

The delusions of net neutrality

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Two key delusions in one phrase:

Net neutrality “is about streaming movies.”

Jim Cicconi, AT&T, 2006

Dominant types of communication: business and social, not content, in the past as well as today

Thirty years ago you left the city of Assur. You have never made a deposit since, and we have not recovered one shekel of silver from you, but we have never made you feel bad about this. Our tablets have been going to you with caravan after caravan, but no report from you has ever come here.

circa 2000 B.C.

A fine thing you did! You didn't take me with you to the city! If you don't want to take me with you to Alexandria, I won't write you a letter, I won't talk to you, I won't say Hello to you even. ... A fine thing you did, all right. Big gifts you sent me - chicken feed! They played a trick on me there, the 12th, the day you sailed. Send for me, I beg you. If you don't, I won't eat, I won't drink. There!

circa 200 A.D.

Human communication:

One picture is worth a thousand words

Human communication:

One picture is worth a thousand words,
provided one uses another thousand
words to justify the picture.

Harold Stark, 1970

Volume is not value:

In 1832, newspapers generated no more than 15 percent of total postal revenues, while making up as much as 95 percent of the weight.

Richard John, “Spreading the News”

Revenue per MB:

- SMS: \$1,000.00
- cellular calls: 1.00
- wireline voice: 0.10
- residential Internet: 0.01
- backbone Internet traffic: 0.0001

Volume is not value, but is an indicator of ecosystem health and growth!

Dreaming of streaming:

Vacuum Cat



Streaming vs. progressive downloads:

Vacuum Cat



Key misleading myth: streaming real-time traffic

- Little demand for truly real-time traffic
- For most traffic, faster-than-real-time transfer wins:
 - far simpler network
 - enables new services
 - takes advantage of growing storage

Function of data networks:

To satisfy human impatience

Human impatience has no limit:

Therefore there is no limit to bandwidth that might not be demanded eventually (and sold profitably).

The Big Question:

Is the Internet threatened by

too much

or

too little

traffic?

Internet traffic as pulse of the Internet:

- Traffic growth slowing
- Hype accelerating
- Even very biased hype is occasionally correct:
trustworthy data collection desirable
- There are huge sources of potential future traffic
- Future traffic levels result of interaction of complex
feedback loops

MINTS News

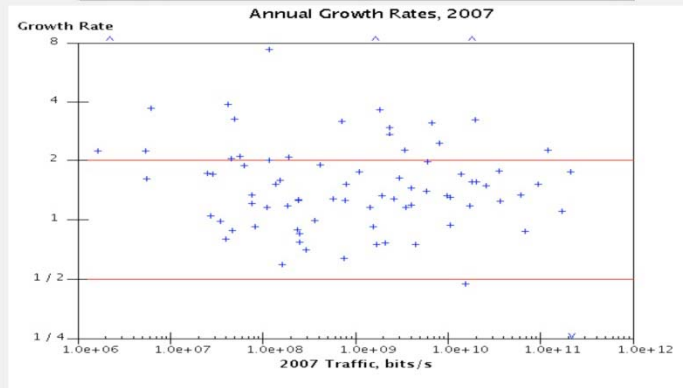
- **Aug 11, 2008** [A dramatic decline in traffic growth? Cogent reports absolute traffic decline, but other signs less dire.](#)
- **Jul 30, 2008** [MINTS pages updated, RSS feed available](#)
- **Jun 25, 2008** [Wireless traffic](#)

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Current (mid-2008) annual Internet traffic growth rates	
U.S.	50-60%
World	50-60%

Year-end 2007 monthly Internet traffic estimate	
U.S.	750-1250 PB (PetaByte = 10^{15} bytes)
World	3000-5000 PB (PetaByte = 10^{15} bytes)

Year-end 2007 estimates for monthly Internet traffic (GB per capita)	
Australia	1.0
Western Europe	2.3
Japan	2.6
U.S.	3.0
Hong Kong	17.0
South Korea	17.0



