Bytes and bits: The dynamics of storage and Internet traffic growth

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The most destructive myths of the boom:

"build it and they will come"

"insatiable demand for bandwidth"

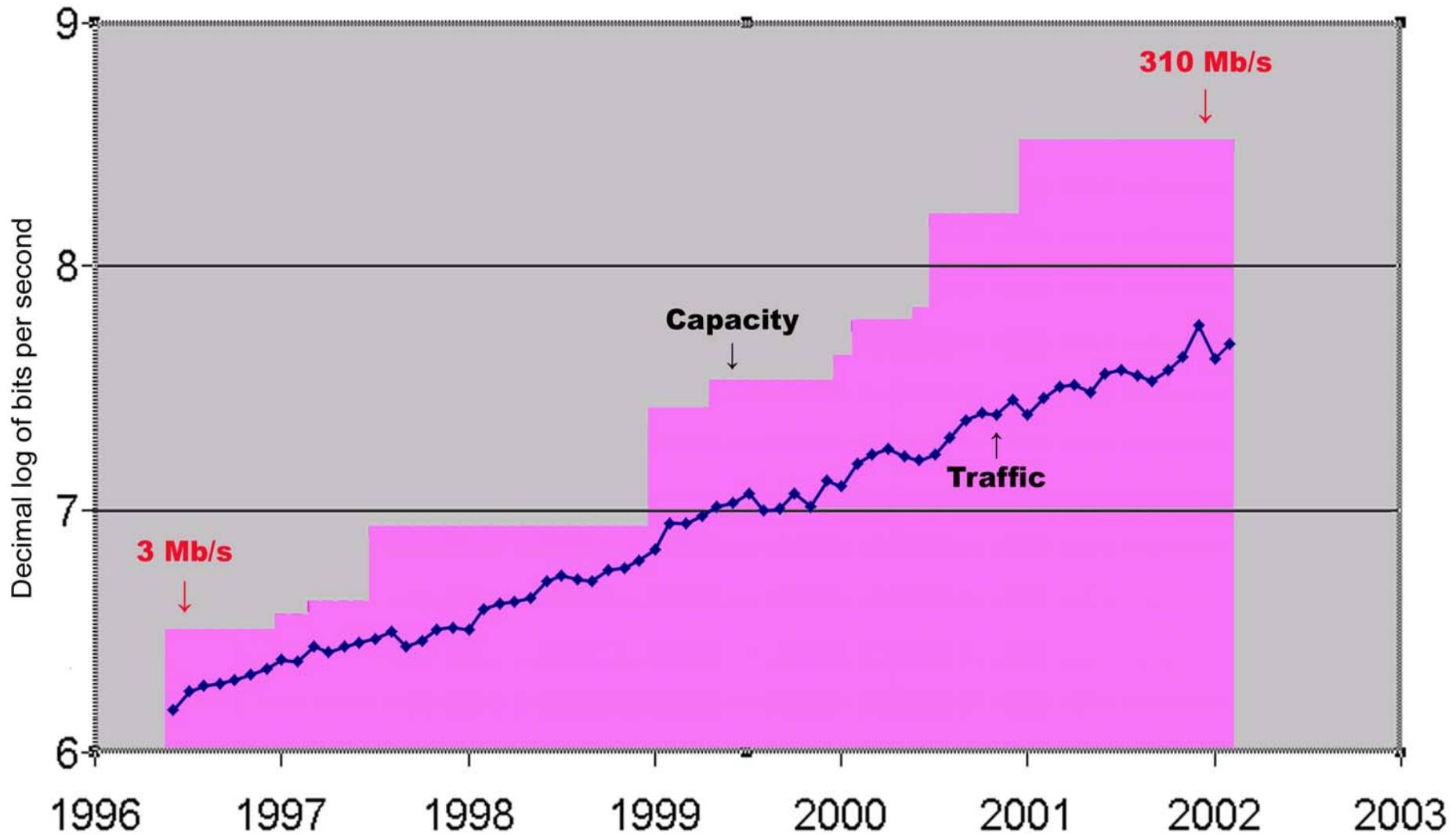"Internet time"

"Internet traffic doubles every three months"

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Traffic on Internet backbones in U.S. For each year, shows estimated traffic in terabytes during December of that year.

