



Service Level Agreements for VoIP

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Agenda

- VoIP SLAs
 - What's typical
 - Why typical isn't ok
- Approaches to SLA measurement
- What to measure
- The "trust" problem
- Final thoughts

What is an SLA?

- Agreed set of performance parameters that:
 - Are measurable
 - Can be easily related to application performance
- In theory - if the SLA is met then the customer is happy
- How well does this work for Voice over IP?

Service Provider Perspective

- Contractual SLA
 - Keep SLA as general as possible
 - Easily measured metrics
 - Measure at service demarcation point
 - SLA monitoring
- But.....
 - Want customer to have good experience overall but minimize level of contractual commitment to this

Customer Perspective

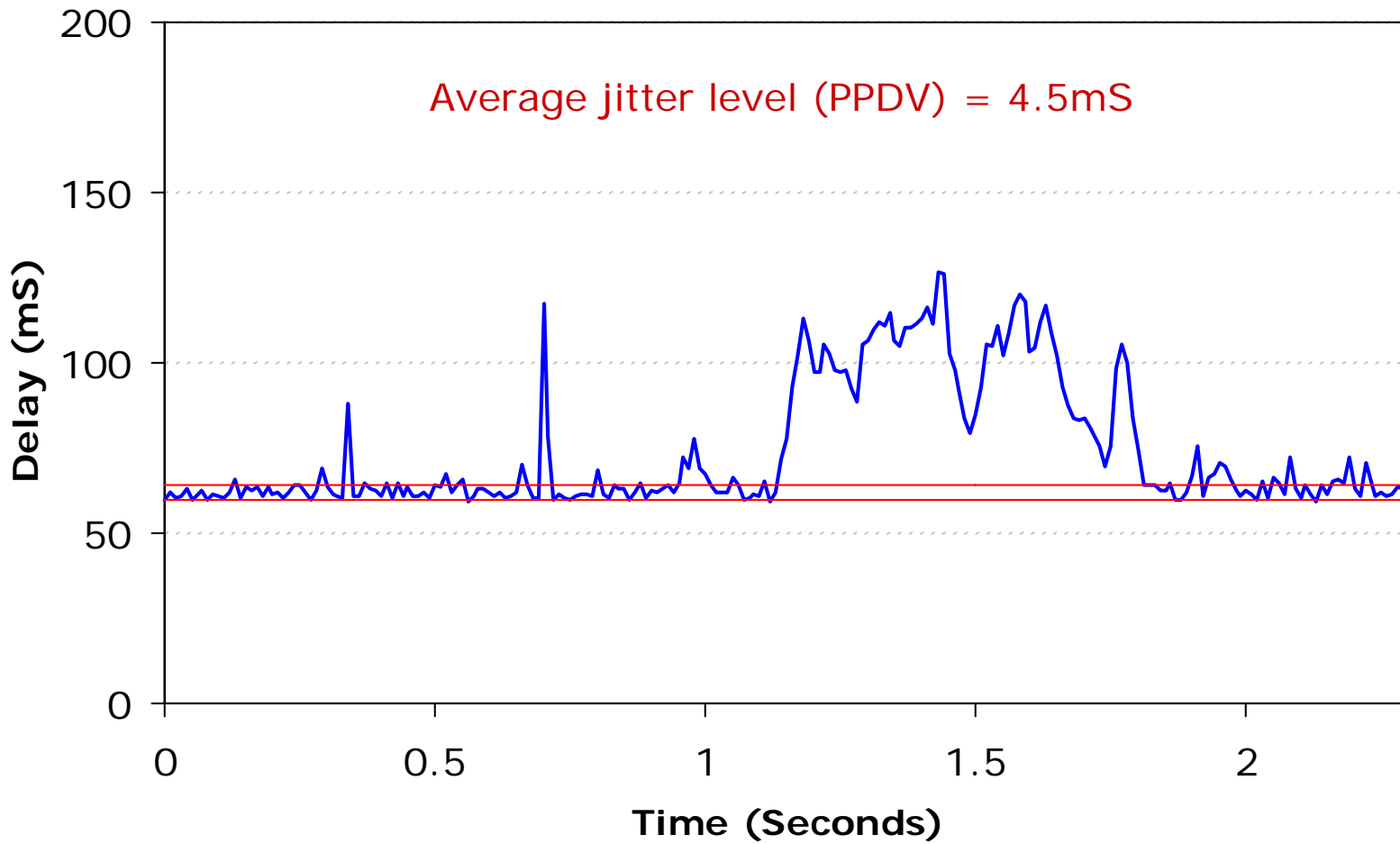
- Voice is a mission critical application
- SLA should report all issues that affect service quality (i.e. don't want service provider to claim they meet SLA when service unsatisfactory)
- Need service provider to "make it work"
- SLA helps to focus service provider on delivering agreed quality levels
- Highly reliable voice service more important than refunds

