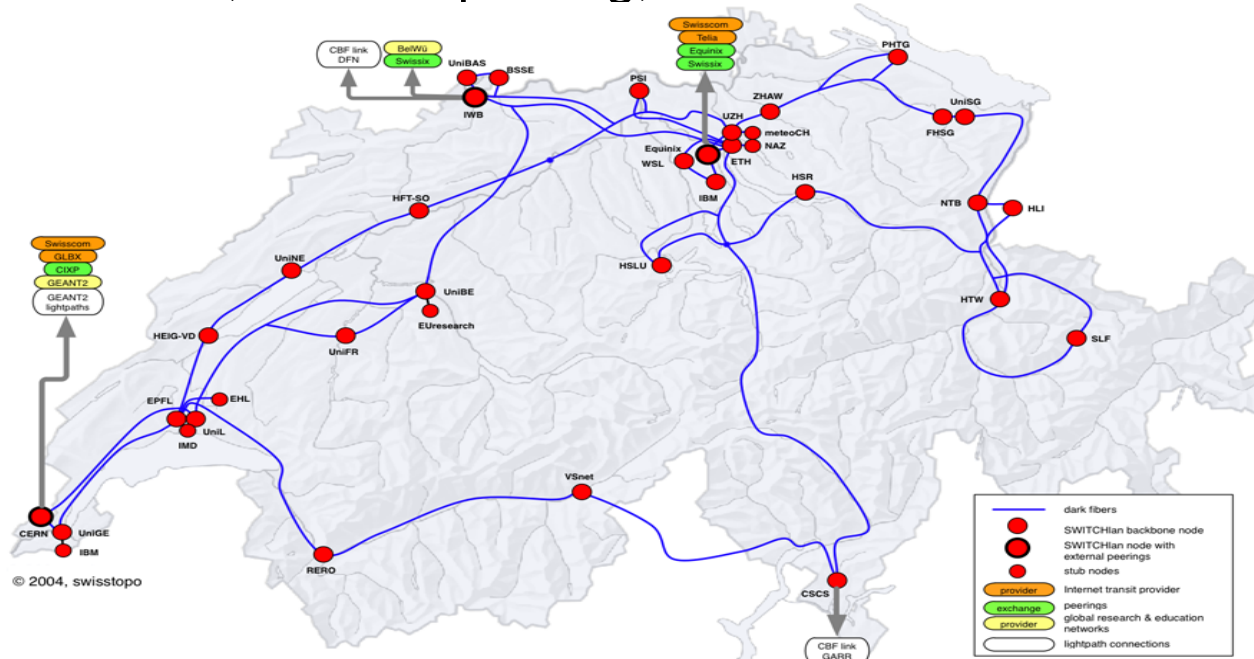


The “SWITCHlan” backbone

- Fiber/WDM-based backbone connecting ~50 R&E sites
- 10 Gb/s and 1 Gb/s backbone links
- 10 Gb/s, 1 Gb/s, and 100/300 Mb/s customer connections
- External connections (Zurich, Geneva, Basel, Kreuzlingen):
 - 13.2Gb/s transit, 22 Gb/s peering, 21 Gb/s other research nets

