



Using passive measurements to debug and improve end-to-end network quality

TNC2006

Arne Øslebø

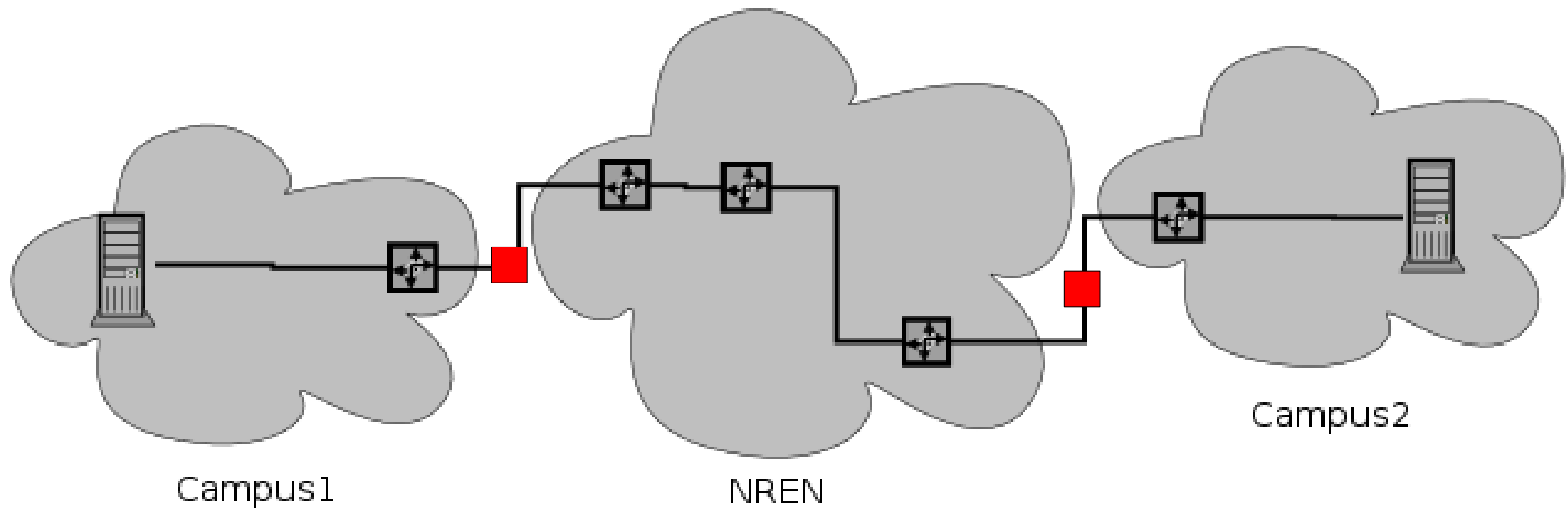
Arne.Oslebo@uninett.no

Outline

- Motivation
- Deployment of measurement probes
- Real time analysis
 - Implementation
 - Usage
- Long term statistics
 - Implementation

Motivation

- Difficult to debug end-to-end performance over multiple domains



Deployed measurement probes



Active measurements

- Network Diagnostic Tool (NDT)
- Mping
 - RTT measurements
- Rude/Crude
 - Detect routing convergence time
- Multicast
 - Beacon
 - ssm ping/asmping

Passive monitoring

- Optical splitter on the main link to the university/college
- Used for:
 - security
 - traffic characterization
 - research
 - **improving end-to-end performance**

Real time and long term statistics

- Real time debugging
 - Access monitoring probes directly to monitor a TCP stream
 - Developed application called tcpdebug based on MAPI
- Long term statistics
 - Users complain about bad performance yesterday
 - Long term statistics for showing trends in the network
 - Detect problems before the customer
 - Solution: Extended NetFlow based on IPFIX function in MAPI

