Policy Server and Policy Control Agent

IRoNet Seminar
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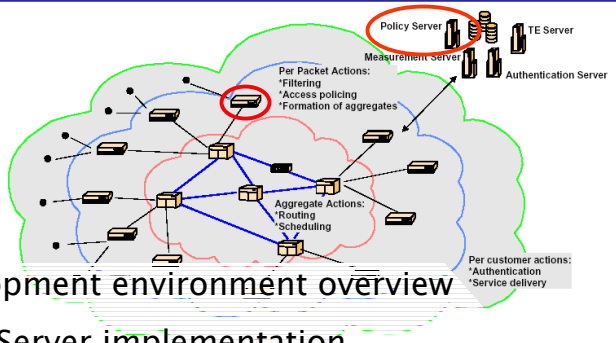
Location in the Big Picture



- Development environment overview
- Policy Server implementation
- Policy Control Agent implementation
- Measurements with the Agent

Policy Server

- Conventional PC hardware
- FreeBSD operating system
- MySQL database
- Databases
  - User database (profiles)
  - Network policy database (profile filters)
  - Class database
- Measurements ongoing

Edge Routers

Hardware

- AMD 1300 MHz processor
- 256 MB memory
- Four 1-port 3Com Ethernet network interface cards or one 4-port D-Link card

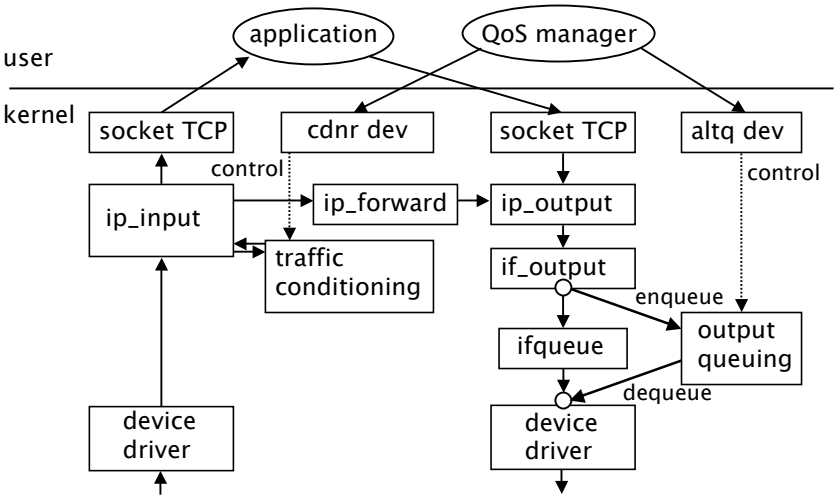
Software

- FreeBSD 4.5 operating system
- Alternate Queuing (ALTQ) 3.1

Alternate Queuing (ALTQ)

- Traffic management software
- Replaces the FreeBSD own queuing system
- Functionality can be enabled/disabled
- Implements different scheduling and queue management mechanisms
- Supports DiffServ and RSVP
- We have used CBQ and conditioners like token bucket and two-rate three colour marker (trTCM)

ALTQ implementation model

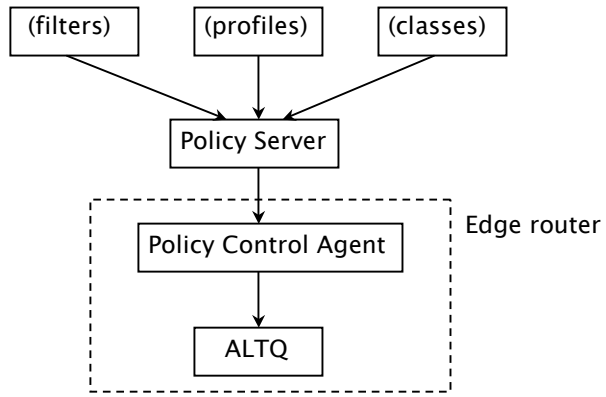


[K. Cho: The Design and Implementation of the ALTQ Traffic Management System]