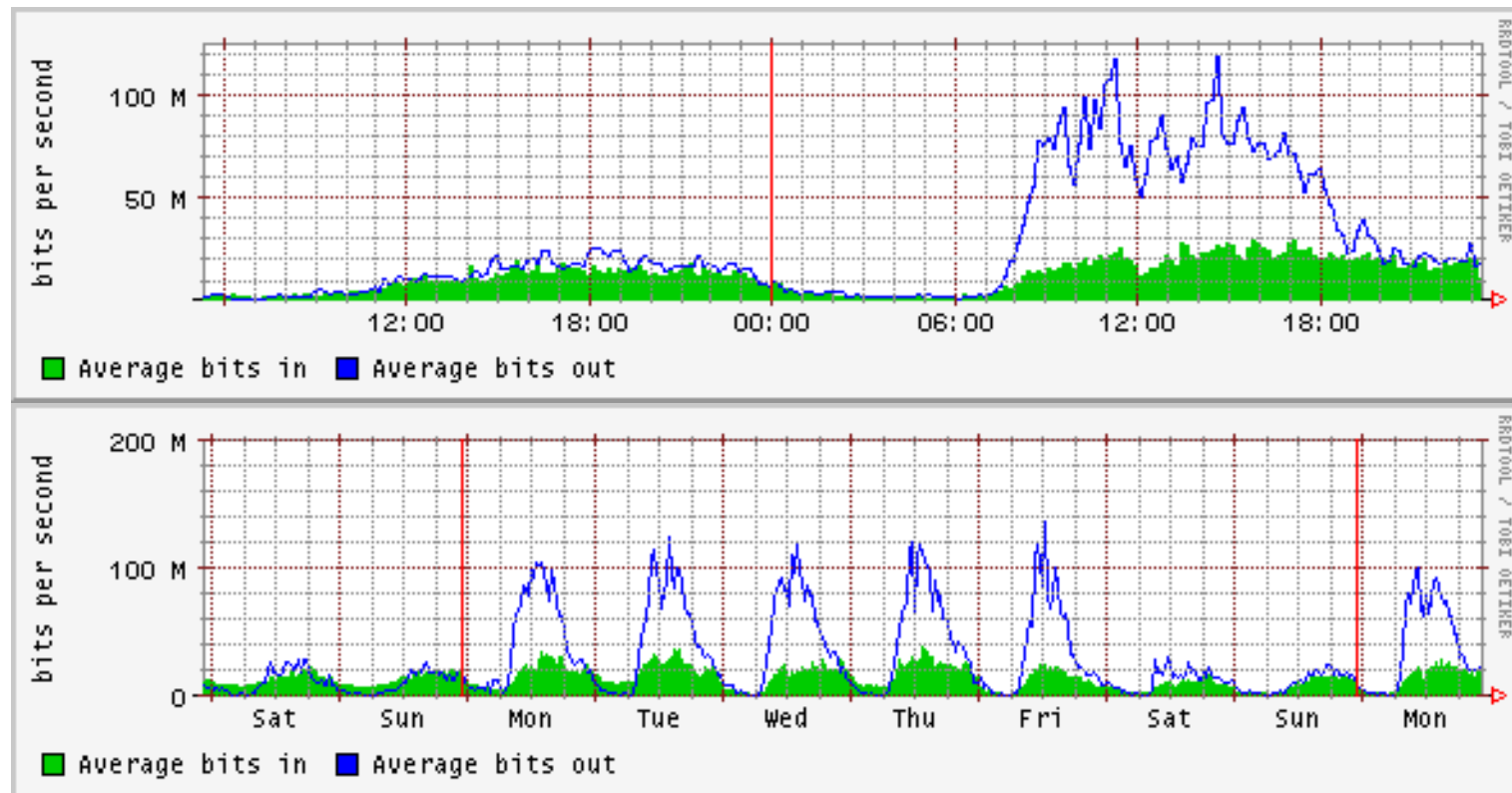


But we *like* traffic!

- SWITCH charges connected sites for (some) traffic:
 - Traffic they receive (outbound is free)
 - From non-research sources (on-net and research nets are free)
 - During extended office hours (nights & weekends are free)
- Complex accounting required – we use unsampled Netflow
 - Upside: helps us understand (external) traffic; supports research
- Perceived as expensive (other ISPs charge flat rates)
- But right incentive structure between ISP and customers
 - Caveat: This breaks down between sites and their resp. users