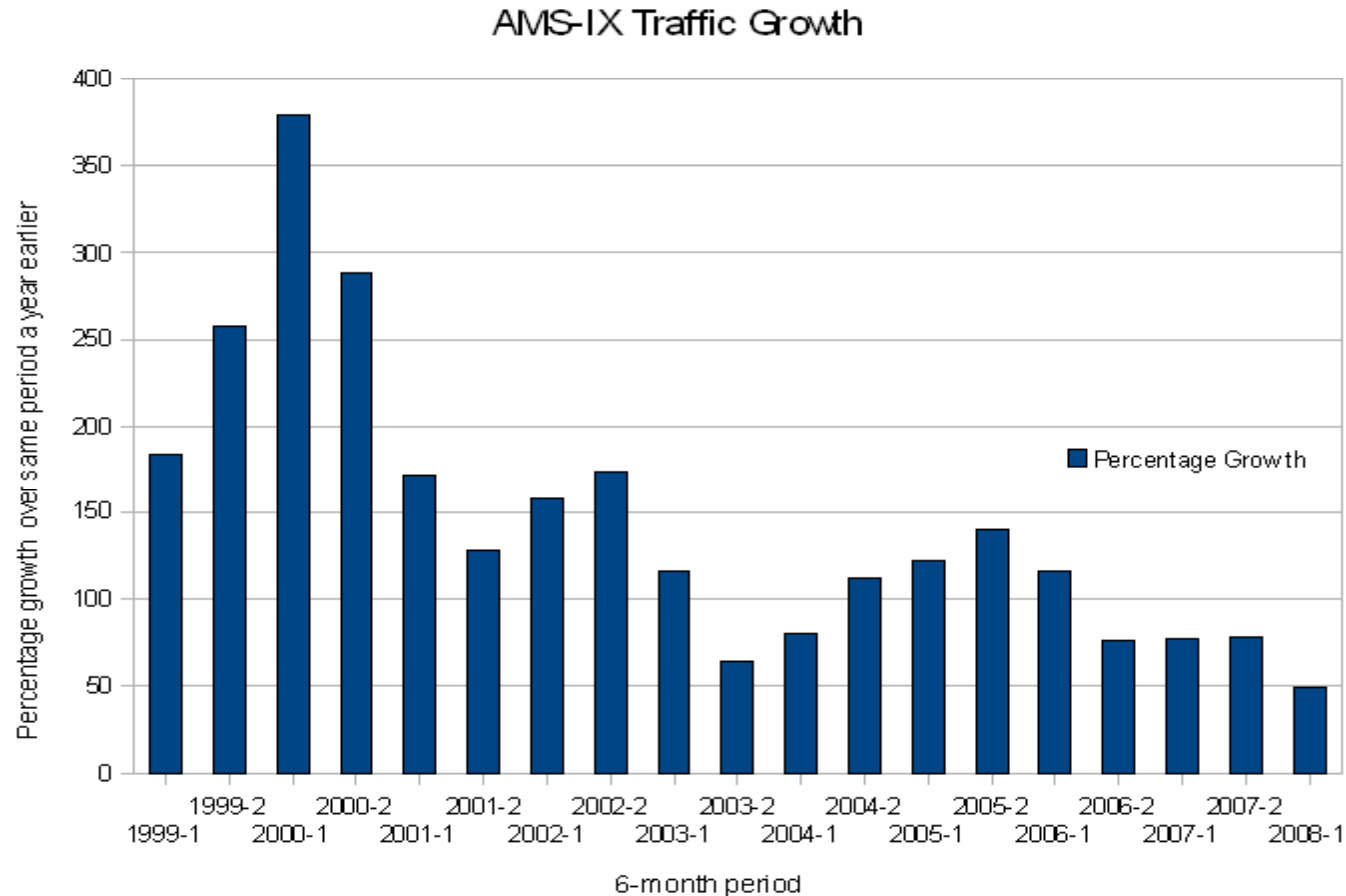
Traffic growth rates from publicly observed sites

<http://www.dtc.umn.edu/mints>

Current US and world Internet traffic:

- growth rates mostly in the 50-60% per year range
- Cisco white paper: 40% CAGR prediction
- Swanson-Gilder exaflood white paper: 55% CAGR prediction
- Nemertes white paper: about 100% CAGR prediction
- 50% growth rate in traffic only offsets 33% cost decline:
 - traffic: 100 \Rightarrow 150
 - unit cost: 100 \Rightarrow 67
 - total cost: 10,000 \Rightarrow 10,050

General slowdown (world's largest exchange):



Hong Kong: extreme and intriguing slowdown

year	growth rate in Internet traffic over the previous year, for February of each year
2002	304%
2003	154
2004	431
2005	122
2006	61
2007	30
2008	11

Per-capita traffic intensity in Hong Kong is about 6x the U.S. level.

Huge potential sources of additional Internet traffic:

- Storage
 - Year-end 2006 worldwide digital storage capacity: 185,000 PB
 - Year-end 2006 worldwide Internet traffic: about 2,500 PB/month
- Broadcast TV
 - Year-end 2006 U.S. Internet traffic per capita: 2 GB/month
 - Year-end 2006 U.S. TV consumption per capita: 40 GB/month
(soft figure, assumes 3 hr/day, at 1 Mbps, no HDTV, ...)

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Suggested value of bandwidth:

bandwidth	technology	relative value
100 bps	early modems, telex	2
10 Kbps	advanced dial modems	4
1 Mbps	early DSL, cable modem	6
100 Mbps	FTTH, some DSL, ...	8
1 Gbps	Future FTTH	9

Further data, discussions, and
speculations in papers and
presentation decks at:

<http://www.dtc.umn.edu/~odlyzko>