Actual (typical?) VoIP SLA

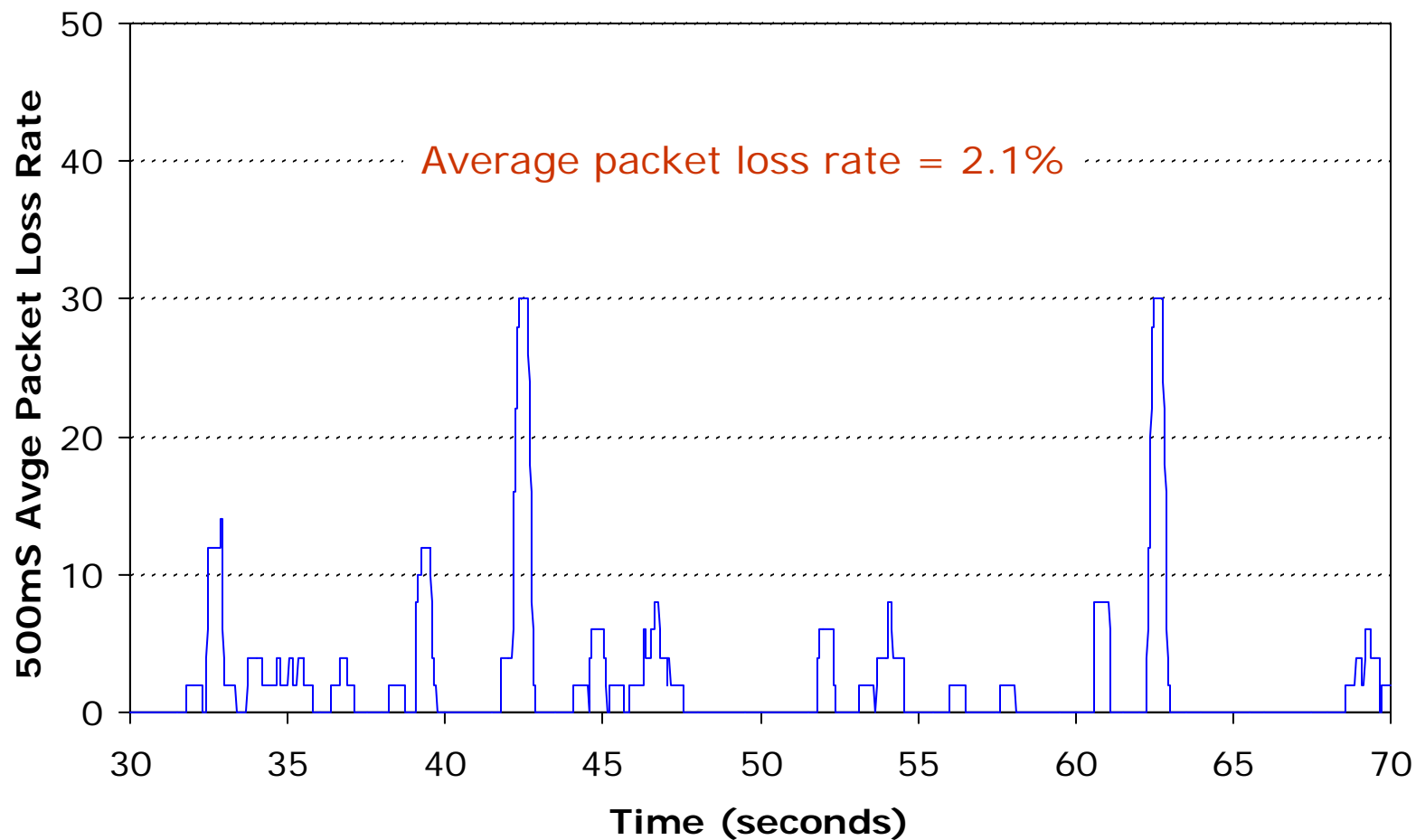


What does this mean in practice?