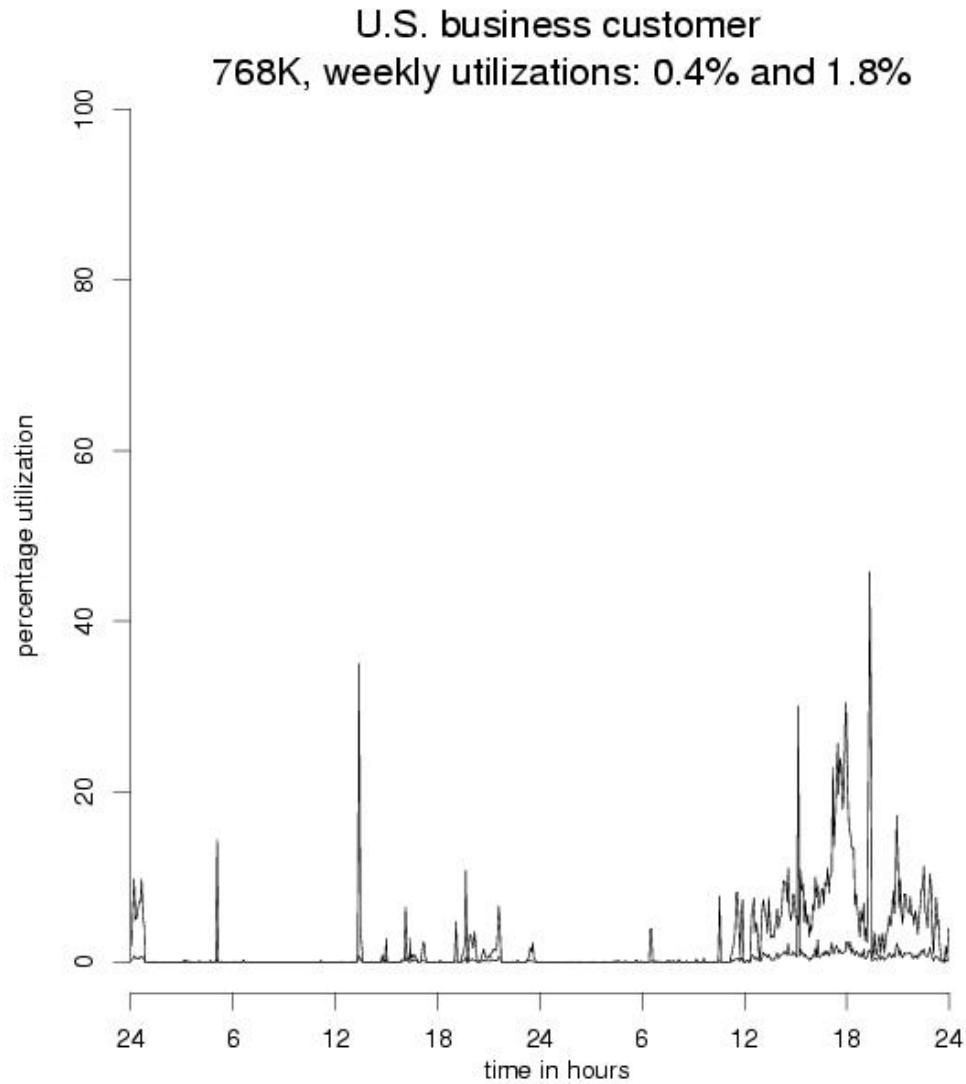| year	TB/month
1990	1.0
1991	2.0
1992	4.4
1993	8.3
1994	16.3
1995	?
1996	1,500
1997	2,500 - 4,000
1998	5,000 - 8,000
1999	10,000 - 16,000
2000	20,000 - 35,000
2001	40,000 - 70,000

Usual pattern of large, well-connected institutions: approximate doubling of traffic each year

Note: Some large institutions report growth rates of 30-40% per year, the historical pre-Internet data traffic growth rate

