

Traffic analysis in multi-service IP networks: Measurement and modelling for QoS improvement

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About Acreo NETLAB

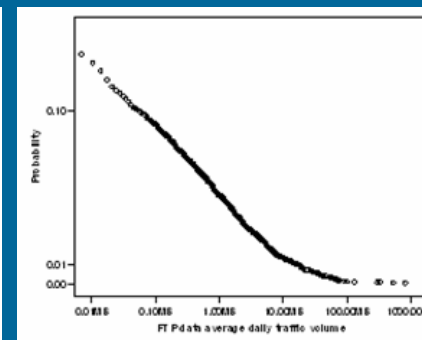
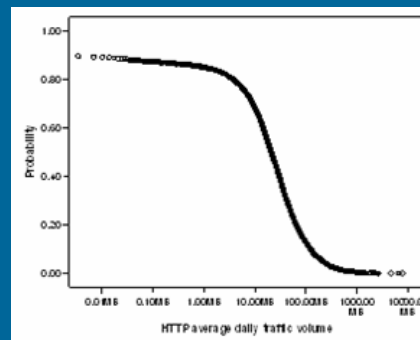


Acreo: Swedish research institute

NETLAB: Networking and transmission department

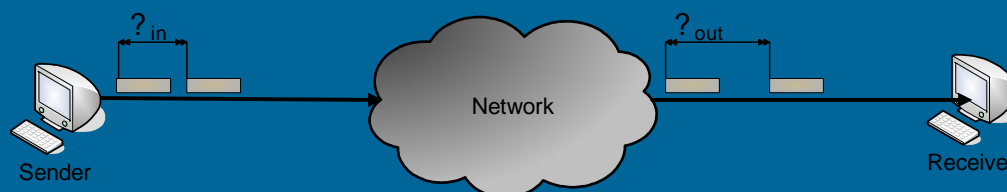
Me: Traffic measurement and analysis,
TRAMMS coordinator

About TRAMMS

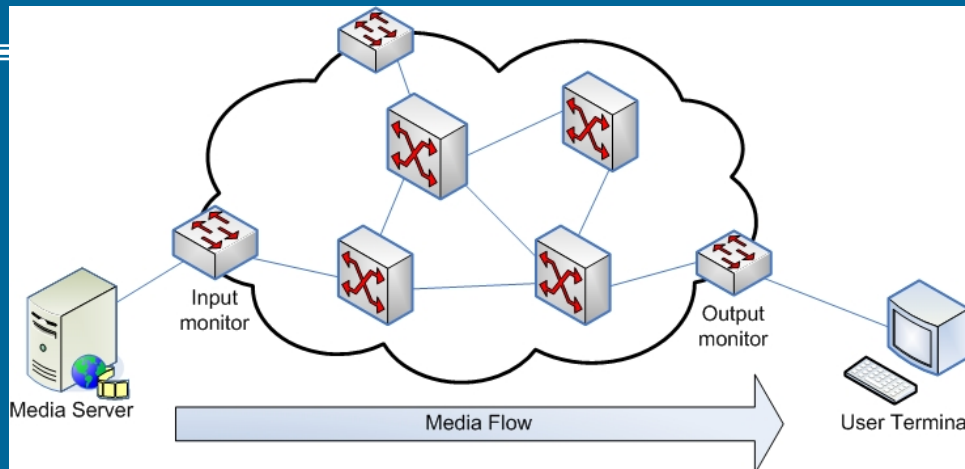


Traffic analysis

Measurements in live networks



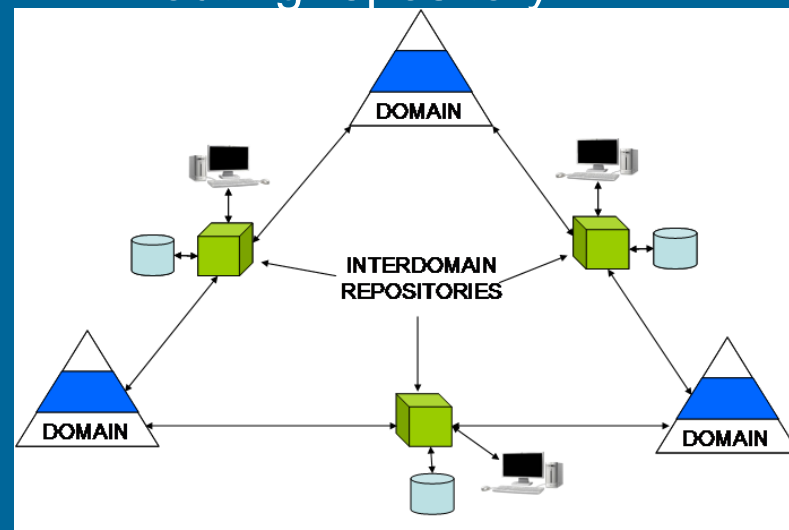
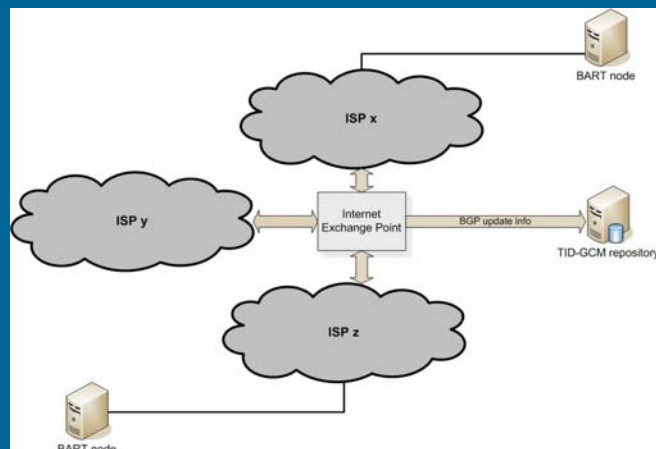
Bottleneck analysis



