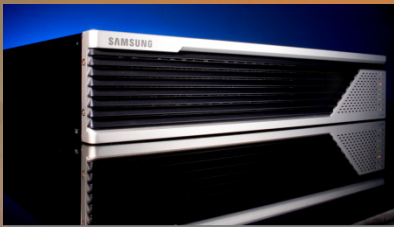


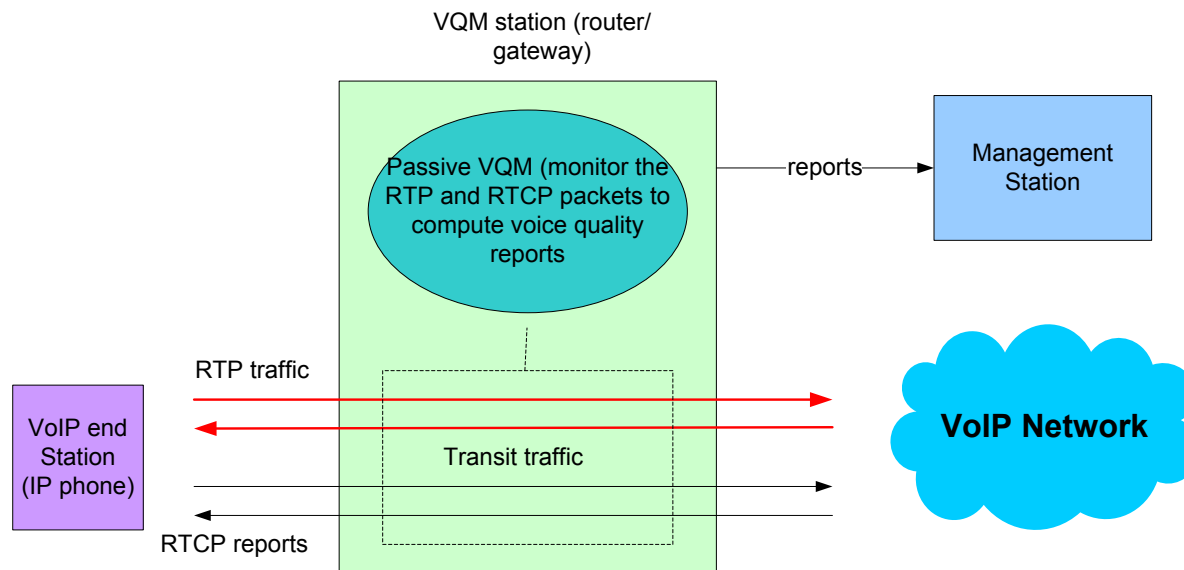
Voice Quality Monitoring (VQM)