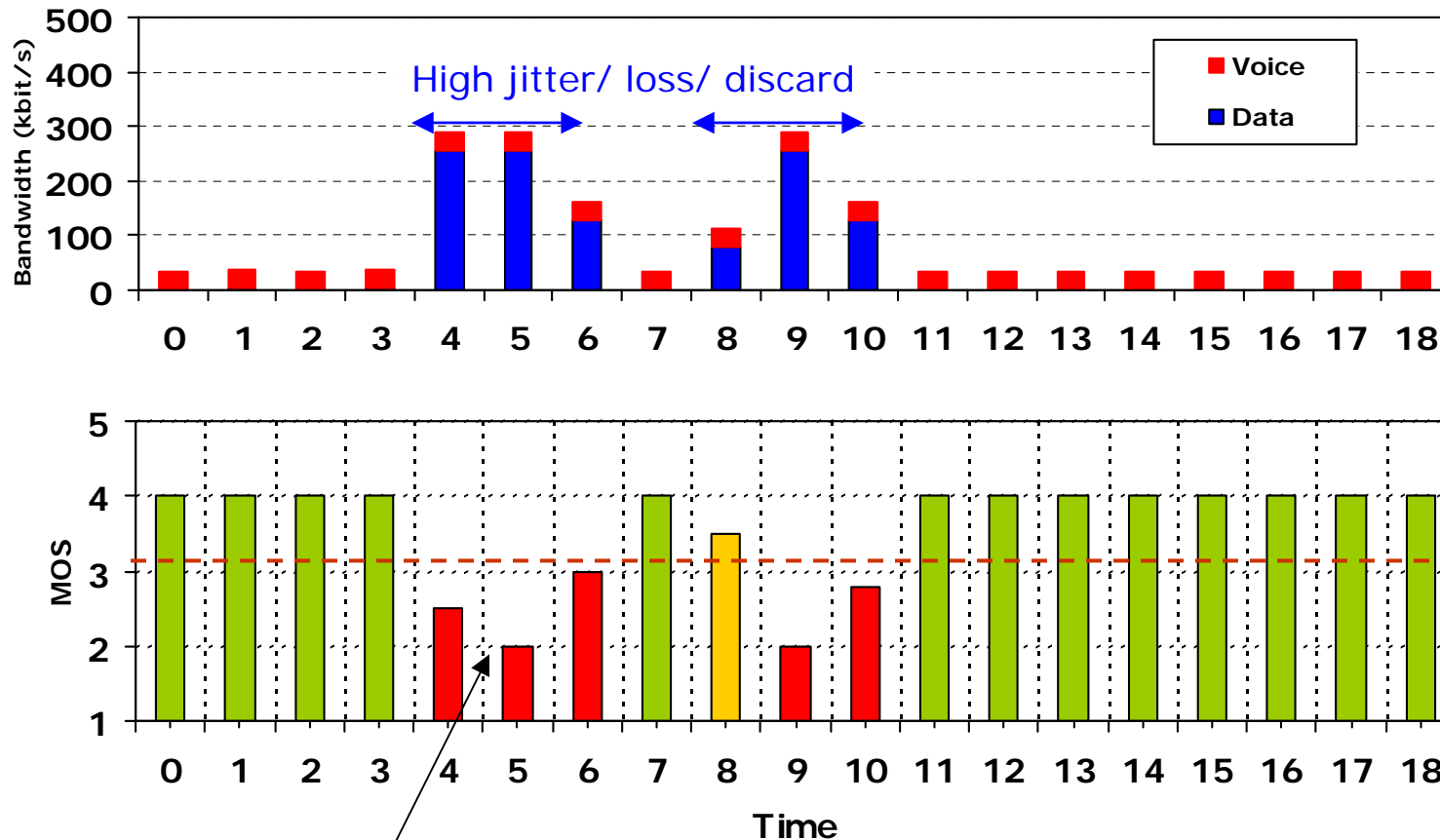
Jitter



Packet Loss - also time varying

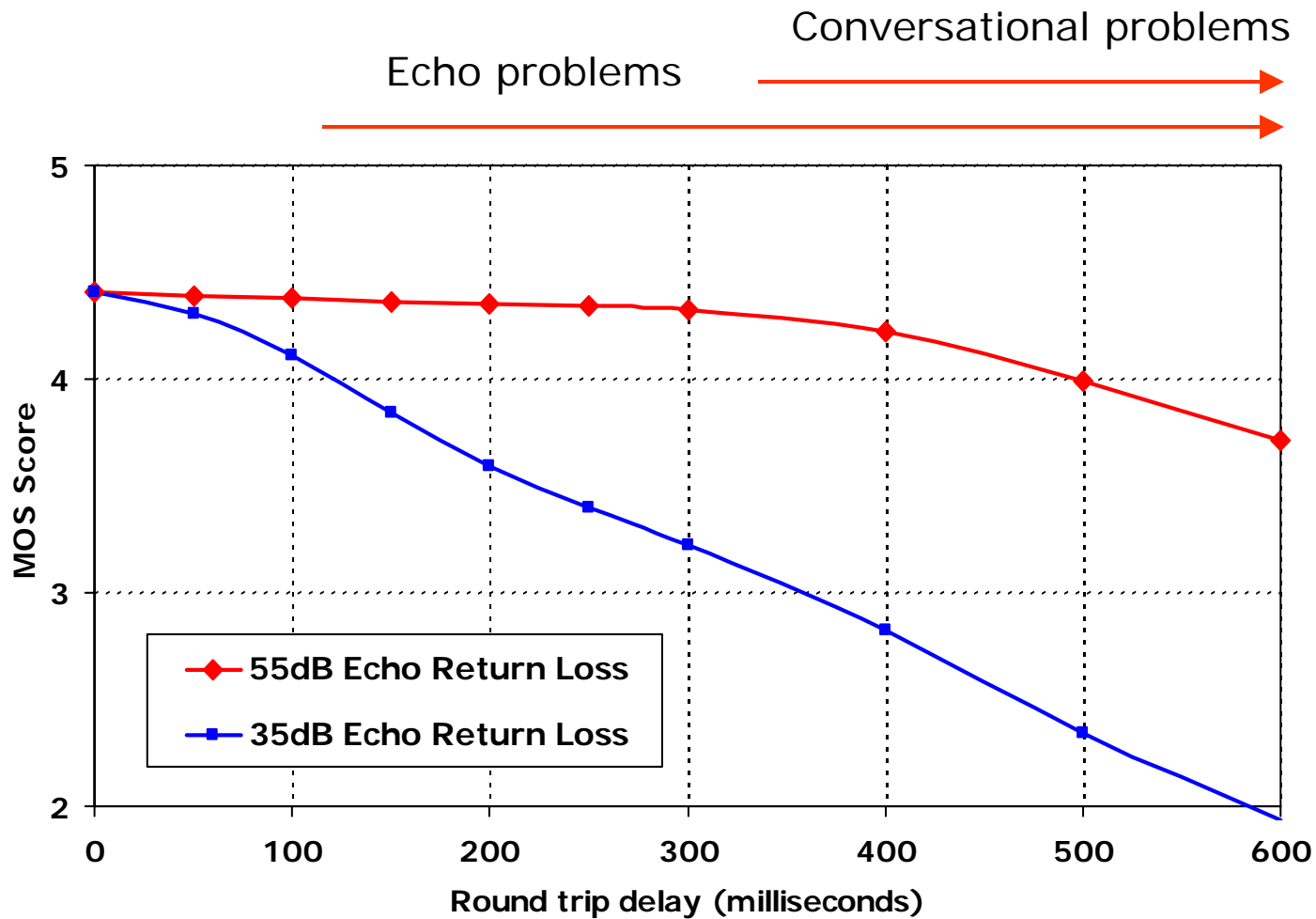


Leads To Time Varying Call Quality