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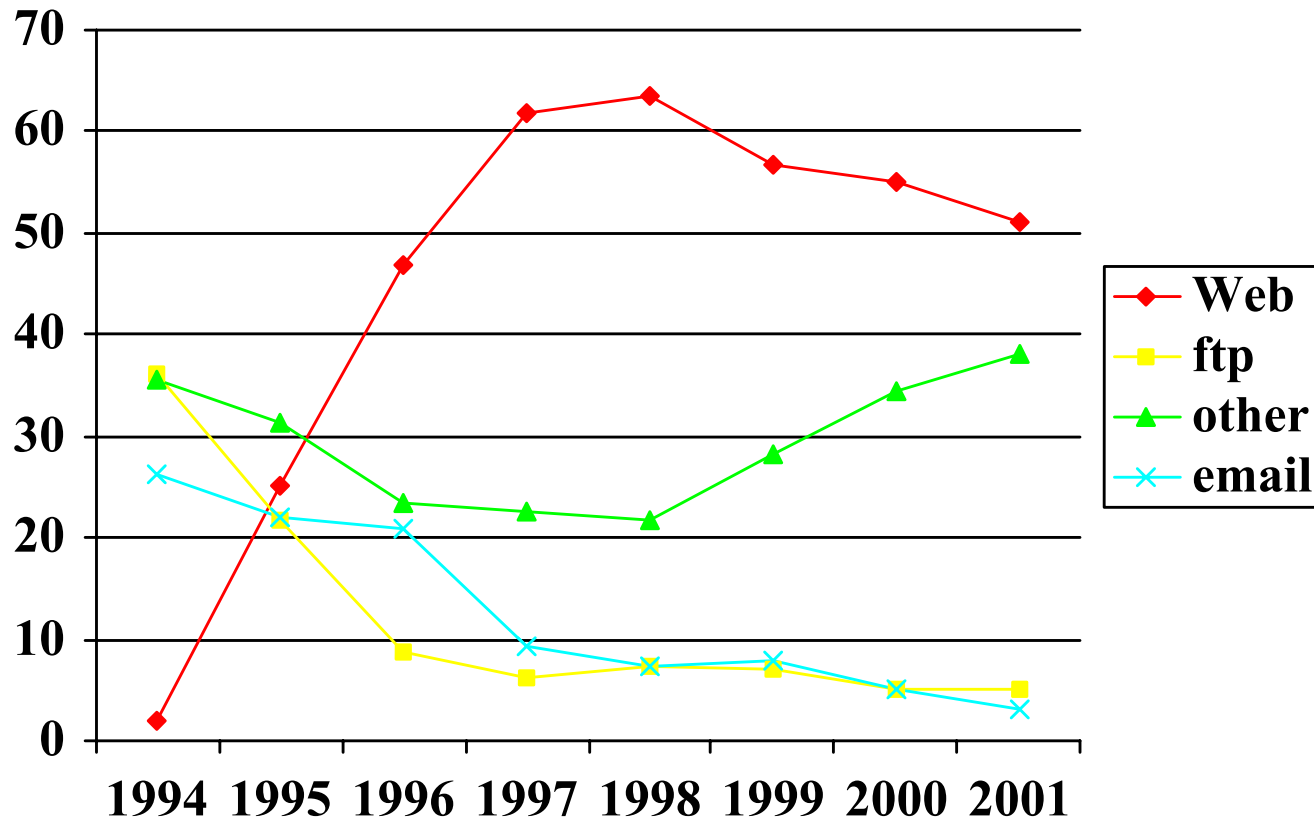# SWITCH traffic and capacity across the Atlantic

Typical enterprise usage profile:

What about disruptive innovations such as the Web, or Napster?

