Managing Enterprise IP Telephony Performance

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Voicecon 2005

Agenda

- Voice over IP Performance Problems
  - Voice quality
  - IP problems
  - Non-IP problems
- VoIP Performance Management Framework
- RTCP XR
- Defining Requirements
- Summary

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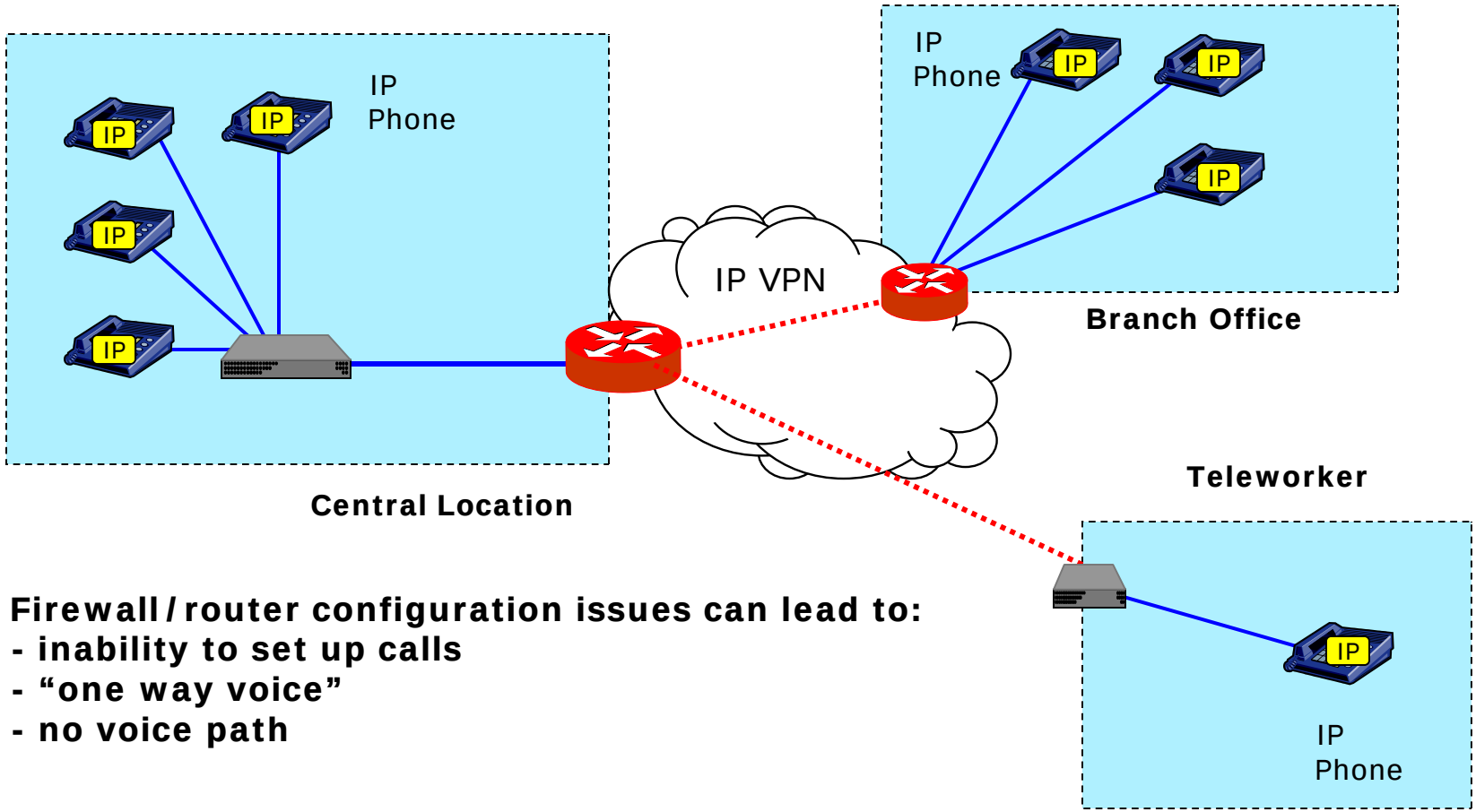
VoIP Performance Problems

- Connectivity problems
- Voice quality
  - What affects it?
  - How to measure it?
  - What do users notice?
- IP-related problems
- Signal, Noise, Echo problems

Connectivity Problems



Firewall / router configuration issues can lead to:
- inability to set up calls
- "one way voice"
- no voice path