NetAuditor:
End-to-end QoS monitoring

BART:
Real-time available bandwidth estimation

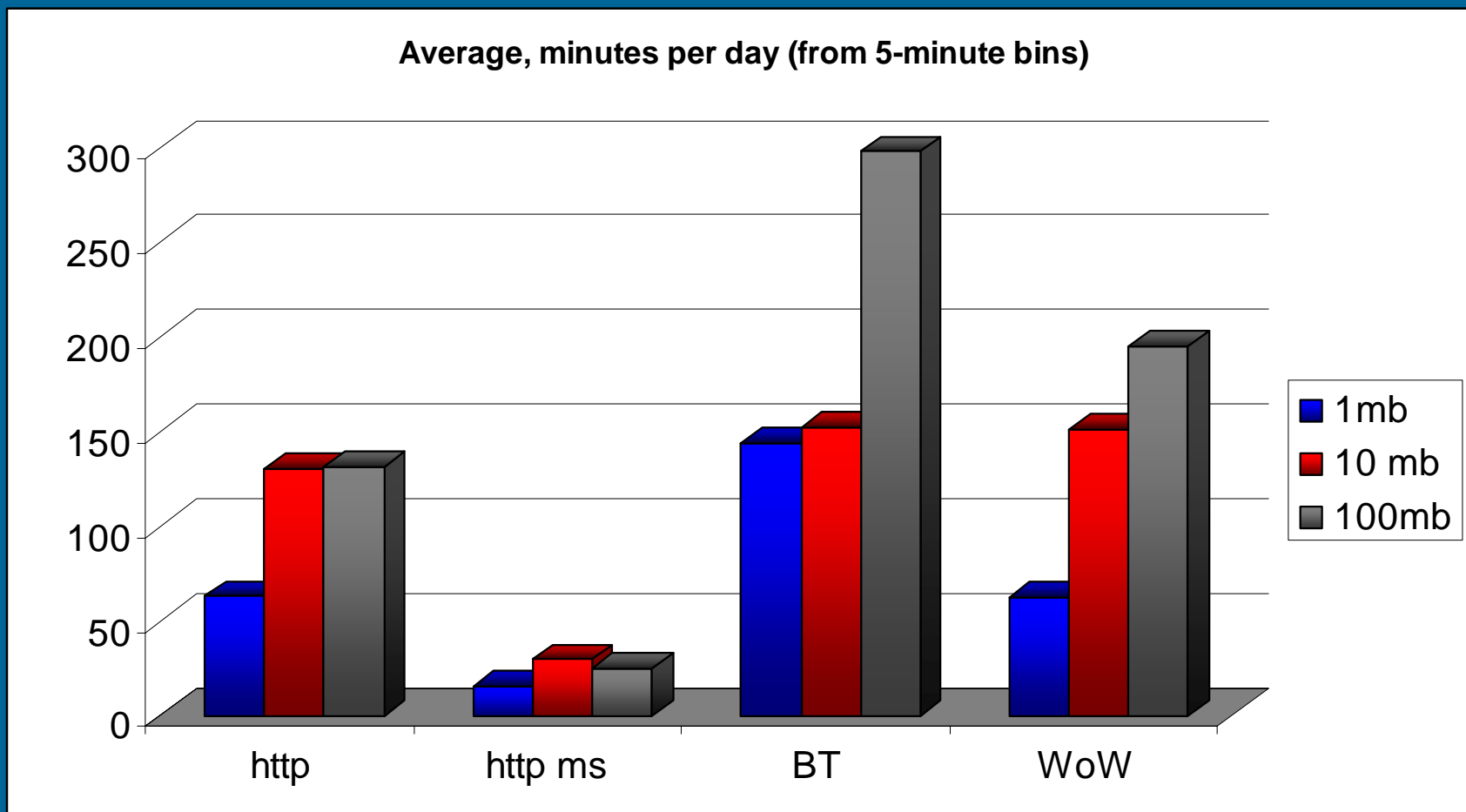
Pocket inter-domain routing repository

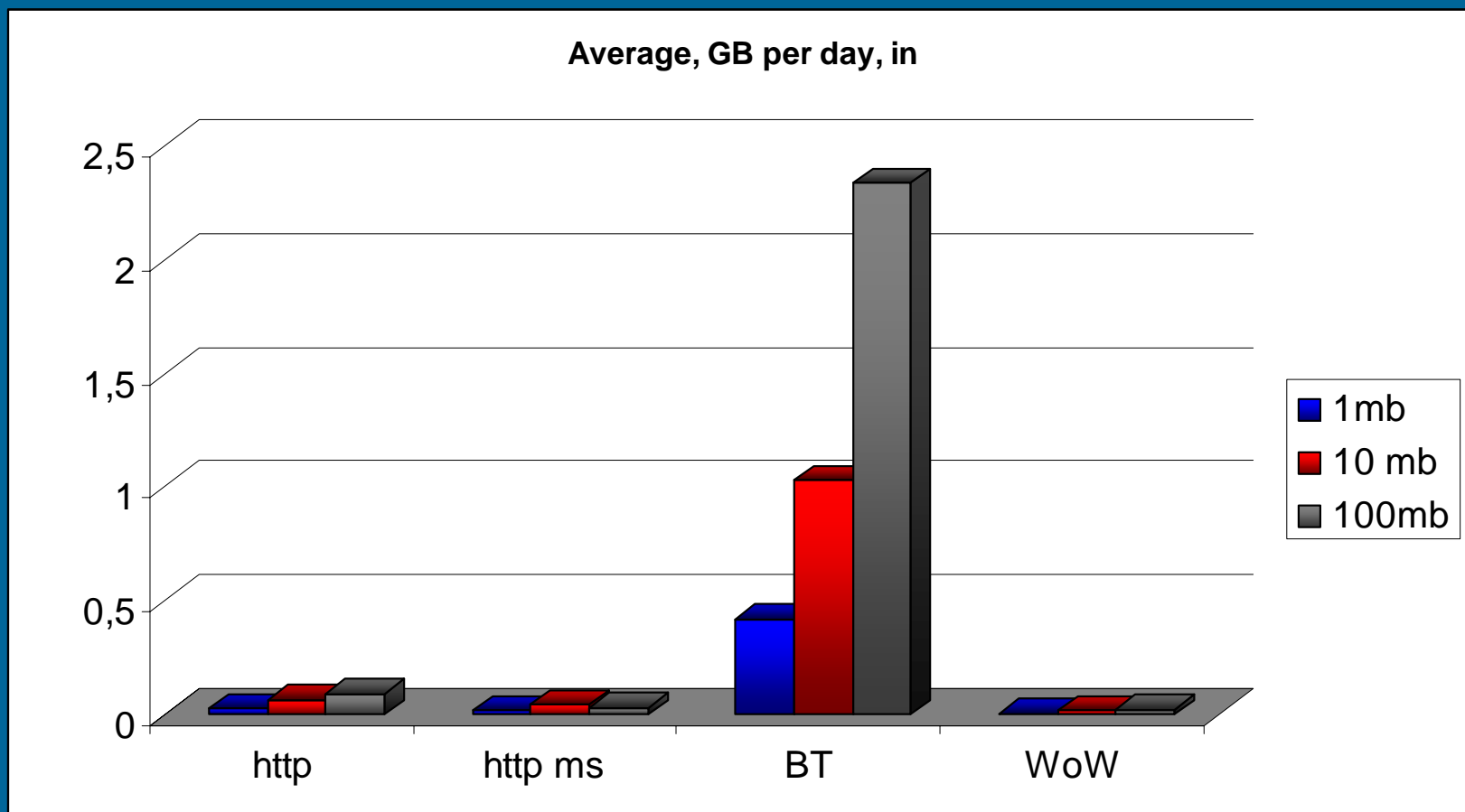