tcpdebug application

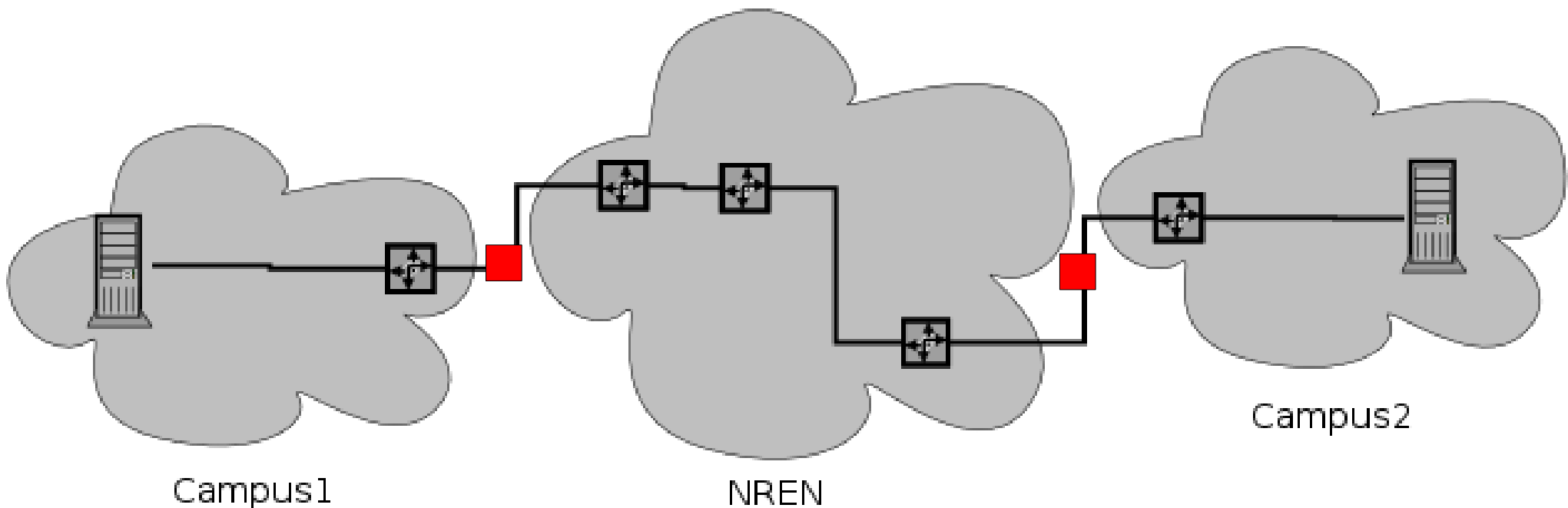
- Provides detailed statistics for a TCP stream
- User selectable statistics interval
 - Makes it easier to monitor TCP streams with long duration
- Command line tool
 - `tcpdebug -i<sec> -f <filename> <device> <srcip>`
`<srcport> <dstip> <dstport>`
- Will later develop a web based interface

