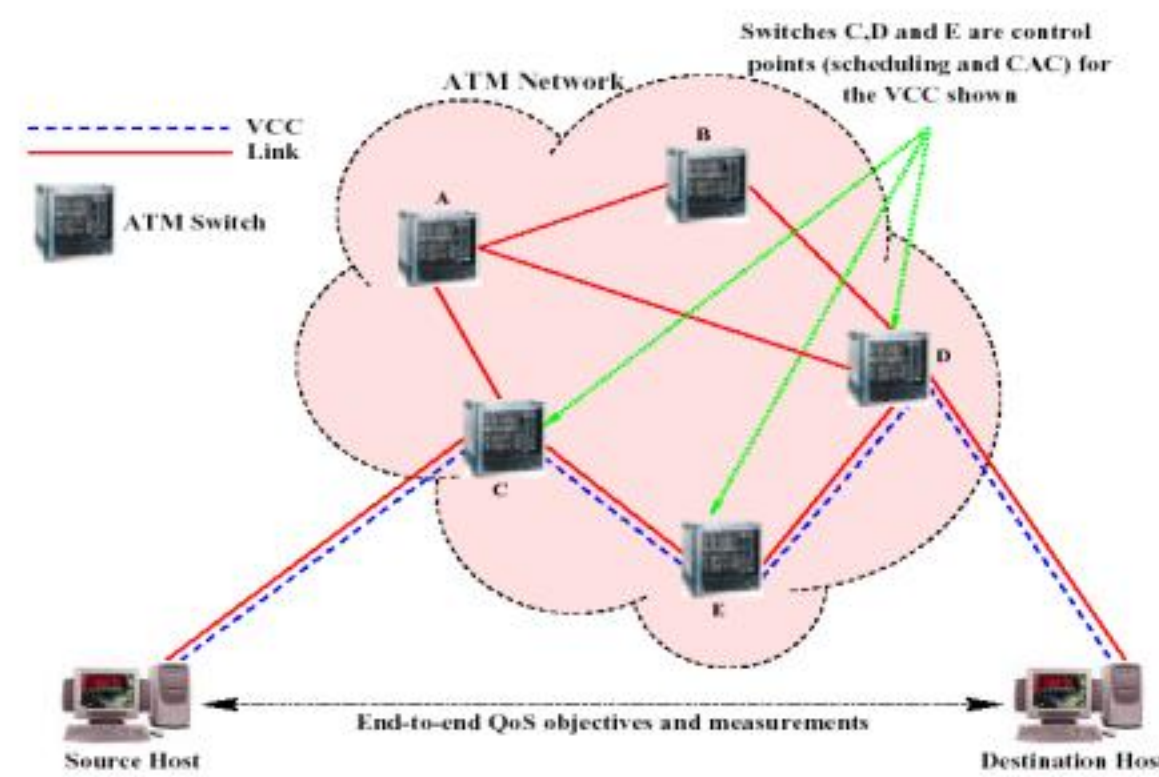# Performance Management in ATM Networks

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QoS Provisioning

- Real-time connections demand strict control on the end-to-end delay and delay-jitter of cells
- Control points in the network are the scheduling and CAC algorithms of switches that provide guarantees at one node


Problem

- Scheduling algorithms can provide bounds on end-to-end parameters using the same scheduler on every switch
- However in a heterogeneous network where switches use different algorithms, end-to-end provisioning in is very difficult
- There are no mechanisms to alter the scheduling parameters in response to changing network conditions
- To establish conformance, and to initiate corrective actions, need to monitor and measure the QoS.
- The protocol to accomplish monitoring is inadequate and inefficient (standard ITU-T I.610)