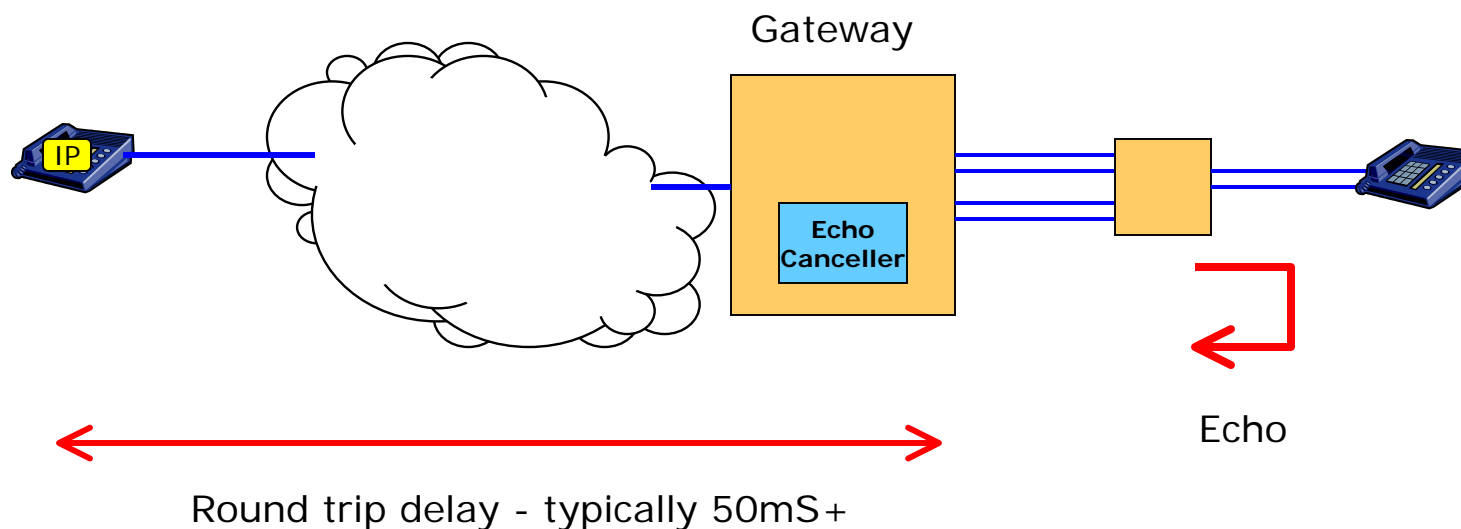


Degraded Service Quality (DSQ) Event = MOS less than X for more than N mS

Delay



Why does echo make a difference?