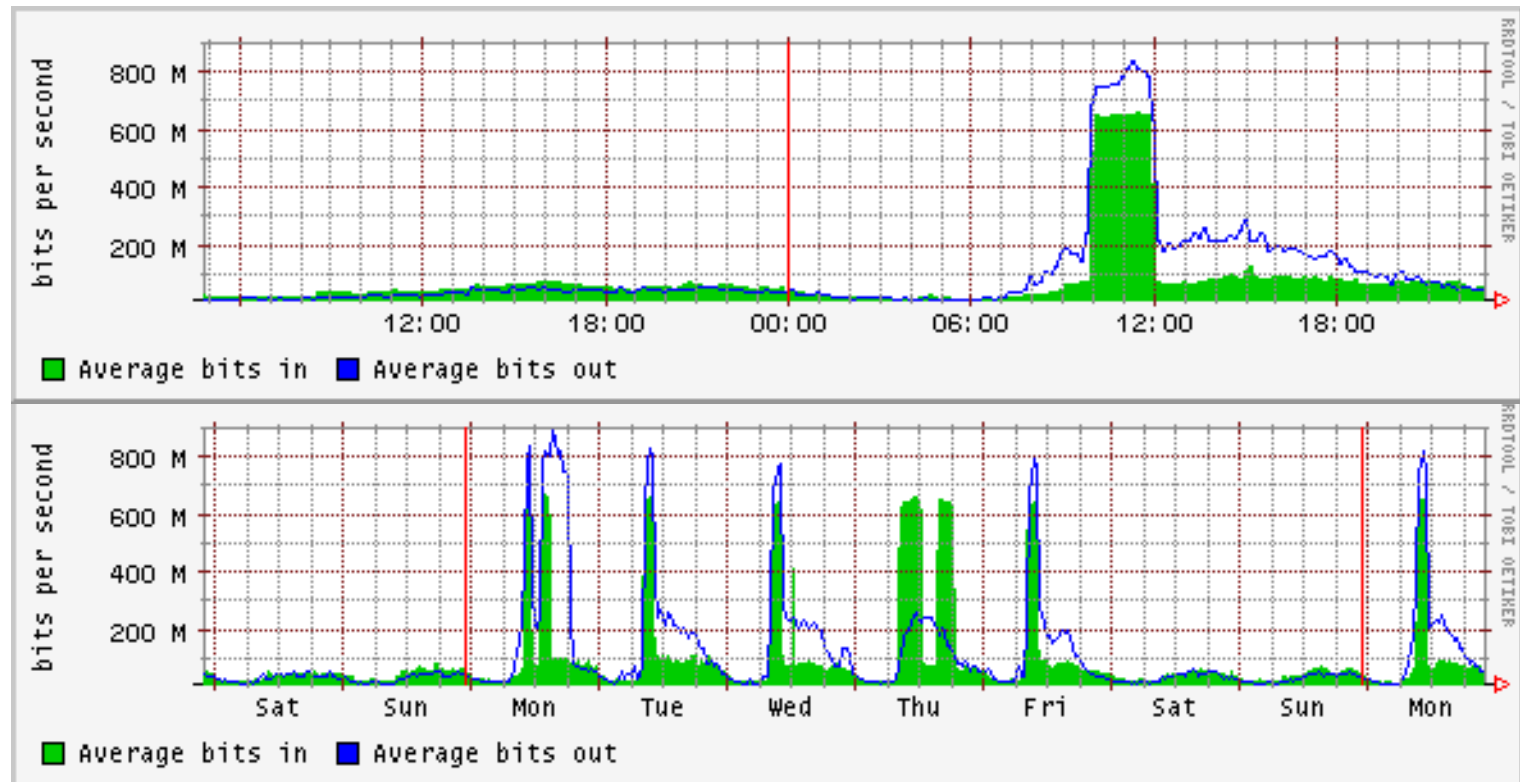
How “special” are universities?

- Not very – most look a lot like large enterprises



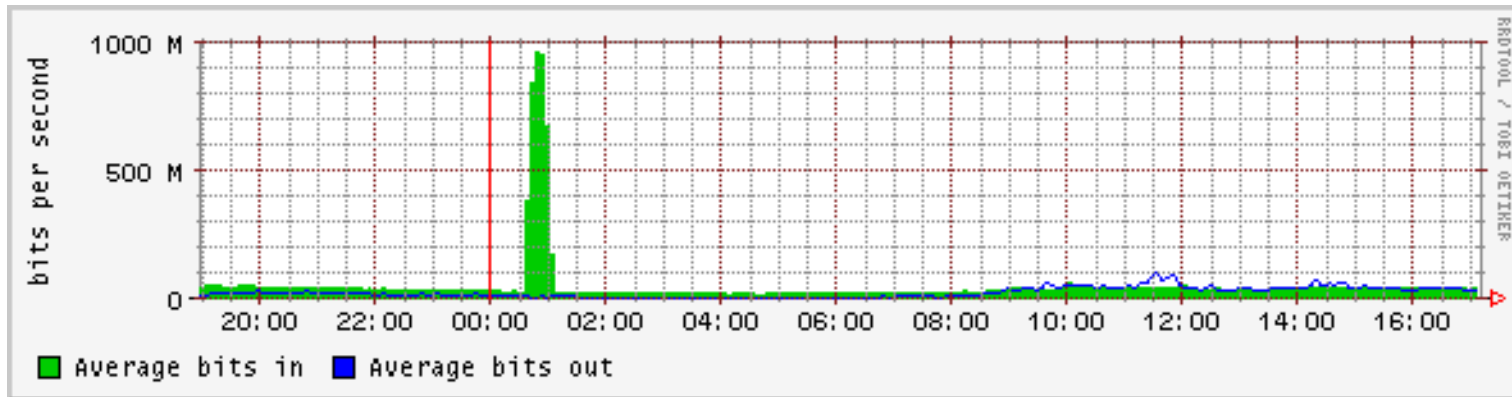
How “special” are universities?

