



NetIQ Vivinet™ Assessor

Voice over IP Readiness Assessment
Executive Summary Report

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Thursday, April 23, 2009 4:01:24 PM

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Overview

This report summarizes the results of a VoIP Readiness Assessment performed by NetIQ Vivinet Assessor. A VoIP Readiness Assessment determines whether a particular network is ready to handle voice over IP (VoIP) in its present configuration. During the assessment, Vivinet Assessor performed some or all of the following tasks:

1. Compiled an inventory of devices and links on the network.
2. Monitored the utilization of these devices and links.
3. Modeled link capacity based on the bandwidth required for VoIP calls.
4. Evaluated the quality of simulated VoIP calls.

A high-level summary of results from any or all of these tasks is presented in this VoIP Readiness Assessment report.

VoIP Readiness Summary

This report contains information gathered during the VoIP Readiness Assessment described below:

| | |
|---------------------------------|---|
| Assessment Name | Sample-April2009 |
| Network Inventory Status | Discovery complete. |
| Utilization Assessment Status | Monitoring complete. |
| VoIP Quality Assessment Status | Assessment complete. |
| Assessment Report Created Using | NetIQ Vivinet Assessor 3.3, build level 13347 |
| Time Report Generated | Thursday, April 23, 2009 4:01:24 PM |
| Report Filter | None |

Network Inventory

Vivinet Assessor discovered routers, switches, and links on the network and queried them to gather information about their suitability for voice over IP traffic. The following table summarizes the findings:

| | # Discovered |
|----------|--------------|
| Routers | 4 |
| Switches | 12 |
| Links | 4 |

Utilization Assessment

Vivinet Assessor monitored the routers, switches, and links discovered on the network to gather information about their current utilization and determine their capacity for carrying VoIP traffic. From SNMP polling, Vivinet Assessor collected device-specific information about queuing and queue drops; link bandwidth utilization; CPU and memory utilization; and errors. A device readiness rating was assigned to each monitored device or link based on the findings.

What Was Assessed

Vivinet Assessor conducted the following Utilization Assessment:

| | |
|-------------------------------|--------------------------------------|
| Assessment Name | Sample-April2009 |
| Utilization Assessment Status | Monitoring complete. |
| Utilization Assessment Length | 6 days and 23 hours |
| Start Time | Thursday, April 16, 2009 10:00:01 AM |
| Scheduled Stop Time | Thursday, April 23, 2009 10:00:00 AM |
| Actual Stop Time | Thursday, April 23, 2009 10:00:00 AM |
| Time Report Generated | Thursday, April 23, 2009 4:01:24 PM |
| Report Filter | None |

Every 5 minutes, device Management Information Bases (MIBs) were polled and their utilization statistics were recorded.

Utilization Readiness Ratings

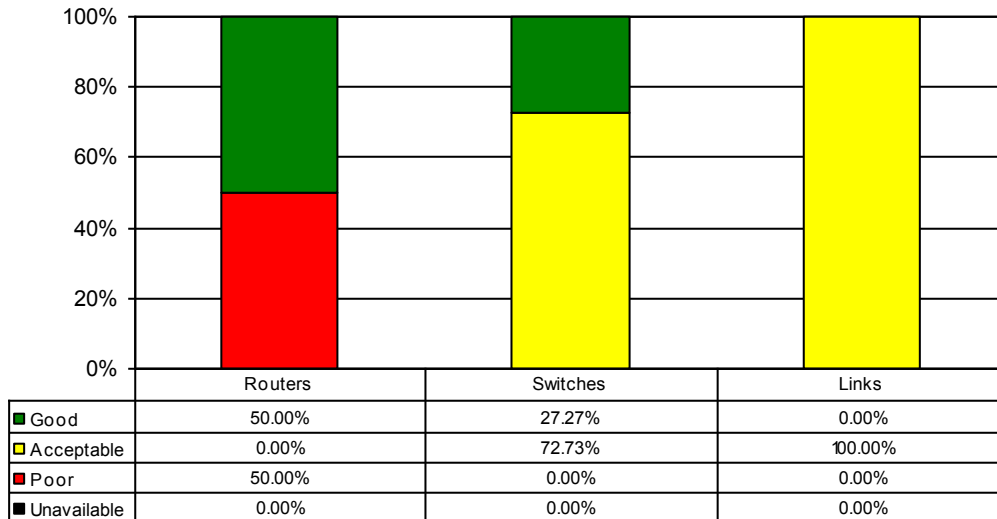
Readiness to carry VoIP was assessed based on the percentage of all measurements for monitored devices and links that fell into each readiness ratings category. Ratings were assigned according to the following result ranges for this assessment:

| Rating | Meaning |
|---------------|--|
| Good | At least 99.00% of collected measurements rated Good. |
| Acceptable | At least 98.00% of collected measurements rated Good or Acceptable. Reconfiguration or an upgrade may be necessary for VoIP readiness. |
| Poor | Any lower value. The measurements were not within acceptable parameters for this assessment. The device or link may not be ready to carry additional VoIP traffic. |
| Unavailable | No results were available to report. |

Utilization Readiness Summary

The chart below shows the percentage of all monitored devices and links that fell into each category of device readiness.

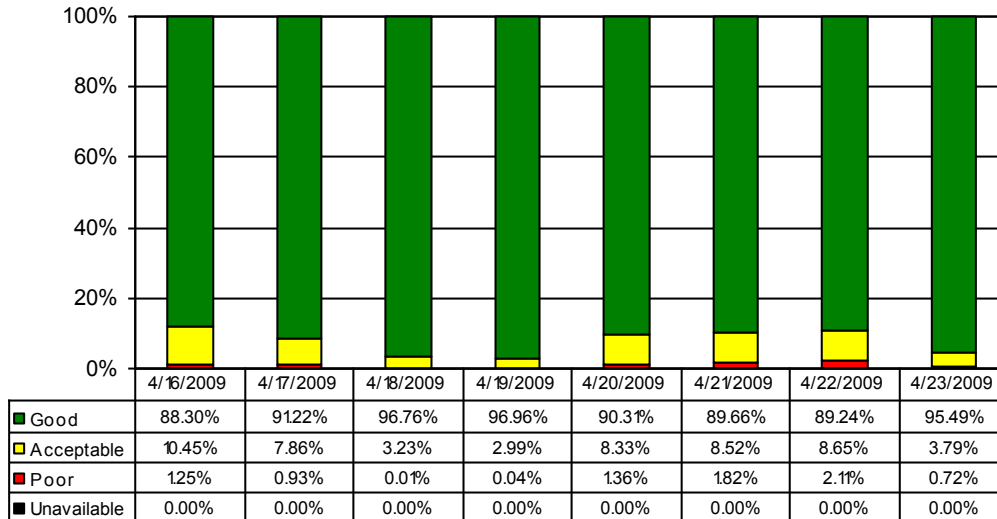
Utilization Readiness Summary



Router Measurements by Day

The chart below breaks out router device readiness per day by evaluating all measurements collected for monitored routers according to the result ranges defined for the assessment.