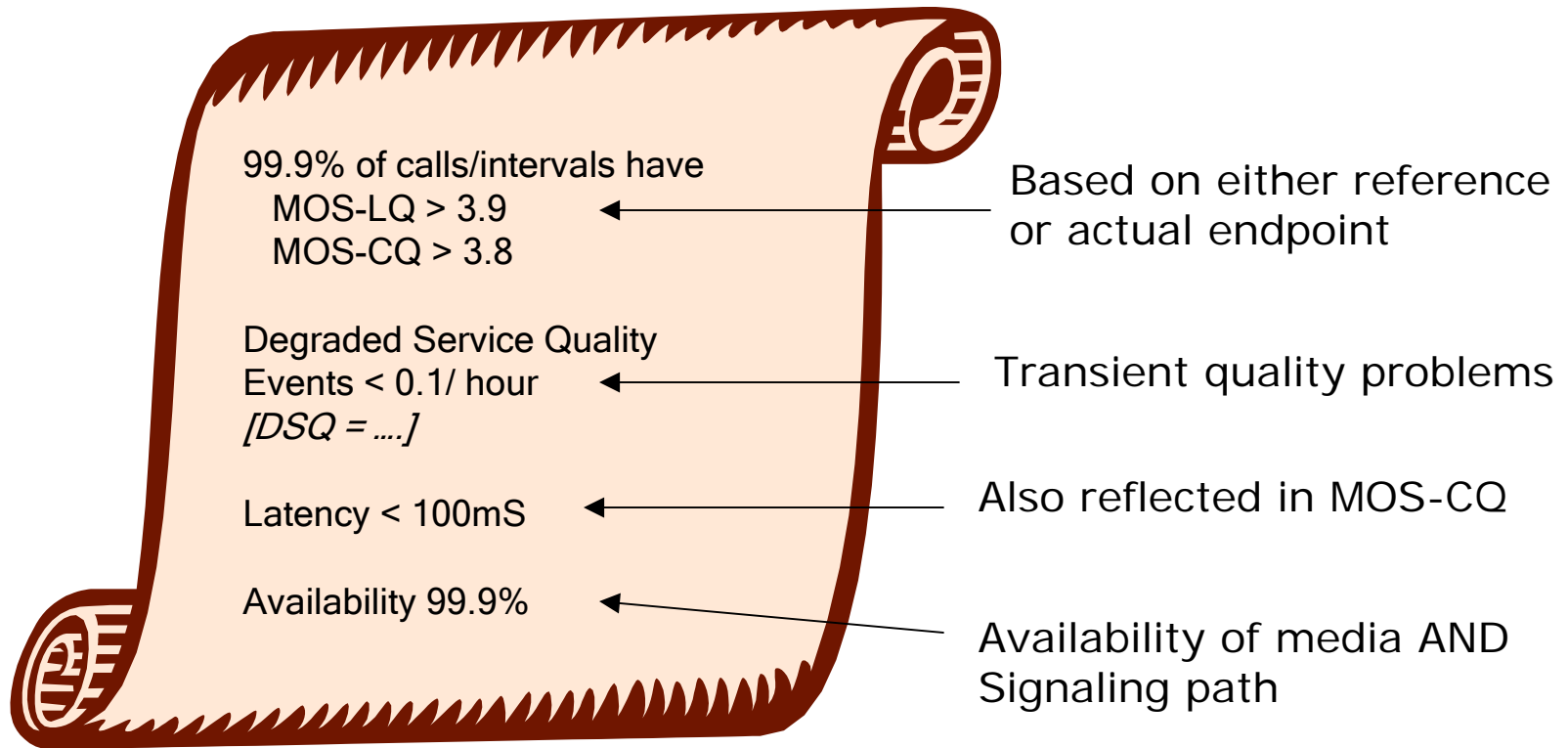


Additional delay introduced by VoIP makes existing echo problems more obvious

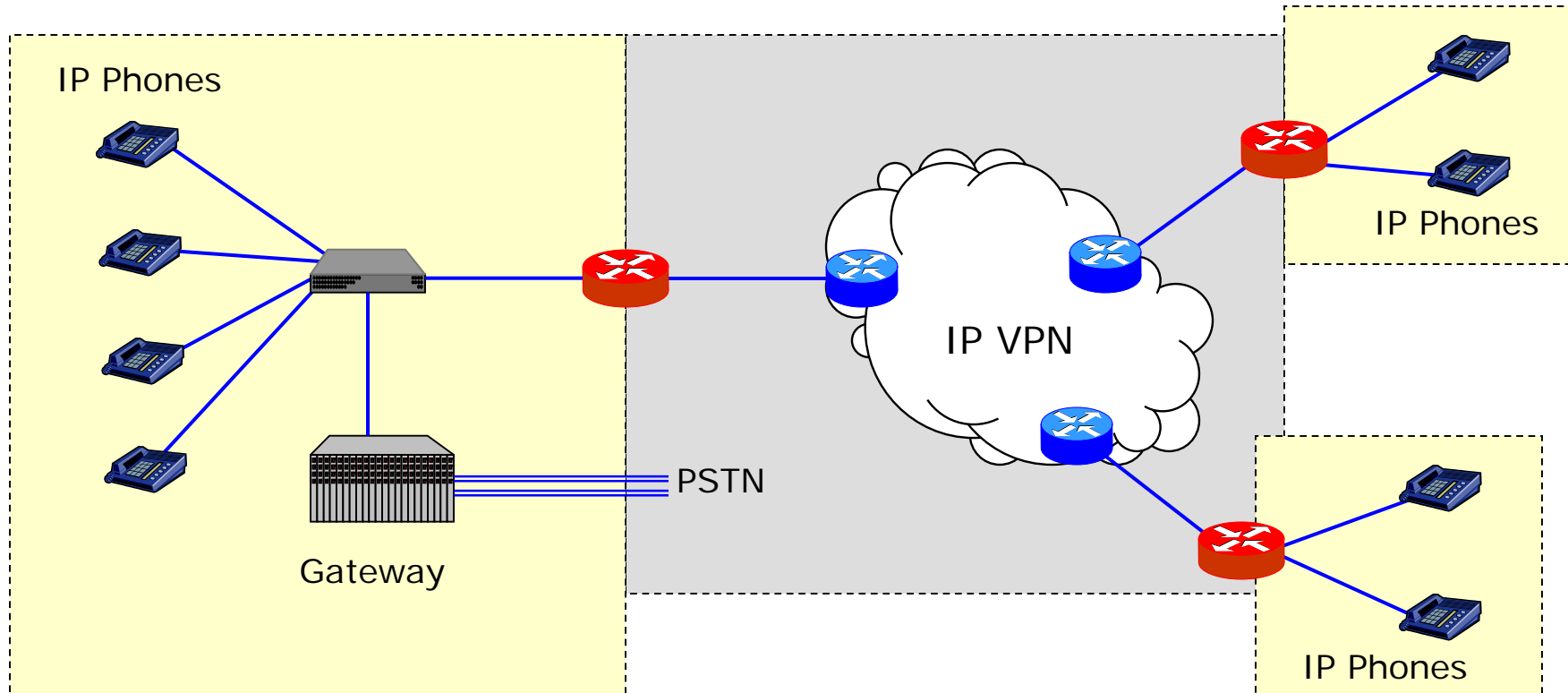
Customer expectations of service quality