- Audio/video link between two lecture halls



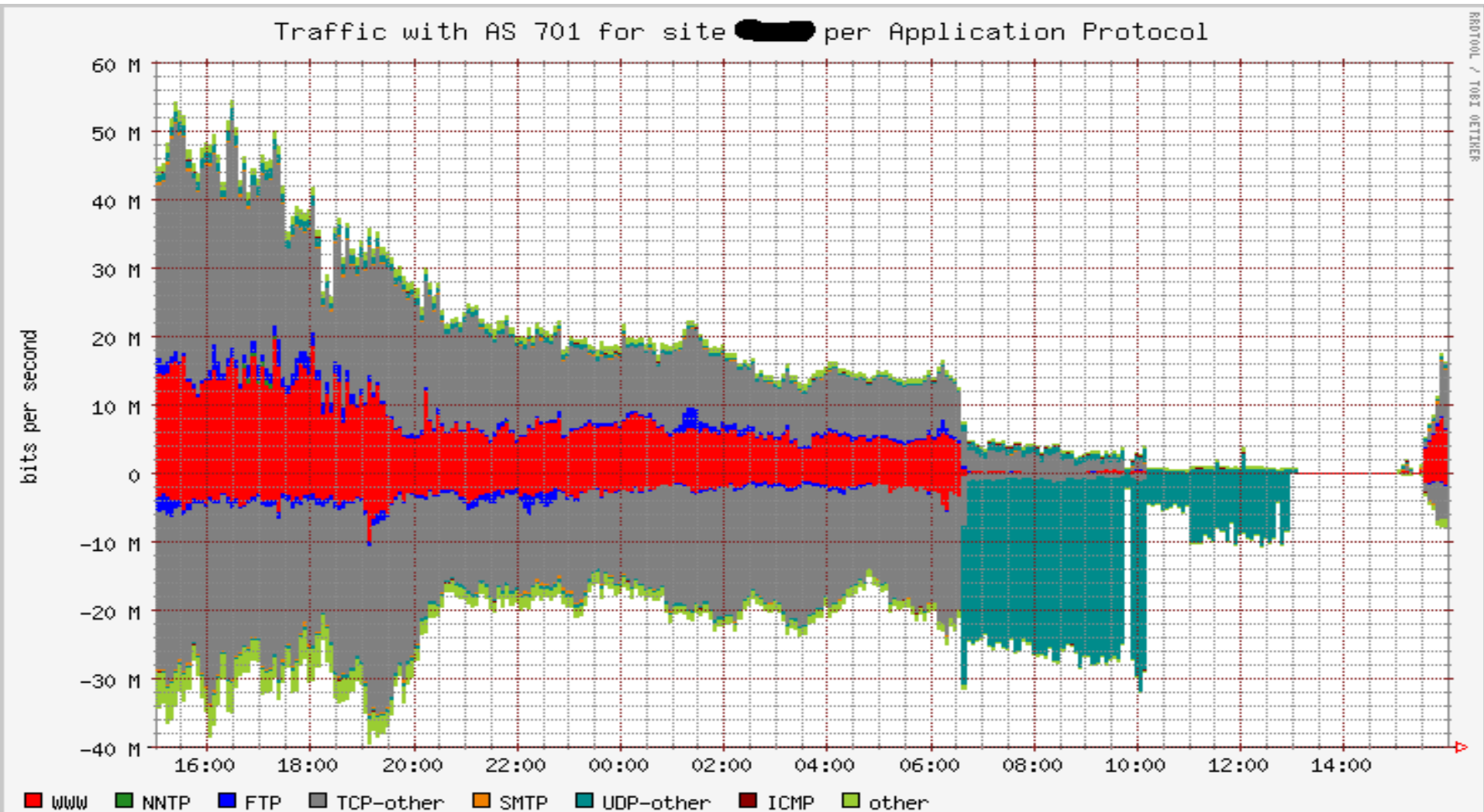
(Non-distributed) DoS

- Fortunately infrequent
- Mostly outbound
 - Universities are more attractive as sources than as targets
- Happens every few months