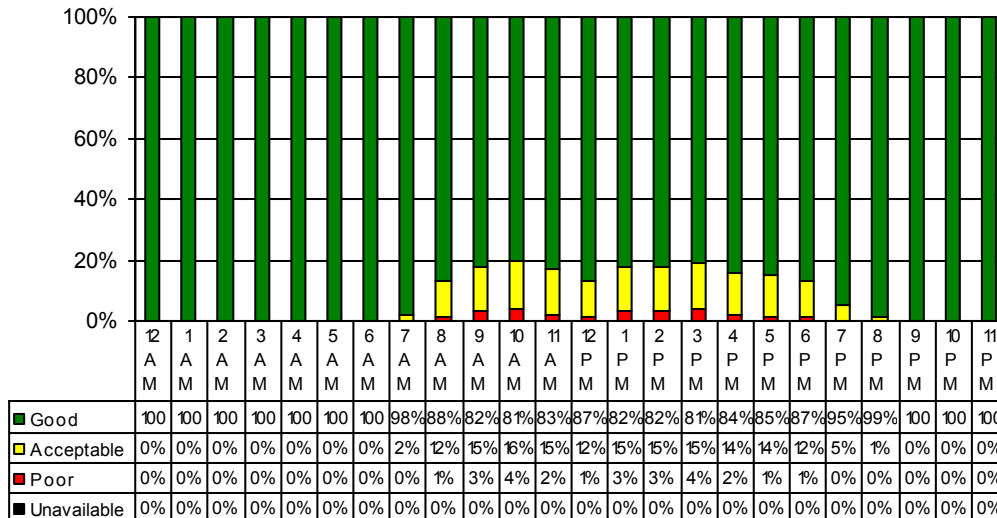
Router Measurements by Day



Router Measurements by Hour

The chart below breaks out router device readiness per hour by evaluating all measurements collected for monitored routers according to the result ranges defined for the assessment.

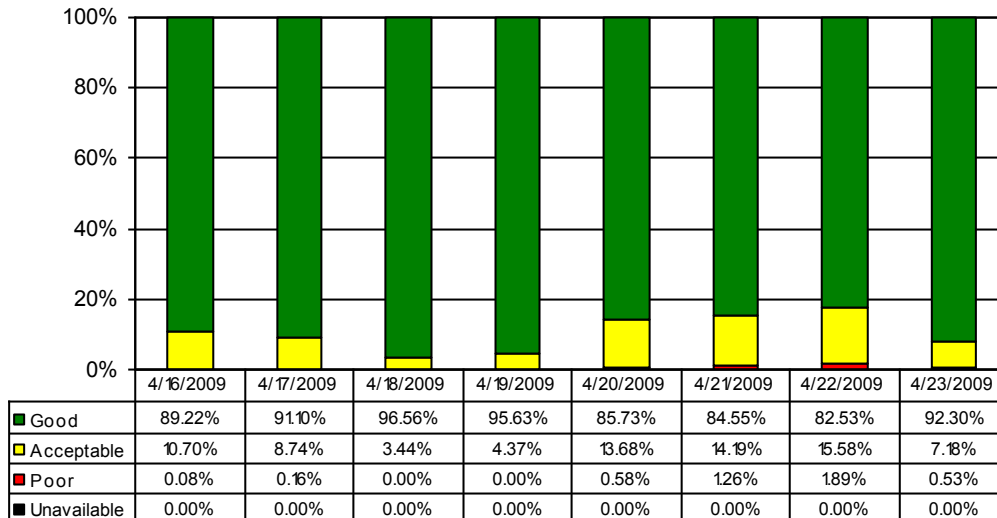
Router Measurements by Hour



Switch Measurements by Day

The chart below breaks out switch device readiness per day by evaluating all measurements collected for monitored switches according to the result ranges defined for the assessment.

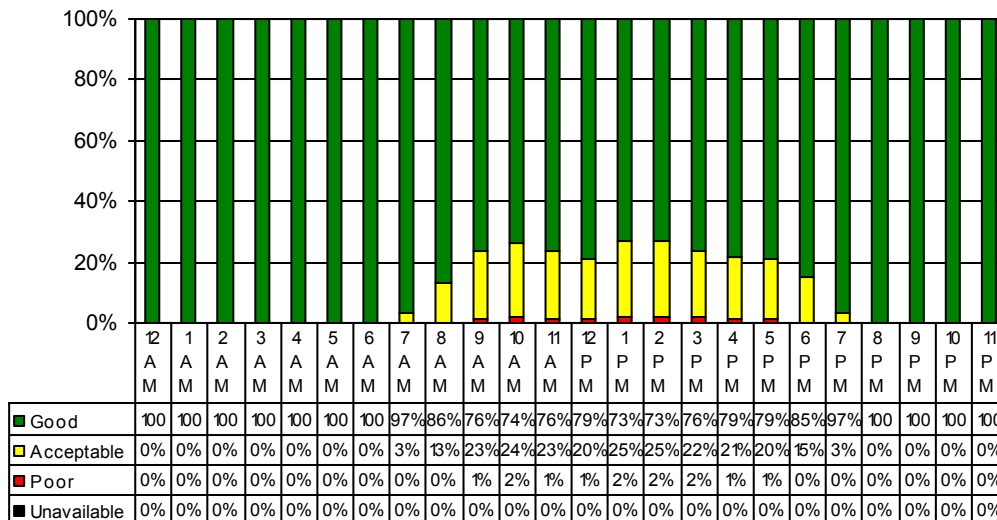
Switch Measurements by Day



Switch Measurements by Hour

The chart below breaks out switch device readiness per hour by evaluating all measurements collected for monitored switches according to the result ranges defined for the assessment.