- Listening quality
 - Clarity, no distracting noise/ pops/ distortion
- Conversational quality
 - No noticeable delay or echo
- Availability
 - Always available, does not drop calls
- Signaling quality
 - Low call setup delay, features work

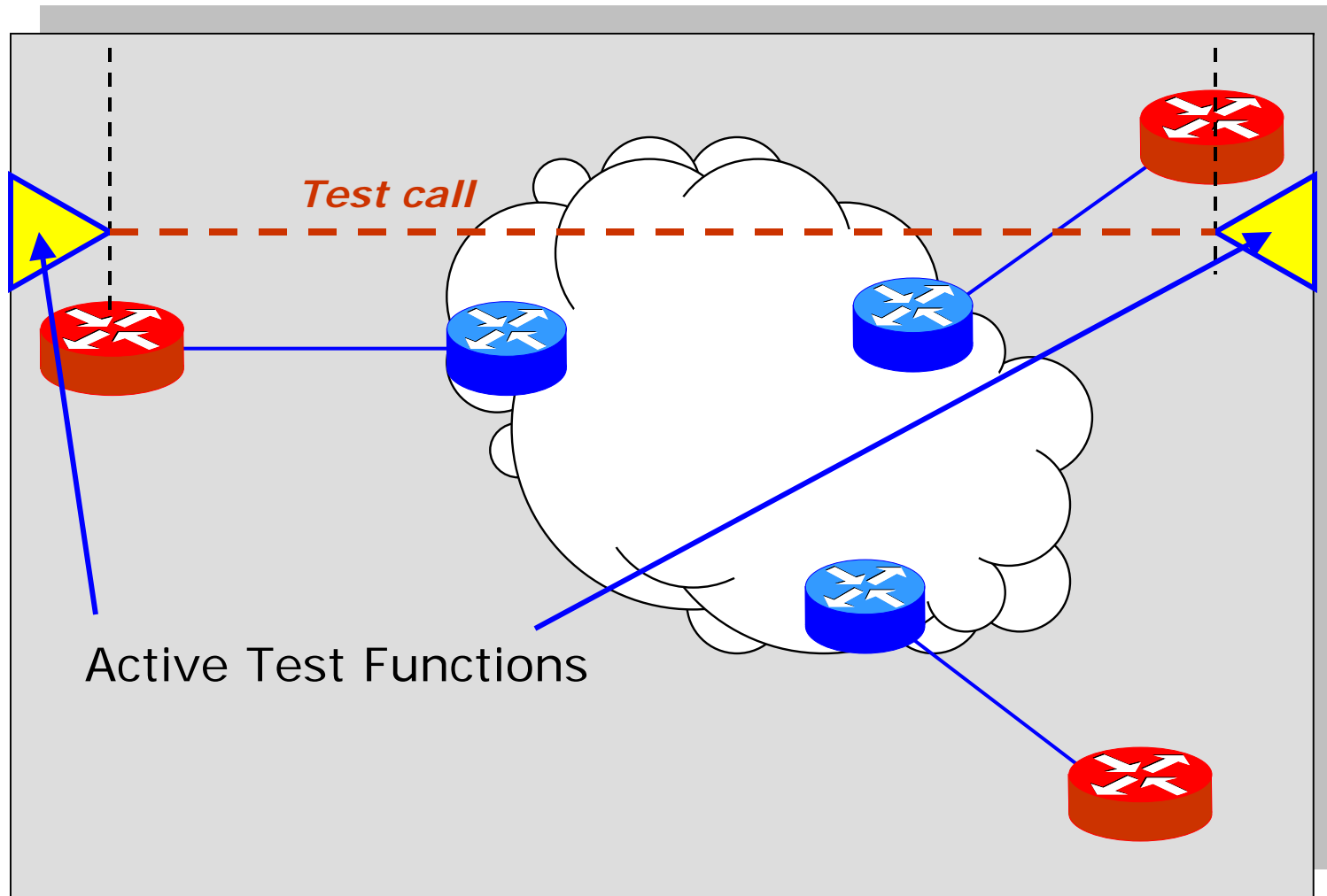
A Better VoIP SLA?