tcpdebug statistics

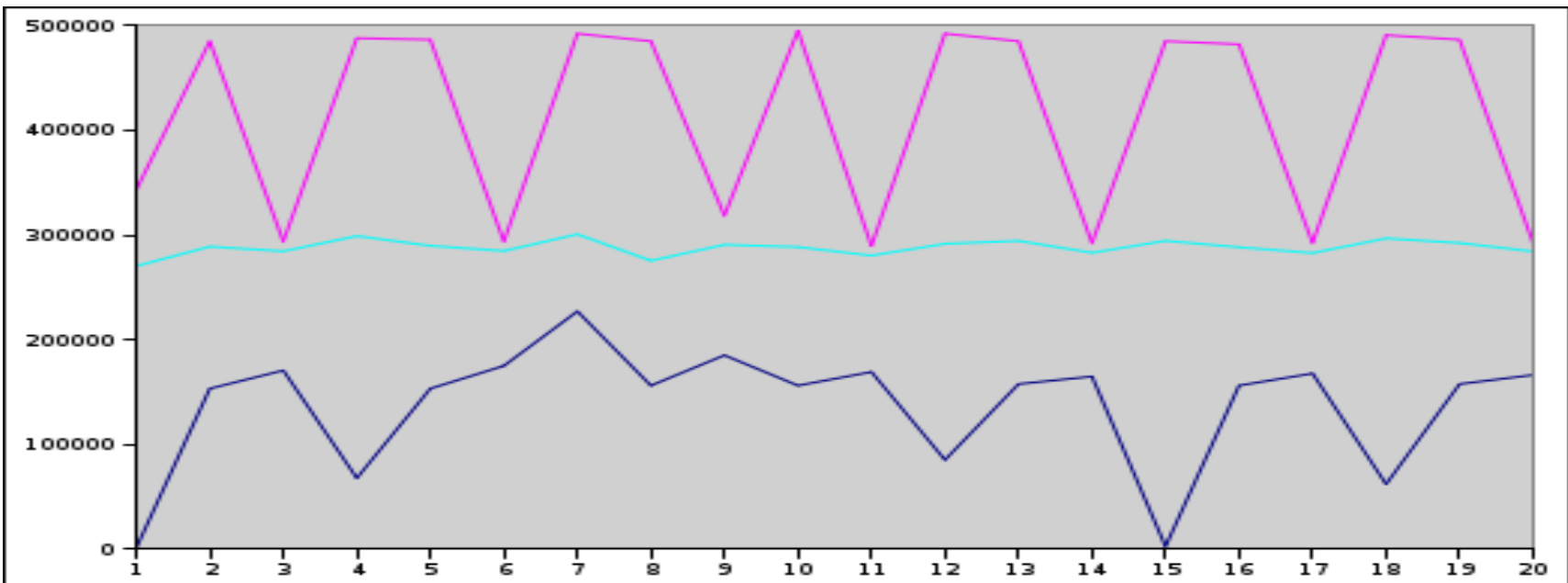
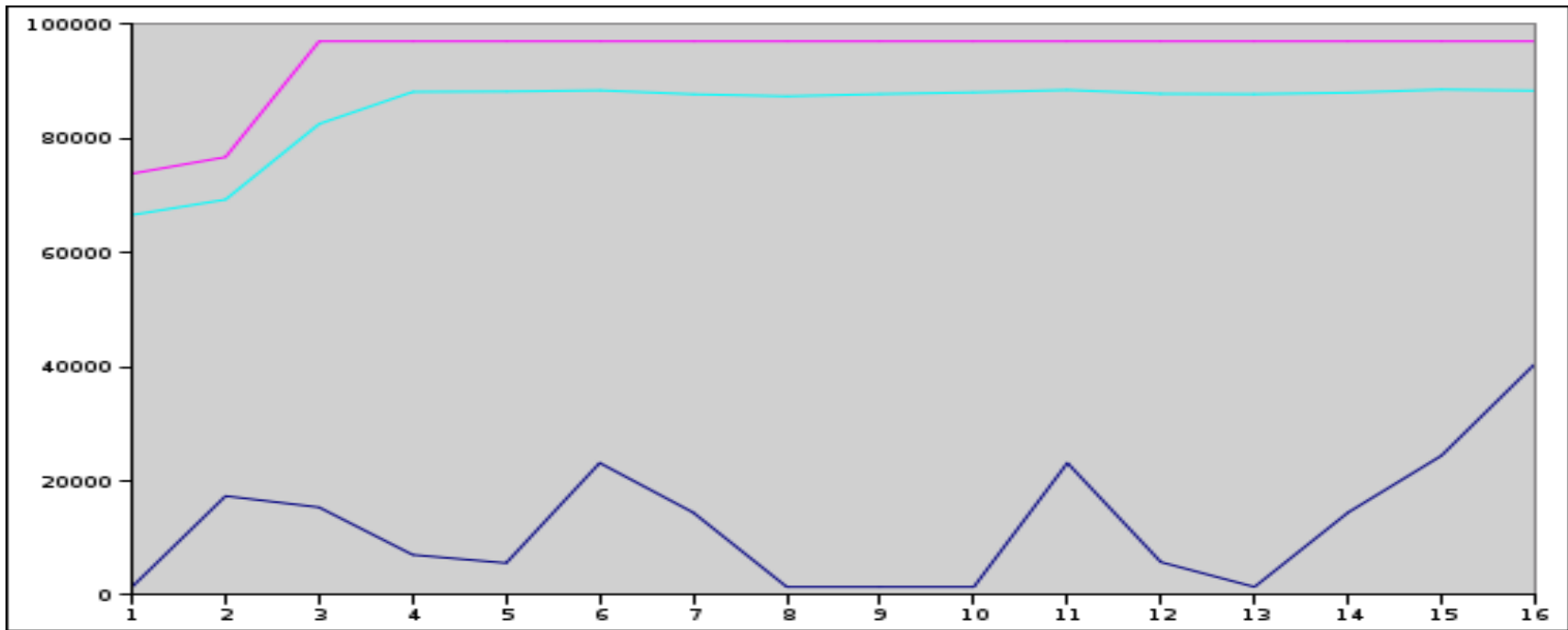
- Packets per second
- Bytes per second
- Packet size statistics
- Jitter statistics
- Acknowledgment jitter statistics
- TCP congestion window statistics
- *Packet reordering*
- *Retransmissions*
- *Duplicate acks*
- *Selective acks (SACKs)*

