

Content versus connectivity and the persistent mirage of real-time streaming multimedia

Andrew Odlyzko
Digital Technology Center
University of Minnesota
<http://www.dtc.umn.edu/~odlyzko>

Motivation and outline:

- Telecom challenges:
 - overcome the gross overinvestment and malinvestment of the bubble years
 - restructure
 - overcome many misleading dogmas
- Main points:
 - content is not king
 - value of broadband is misunderstood
 - real-time streaming multimedia will not dominate

Analogies with railroads:

U.S. railroad industry

Year	Revenues	Fraction of GDP
1900	\$1.5 B	8%
2000	\$35 B	0.4%

Transportation industry as a whole has thrived; railroads do play a vital role (occasionally even a profitable one). Many intriguing analogies between telecom and transportation (but to be treated with caution).

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.

What is broadband?

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connections with speed exceeding 200 Kb/s
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**Under the official definition, we all have broadband
connectivity courtesy of snail mail!**

**CD-ROMs via USPS deliver more data at same cost
as a 1 Mb/s connection running at full capacity.**

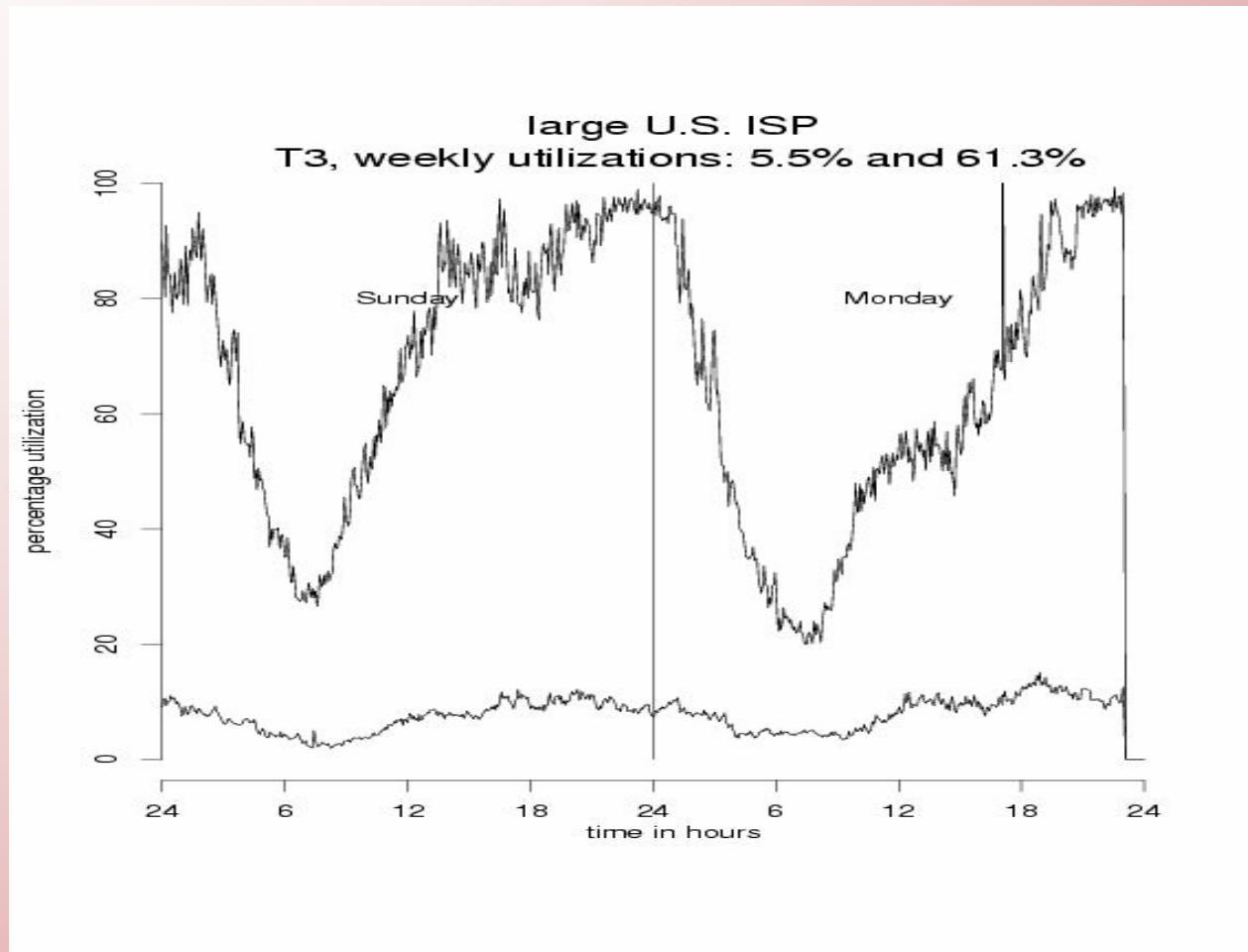
What matters most in communications:

- **volume**
 - **transaction time**
 - **reach**
 - **price**
-

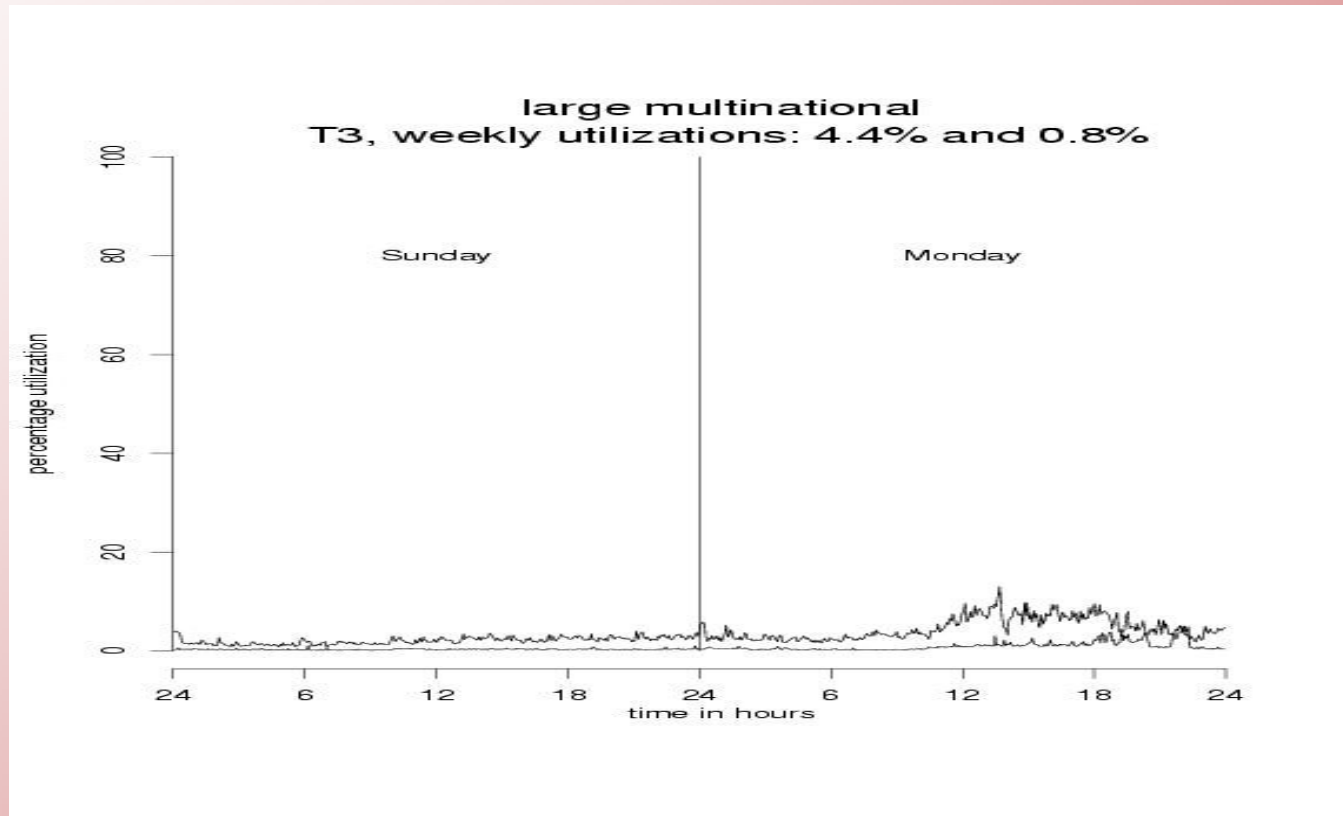
also:

- **isochronicity (easy byproduct of low latency)**

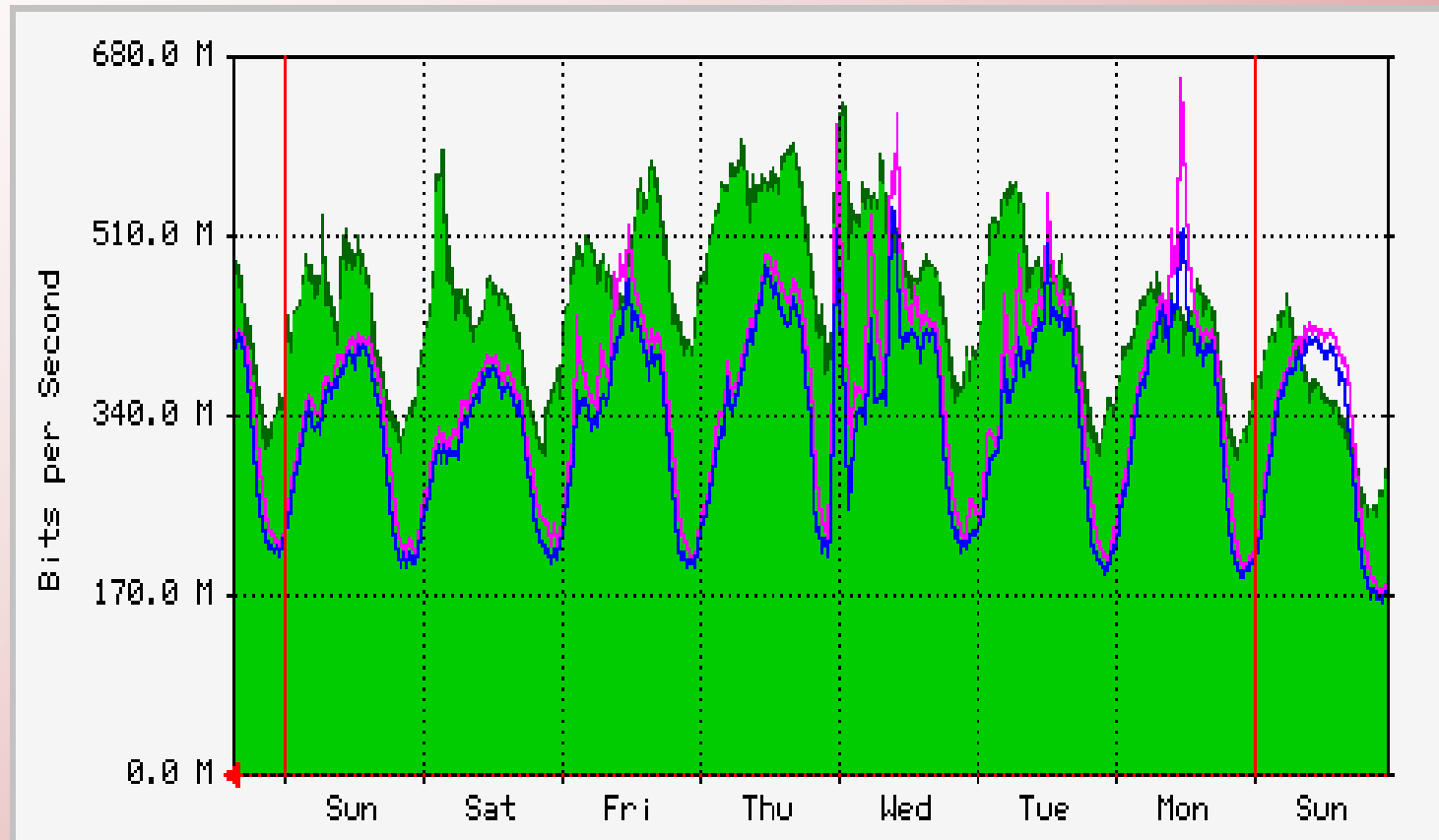
The dominant and seriously misleading view of data network utilization:



Typical enterprise traffic profile: Demolishes myth of insatiable demand for bandwidth and many (implicit) assumptions about nature of traffic



Weekly traffic profile on an AboveNet OC192 link from Washington, DC to New York City:



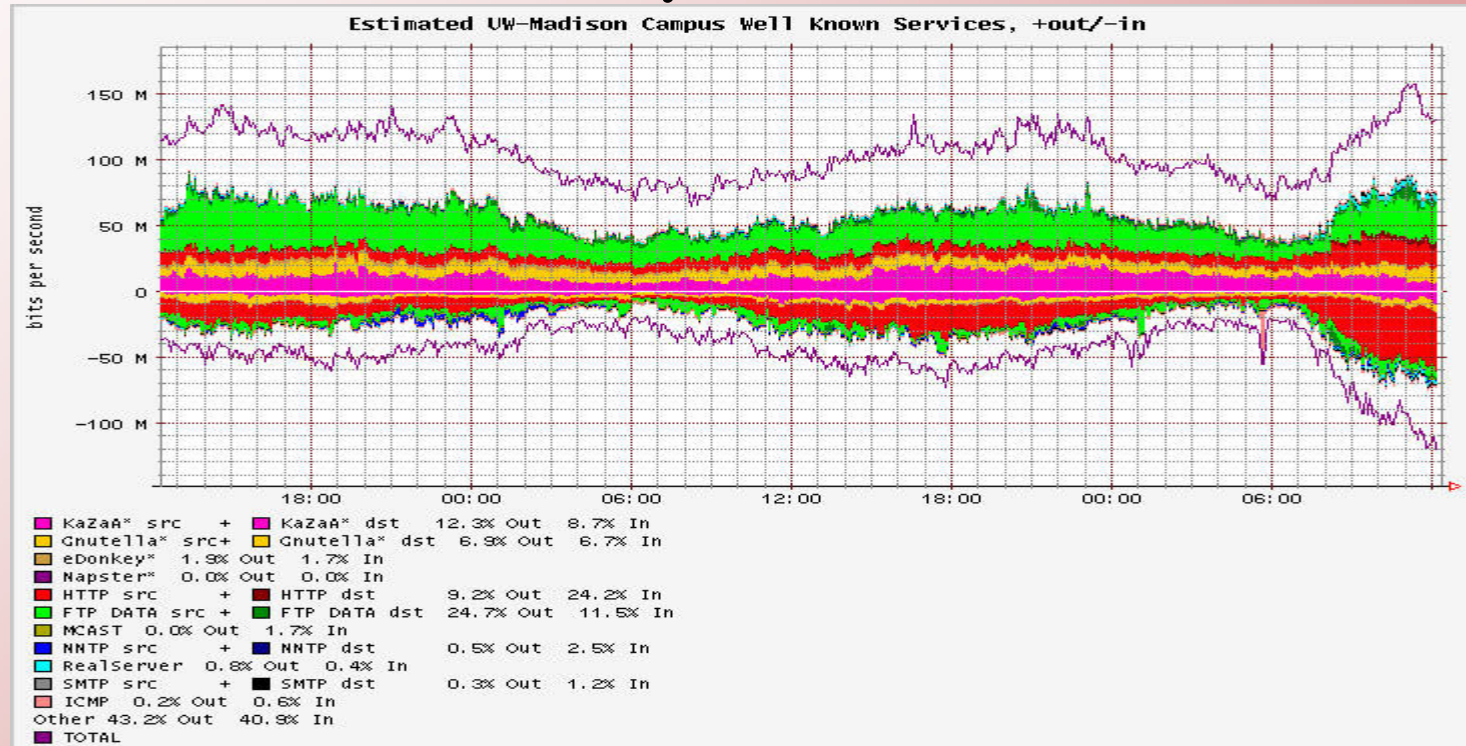
Streaming multimedia vs. file transfers:

File transfer for local storage and transfer to other devices the most natural evolution (giving edge to Ethernet)

- ◆ **Predicted long ago**
- ◆ **Confirmed by Napster, . . .**
- ◆ **Want high bandwidth for faster-than-real-time**
- ◆ **Destroys case for QoS**

Multimedia file transfers a large fraction of current traffic, streaming traffic in the noise:

Internet traffic at the University of Wisconsin in Madison



Conclusions:

- telecom industry hobbled by misleading dogmas
- content is not king
- streaming real-time multimedia is not the future
- intelligence, costs, and revenues will continue to migrate to the edges
- painful restructuring in store

More evidence, arguments, and speculations in papers at:

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