Enterprise Scenario



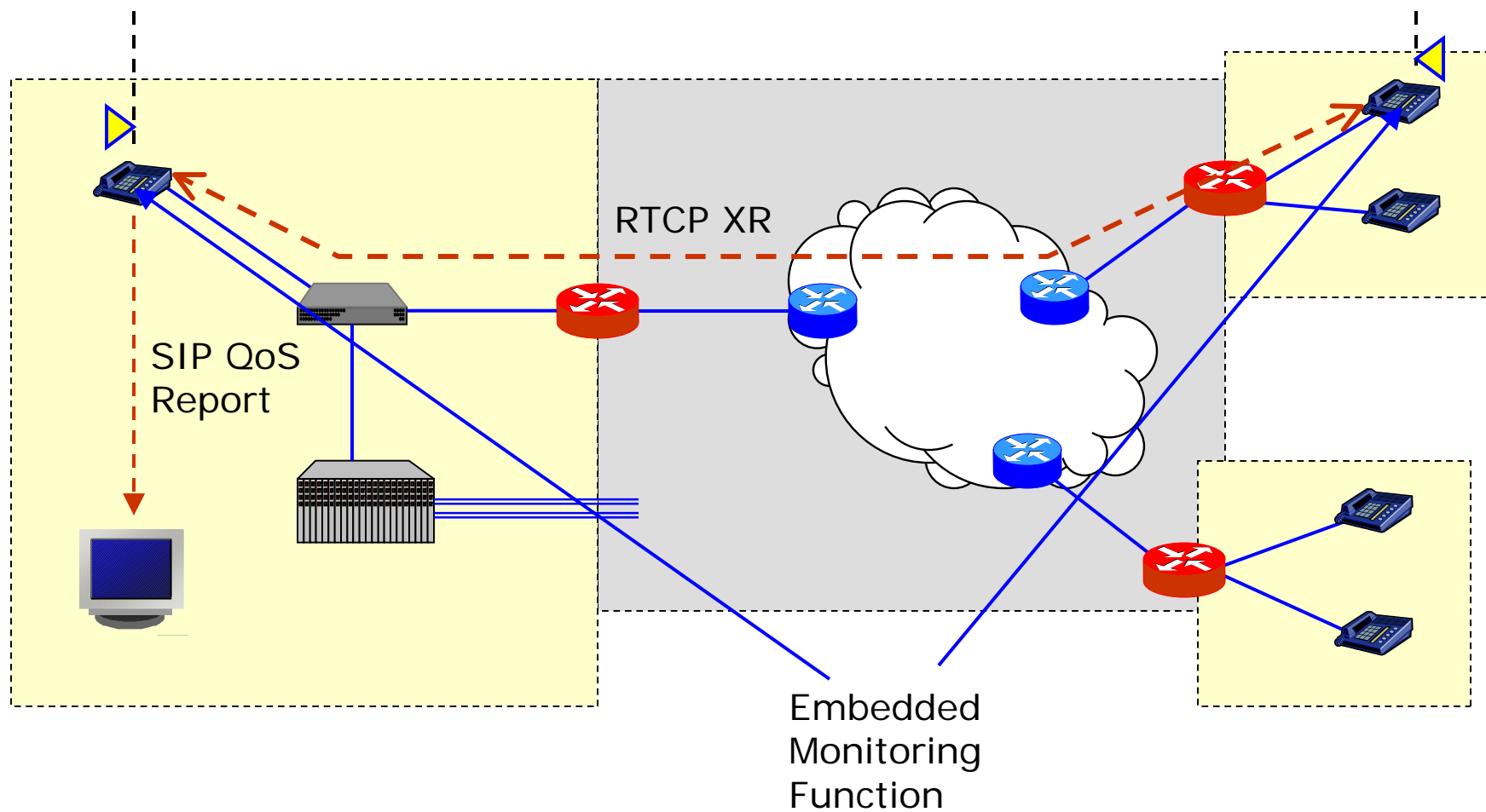
Measuring at ISP Demarcation - active test



Active test for IP Service SLA

- Uses VoIP calls, to ensure packets are treated identically to “real” VoIP calls
- Use a Reference endpoint - I.e. a fixed configuration, known, virtual IP endpoint
- Test:
 - Peak times - to understand quality under load conditions
 - Off-peak times - to detect problems before they impact users

Measuring at user desktop - passive test



Passive test for IP SLA

- Most effective for end-to-end measurement
- Embedded quality monitoring function in IP endpoint
- Can measure service quality, signaling reliability.....
- Collect data via RTCP XR or SIP QoS reports