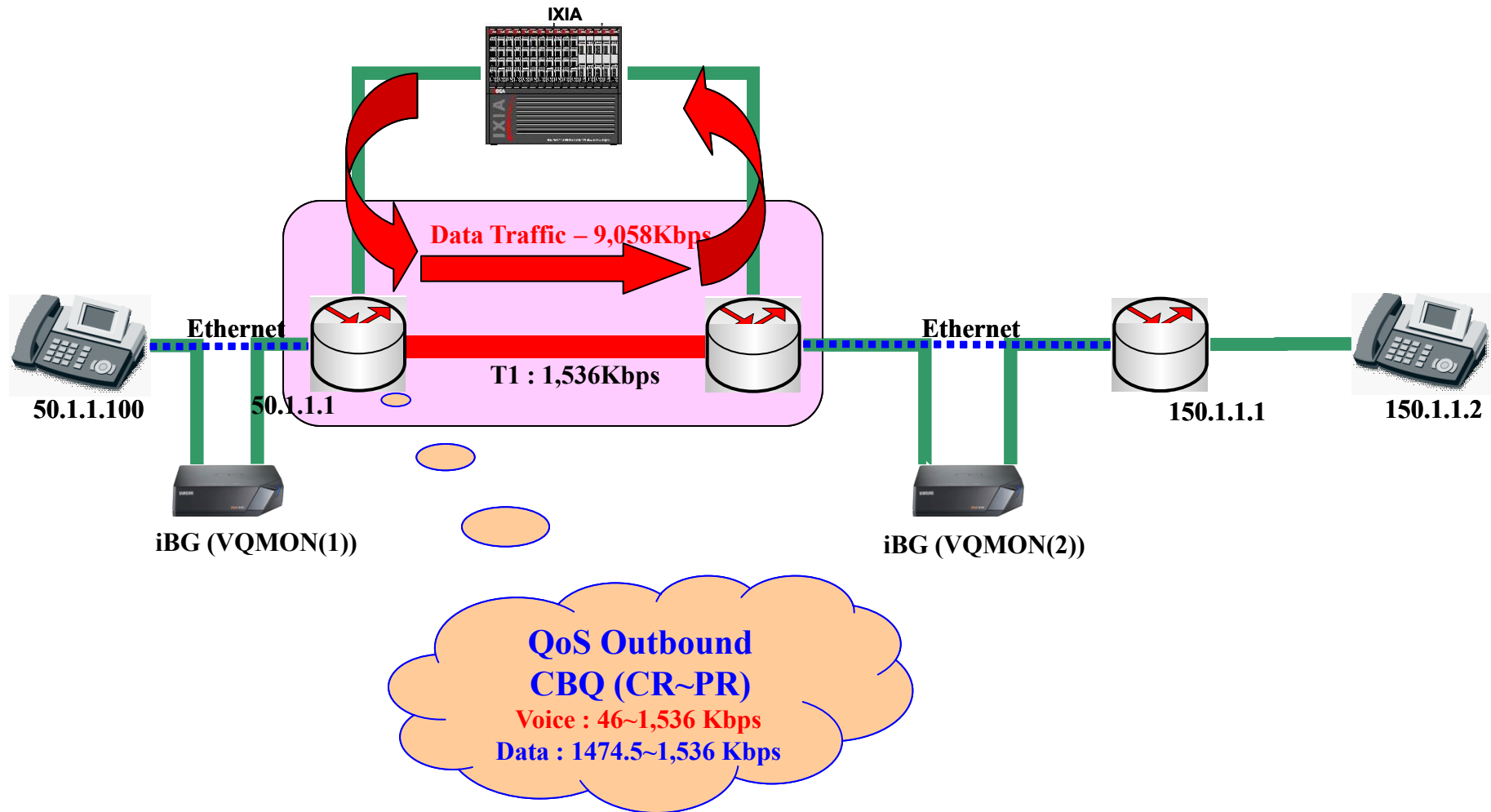


● Passive Monitoring

- Monitors real call flow in the media path in a passive non-intrusive fashion
- RTP and RTCP/RTCP-XR are used for calculating the voice quality.
- Signaling of voice quality reports using SIP and SDP are not used.



Example (L2 Monitoring)



● Configure non-IP interfaces

```
bridge 1 protocol mstp
vlan database
  vlan 100 bridge 1 name VLAN0100
exit database
gratuitous-arp
interface ethernet 0/0
  switchport
  bridge-group 1
  switchport mode access
  switchport access vlan 100
qos
  exit qos
exit ethernet
interface ethernet 0/1
  switchport
  bridge-group 1
  switchport mode access
  switchport access vlan 100
qos
  exit qos
exit ethernet
interface vlan vlan1.100
  ip address 12.1.1.3 255.255.255.0
qos
  exit qos
exit vlan
```



● Enable L2 Monitoring

- ibg# configure terminal
- ibg/configure# vqm
- ibg/configure/vqm# enable L2

● Configure RTP-port range

- ibg/configure/vqm# rtp-port 10000-65535

```
vqm
  enable L2
  connection-limit 10
  reporting-mode verbose
  rtp-port 10000-65535
  upload
    interval 1
    mode cf0
    target directory /
  exit upload
exit vqm
```

● Current Configurations

● ibg# show vqm config

```
VQM Configuration
=====
Operational Status: Operational, Admin Stats: Enabled
Connection Filter Status: NOT Configured
Max Concurrent Calls Monitored: 10
Stats Collection Mode: End-of-call
Stats Reporting Mode: Verbose
Alarm Reporting Mode: Enabled
  Alarm Thresholds(R-factor/Excessive Burst/Delay): 60/90/200
Stats Upload Mode: /cf0, upload dir: /, File Prefix: vqm
Upload Interval: 1 mins
```