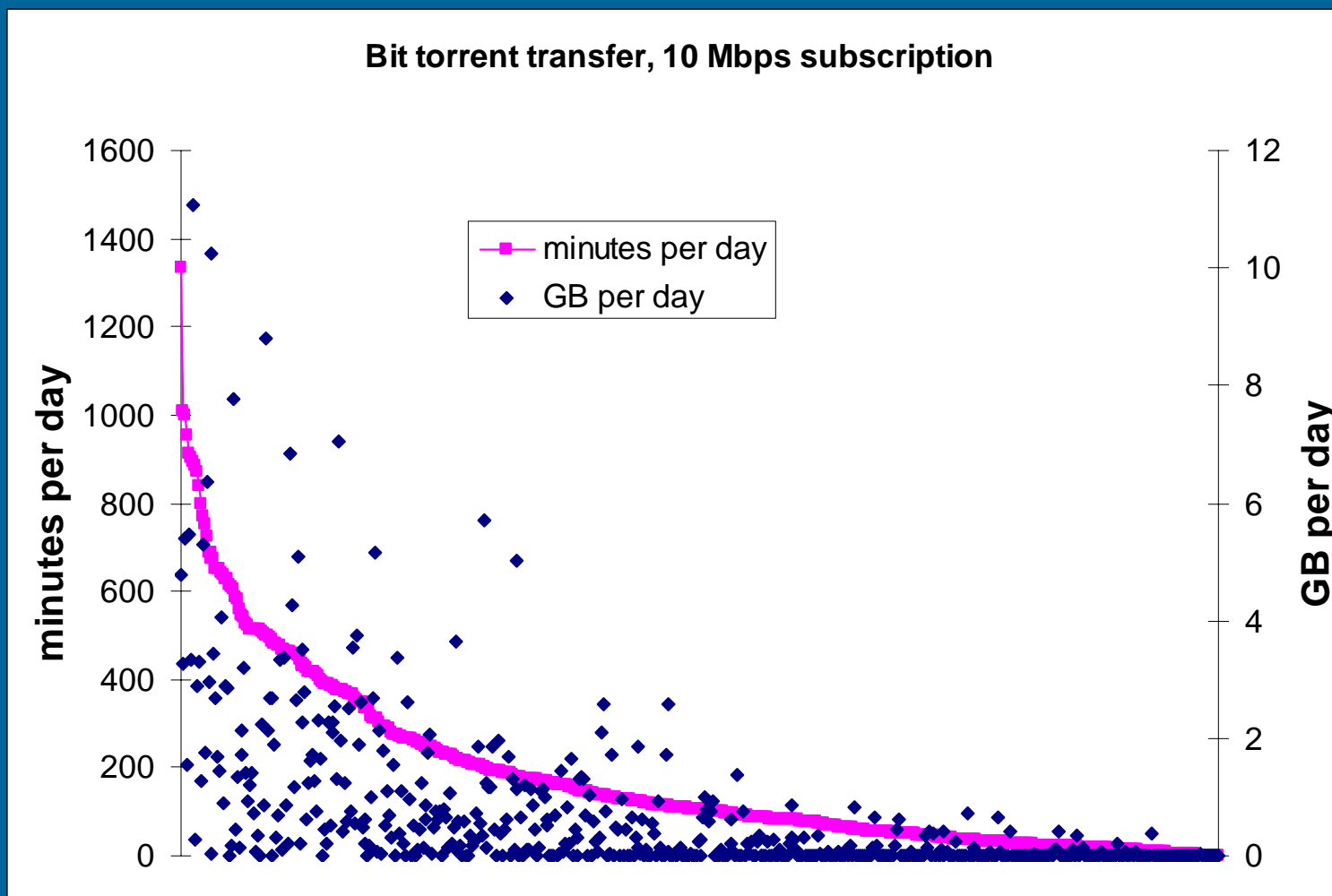
- Access networks
- Deep packet/deep flow => application level
- Household level
- Internet service subscription level
- Installed equipment, always on, hands on
- FTTH, DSL, Cable, UMTS