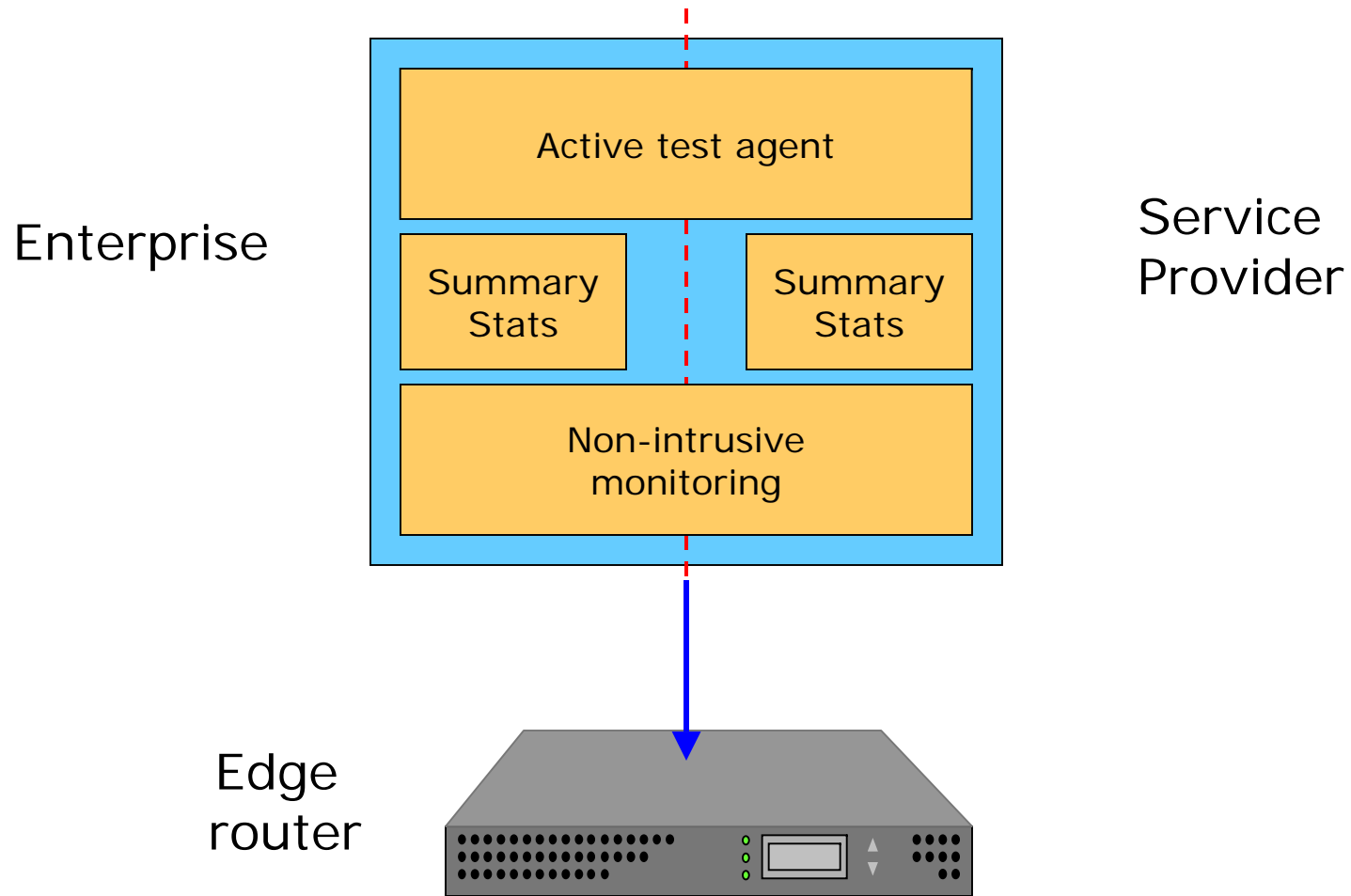
Service Level Metrics - “mine” or “yours”

- Common problem with SLAs
 - Service provider measures SLA and reports that they meet SLA
 - Customer uses different tools and finds that service provider “does not” meet SLA
- Who is right?

Overcoming the “somebody else’s problem” problem

- Need
 - Common measurement methodology
 - Ability to make the same measurements at the same time in the same way
- Otherwise
 - Results will differ and fingers will point
- Solution?
 - A common (trusted) measurement methodology
 - A shared (trusted) measurement function that is accessible to both service provider and customer

A "Trusted" SLA Monitoring Function



SLA Monitoring Function

- Ideally - locate in edge router on customer premise
- Measurement data available to both service provider and customer
- Provides both
 - Non-intrusive per-call monitoring of live traffic
 - Active test agent for scheduled testing and troubleshooting
- Measures SLA in terms of
 - Estimated call quality level (MOS, R)
 - DSQ (Degraded Service Quality) events
 - Loss, jitter, discard, delay.....

VoIP SLA Management

- VoIP SLAs
 - What's typical
 - Why typical isn't ok
- Approaches to SLA measurement
- What to measure
- The "trust" problem
- Final thoughts?
 - *VoIP does not have such distinct service boundaries as traditional telephony - some form of shared data model is an essential addition to an SLA for collaborative troubleshooting across network boundaries.*