How to use tcpdebug

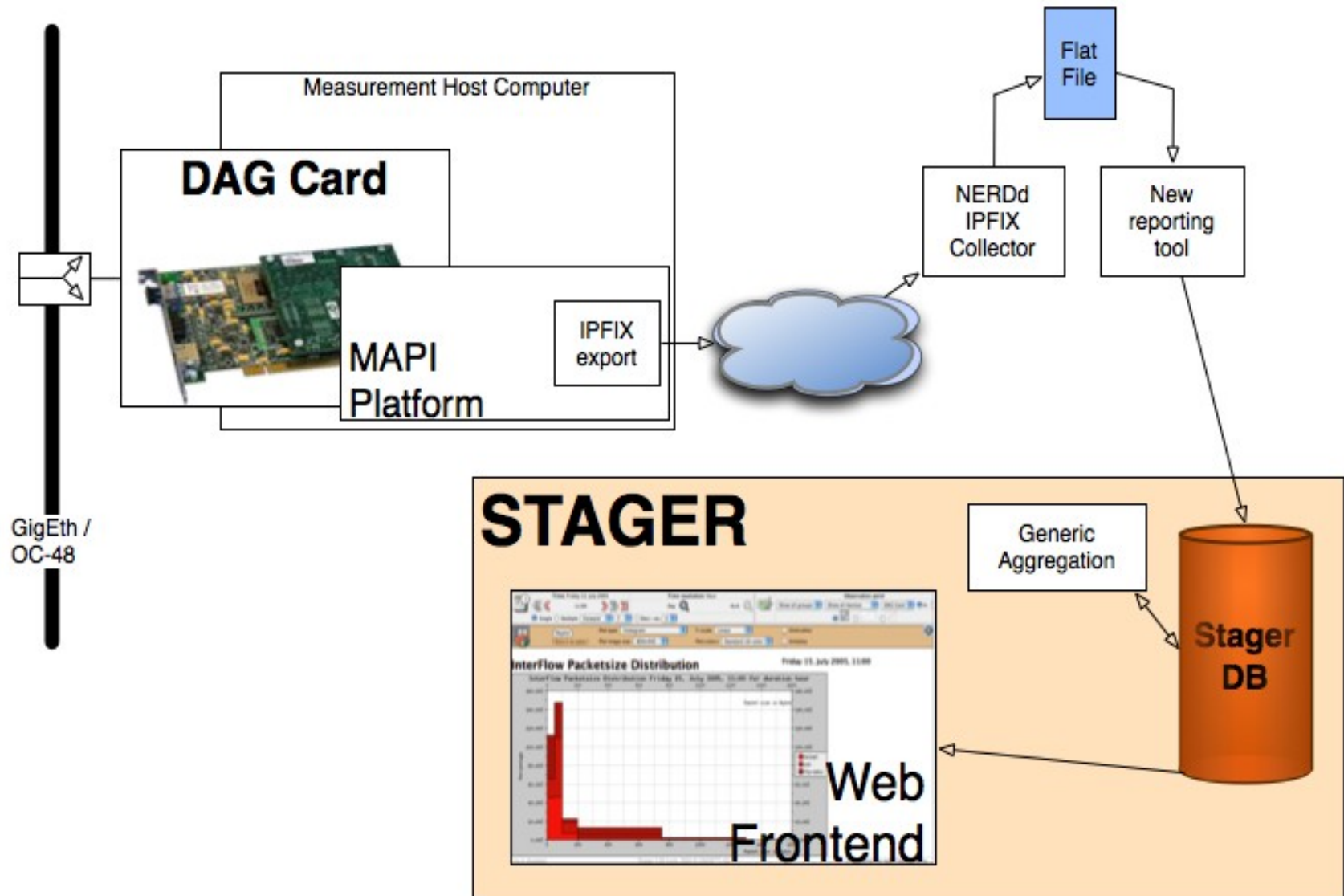
- Monitor as close to the sender as possible
- If possible, monitor at several probes



tcpdebug results



Extended NetFlow



New attributes

- Packet size distribution
- Packet distance distribution
- Packet reordering
- Max/Min bandwidth at 10ms, 100ms and 1s
- *TCP congestion window*
- *Payload inspection*
 - *Traffic characterization*
 - *RTP statistics*

Packet size distribution

Time: Friday 15. July 2005
Time resolution: Hour
11:00
Day N/A
Observation point: DAG Card In