Show information



● Current stats

● lbg# show vqm current-stats detail

```
[CONN-1      Start Time=21:15:48, Duration=85 sec]
=====
SRC[I/F=ethernet0/1, SIP-ID=N/A, IP=90.90.113.161:51492]
DST[I/F=test, SIP-ID=N/A, IP=90.90.13.160:50830]
RTP Flow Quality Reports:
-----
[Flow-1] Start Time=21:15:48, Duration=85 sec, Dir=Forward, ssrc=3865671341, Quality Rating=Good
[Quality Metrics] MOS-LQ=4.20, MOS-CQ=4.18, Rfactor-LQ=93, Rfactor-CQ=92
Vocoder=G711a [Ave Bit Rate=64000 bps]
[Jitter Metrics] Ave PDV=0 msec, Max PDV=53 msec
[Packet Delay] Min=9 msec, Ave=33 msec, Max=39 msec
[One Way Delay] Current=45 msec, Ave=53 msec, Max=60 msec
[Round Trip Delay] Current=N/A msec, Ave=N/A msec, Max=N/A msec
[Packet Stats] Received=4286, Lost=0, Discarded=0
[Packet Errors] too-early=1652, too-late=2633, out-seq=0
                overrun=0, under-run=0, duplicate=0
[Analog Stats] signal(dB)=N/A, noise(dB)=-61, local-echo(dB)=N/A
                remote-echo(dB)=N/A, remote-signal(dB)=N/A
[Qualiy Impact %] pkt-loss=0.00, discards=0.00, vocoder=0.00
                  delay=0.00, signal-level=0.00, noise-level=0.00, echo=0.00
-----
[Flow-2] Start Time=21:15:49, Duration=85 sec, Dir=Riverse, ssrc=695813476, Quality Rating=Good
[Quality Metrics] MOS-LQ=4.20, MOS-CQ=4.18, Rfactor-LQ=93, Rfactor-CQ=92
Vocoder=G711a [Ave Bit Rate=64000 bps]
[Jitter Metrics] Ave PDV=0 msec, Max PDV=8 msec
[Packet Delay] Min=9 msec, Ave=33 msec, Max=39 msec
[One Way Delay] Current=45 msec, Ave=53 msec, Max=60 msec
[Round Trip Delay] Current=N/A msec, Ave=N/A msec, Max=N/A msec
[Packet Stats] Received=4276, Lost=0, Discarded=0
[Packet Errors] too-early=1797, too-late=2478, out-seq=0
                overrun=0, under-run=0, duplicate=0
[Analog Stats] signal(dB)=N/A, noise(dB)=-61, local-echo(dB)=N/A
                remote-echo(dB)=N/A, remote-signal(dB)=N/A
[Qualiy Impact %] pkt-loss=0.00, discards=0.00, vocoder=0.00
                  delay=0.00, signal-level=0.00, noise-level=0.00, echo=0.00
```

