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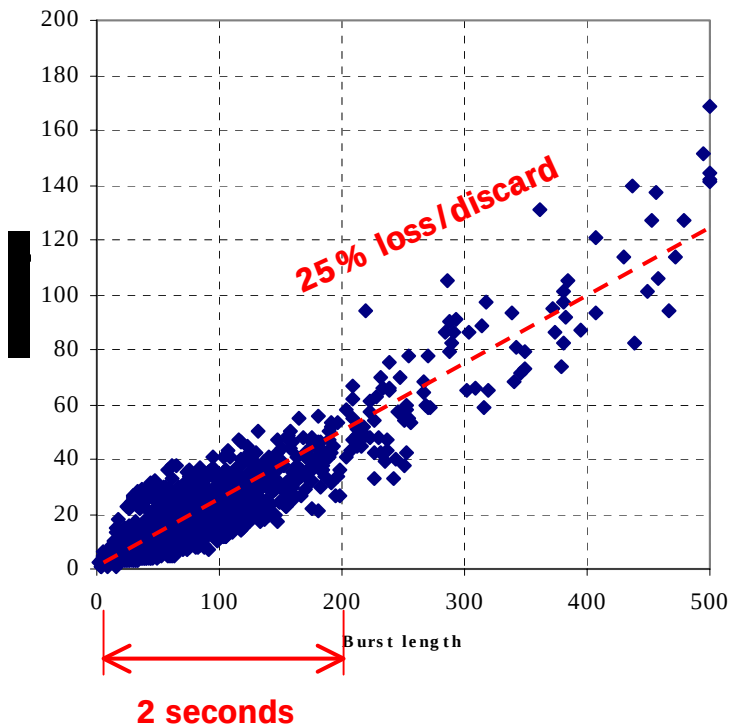
How to ensure QoS

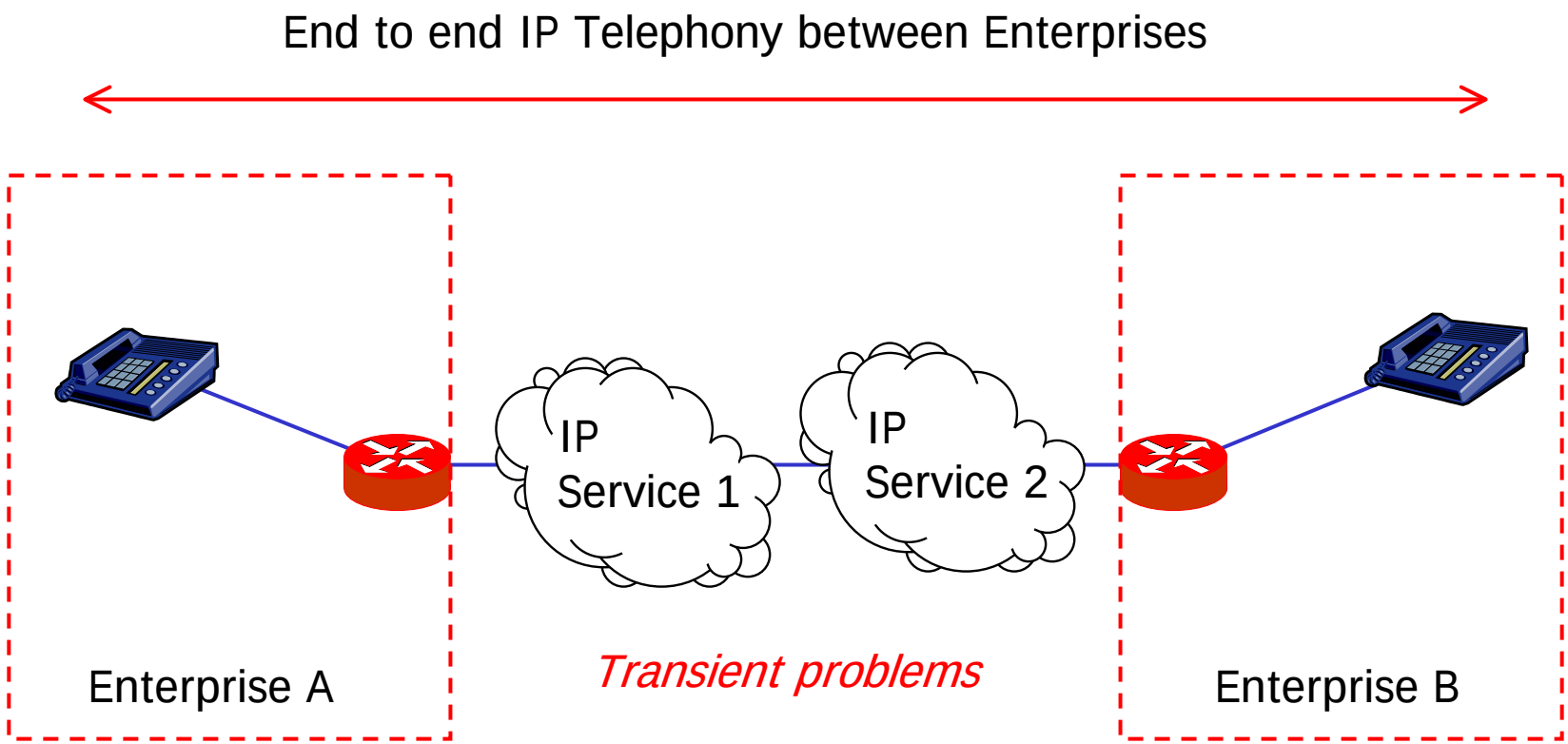
VoIP requires a radical re-think of network management