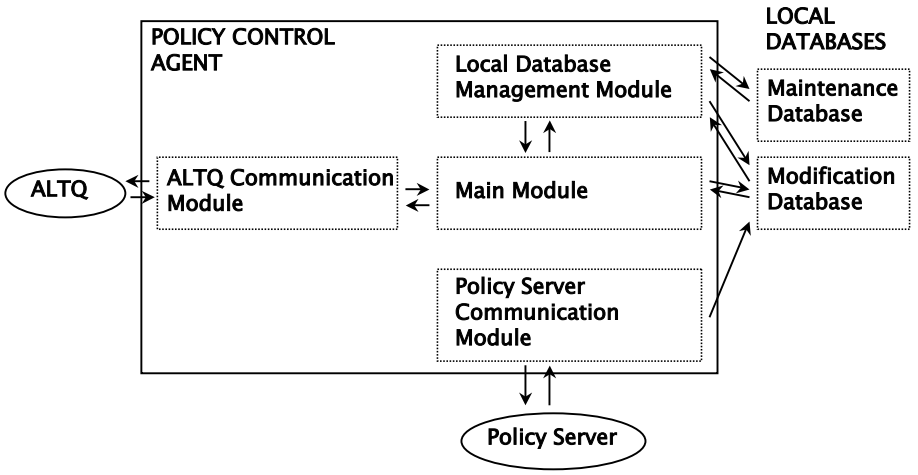
Policy Control Agent

- Software that resides in every edge router
- Link between the Policy Server and ALTQ
- Configures ALTQ according to the parameters received from the Policy Server
- Maintains backup copies of the current ALTQ configuration parameters in a local database

Information Flow

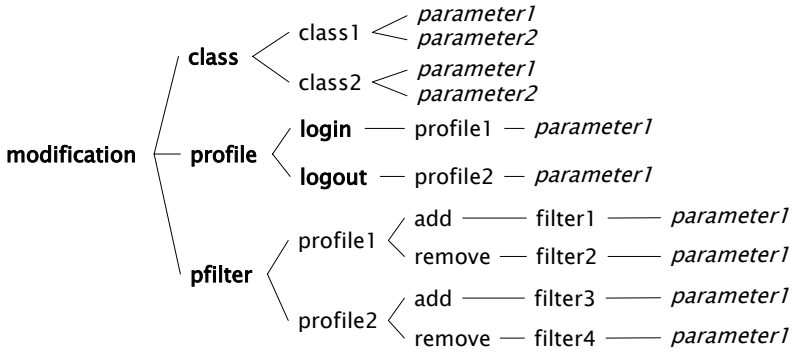


Architecture



Local Databases

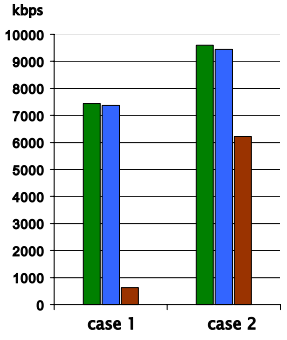
- External part of the Agent
- Modification database: new parameters
- Maintenance database: current parameters



Measurements

- Performance of the Policy Control Agent
  - Effects on throughput, packet delay and packet loss
  - Configuration modifications
- Test setup
  - One ALTQ router with the Agent
  - Spirent SmartBits 600 with SmartFlow software
  - 10 Mbps network

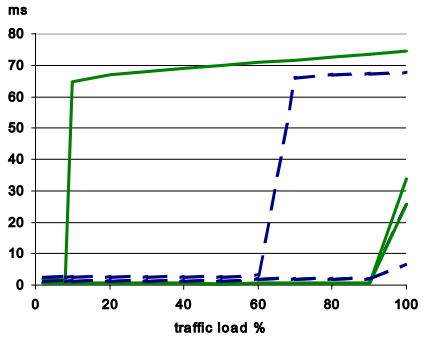
Throughput



- When ALTQ is running, every packet is examined
- Case 1: packet size 128 B
- Case 2: packet size 1024 B
- Variations
  - Green: no ALTQ
  - Blue: ALTQ with simple configuration
  - Brown: ALTQ with complex configuration

