Goals

Measure available bandwidth between two sites

- On-line / up to date
- Low bandwidth
- Accurate

Existing Systems: Overview

System	Quantity	Accuracy	Method
ttcp	Huge	reference	actual data
treno	Huge	Good	actual data
bing	Low	Medium	P-pair: Link
bprobe	Large	poor*	P-pair: Link
cprobe	Large	poor*	P-pair: Available
pathchar	HUGE	Good	per-link

* = May be due to my port

Existing Systems: TTCP

- Server-client
- Actual TCP throughput
- Megabytes of data
- Running time: 1-30 seconds
- Summary: Too much BW

Existing Systems: treno

- Client-only
- ICMP rate-limiting breaks it
- IPPM standards track
- Good estimate
- 100s of Kbytes
- Running time: 1-10 seconds
- Summary: High BW, but nice

Existing Systems: bing

- Client-only
- Basic packet-pair
- Fragile
- Medium accuracy
- Low bandwidth
- Running-time: 1-3 seconds
- Summary: Merits investigation

Existing Systems: b/c-probe

- Implementation problems
- Client-only
- Medium accuracy *when it works*
- Medium b/w: 10-150Kbytes
- Running time: 10-40 seconds
- Summary: Needs work

Existing Systems: pathchar

- Client-only
- 1Mbyte per link
- Per-link bandwidths
- Running time: 10-200 seconds
- Summary: Very excessive

Unimplemented systems: RBPP

- Receiver-based packet pair (Passive)
- Client-server
- Paxson indicates it works well
- Bandwidth and time unclear
- nettimer is in-progress

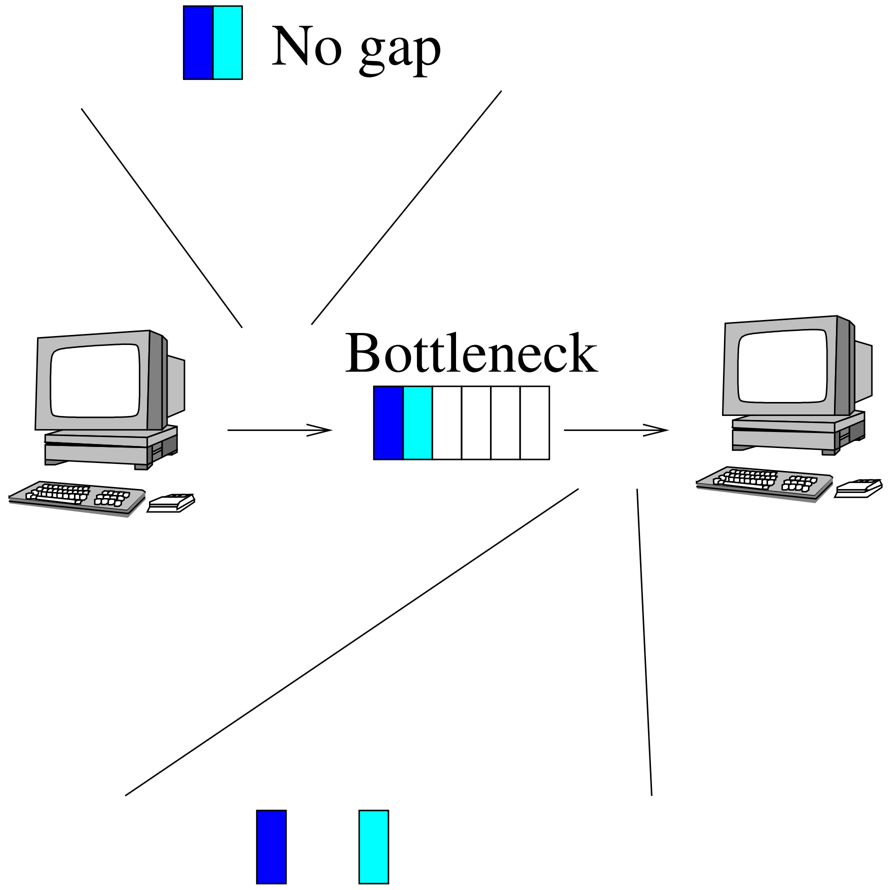
Unimplemented systems: PBM

- Packet Bunch Mode (Passive)
- Client-server
- Paxson indicates it works very well
- More BW than RBPP

Ideal System: ???

- Active + Passive
- Client-server
- Low bandwidth
- Continuous probing
- Packet-pair like?
- treno-like with fast revalidation?

Packet Pair



Interpacket gap: t seconds

$$t = \frac{\text{packetsize}}{\text{bandwidth}}$$

$$\text{bandwidth} = \frac{\text{packetsize}}{t}$$