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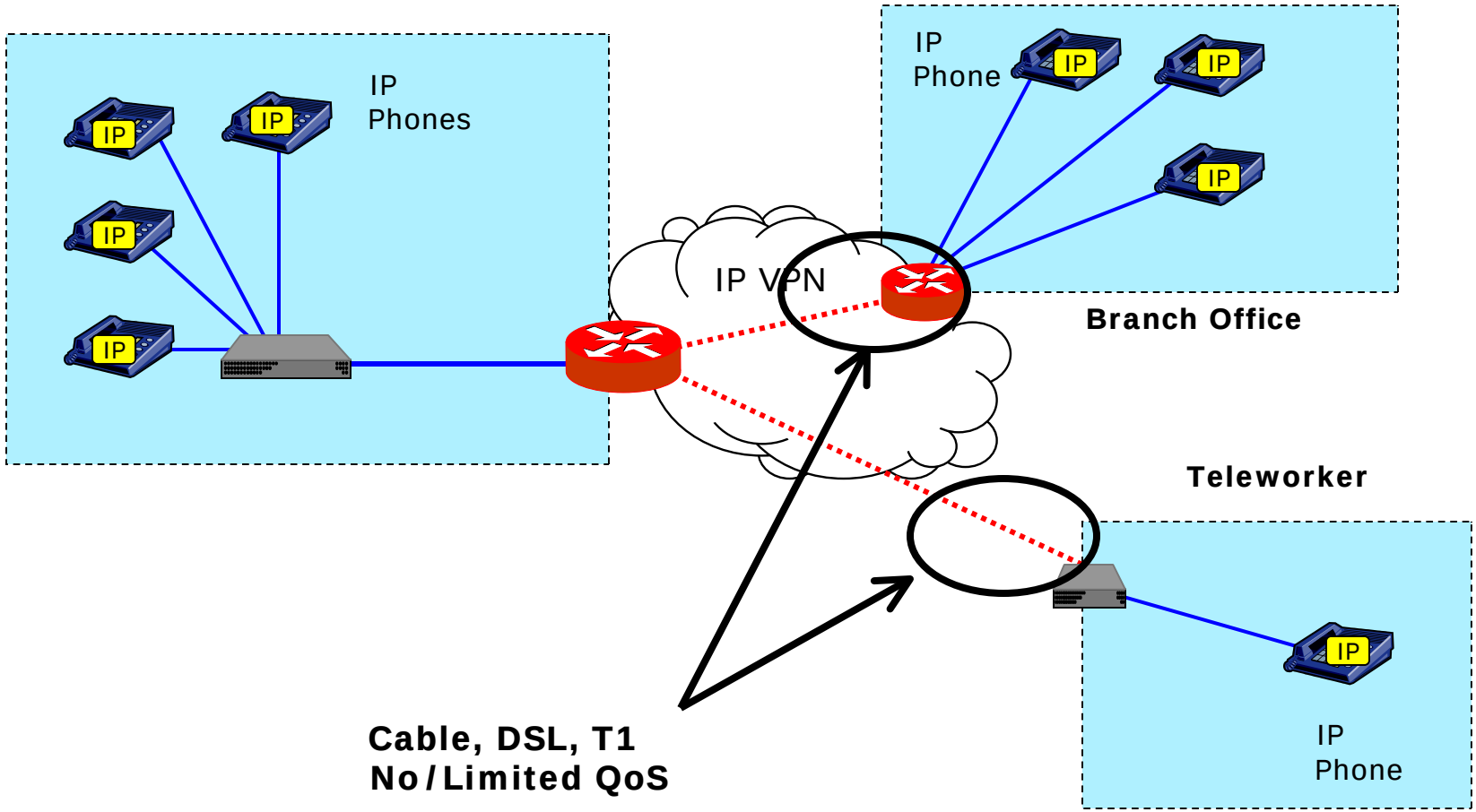
IP Performance Issues and Problems

- The “mantra”
  - Packet Loss -- Leads to quality degradation
  - Jitter -- Leads to packet loss (discards)
  - Delay -- Causes conversational difficulty
- But ...