How do IP networks behave

- IP impairments – loss, jitter, delay
- But!!
  - Impairments are often due to short term congestion or equipment problems and....
  - ..are therefore transient and time varying
- Loss & Discards (due to jitter) occur in bursts
  - Typically 20-40% loss rates lasting for 0.5-5 seconds
- Result = time varying call quality



VoIP Management in 2006



Why traditional NM doesn't work for VoIP

- Metrics are too coarse – e.g. per call average packet loss rates
- Wrong metrics – jitter vs discard rate
- Can't combine per-call average metrics
- Doesn't see transient problems
- Basically
  - Doesn't work for real time traffic

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So - what do we need?

- More detailed, relevant and application specific metrics
  - e.g. burst packet loss rates
- Correlate metrics at source and in real time
  - e.g. did jitter occur simultaneously with loss?
- Measure as close to the user as reasonably possible
  - e.g. integrate monitoring into IP Phone or Gateway port
- Measure at key “chokepoints”
  - e.g. access links/ edge routers, boundaries between networks
- Support management across domains

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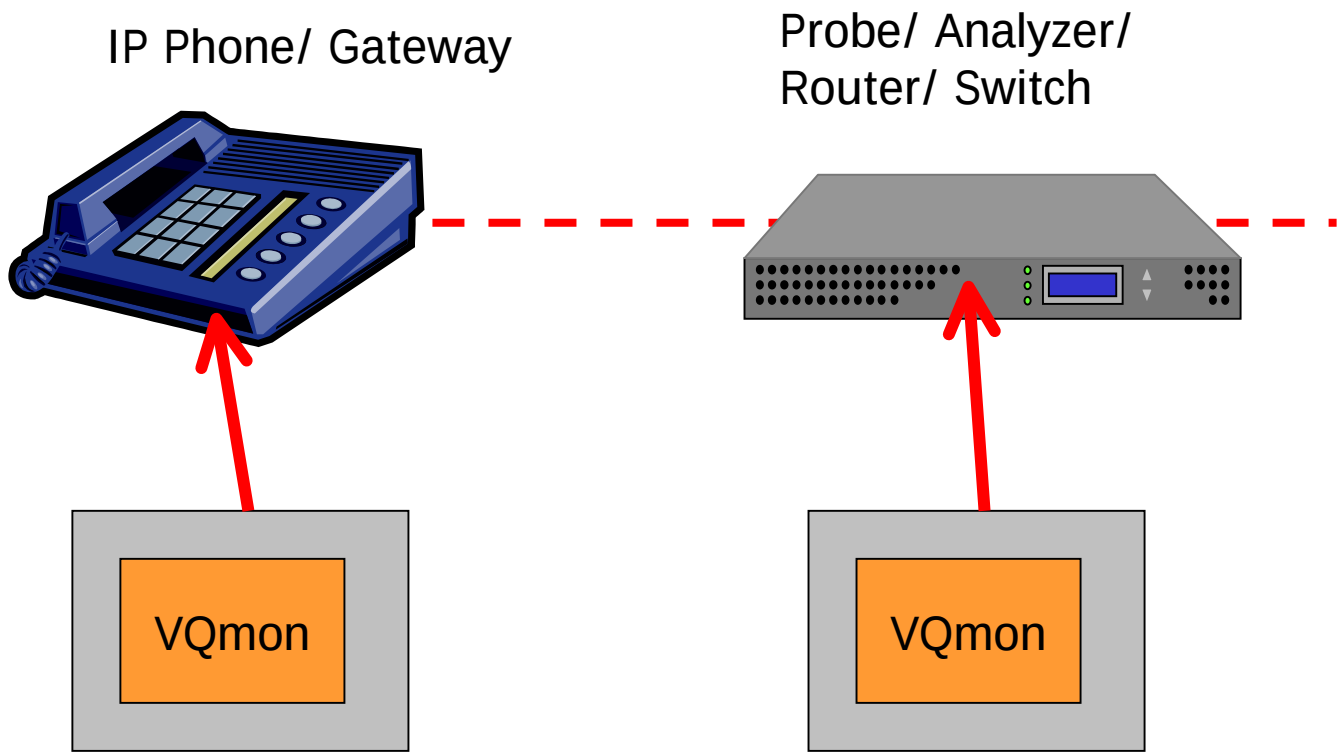
Integrating Management, Monitoring and Diagnosis