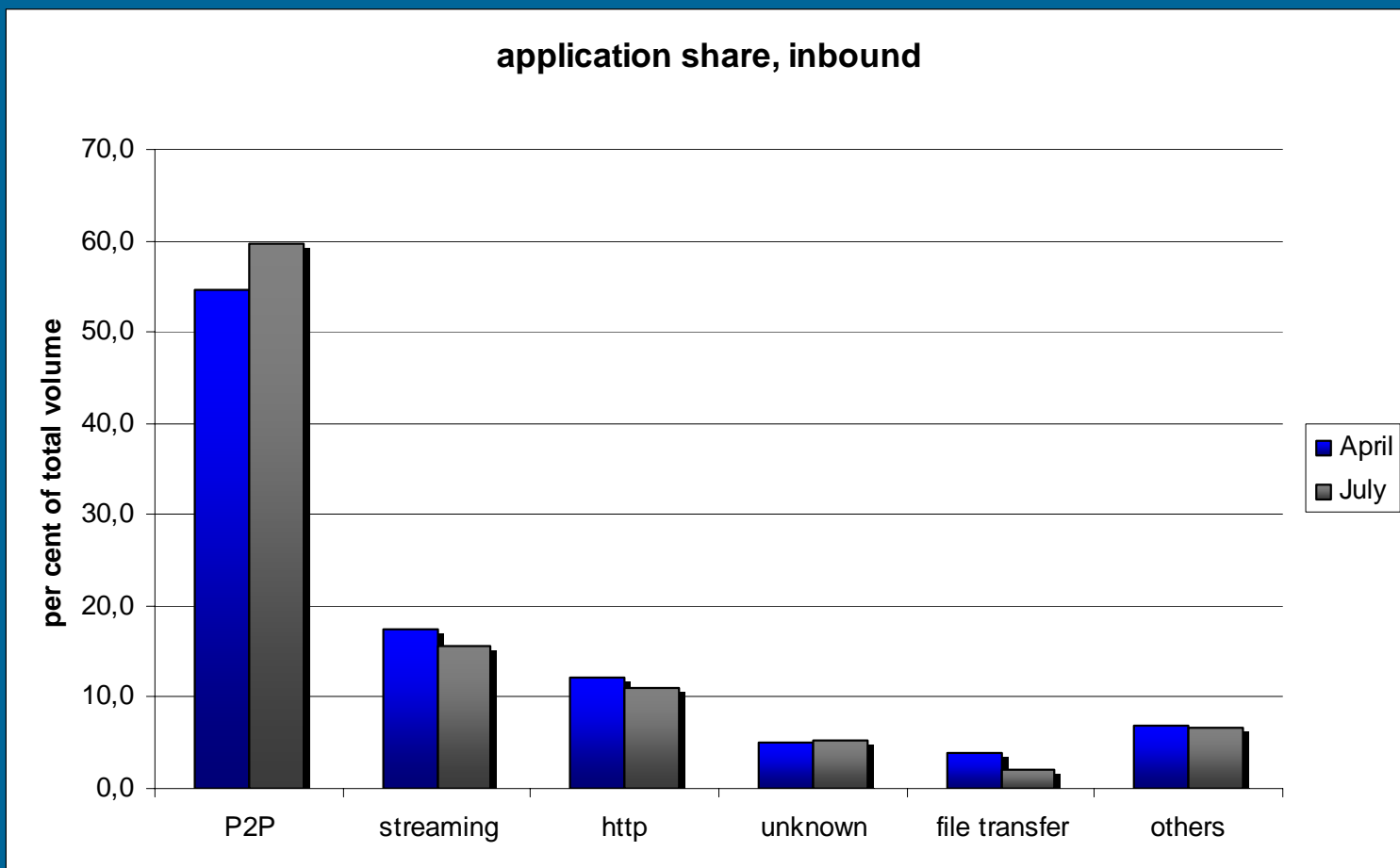
- User behaviour modelling
- Application modelling
- Impact on network
- Coupling experienced Q \Leftrightarrow behaviour
- QoS for SLA, provisioning, etc.,