Teleworkers, Branch Offices & Call Centers



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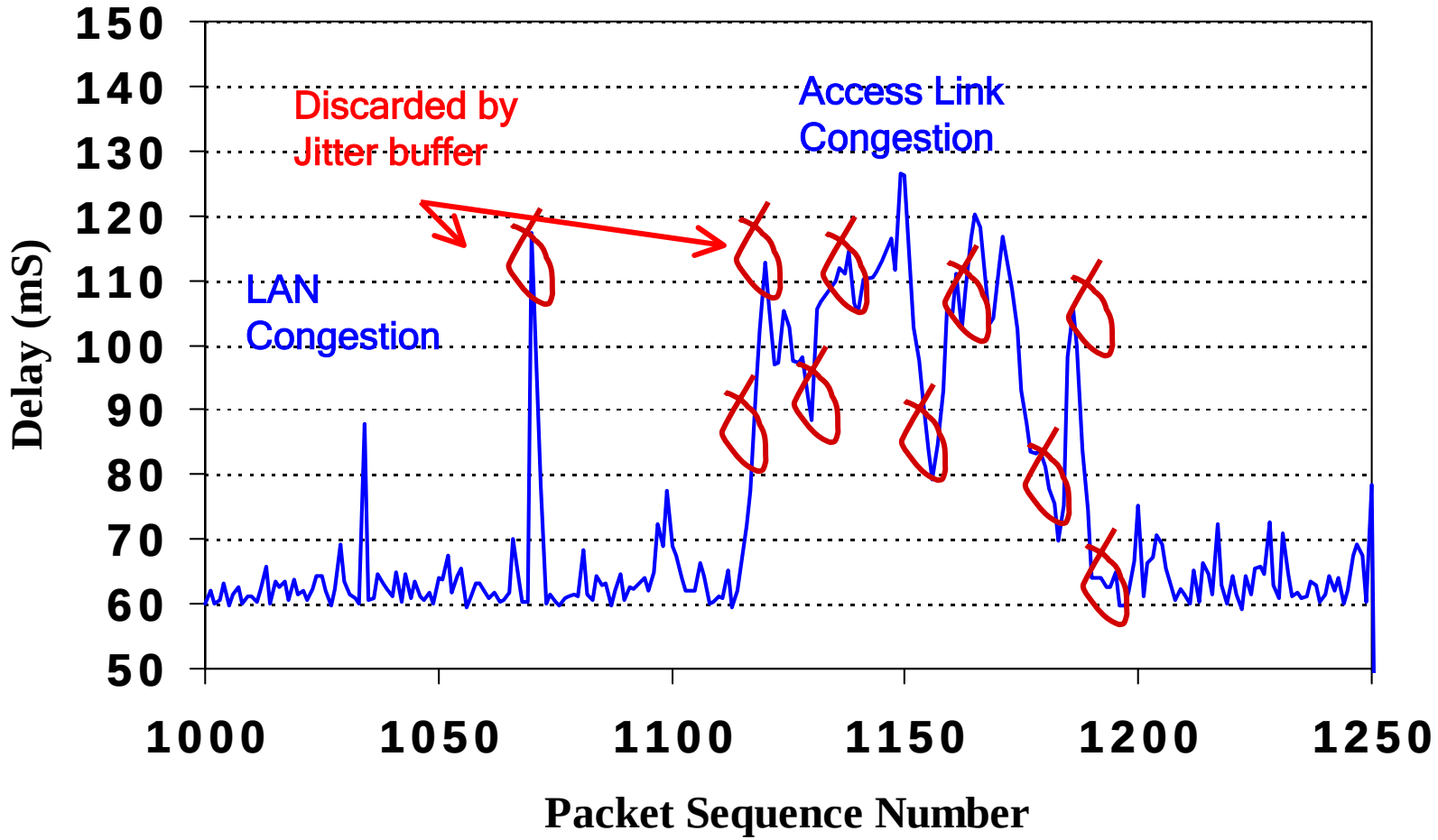
Leads To Transient IP Problems



