Perspectives on Congestion Exposure

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Comcast

Agenda

Constraints and requirements for solutions

Potential use cases

Next steps for engineering

Solution Constraints for an ISP

ISP must be responsive to dissimilar customer application demands

- Customer care call volume is an obvious indicator of customer dissatisfaction, as well as its own support cost
- Mix of popular customer applications tends to vary according to demographics, e.g., higher P2P usage in college environments
- Interactive applications (VoIP, web, streaming video) tend to have much stronger diurnal consumption patterns than bulk file distribution (P2P)

ISP must balance multiple external concerns

- Internet community, government regulators, different traffic sources & sinks, sustainable business models, etc.

Network capacity increases are not instantaneous

- DOCSIS bandwidth augmentation usually requires fiber node splits and CMTS port allocations; it sometimes requires new fiber runs, additional CMTS blades and chassis, and occasionally the allocation of additional RF spectrum
- Additional access network capacity can be consumed quickly

Requirements for a Long-Term Solution

Provide best possible network experience for broadest set of customers

- Minimize or eliminate cross-customer service quality impacts
- Reduce customer care calls

Enable customers to control their own network experience

- Inform customers of application bandwidth usage and network reaction to that usage
- Enable customer-directed prioritization of application bandwidth usage

Enable continued Internet evolution

- Avoid ‘cat and mouse game’ with the detection and mitigation of specific protocols
- Enable transparency of network operation for current and future applications

Support a reasonable network capacity upgrade schedule

- Support growth in number of customers
- Support growth in per-customer average and peak bandwidth
- Avoid uneconomic capacity upgrades that benefit only 5% of heavy usage customers

Potential Use Cases for Congestion Exposure

Congestion volume as input to congestion management

- Current mechanism “FairShare” uses per-subscriber traffic volume
- Future mechanism might use per-subscriber congestion volume (in addition to, or instead of, traffic volume)
- This evolution may incent the implementation and deployment of LEDBAT-like congestion control applications

Discovery and diagnosis of ‘whole path’ congestion issues

- Consumer ISPs need to detect congestion, which can occur in broadband access networks, backbones, interconnects, other ISP networks, and in remote data centers
- Current detection mechanisms include weathermaps (internal networks only), traceroutes, and customer calls

DDOS mitigation (viability TBD)

Next Steps for Engineering

Assume acceptance as an IETF standards activity

We recognize the need to create two Congestion Exposure ecosystems

- Software/firmware implementation ecosystem
  - Operating systems
  - Appliance and consumer device firmware
  - Network elements (routers and access equipment)
  - Network management systems
- Network deployment ecosystem
  - ISPs
  - Application and content providers
  - Consumers / home networks
- Need to consider funding, prototyping, lab testing, and trial deployments – think 2-3 years or more

These are engineering issues, not research issues