- Trend analysis
- Societal interests

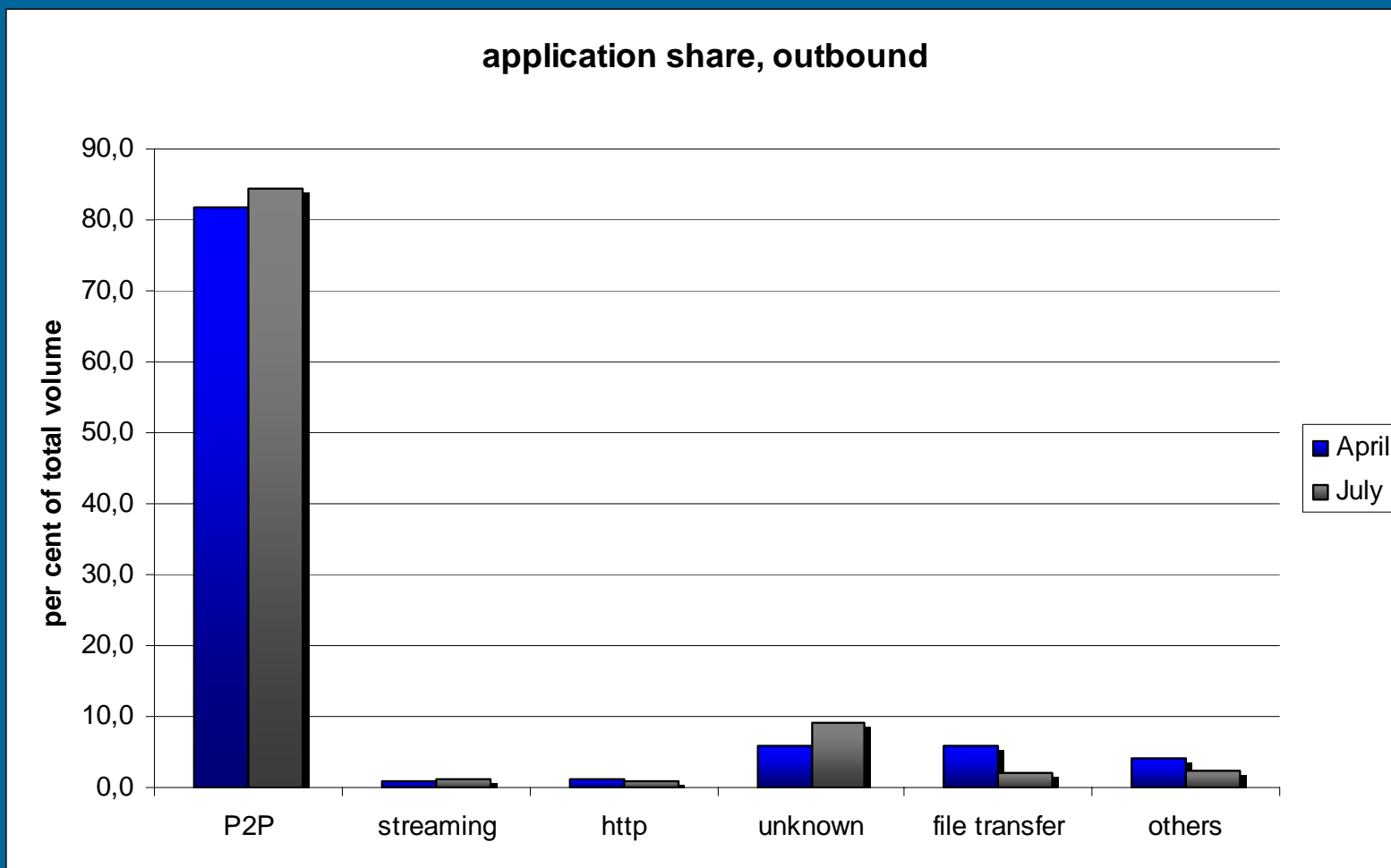
- Application usage, traffic mix
- Application penetration
- Minutes of use per household/application