Packet Delay

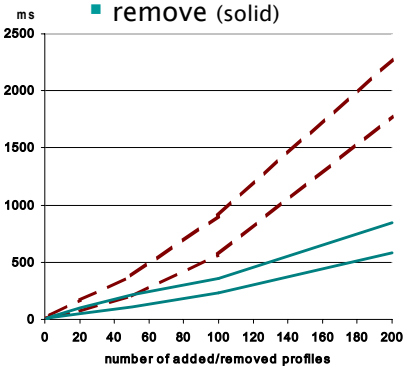
- Green: packet size 128 bytes (solid)
- Blue: packet size 1024 bytes (dashed)

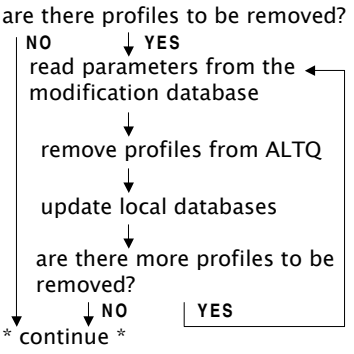


- Variations
  - no ALTQ
  - ALTQ with simple configuration
  - ALTQ with complex configuration

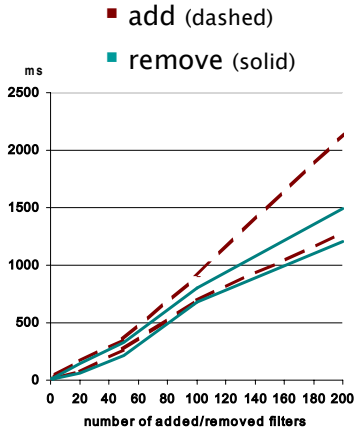
Profile Adding / Removing

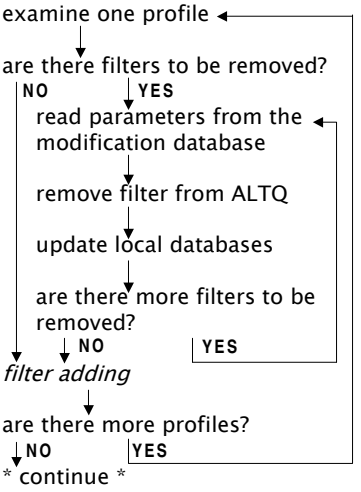
- add (dashed)
- remove (solid)





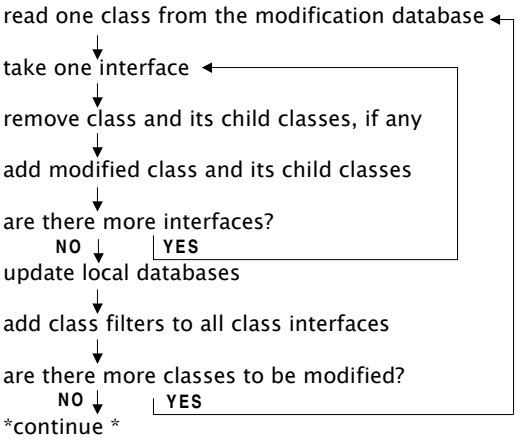
Filter Adding / Removing





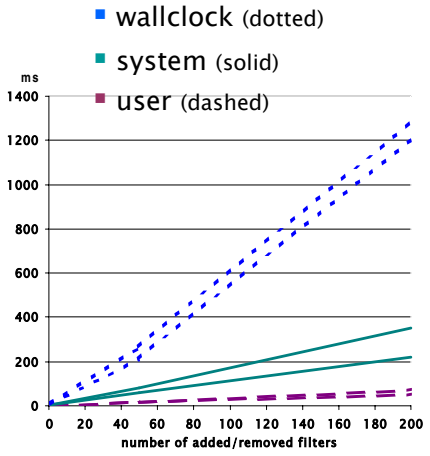
Class Modification

- Class modification time depends on the place of the class in the CBQ hierarchy



Performance Times

- User time and system time (I/O operations) grow linearly
- I/O operations time consuming
- Wallclock time grows more rapidly
- Example: adding and removing filters



Conclusions

- ”Brute force” solutions
- Scalability issues
  - Policy Server: number of edge routers
  - Policy Control Agent: number of profiles and filters, time consuming I/O operations
- Communication between Policy Server and Policy Control Agent
- Customer authentication
- Interoperability testing to come

Thank you!