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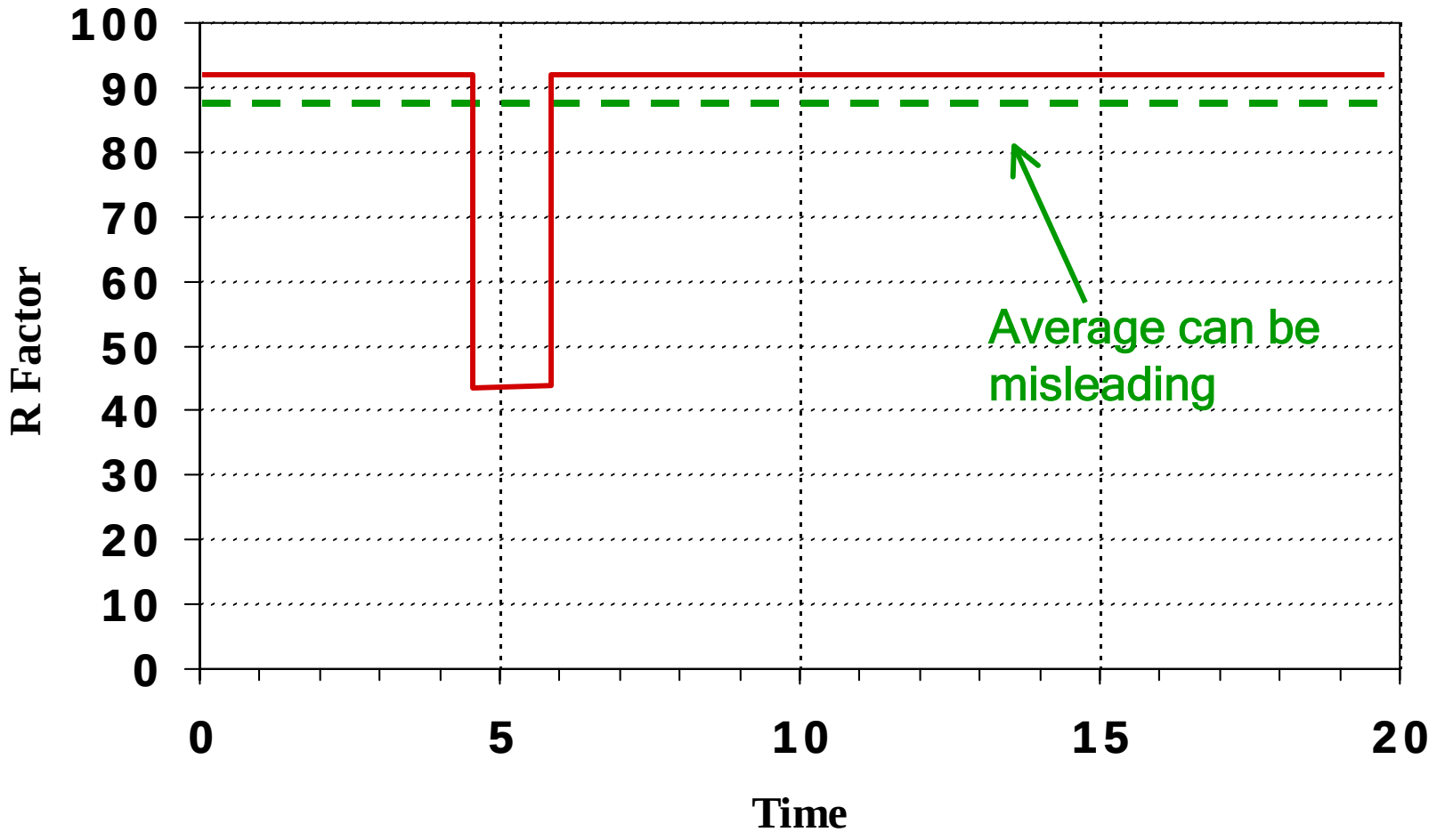
Packet Loss and Discard

- Loss and discard are typically due to network congestion
- Congestion is time varying (e.g., file downloads) …
- … therefore loss and discard are “bursty”
- Typical loss/discard condition -- bursts of 20-30% loss rate lasting 1-2 seconds