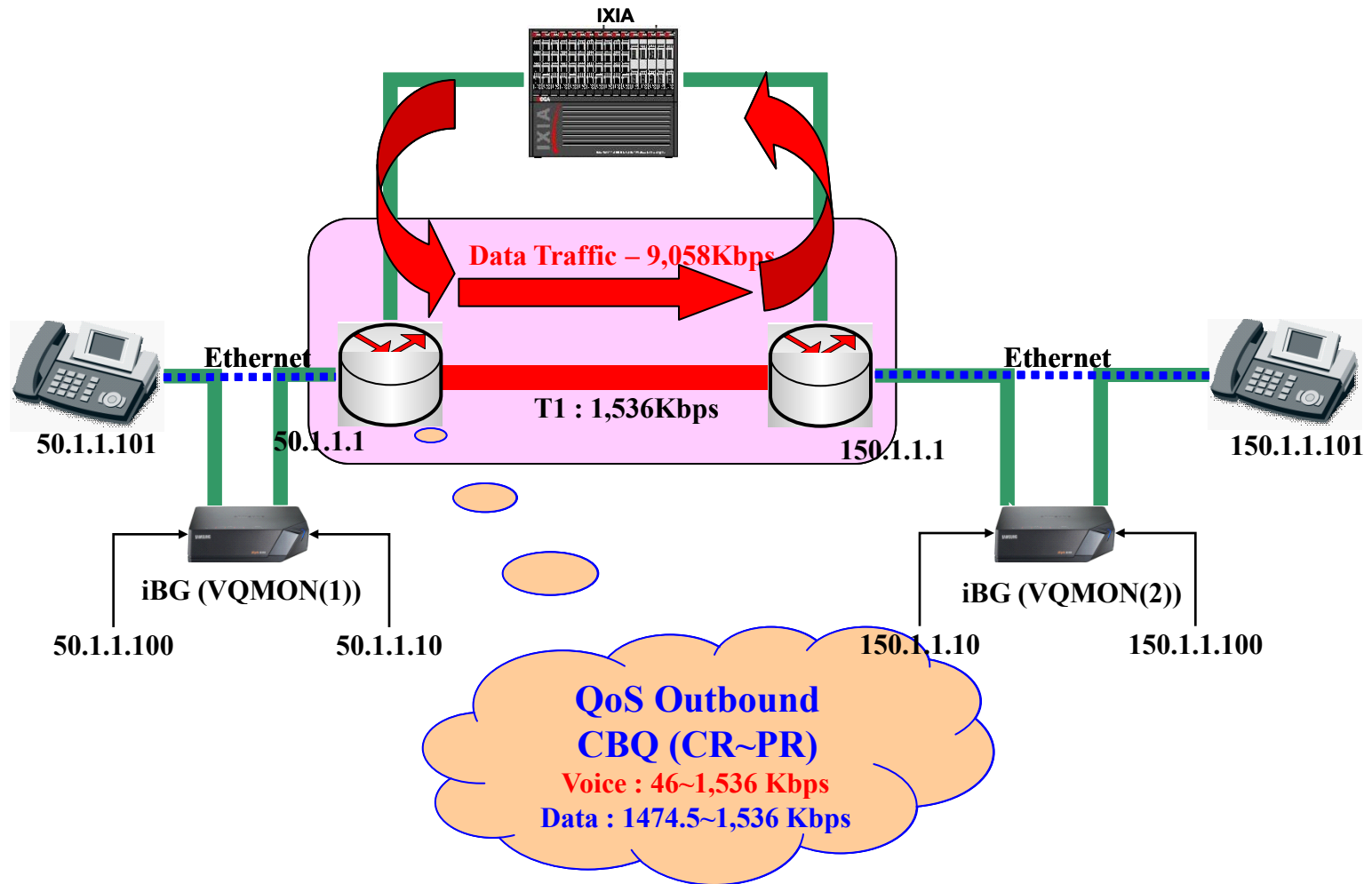



Summary stats

ibg# show vqm summary-stats

```
VQM Summary Stats for last 18 DY:7 HR:53 MN:22 SEC
=====
Calls Active = 1, Calls Completed = 2
Flows Quality Summary (Total/Good/Fair/Poor) = 4/4/0/0
Listening Call Quality (MOS) min/ave/max = 4.20/4.20/4.20
Conversational Call Quality (MOS) min/ave/max = 4.18/4.18/4.18
Listening Call Quality (R-factor) min/ave/max = 93/93/93
Conversational Call Quality (R-factor) min/ave/max = 92/92/92
Packet Delay Variation (msec) ave/max = 0/0
Packet Received/Processed/Lost/Discarded = 27416/14082/0/0
Packet Error Stats: Ignored/Errors = 8/4
System Error Stats: Resource Unavail/Filter Mismatch/Limit Exceeded = 0/0/0
Voice Quality Alerts: Low R-factor/Excess Loss/Excess Delay = 0/0/0
Upload Status: Last Upload 2 MN:36 SEC ago, with file name:
/cf0///vqm_080209_2115.dat
```


Example (L3 Monitoring)





● Enable L3 Monitoring

- ibg# configure terminal
- ibg/configure# vqm
- ibg/configure/vqm# enable L3

● Configure RTP-port range

- ibg/configure/vqm# rtp-port 10000-65535

```
vqm
  enable L3
  connection-limit 10
  reporting-mode verbose
  rtp-port 10000-65535
  upload
    interval 1
    mode cf0
    target directory /
  exit upload
exit vqm
```

● Current Configurations

● ibg# show vqm config

```
VQM Configuration
=====
Operational Status: Operational, Admin Stats: Enabled
Connection Filter Status: NOT Configured
Max Concurrent Calls Monitored: 10
Stats Collection Mode: End-of-call
Stats Reporting Mode: Verbose
Alarm Reporting Mode: Enabled
  Alarm Thresholds(R-factor/Excessive Burst/Delay): 60/90/200
Stats Upload Mode: /cf0, upload dir: /, File Prefix: vqm
Upload Interval: 1 mins
```

