Common VoIP Metrics

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Summary

- Typical VoIP Problems
- Management Requirements
- Common Metrics proposal
- Media path reporting
- Reporting through signaling protocols
- RTCP XR
- Applications examples
IP related problems

Gateway

CODEC

Lost Packets

Gateway

Delay & Jitter

Packet discards
by jitter buffer

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Non-IP related problems

Signal Level too High or low

VoIP Gateway

Hybrid

Uncanceled echo

Echo Canceller

Echo from Unbalanced Hybrid

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VoIP Metrics Reporting

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Signaling System Reporting

End of call message

IP Endpoint

Voice over IP quality metrics

Integrates call quality data into CDR system, supports service management / billing
Media Path Reporting

Allows information to be exchanged between endpoints
Allows information to be sent through firewalls
Management Reporting

IP Endpoint

SNMP “Get”

Management System

Provides access to information on an “as needed” basis
Integrates with current NMS
Common VoIP Metrics?

- Equipment needs only count/measure one set of metrics regardless of the protocol used for reporting
- Network manager/operator can see the same set of data regardless of how it was reported
- Drive the equipment vendors towards a common “sensible” metrics set
# RTCP XR protocol

<table>
<thead>
<tr>
<th>Loss rate</th>
<th>Discard rate</th>
<th>Burst density</th>
<th>Gap density</th>
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<tbody>
<tr>
<td>Burst duration (mS)</td>
<td></td>
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<td>Gap duration (mS)</td>
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<tr>
<td>Round trip delay (mS)</td>
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<td>End system delay (mS)</td>
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<tr>
<td>Signal level</td>
<td>RERL</td>
<td>Noise level</td>
<td>Gmin</td>
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<td>Ext R</td>
<td>MOS-LQ</td>
<td>MOS-CQ</td>
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<td>Rx Config</td>
<td></td>
<td>Jitter Buffer Nominal</td>
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<td>Jitter Buffer Max</td>
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<td>Jitter Buffer Abs Max</td>
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RTCP XR applications

Provides several key functions:
- Exchange information between endpoints to support more comprehensive call quality estimates
- Allows mid-stream systems to monitor endpoint QoS, even if RTP payload encryption is used
- Supports exchange of endpoint measured QoS where endpoint is in different management domain
- Supports endpoint adaptation
Migrating into signaling protocols

- RTCP XR - IETF AVT group
  - In RFC editor queue - RFC in October?
  - Already being implemented by manufacturers
- H.323 .... H.460.9 Annex 2
  - Consent in January 2004?
- H.248 .... H.248.rtcpxr
  - Consent in January 2004?
- SIP ..... New work in IETF
Generating VoIP Metrics

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IP Phone or Gateway

DSP

CODEC

Loss/Discard

RTCP XR

Signal Noise RERL

“Software Probe”

200 IPS

End of Call Signaling
Accumulating endpoint metrics in Gateway

SNMP or Bulk upload

C"Q"DR

RTCP XR

IP “cloud”

Soft Probe

PCM

SNMP MIB based around RTCP XR metrics

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Example – IP Centrex

Service domain Provider domain

Access link congestion LAN congestion

IP Network

Passive hub or shared Ethernet segments

Poorly located server

NO VISIBILITY OF PROBLEMS

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Solution to IP Centrex problem

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Summary

- Equipment needs only count/measure one set of metrics regardless of the protocol used for reporting.
- Network manager/operator can see the same set of data regardless of how it was reported.
- Drive the equipment vendors towards a common “sensible” metrics set.
- Already gaining support within the industry:
  - Nine+ test equipment vendors will be supporting RTCP XR decodes by the end of 2003.
  - At least three major IP equipment manufacturers expected to be supporting RTCP XR by the end of 2003.
  - Three major DSP software vendors providing support for this architectural model by the end of 2003.