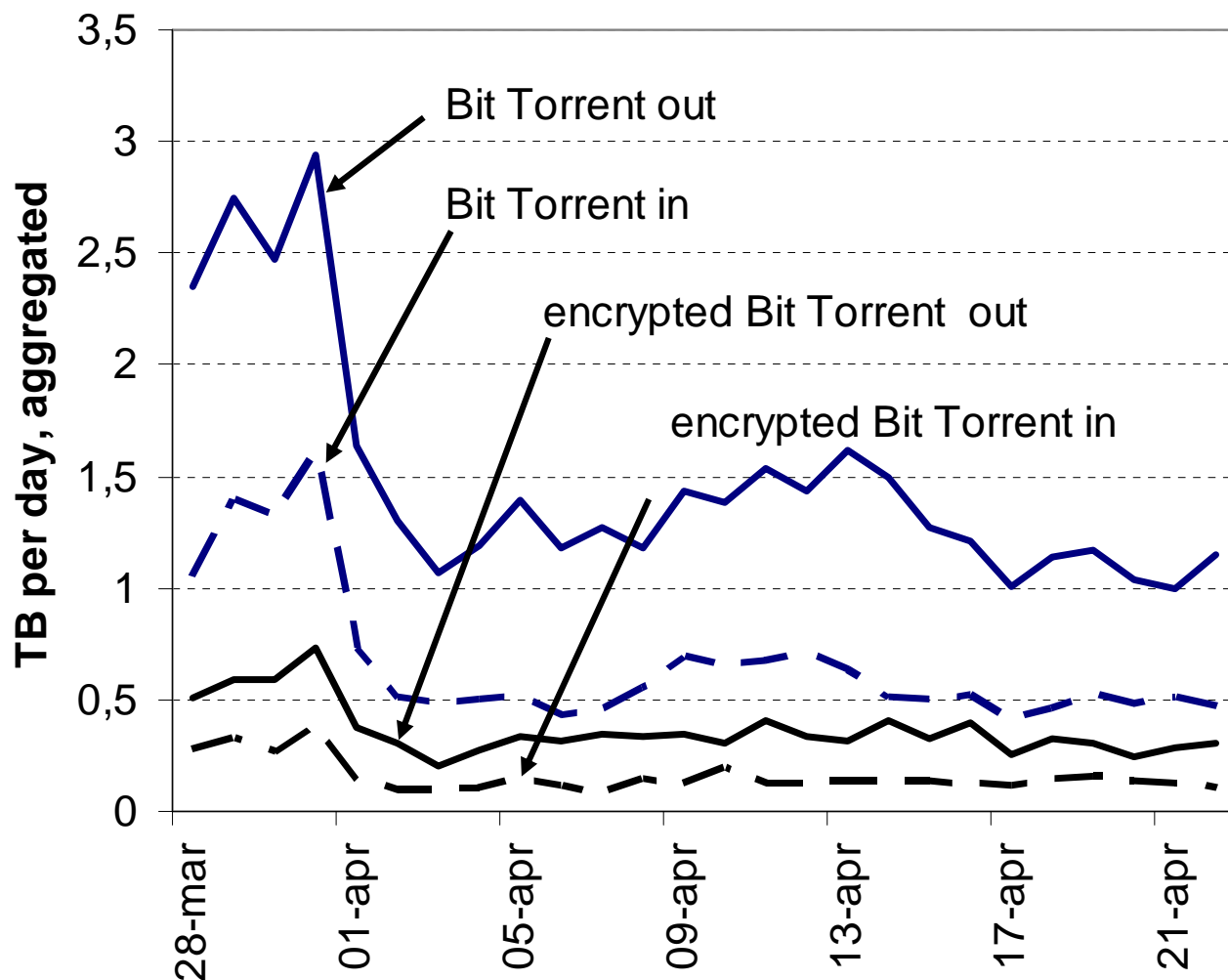








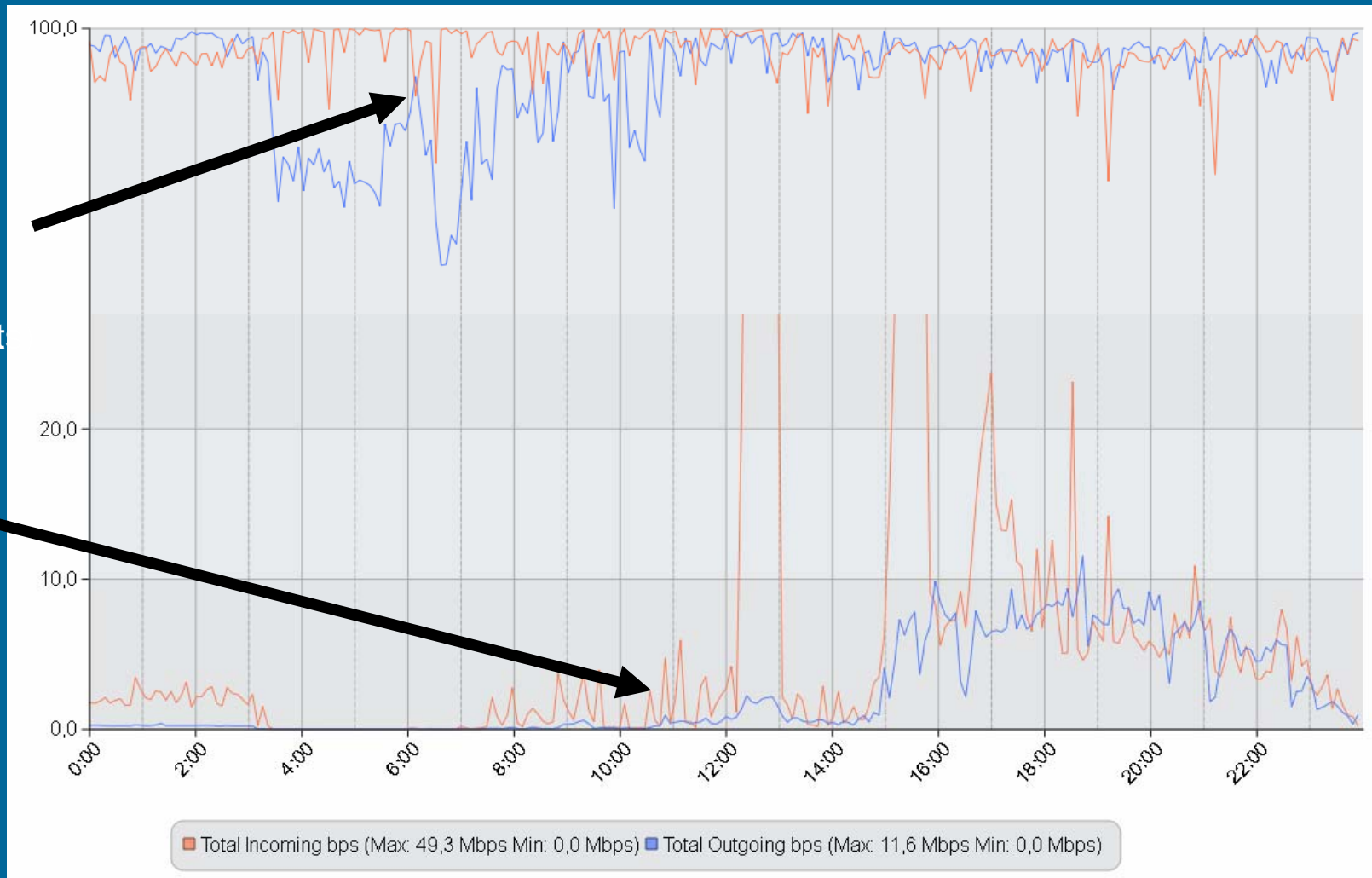
Example, IPRED 1st April



Percent	Application or protocol
99.3%	HTTP
94.9%	SSL
91.8%	ICMP
88.9%	HTTP media stream
86.3%	BitTorrent
86.2%	NTP
85.0%	DNS
85.0%	SOAP over HTTP
78.3%	Ares
76.6%	eDonkey
75.5%	MSN messenger
61.8%	RTP