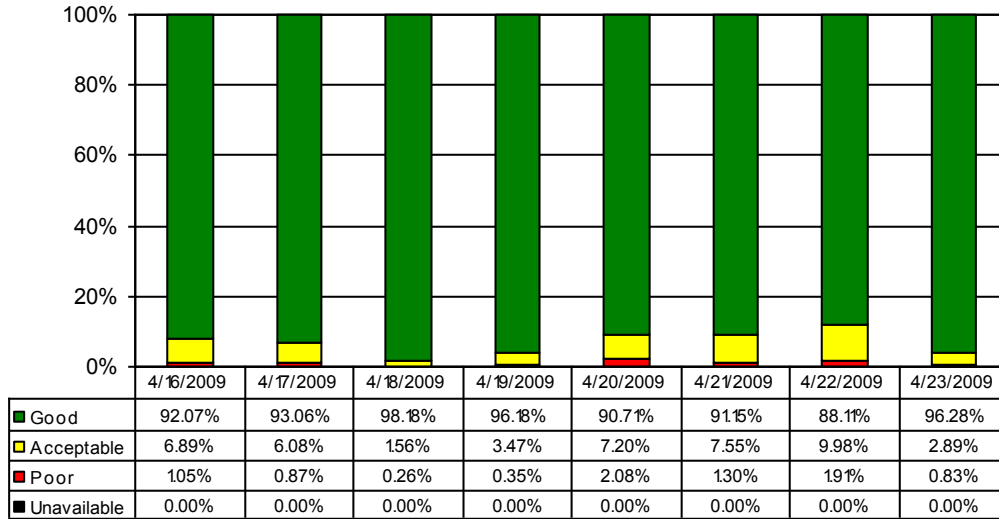
Switch Measurements by Hour



Link Measurements by Day

The chart below breaks out link device readiness per day by evaluating all measurements collected for monitored links according to the result ranges defined for the assessment.

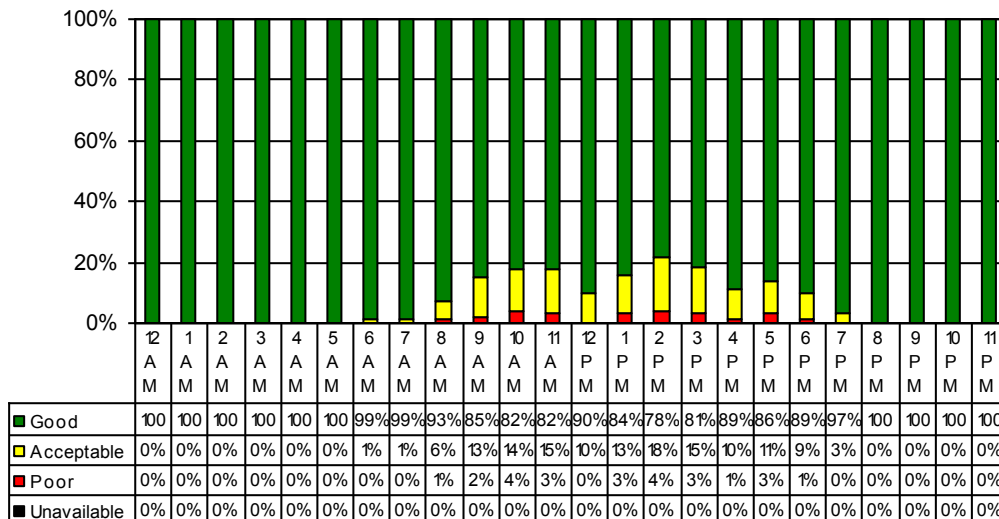
Link Measurements by Day



Link Measurements by Hour

The chart below breaks out link device readiness per hour by evaluating all measurements collected for monitored links according to the result ranges defined for the assessment.