- *What does this mean to the user?*

Leads To Time Varying Call Quality



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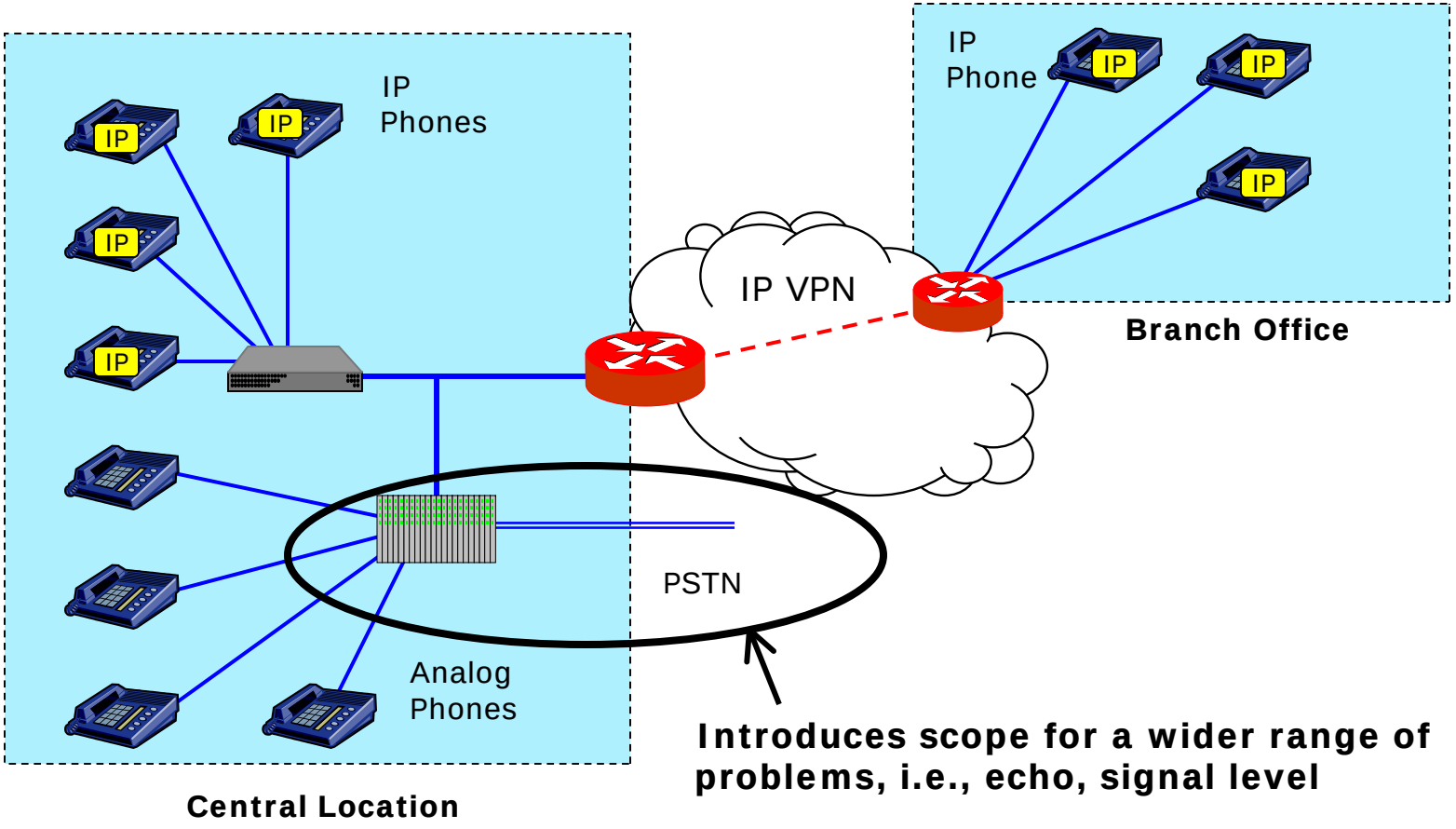
Signal, Noise and Echo Problems



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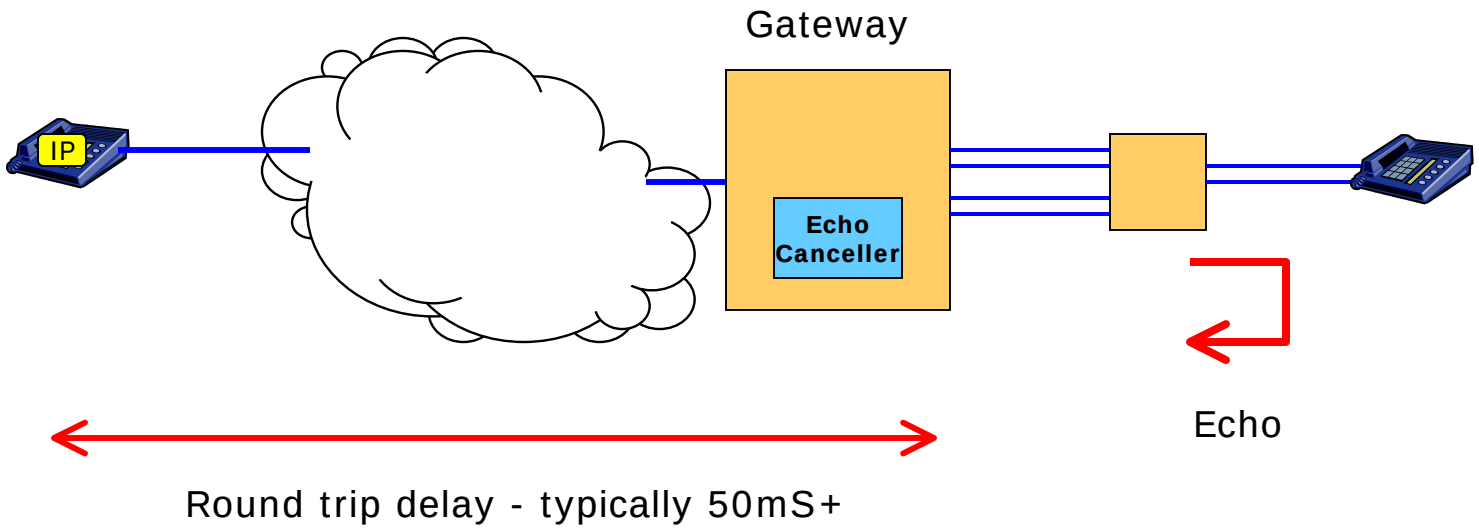
Echo Problems