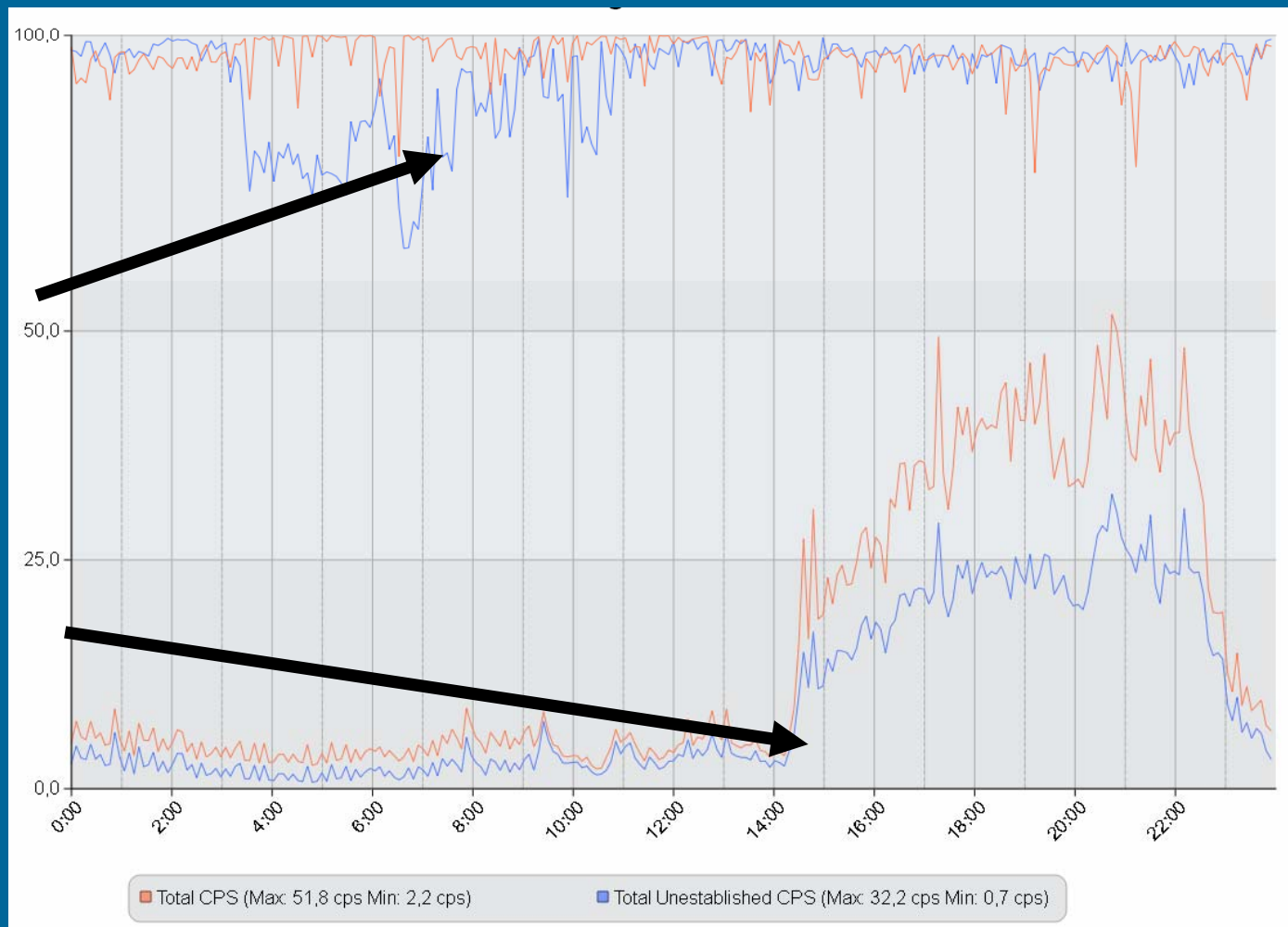
Estimated
Quality (%)
(based on
packet drops
and retransmit

Mbps



Estimated
Quality (%)
(based on packet
drops and
retransmits)

Connections
per second



- Test bed for developed tools
- Coupling of traffic data to QoE data
- Coupling of behaviour to traffic data
- Enhance traffic models
- Contribute to ETSI standardisation

- Tool development ↔ traffic analysis
- High level of detail ↔ close to users
- Customer level ↔ large measurement effort

⇒ BUT, it's worth it!

- detailed info on user behaviour
- link experienced quality to usage
- understand measurement results
(customer feedback)



Backup slides



Volume share of encrypted traffic