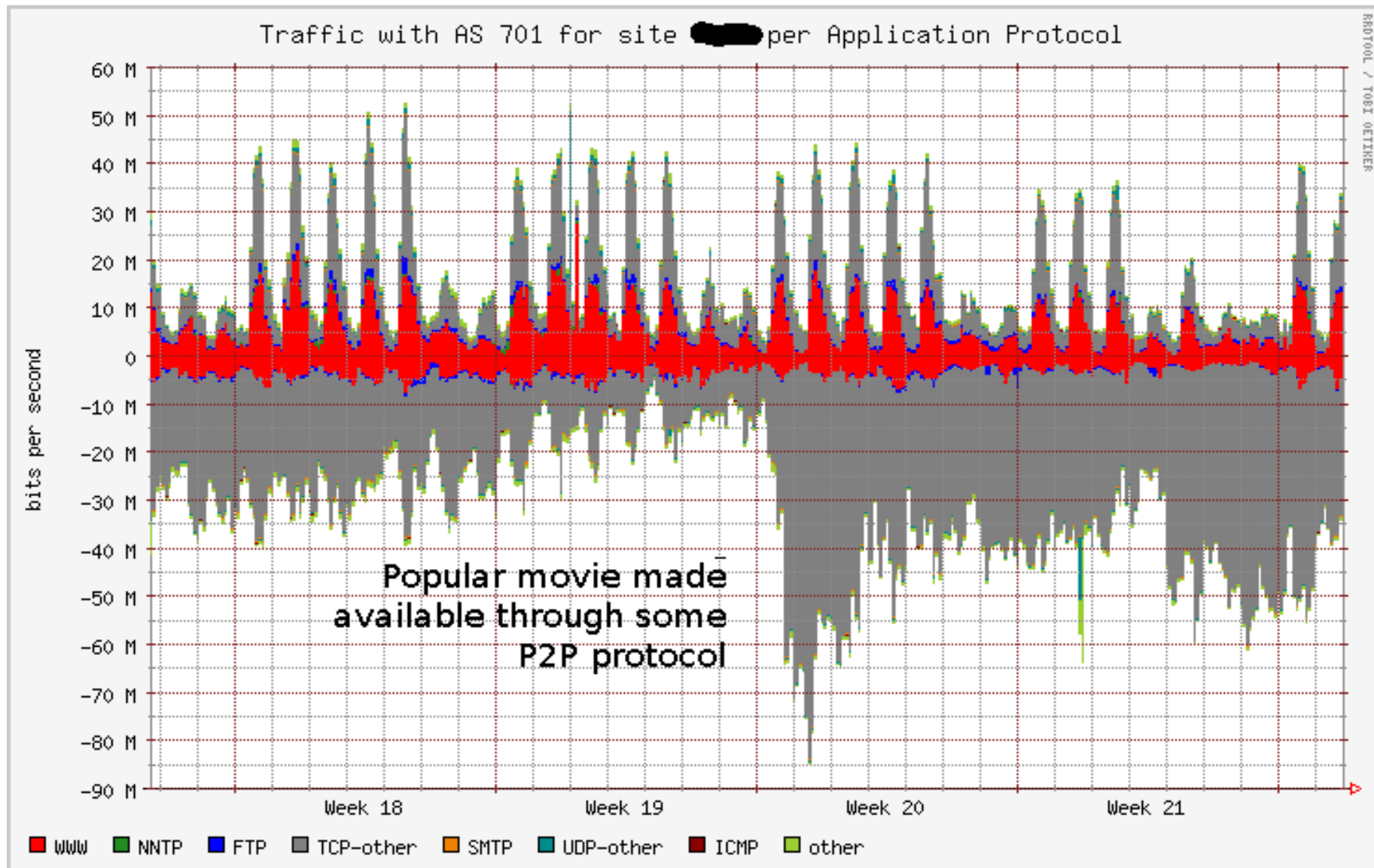


DDoS

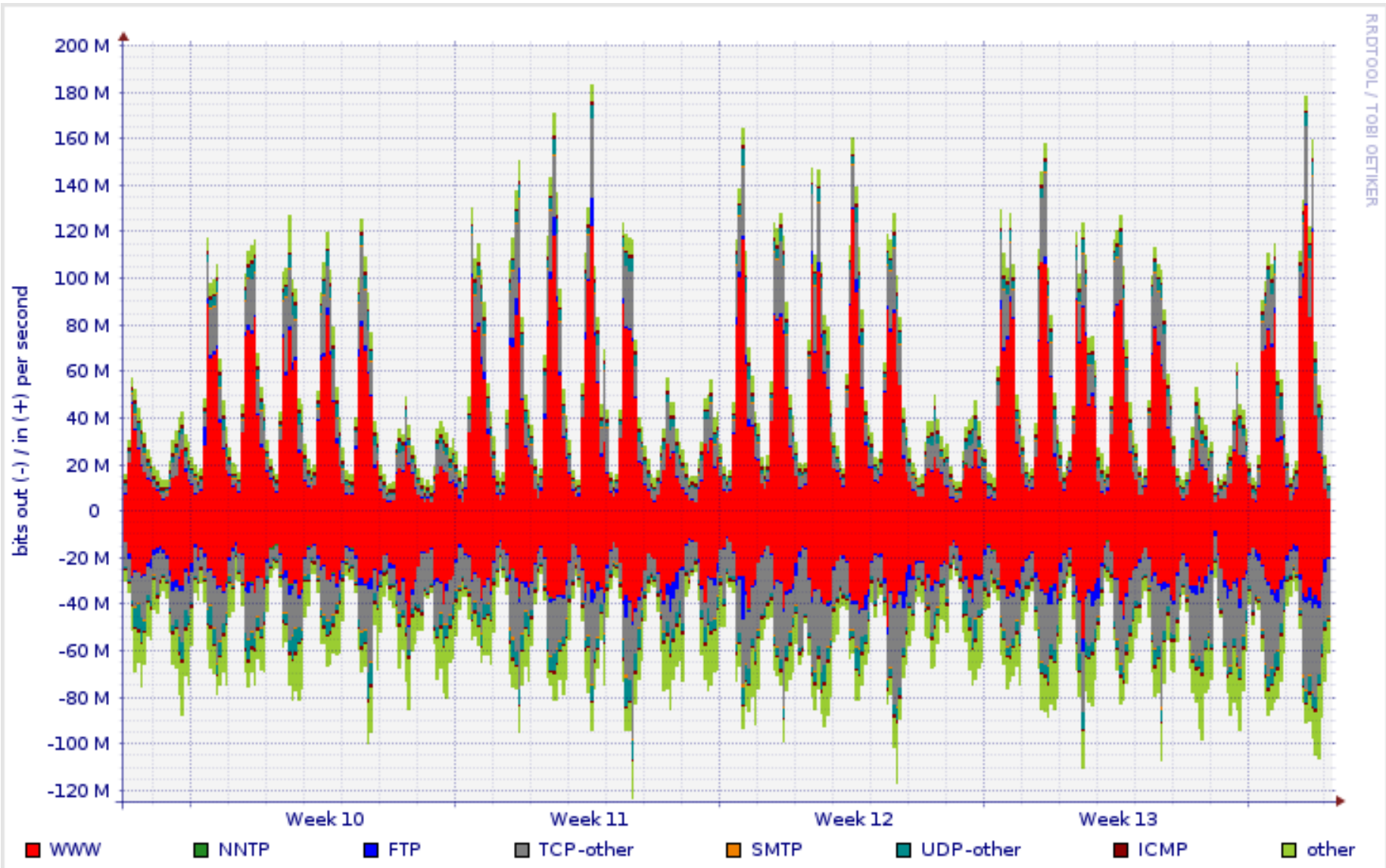
- Not seen much since 2003 – anyone remember this guy?



