to peer with the big guys later – traffic levels are key for the Tier 1's.

Peering Modalities
Donut Peering

- Other drawbacks -
  - Too many peers can raise OpEx costs.
  - Allowing unfavorable ratios may tax backbone capacity
- But there are advantages -
  - Fast reduction in transit costs
  - Increased performance

Peering Modalities
Selective Peering

- Generally larger providers - PTTs, largest access providers.

- More Requirements, including ratios and traffic levels.

- Generally slower approach to acquiring peering, as some peering requests are rejected

- Conservative in terms of OpEx, Backbone Capacity

- Leaves open potential to go Transit Free

The Future Of Peering
New Approaches

- Compensation-based Peering
- Content-Provider Peering
- Access-Provider Peering

The Future Of Peering
Compensation-based Peering

- Predicated on the idea that there will be a pricing niche

- Currently, transit is being sold below cost by the cheapest providers - this can not be maintained

- Stable transit pricing should be $150 mpbs in large quantities. Higher costs for lower quantities.

The Future Of Peering
Compensation-based Peering

- Carriers will be able to provide this service at lower cost than traditional transit
  - Limited Availability
  - In-Facility
  - Lower Customer Costs
 - On-Net drives up transit revenue

The Future Of Peering
Compensation-based Peering

- Collocation providers are emerging as brokers for these arrangements, reducing carrier risk and overhead
  - Equinix - in San Jose and Ashburn - "Product X"
  - Redbus - in Frankfurt - "Intergate"
  - Provides either an intermediate router or route server and MAC accounting services.
  - Contracts are between end parties and colo provider, rather than between parties.

The Future Of Peering
Compensation-based Peering

AOL Transit Data Network
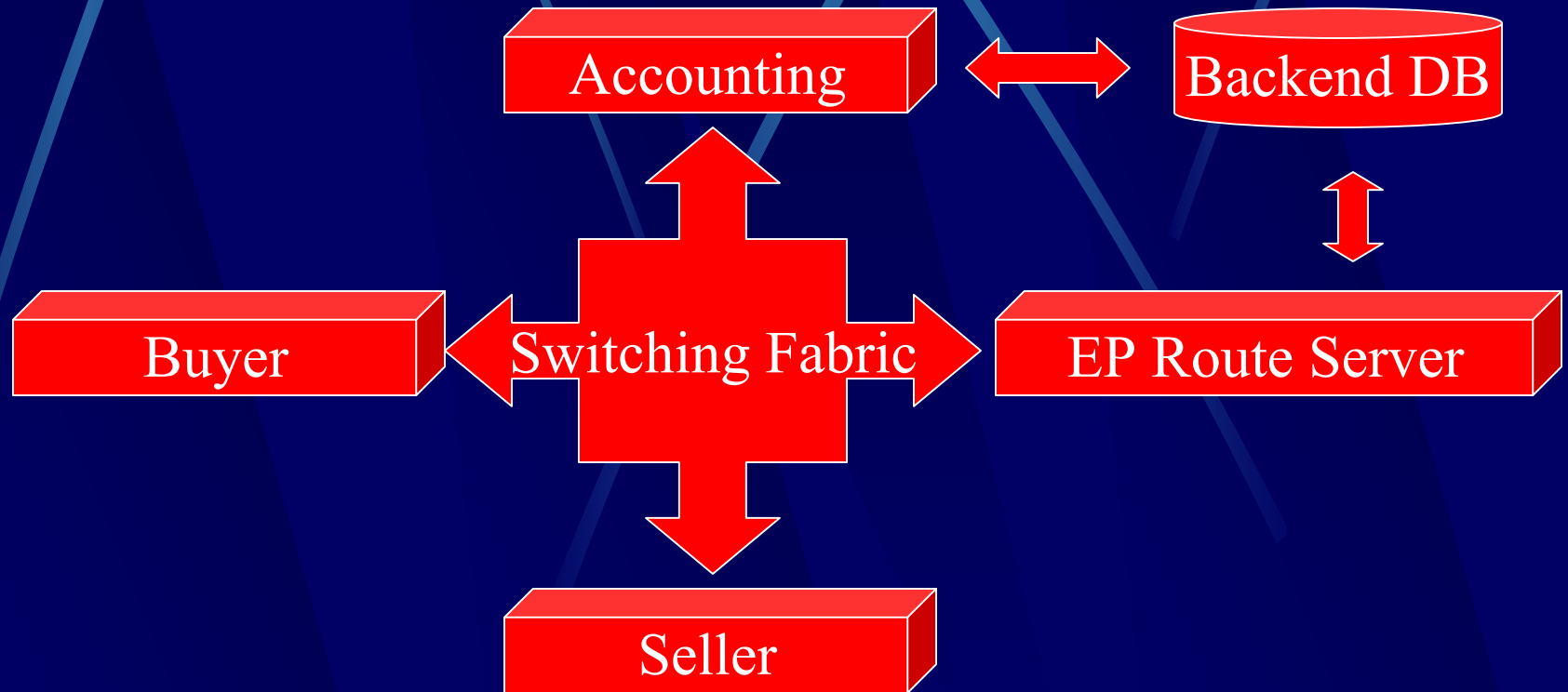
The Future Of Peering
Content Provider Peering

