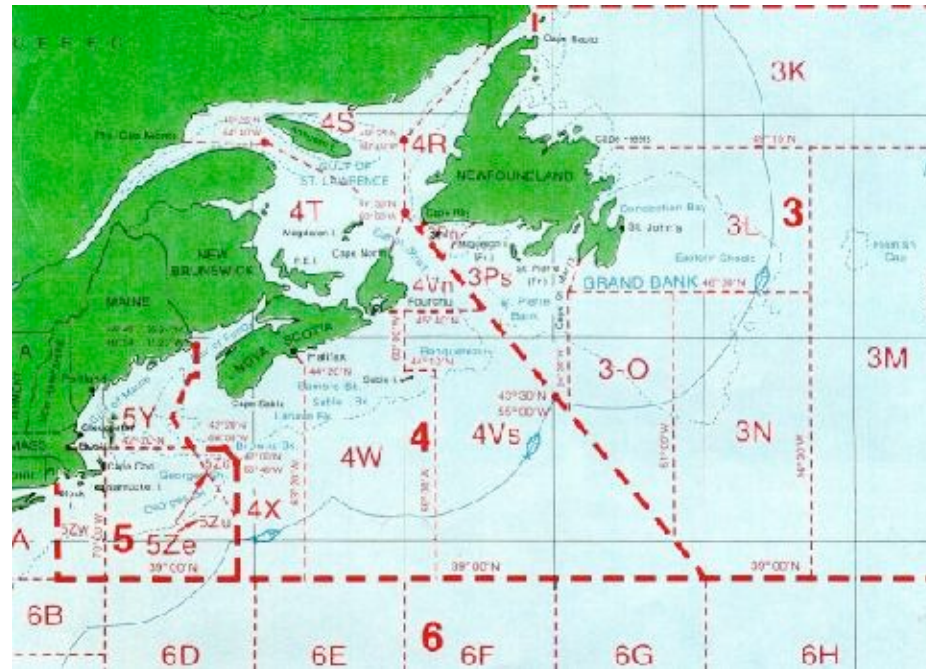


# Perfect Storms, Internet Economics, and the Future of the Internet



David Meyer  
NANOG 4I  
October 2007

# Agenda

- Background and Context
- So what is the “Perfect Storm”?
- Three Pieces of the Puzzle
- A Few Considerations
- Discussion

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  - RFC 3439



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  - We'll see why this is an interesting question in a moment





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- In analyzing the space a bit, I proposed a scenario that became known as "Meyer's Telecommunications Perfect Storm", or TPS
  - “You name it, you own it”
- The rest of this talk reviews the TPS scenario and its implications

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    - This conclusion “may” be considered controversial by some



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- Let's look at each of these in detail...

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- "deconvergence "
- In any event, *lower OPEX* is something you'll need if you want to get to a profitable low margin business

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  - See e.g., <http://www.potaroo.net/ispcol/2006-02/congconverged.html>

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  - But even that is changing (rapidly)

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  - So we need to encourage research in this area

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  - In any event, a "race to the bottom" ensues
- Which is exactly what the SP industry has experienced over the past few years

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    - i.e., the incremental cost of forwarding a packet

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- Answer: Approaching zero
- So what does this say about pricing power that an SP has in the market?

# On Economic Realities<sup>1</sup>

## capital distribution problem

(the ones who need to innovate in the core don't have capital)

INNOVATOR	EPS (\$)	MKT CAP (\$B)
MCIW	-11.22	6.5
SPRNT/NXTL	-0.31	34
VERIO/NTT	1.98	71.6
LEVEL3	-0.74	1.9
SBC/T	1.41	78
QWEST	-0.45	7.7
COGENT	-7.42	0.2
GLBC	-13.84	0.3
SAVVIS	-0.90	0.12
ABOVENET	n/a	n/a
WILTEL	n/a	n/a
TELEGLOBE	-0.74	0.2
C&W	0.70	4.7B
TWTELCOM	-1.12	1.0
(TWARNER)	0.48	82
XO	-2.18	0.4

INNOVATOR	EPS (\$)	MKT CAP (\$B)
CISCO	0.87	108
GOOGLE	3.41	97
AMAZON	1.25	19
YAHOO	1.07	49
EBAY	0.73	51
JUNIPER	0.53	13
APPLE	1.56	47.
INTEL	1.33	141
VERISIGN	0.93	6.15
DELL	1.27	76.3
MICROSOFT	1.12	269B

source: finance.yahoo.com, 25 oct 2005

<sup>1</sup>Chart courtesy kc claffy



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- The Internet Architecture, and in particular, the end-to-end principle, suggests that packet transport is a low margin, commodity business
- If you buy this, then one needs to question whether “policy-based” architectures can ever yield the higher margin transport infrastructures they promise

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- Truth in advertising #2: We still don't have a (inexpensive) wireless technology that could deliver 100s (or even 10s) of HDTV channels (in the access)



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- Consider the success of AOL or other attempted "walled-garden" providers
  - But then, what about IMS and the like?

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- And we can talk about the "bundling argument" if we wind up with time...

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  - plus encryption + anonymization + lots of app developers



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- Conclusion: *You can't effectively stop over-the-top services*
  - If there is competition in the access
- This is a classic arms race...but we're the arms dealer



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- Third piece of this puzzle is that a set of peer-to-peer (p2p) applications emerge that attack the incumbents revenue streams
  - "attack" in the capture-the-revenue sense (contrast DDOS)
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  - But also video, FMC, presence, IM, ...



# Applications Emerge that Target Incumbent Revenue Streams

- *So this is about a convulsion of the Internet technology and its end-to-end nature and the creativity it unleashed, with traditional carrier architectures and business models*
- In particular, while traditional carrier networks were vertically integrated (*the network was the application*), the Internet is horizontally integrated
- This has the effect of making many of the services the vertically integrated networks provided into *applications* on the Internet
  - Canonical example: Voice

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- *So is IPv6 really a perfect storm driver?*



# Summary

- So, what happens if we wind up with...
- *Low margin but profitable packet transport*
  - Emergence of "new world players"
- *No (or weakened) access monopolies*
  - Competition and/or new technologies
- *Large scale co-opting of traditional service provider revenue streams*
  - p2p (or other) applications target revenue
- Is this really an “if”?

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- And finally, what if we can't find a way to make a commodity internet profitable?

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  - Work with the vendors and the open source community to build platforms that have the needed properties

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- Even if the perfect storm scenario materializes, vendors *will* be able to preserve advantageous margin structures for *some* customers
- However, if what evolves is the need for low margin interfaces (perhaps riding the “ethernet cost/performance curve”), then vendors may need to hedge against their margin strategies

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    - Noting that *everything is Over-the-Top* on the Internet
- Continued understanding of our evolving needs
- And of course, continued smart and innovative engineering on our part

# A Few Final Thoughts

- We need to be teaching and informing the community at large
  - Where "community" includes SPs, enterprise operators, content providers, researchers, vendors, ...
- A bad (tm) outcome would be to find ourselves in a situation in which
  - Service Providers can't be profitable enough to continue bandwidth upgrade cycles
  - Service Providers then attempt to choke off innovation for (perceived) self-preservation
    - via legislative/regulatory action, and/or by technical means

# Questions/Comments?

# **Thanks!**