Additional delay introduced by VoIP
makes existing echo problems more obvious

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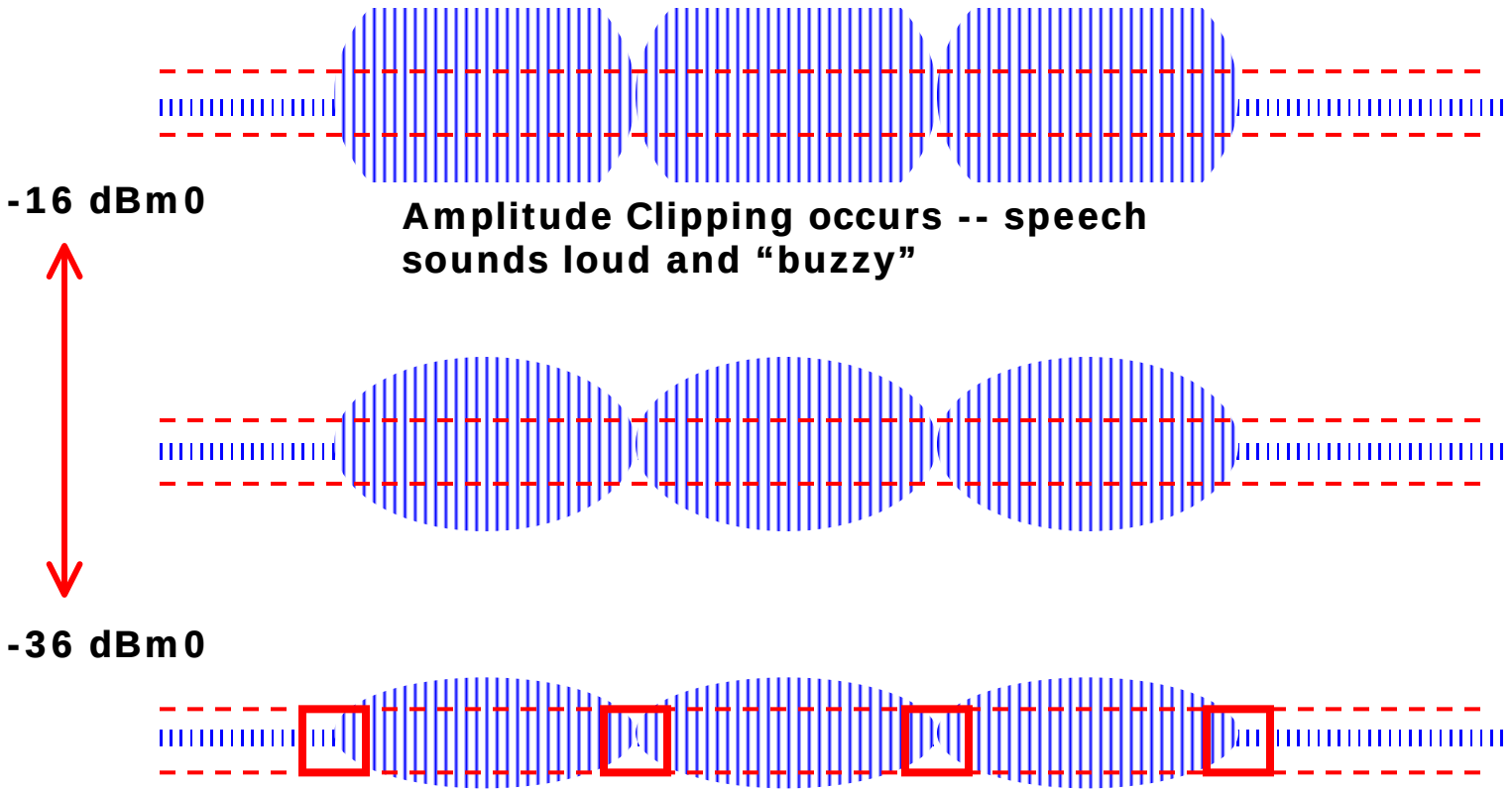
Signal Level Problems



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Measuring Signal, Noise and Echo Levels?