Link Measurements by Hour



VoIP Quality Assessment

Vivinet Assessor determines how well VoIP will perform once it's deployed by assessing the quality of simulated VoIP calls sent over the network. Call quality is evaluated based on the average Mean Opinion Score (MOS) assigned to the simulated calls. Vivinet Assessor's objective estimation of a MOS takes into account important factors, such as codec, delay, lost data, and jitter buffer loss, that affect call quality in any VoIP implementation. A higher MOS estimate indicates higher call quality.

What Was Assessed

Vivinet Assessor conducted the following VoIP Quality Assessment:

| | |
|--------------------------------|--------------------------------------|
| Assessment Name | Sample-April2009 |
| Schedule Type | Series of scheduled calls. |
| VoIP Quality Assessment Status | Assessment complete. |
| VoIP Quality Assessment Length | 7 days |
| Start Time | Thursday, April 16, 2009 10:00:01 AM |
| Scheduled Stop Time | Thursday, April 23, 2009 10:00:00 AM |
| Actual Stop Time | Thursday, April 23, 2009 10:00:00 AM |
| Time Report Generated | Thursday, April 23, 2009 4:01:24 PM |
| Report Filter | None |

Every 60 minutes, 24 VoIP calls were emulated; each lasted 1 minute.

Call Quality Ratings

A MOS was calculated for each simulated call. The values were categorized as shown in the following table:

| Measurement | Good | Acceptable | Poor |
|-------------|---------------|---------------|-----------------|
| MOS | At least 4.03 | At least 3.60 | Any lower value |

Potential Lost Revenue

Telephone service downtime can cause revenue loss, which should be factored into the cost justification for network upgrades to support VoIP. The VoIP Quality assessment measured downtime as the percentage of simulated VoIP calls whose quality was rated “Poor” or that could not be completed (“Unavailable” calls). The downtime measurement was then used to estimate revenue loss, based on 100 employees making VoIP calls on the network and 17.21% “Poor” and “Unavailable” calls measured during the assessment. If no changes are made to the network, Vivinet Assessor projected the following industry-specific revenue loss, shown in the following table:

| Industry | Lost Revenue Per Hour Per Employee¹ | Total Lost Revenue | | |
|-----------------|---|---------------------------|----------------------------|-----------------------------|
| | | Per Hour | Per Day² | Per Week³ |
| Financial | \$42.67 | \$734.35 | \$5,874.81 | \$29,374.03 |

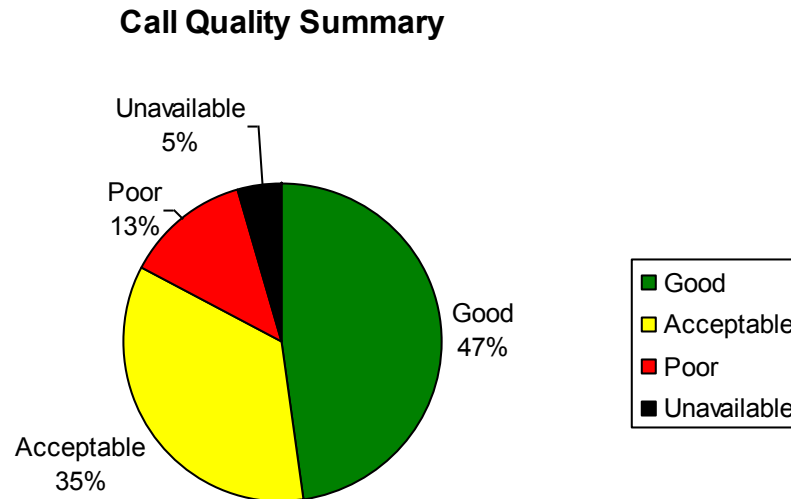
¹ The figures for average revenue lost were calculated by TeleChoice, Inc., a leading telecom consulting and analyst firm. The figures were derived based on specific and factual industry information provided by select U.S. companies in each segment as well as from U.S. government compiled information. Information was collected and analyzed in 2002 although much of the underlying data was from 2000 and 2001.