- Content Peering is a bad idea. Why?
- No significant performance improvement for carriers with current content
- It hurts you ratios, as compared to peering with the content's upstream
- Pressure is off for content providers, at least for now, due to low transit prices and eventual emergence of paid peering.

The Future Of Peering
Content Provider Peering

- A bad idea - general Internet efficiency negates any performance bonuses from direct interconnection to content.

- Negatives - if you peer with a content provider's upstream, it helps your ratio. If you peer with the content provider, no benefit.

- "Time to give it up?", except for the largest content players – Google, Yahoo, eBay.

- And even they aren't exactly well peered. The smaller content folks are still high and dry.

- Also, pressure is off, due to free-falling transit prices and, soon, availability of paid peering.

The Future Of Peering
Access Provider Peering

- Who? The eyeball folks – Dial, DSL, Cable
- Why? Transit Costs are not tolerable.
- Backbone Provider Perspective –
  - Not eager to give up revenue, but…
  - Can I sell you a lambda? Pursuit of peering strategies often means a network buildout
- Access providers must balance ability to get peering, network costs, transit costs, to find balance.
- Options: National buildout, regional buildout, no buildout.

The Future Of Peering
Access Provider Peering

- Major Dial ISPs build networks, and have begun to peer.

- Cable Companies are starting to build out now, having been delayed by heavy debt loads as the result of profitless digital builds. Look for more peering activity in this area from the least debt-laden.

- RBOCs: What a mess! The Telecom Act of 1996 has sabotaged RBOC Peering. SBC has been aggressive, other RBOCs less so. Clue is the key for RBOC peering success.

The Future Of Peering

Conclusions

Decide where you are at…

"My company is looking at peering."

"My company has a peering strategy - I don't know if its successful."

"We need to re-examine our peering strategy, because of evolving market conditions"

The Future Of Peering
What Does This Mean?

- Be Smart About Peering- Don't peer just for bragging rights - peering is a deliberate, business decision.

- Decide on a strategy - it should be in <u>writing</u>

- Don't grow your network just to peer, but leverage your growth smartly

- Be aware of your peering strengths and weaknesses - Ratios, traffic levels, network reach, special content.

The Future Of Peering
What Does This Mean?

Be cheap about peering
- Minimize costs by going into peering friendly facilities
- Don't drink the Kool-Aid ™ at any cost – some peering solutions are too expensive – ATM, metro circuits, some long-haul.
- Explore alternate solutions like paid peering.

Look to the future!
- Transit prices will rise – current pricing is non-sustainable
- Time to finally lock in that transit pricing?
- Value of peering will become more obvious - strike when the time is right.

Question and Answer

- How to contact me?
  - dgolding@aol.net
  - Peering inquiries should be directed to peering@aol.net