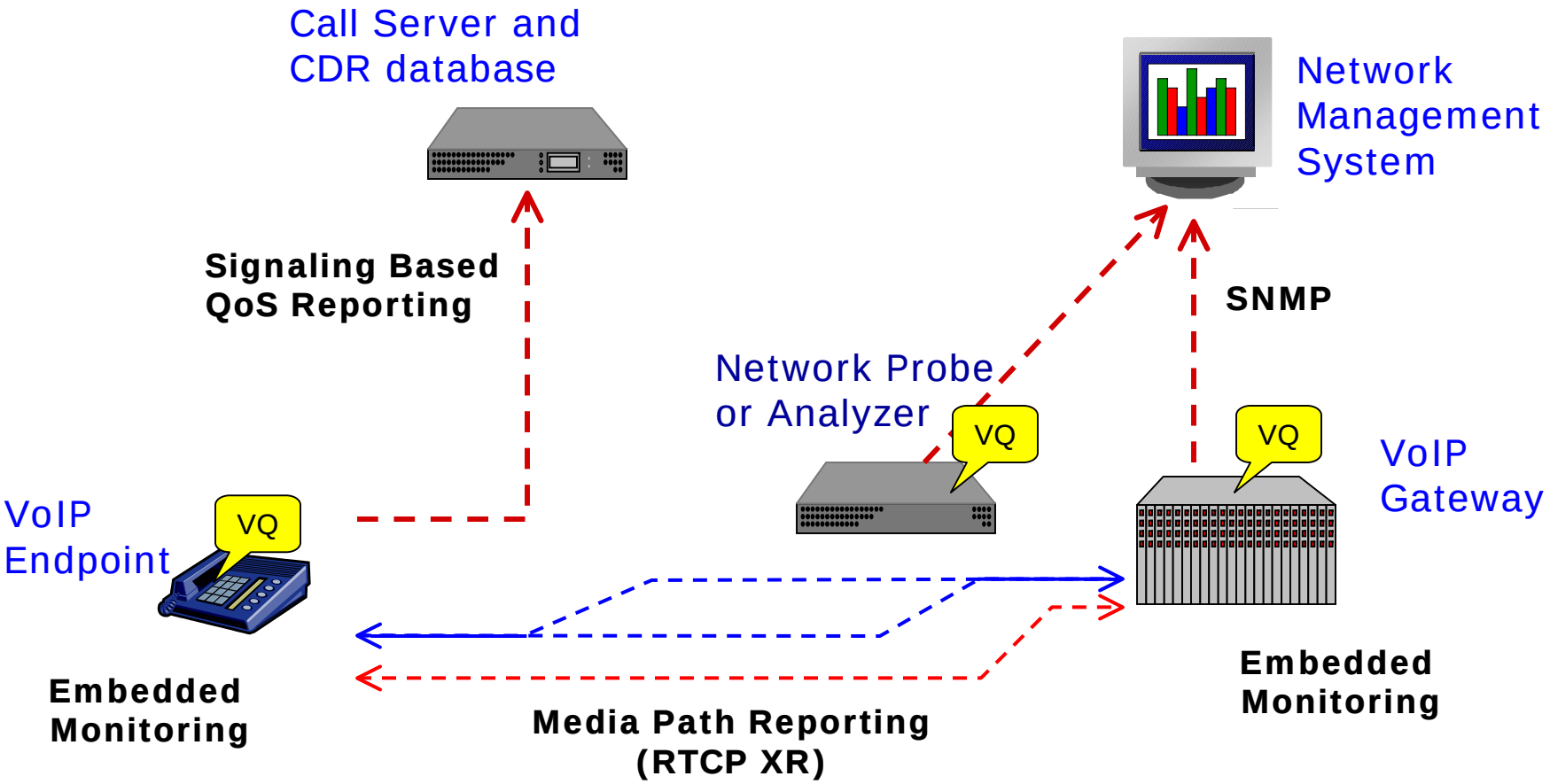
Method 1 - Active Test

- Attach test system to voice port, make a call and analyze
- Suitable for diagnosis when you know there is a problem

Method 2 - Passive Monitoring

- “Traditional” -- decode voice stream and analyze
  - Expensive
  - Doesn’t work with encrypted voice traffic
- “Embedded” -- end-system already has access to this data, make it available
  - Inexpensive
  - Will work with any security policy

VoIP Performance Management Framework



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RTCP XR

Loss Rate	**Discard Rate**	**Burst Density**	**Gap Density**
Burst Duration (mS)		**Gap Duration (mS)**	
Round Trip Delay (mS)		**End System Delay (mS)**	
Signal level	**RERL**	**Noise Level**	**Gmin**
R Factor	**Ext R**	**MOS-LQ**	**MOS-CQ**
Rx Config	**-**	**Jitter Buffer Nominal**	
Jitter Buffer Max		**Jitter Buffer Abs Max**	