² Assumes standard 8-hour workday.

³ Assumes standard 40-hour workweek.

Call Quality Summary

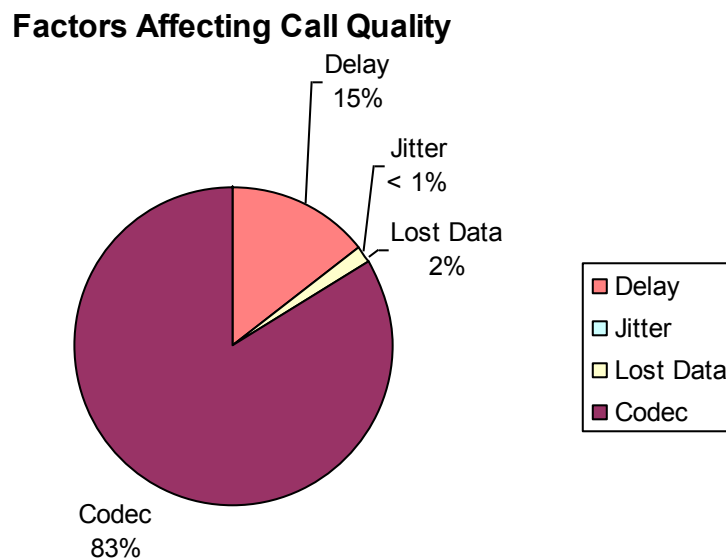
The chart below shows the percentage of all calls completed during the assessment that fell into each category of call quality. "Unavailable" call quality indicates that a call could not be connected or failed.



Good - At least 4.03 MOS Acceptable - At least 3.60 MOS Poor - Any lower value

Factors Affecting Call Quality

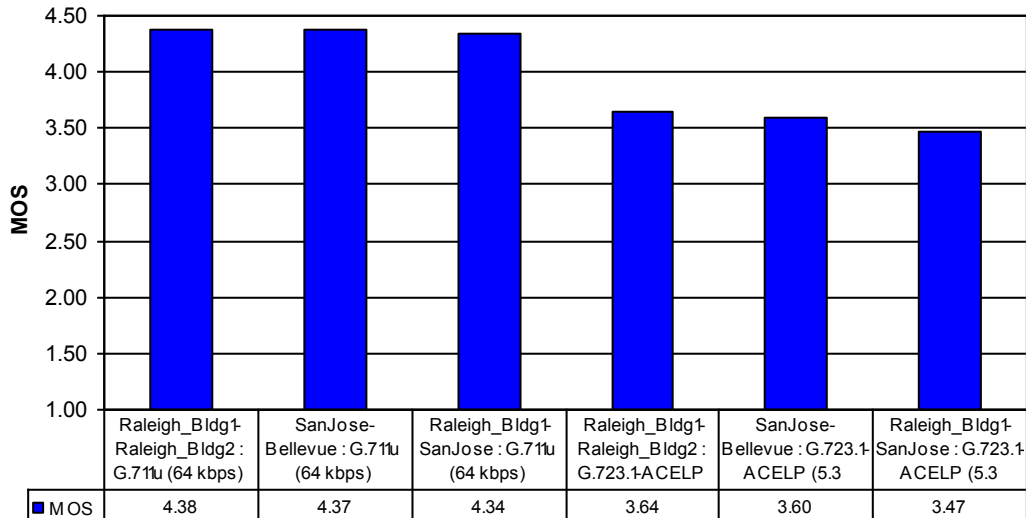
The chart below shows each call quality impairment factor's contribution to the overall call quality. Each factor's contribution is shown as a percentage of all call-quality impairments.



Call Quality Summary by Call Group

The chart below shows the call quality values for up to 10 call groups, ranked from highest MOS to lowest.

