Next Steps for QoS

A report of an IAB collaboration examining the state of QoS architectures for IP networks

Geoff Huston

Where we have been….

- **IntServ**
    - <u>application</u>-centric view of the QoS world
    - pre-emptive reservation imposed upon the network
    - recognized issues with scaling into vary large systems
- **DiffServ**
    - <u>network boundary</u>-centric view of the QoS world
    - no a-priori associated service delivery undertaking
        for that, you must add resource management tools to the mix
    - good scaling properties but at the expense of accuracy of service undertaking

QoS Delivery

Managing the delivery of QoS is a combination of:

- Hop-by-hop Service **Response Mechanisms**
- Multi-Hop **Control** structures

- **Response Mechanisms** appear to be well understood
  - filtering, conditioning, metering, queuing, discard...
- **Reservation Control** mechanisms appear to be well understood
  - Intserv and RSVP
- **Adaptive Control** mechanisms do not appear to be as well understood
  - Measurement and signaling to create a control feedback loop between the network and the admission control subsystems

QoS issues discussed in RFC 2990

- QoS Enabled Applications
- The Service Environment
- QoS Discovery
- QoS Routing and Resource Management
- TCP and QoS
- Per-Flow States and Per-Packet Classifiers
- The Service Set
- Measuring Service Delivery
- QoS Accounting
- QoS Inter-Domain Signalling
- QoS Deployment Diversity
- QoS Deployment Logistics

Next Steps …
Towards an End-to-End QoS Architecture

- Study of an approach to a QoS architecture which uses:
  - fine-grained IntServ tools as the application signaling mechanism at the edge of the network
  - Aggregated service IntServ tools at inter-network boundaries
  - DiffServ admission tools as the means of controlling admission of traffic into network cores

  - Per-Flow fine-grained response at the network edge
  - Aggregated service response within the network core

- Residual issue of management of feedback control system from the network core to the network boundary within the DiffServ architecture
  - Adaptive QoS control systems