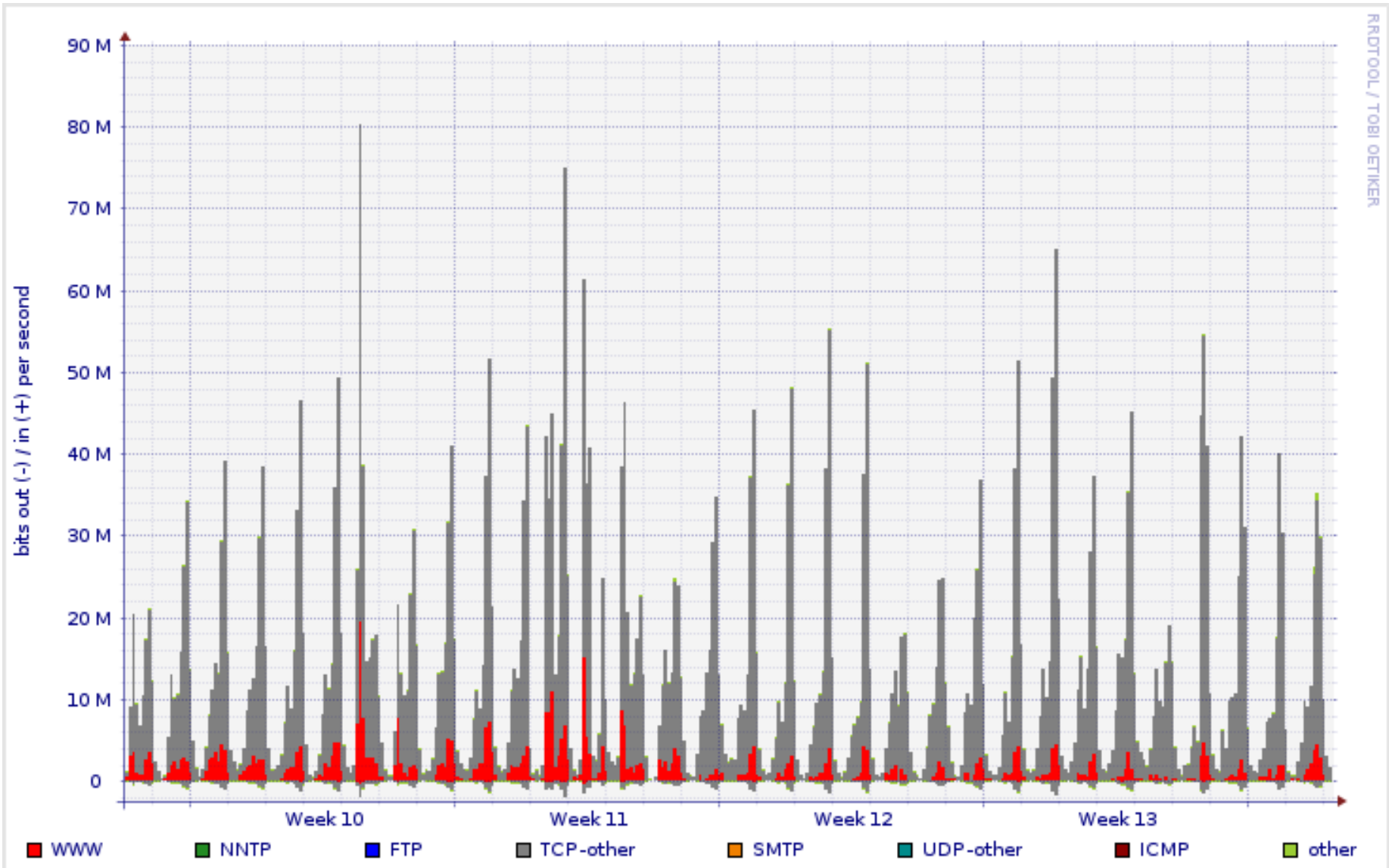
P2P – 2003



P2P(?) – 2009

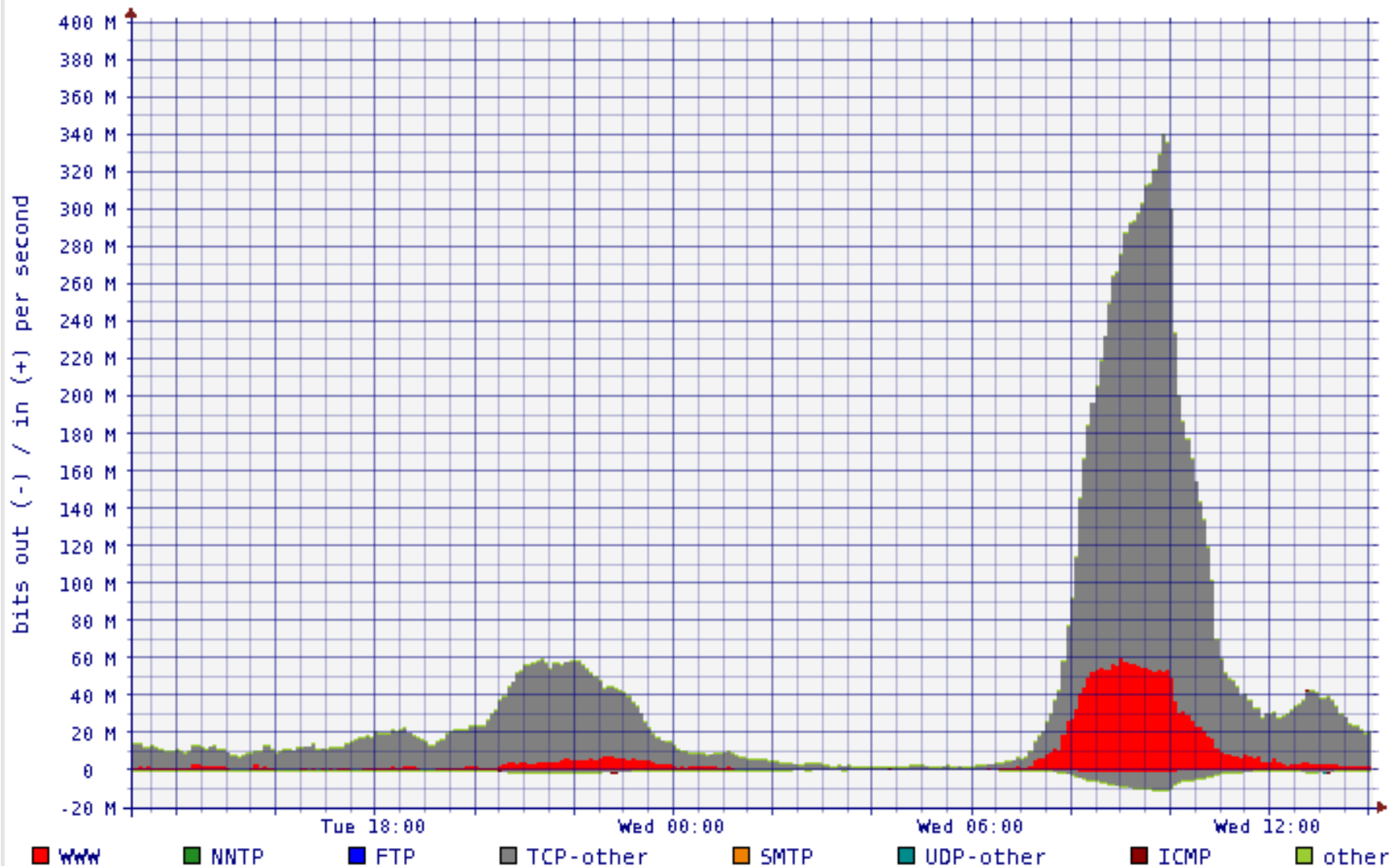


TV over Internet – “P2P” TV peering traffic

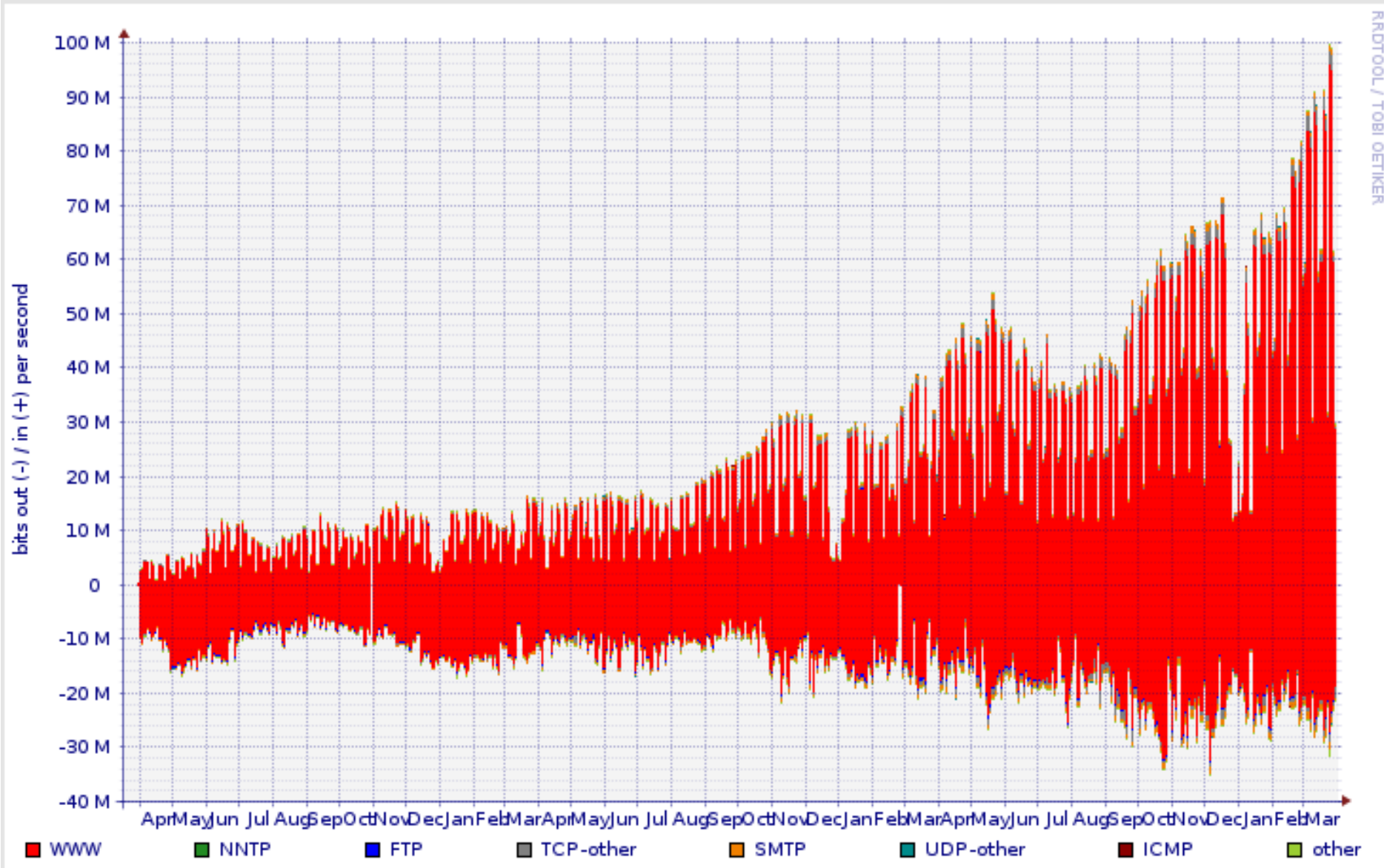


TV over Internet – event during office hours

Traffic with AS [redacted] per Application Protocol



Content peering – large search engine



“Cloud” use by researchers – still very rare

Traffic with AS 701 for site [redacted] per Application Protocol