Call Quality Summary by Call Group

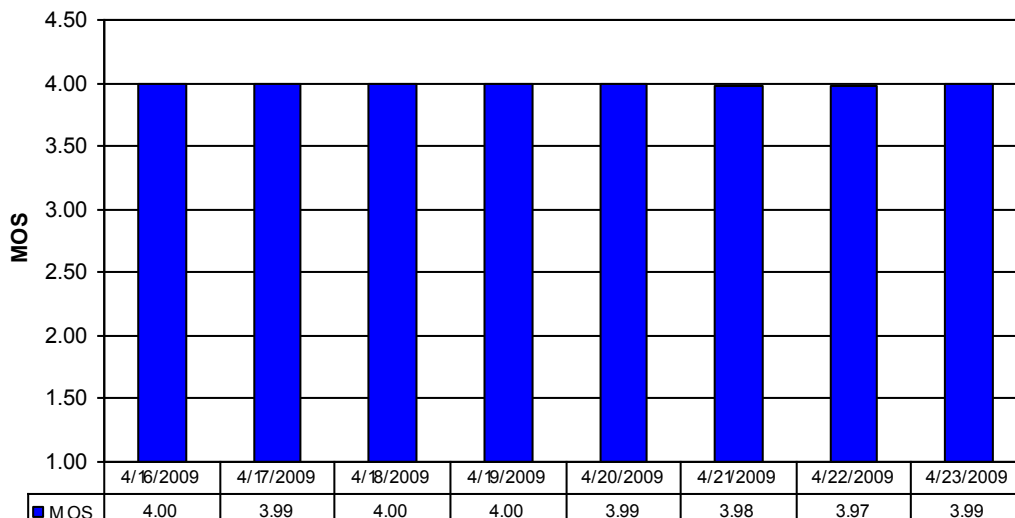


Good - At least 4.03 MOS | **Acceptable - At least 3.60 MOS** | **Poor - Any lower value**

Call Quality Summary by Day

The chart below shows the average MOS values for each day of the assessment.

Call Quality Summary by Day

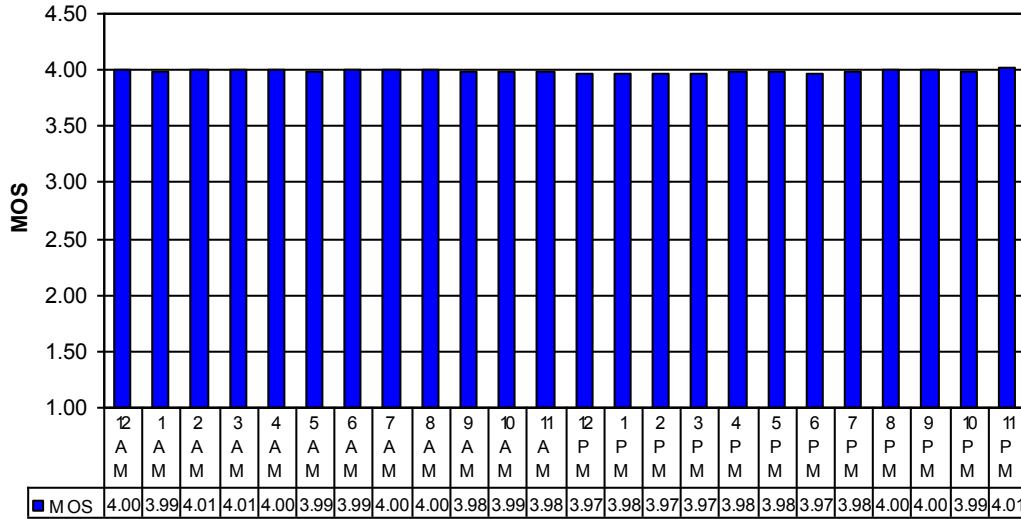


Good - At least 4.03 MOS | **Acceptable - At least 3.60 MOS** | **Poor - Any lower value**

Call Quality Summary by Hour

The chart below shows the average MOS values broken out by hour of the day. Each bar shows the MOS values averaged across all days of the assessment for that hour.

Call Quality Summary by Hour



Good - At least 4.03 MOS Acceptable - At least 3.60 MOS Poor - Any lower value