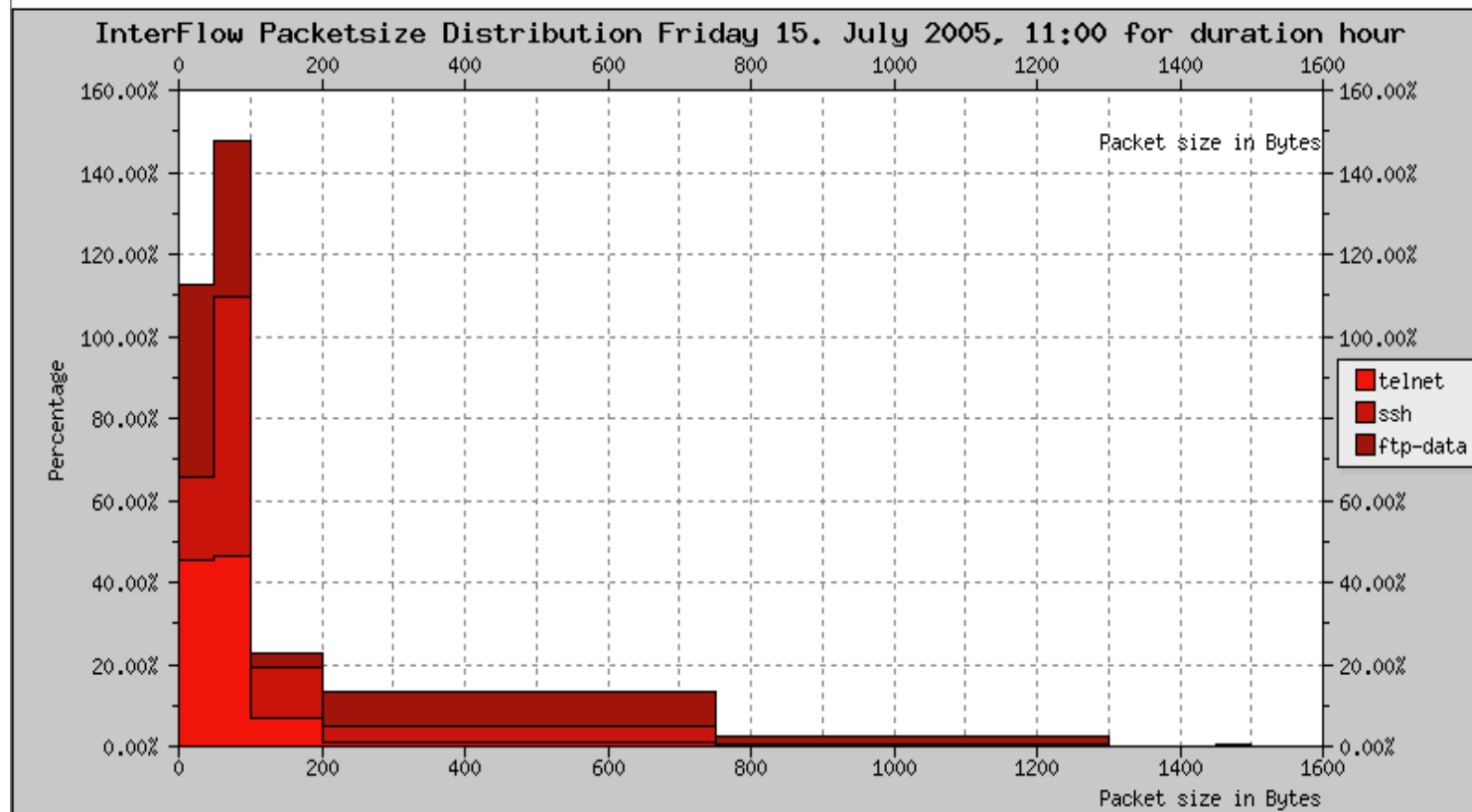
Single Multiple Forward 7 Decr. res. 3

Show all groups Show all devices

Replot Plot type: Histogram Y-scale: Linear Omit other
[Return to table] Plot image size: 800x400 Plot colors: Standard 16-color Antialias

InterFlow Packetsize Distribution

Friday 15. July 2005, 11:00



Software availability

- Still under development
- Beta versions available from Subversion repository
 - <http://mapi.uninett.no/>
- Stable release in August
- <http://www.ist-lobster.org>