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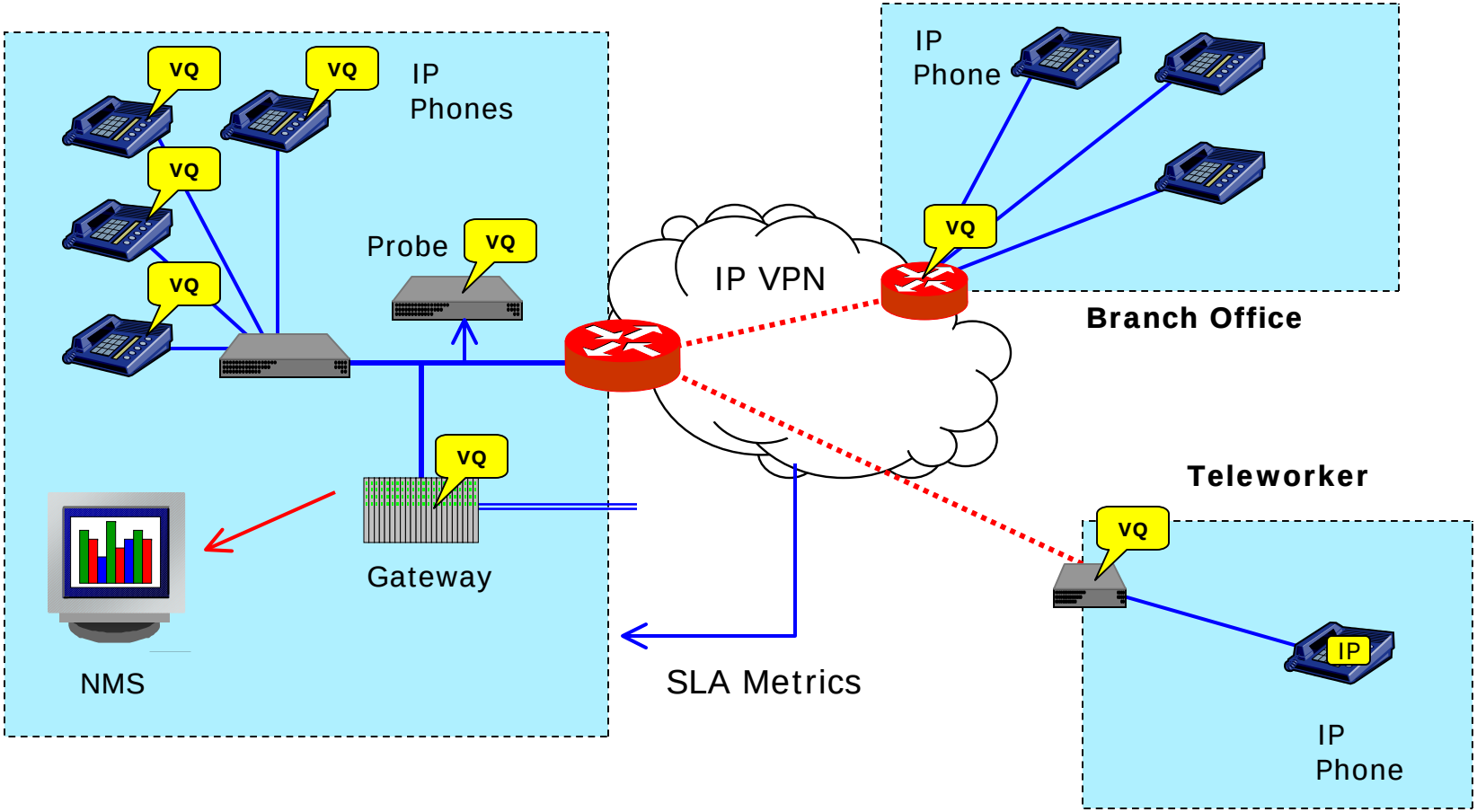
RTCP XR-Based Protocols

- Media Path
  - RFC3611 RTCP XR -- published Nov 2003
- Signaling
  - SIP QoS Reporting -- draft, final by end Dec 04
  - H.323 reporting (H.460.9) -- published Apr 04
  - Megaco reporting (H.248.30) -- published Apr 04
  - MGCP -- not yet started
- SNMP
  - RTCP XR MIB -- draft, final by March 05

Enterprise Application Using New Framework



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Defining Requirements

- Do predeployment testing!!
- Request support for RFC3611 VoIP Metrics in IP Phones and Gateways
- Use same monitoring technology in IP endpoints, probes and analyzers
- Use VoIP Performance Management Framework
- Request SLA metrics from service providers that are meaningful for VoIP
- Remember that IP problems are transient!!

Summary

- Voice over IP Performance Problems
  - Voice quality
  - IP problems
  - Non-IP problems
- VoIP Performance Management Framework
- RTCP XR
- Defining Requirements

Telchemy Overview

- Leading provider of technology for VoIP Fault & Performance Management
- Products deployed for 3 years; widely used by Enterprise and Service Providers
- Multiple patents/applications
- Led development of VoIP performance reporting standards in IETF and ITU
- Widely recognized as “Subject Matter Experts” on VoIP performance

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