Common monitoring technology integrated into IP endpoints and midstream systems

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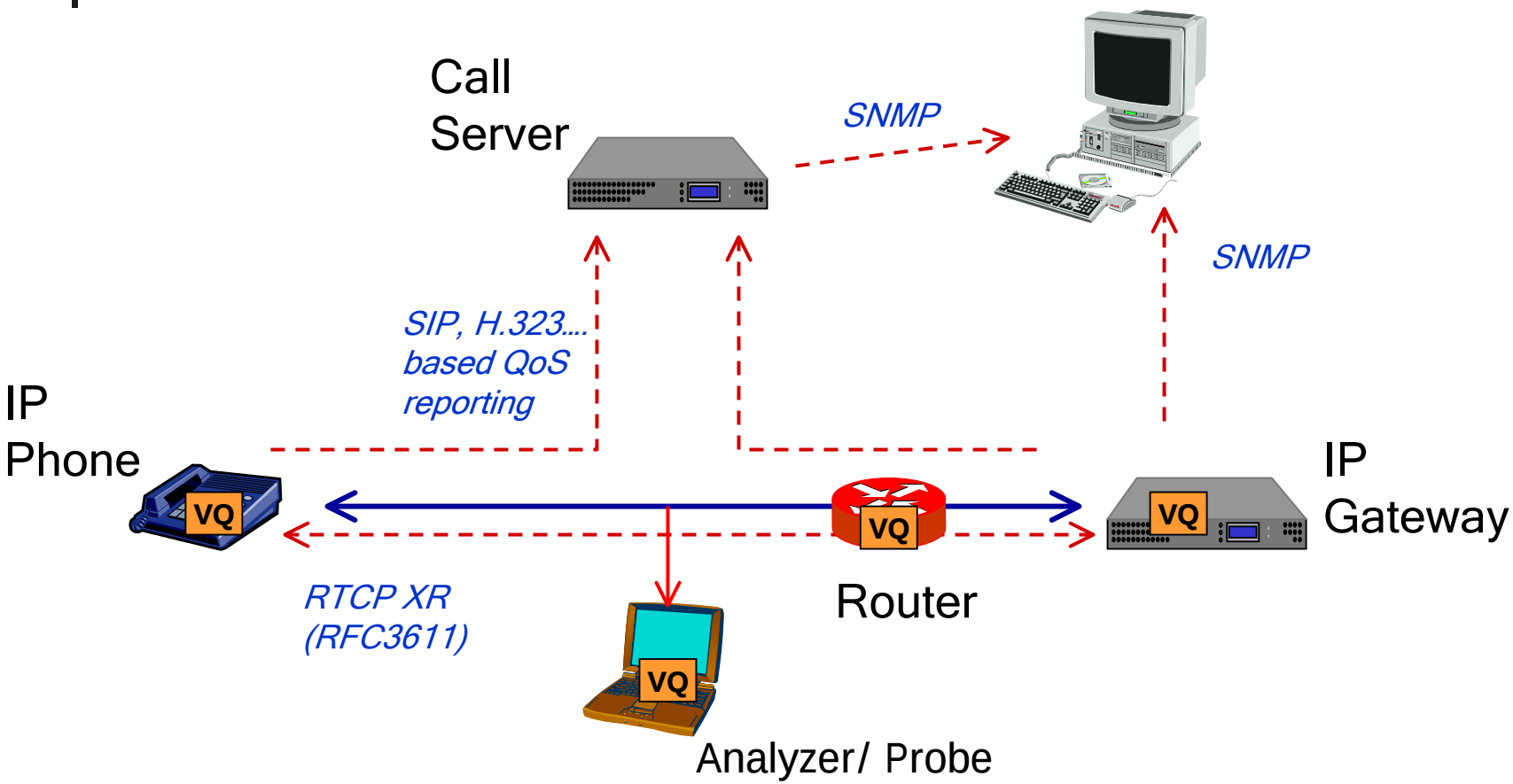
Real Time Management System



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What to look/ask for in 2004

- Support for RTCP XR in IP Phones and Gateways
- Real time management support embedded into IP endpoints
- Consistent (same) technology for monitoring, managing and diagnosing problems - in endpoints, probes, analyzers
- Strategy for multi-domain end-to-end quality management

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