Answer: subsumed in (and feed) the 2x per year rate
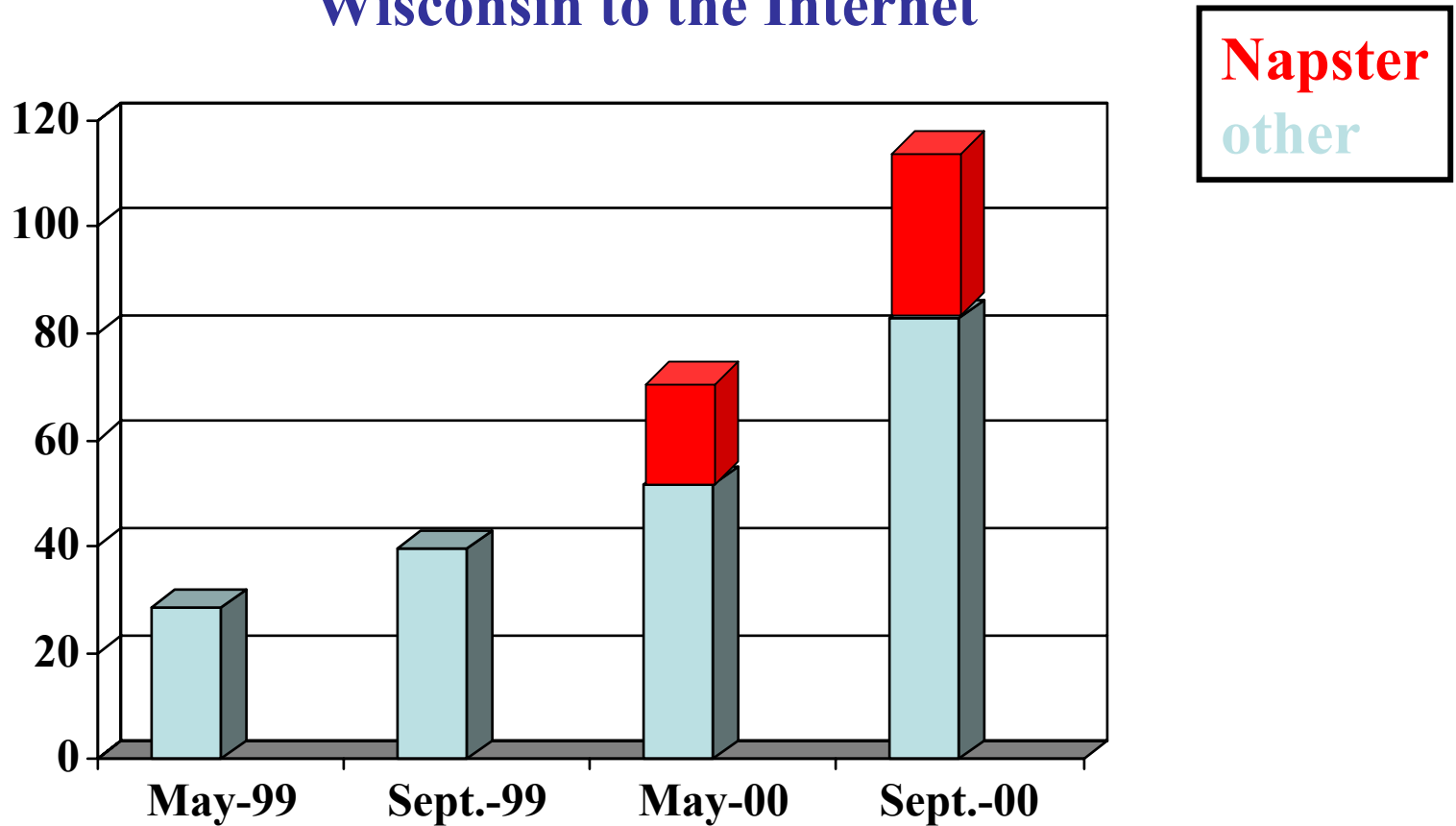
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Internet Traffic at the University of Waterloo

Napster, just like WWW, is another disruptive phenomenon that helps sustain the growth of traffic:

Traffic from the University of Wisconsin to the Internet

Napster
other

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Worldwide hard disk drive market.

Year	Storage capacity (terabytes)
1995	76,243
1996	147,200
1997	334,791
1998	695,140
1999	1,463,109
2000	3,176,845
2001	5,273,817
2002	10,535,758
2003	18,360,034
2004	28,073,322
2005	43,642,319

(Based on IDC reports.)

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Storage and traffic growing about 2x per year, faster than processing power, and far faster than displays

Imbalance between storage and transmission will persist

(many implications for locality of data, nature of traffic, etc.)

If you build it, they will come

If you build it, they will come instantly

If you build it, they will come inst~~a~~ntly

If you build it, they will come inst~~a~~ntly

If you build it, they will come, but in their own sweet time (and they will do things you don't expect).

More data, arguments, and speculations at:

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