

Traffic Data: Economic and Policy Relevance

William Lehr

(wlehr@mit.edu)

Communications Futures Program
Massachusetts Institute of Technology

CFP Plenary Meeting
Venice, Italy
May 13-14, 2009

Traffic data: economic and policy relevance

- ❑ Traffic data critical to understanding industry economics
- ❑ Why we need to pool ISP data
- ❑ Why it is a challenge...
- ❑ Business and policy relevance...

DATA, DATA, DATA.....

- ❑ Show me the numbers!!!!
 - Validate theory, confirm intuition
 - Formulate new theories
- ❑ Good strategy, good policy depends on good information



Steel industry makes steel...

Poultry industry raises chickens...and...

INTERNET transports *TRAFFIC*

Key driver of costs (usage & capacity, investment)

— Perhaps less well correlated with demand (value, revenue) †

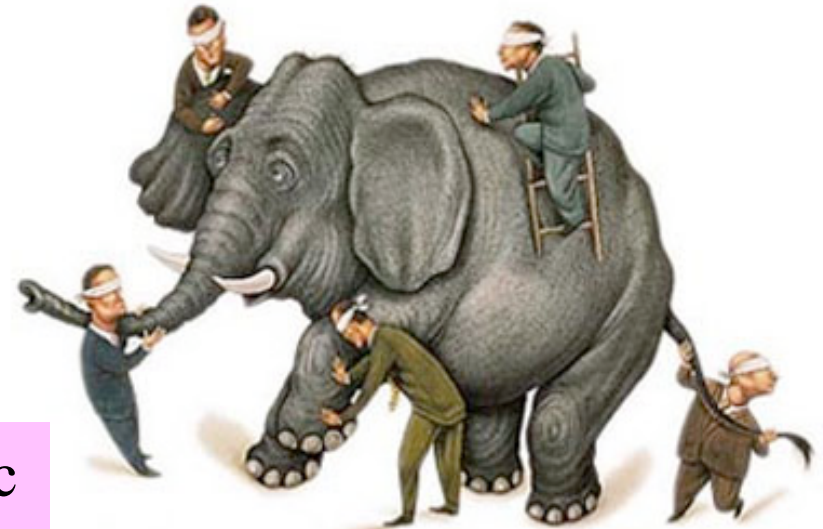
Some things about traffic we would like to know...

- Factoids to understand better...
 - Internet traffic growing rapidly – 50-60%/year (Odlyzko, “MINTS” 2009)
 - Fat-tailed user distribution
 - Growing share due to streaming media
- Further refinements...
 - Can we decompose growth into components?
 - Individual usage vs. mix of user types? Changes service features?
 - Application availability? Changes in network mgmt? Architecture?
 - Heavy users heavy all the time? Heavy during peak? Heavy off-net?
 - Trends?
 - Experience effects? Behavior converges/diverges?
 - Secular trends vs. business cycles?

Need traffic data from multiple ISPs

Each ISP sees only their own traffic

- Large variation in what ISPs know
- Limited info about other ISPs
- Other stakeholders even more ignorant



Need to see Network-of-networks traffic

- Local v. general phenomena
- e2e and interconnection issues

Markets need information to operate efficiently

- Need for additional capacity? Where is the slack?
- Where are the opportunities?
- (Alternative to markets is regulation...)

Why is sharing traffic data difficult?

Need to share strategically valuable information with potential rivals...



Need to protect user privacy...



Free-rider problem...

And, lots of data compatibility issues...

Business and Policy Relevance

- Better market data => greater efficiency => less regulation
 - Transparency (Transaction costs)
 - Verifiability (Trusted)
 - Collective understanding (e.g., Broadband Incentive Problem)
 - “self regulation” (with small “r”)
- Richer options for “contracts”
 - Service offerings, Interconnection
 - Congestion accounting: only peak traffic is costly to carry...
 - e.g., LEDBAT standards...
 - e.g., Congestion-adjusted Volume Caps...
 - Incentive-based contracting
- Collective learning about better congestion mgmt strategies

Summing up...

Traffic data key to understanding ISP & industry economics, especially into the future.

Need data from multiple ISPs since any single ISP sees only part of the picture.

Collecting the data poses significant challenge for industry coordination (technical, business, policy).

Success will help market efficiency and enrich options for e2e congestion management.

Subscriber usage questions

- What subscriber profile types contribute the most to peak traffic?
- Which external events may impact overall traffic, e.g. “Patch Tuesdays”? Extreme weather-related events? Obama inauguration?
- Distribution of traffic usage among different classes of users?
- Traffic usage and app usage between peak and off-peak times?
- What is the impact of consumption billing changes on peak usage?
- Does speed/bandwidth affect or influence end user behavior? Or, lag increase in speed?
- On-net v. Off-net usage?

Aggregate usage questions

- What are current traffic growth rates?
- New subs versus growing usage?
- What is the difference in growth rates in different parts of the network?
- Where does congestion occur? Time of day, day of week, and seasonal patterns?
- What are current traffic volumes?
- What is the current distribution of packet sizes?
- How does the view of application traffic differ between DPI and Netflow measurements?
- How does on-net traffic volume compare to off-net traffic volume?
- What is a reasonable broadband access over-subscription model?