Approach

- Monitor the delay, jitter, and loss rate of real-time connections accurately and efficiently
- Schedulers should guarantee local delay and jitter bounds regardless of the rate of the connection
- Use the end-to-end delay and jitter measurements to adapt the local scheduling parameters at switches
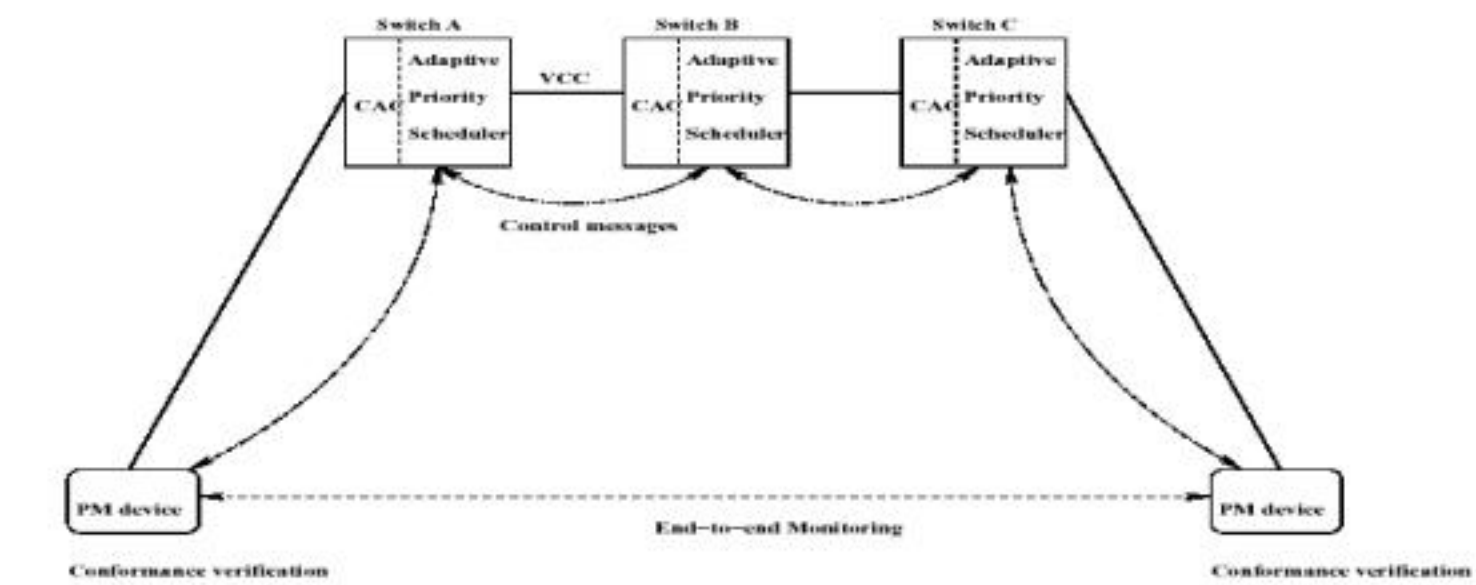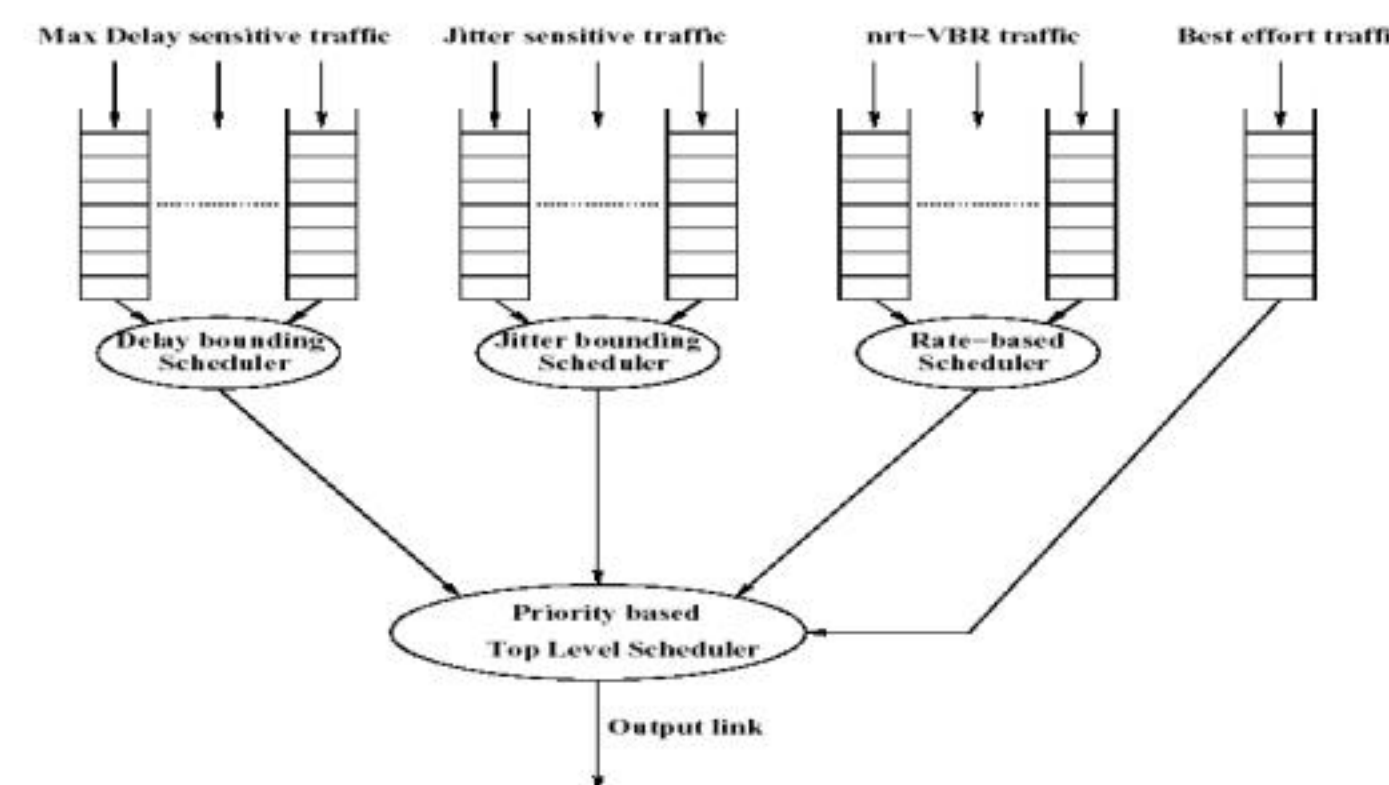