Show information



● Current stats

● lbg# show vqm current-stats detail

```
[CONN-1      Start Time=21:15:48, Duration=85 sec]
=====
SRC[I/F=ethernet0/1, SIP-ID=N/A, IP=90.90.113.161:51492]
DST[I/F=test, SIP-ID=N/A, IP=90.90.13.160:50830]
RTP Flow Quality Reports:
-----
[Flow-1] Start Time=21:15:48, Duration=85 sec, Dir=Forward, ssrc=3865671341, Quality Rating=Good
[Quality Metrics] MOS-LQ=4.20, MOS-CQ=4.18, Rfactor-LQ=93, Rfactor-CQ=92
Vocoder=G711a [Ave Bit Rate=64000 bps]
[Jitter Metrics] Ave PDV=0 msec, Max PDV=53 msec
[Packet Delay] Min=9 msec, Ave=33 msec, Max=39 msec
[One Way Delay] Current=45 msec, Ave=53 msec, Max=60 msec
[Round Trip Delay] Current=N/A msec, Ave=N/A msec, Max=N/A msec
[Packet Stats] Received=4286, Lost=0, Discarded=0
[Packet Errors] too-early=1652, too-late=2633, out-seq=0
                overrun=0, under-run=0, duplicate=0
[Analog Stats] signal(dB)=N/A, noise(dB)=-61, local-echo(dB)=N/A
                remote-echo(dB)=N/A, remote-signal(dB)=N/A
[Qualiy Impact %] pkt-loss=0.00, discards=0.00, vocoder=0.00
                  delay=0.00, signal-level=0.00, noise-level=0.00, echo=0.00
-----
[Flow-2] Start Time=21:15:49, Duration=85 sec, Dir=Riverse, ssrc=695813476, Quality Rating=Good
[Quality Metrics] MOS-LQ=4.20, MOS-CQ=4.18, Rfactor-LQ=93, Rfactor-CQ=92
Vocoder=G711a [Ave Bit Rate=64000 bps]
[Jitter Metrics] Ave PDV=0 msec, Max PDV=8 msec
[Packet Delay] Min=9 msec, Ave=33 msec, Max=39 msec
[One Way Delay] Current=45 msec, Ave=53 msec, Max=60 msec
[Round Trip Delay] Current=N/A msec, Ave=N/A msec, Max=N/A msec
[Packet Stats] Received=4276, Lost=0, Discarded=0
[Packet Errors] too-early=1797, too-late=2478, out-seq=0
                overrun=0, under-run=0, duplicate=0
[Analog Stats] signal(dB)=N/A, noise(dB)=-61, local-echo(dB)=N/A
                remote-echo(dB)=N/A, remote-signal(dB)=N/A
[Qualiy Impact %] pkt-loss=0.00, discards=0.00, vocoder=0.00
                  delay=0.00, signal-level=0.00, noise-level=0.00, echo=0.00
```



Summary stats

ibg# show vqm summary-stats

```
VQM Summary Stats for last 18 DY:7 HR:53 MN:22 SEC
=====
Calls Active = 1, Calls Completed = 2
Flows Quality Summary (Total/Good/Fair/Poor) = 4/4/0/0
Listening Call Quality (MOS) min/ave/max = 4.20/4.20/4.20
Conversational Call Quality (MOS) min/ave/max = 4.18/4.18/4.18
Listening Call Quality (R-factor) min/ave/max = 93/93/93
Conversational Call Quality (R-factor) min/ave/max = 92/92/92
Packet Delay Variation (msec) ave/max = 0/0
Packet Received/Processed/Lost/Discarded = 27416/14082/0/0
Packet Error Stats: Ignored/Errors = 8/4
System Error Stats: Resource Unavail/Filter Mismatch/Limit Exceeded = 0/0/0
Voice Quality Alerts: Low R-factor/Excess Loss/Excess Delay = 0/0/0
Upload Status: Last Upload 2 MN:36 SEC ago, with file name:
/cf0///vqm_080209_2115.dat
```

Thank you!