Monitoring

- Need a Performance Monitoring (PM) device to monitor the delay and jitter on a connection with special cells having minimum bandwidth overhead
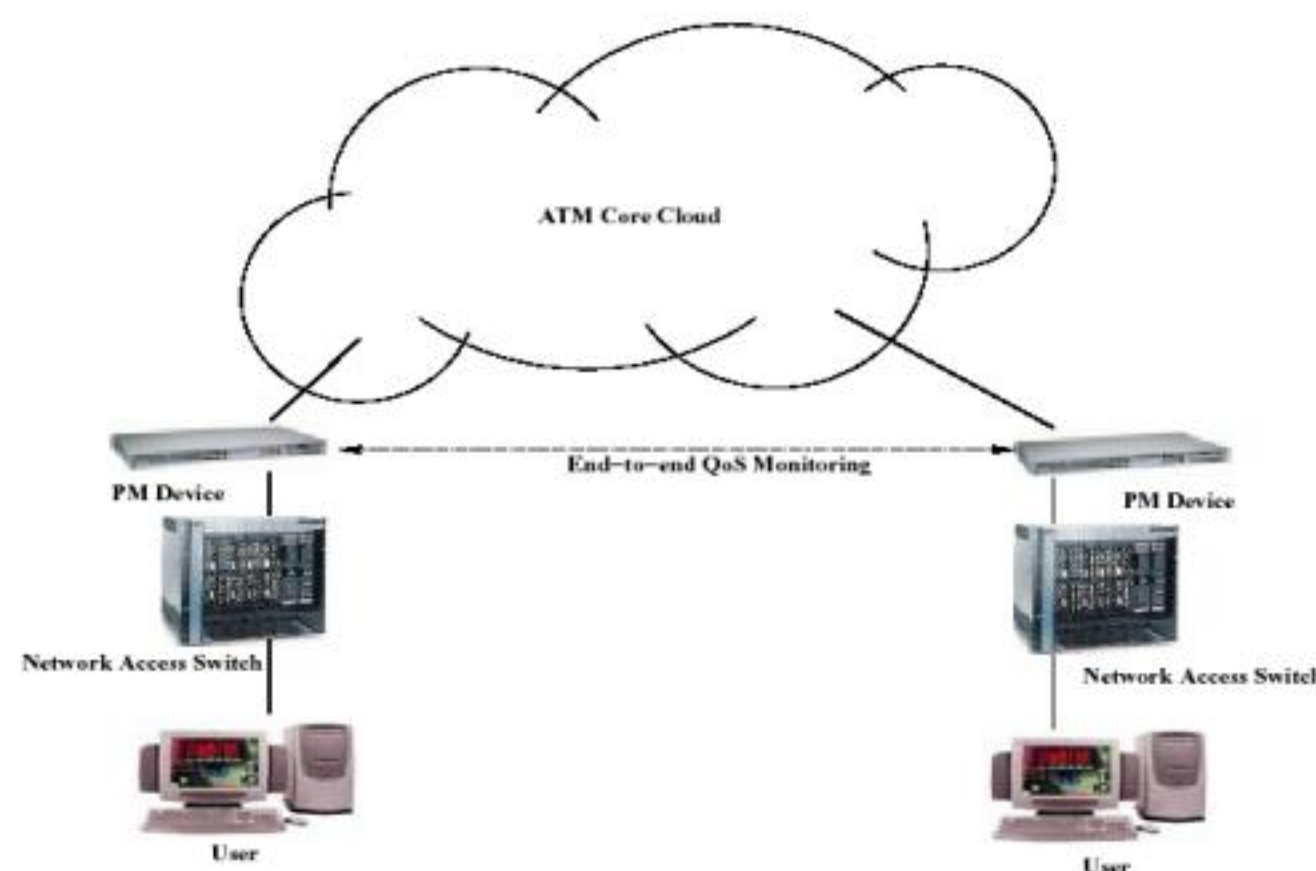
Scheduling

- In order to decouple the desired rate and delay bounds, need a hierarchical scheduler
- It combines lower level rate, delay and jitter bounding schedulers using the concept of urgency of cells

Adaptation

- The PM device sends out measurements or functions of the measurements in special cells to all the switches in the path
- The switches respond by changing the priority of the connection (if required) and marking the correction term on the special cells
- If the measurements are significantly better than the requirements, the switches can also downgrade the priority of the connection in order to attain higher resource utilization
- This is a heuristic method of achieving communication between PM devices and switches, need further work in this direction