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1 POC Test Procedure

While performing the POC tests, the Technical Services engineer will record test results in a separate document.

1.1 Aggregator Information

Since the POC environment affects the test results and network conditions can change before, during, and after the tests, the physical and network characteristics need to be recorded. All this information can be found in the bonding dashboard, in the details page for the aggregator.

1.2 CPE Information

Record information about the CPE, available in the bond details page in the bonding dashboard.

1.3 Individual Connection Information

Bonded Internet uses multiple Internet connections to provide a high-performance, reliable network solution. Results can be impacted by the health of the legs, such as high amount of latency or jitter. Thus, knowing the type of line is critical to analyzing the POC test results.

1.4 Traceroutes to Aggregator From Each Link

The location of the aggregator is critical in maximizing performance and minimizing latency. Please provide traceroute output from each CPE link to the aggregator.

1.5 Partner Infrastructure Information

Record any other vital information about the partner's infrastructure, such as VoIP PBX IP type and address.

2   Test Descriptions and Instructions

2.1   Individual Internet Connection Tests

The performance of the bonded connection depends on the performance of the individual legs. The first step of the POC is to test each leg to establish the expected bonded performance.

2.1.1   Throughput tests

These speed tests can be executed using the speed test functionality in the bonding web interface. Record all results in Mbps.

2.1.2   Latency and jitter tests

Latency and jitter are recorded by pinging the aggregator from the CPE. Record all results in milliseconds (ms).

2.2   Bonding tests

The collection of individual links is called a bond. This session is presented on the CPE and aggregator as "tun" interfaces. Bonded throughput can be monitored by watching the throughput on the tun interfaces.

2.2.1   Aggregated throughput- compression disabled

Ensure compression and QoS are disabled.

Test the aggregated link speed with one of the following methods:

Use a browser-based test: speedtest.net, speakeasy.net/speedtest/, or similar. Ideally, the speed test site should be hosted on the same network as the aggregator. This will reduce the chance that external network problems will impact the test.

Download a file from the aggregator to the CPE or test client, and upload a file from the CPE to the aggregator.

Test both download and upload throughput.

The bonded throughput should be 85% or more of the combined speeds seen in test 3.1.1.

2.2.2   Aggregated throughput- compression enabled

Enable compression and repeat the tests from 3.2.1.

Compare compressed throughput to the uncompressed throughput from test 3.2.1. The results should be 3-7 times higher.

Disable compression.

2.3 Failvoer tests

The bi-directional failover technology performs seamless failover and recovery from loss of connectivity. Benefits include:

• Automated link removal and recovery
• No dropped VoIP calls on failover
• Lossless connection failover

For these tests, configure all legs as non-failover. That is, every leg is a permanent part of the bond.

2.3.1 Lose one leg

With all legs up, download a large file. Disconnect the Ethernet cable for one leg. The download should slow down but continue uninterrupted. The bonding dashboard should show a red icon for that leg, indicating that it has failed.

2.3.2 Lose two legs

If the CPE has only two legs, skip this test.

Disconnect the Ethernet cable for a second leg. The download should slow down but continue uninterrupted. The bonding dashboard should show that two legs have failed.

2.3.3 Leg recovery

Reconnect all failed legs. The download should resume the original speed and the dashboard should show all legs up.

2.3.4 Failover VoIP test

Perform one of the following procedures:

1. Start a VoIP call. During the call, disconnect one leg. The call should continue uninterrupted, losing 0.5 seconds of speech or less.

2. Start a ping between the CPE and aggregator at a 50 ms interval. Disconnect one leg. Stop the ping. The ping should report 6 or fewer packets lost.

Reconnect the leg.

2.4   Quality of Service Testing

The QoS feature allows the bonded connection to offer low-latency, low-jitter service to sensitive applications such as VoIP, even when high-throughput applications are using the same connection.

QoS testing can be skipped if the partner is not interested in VoIP or QoS.

2.4.1   Latency-sensitive traffic with bulk upload- QoS disabled

Begin a large file upload between the CPE and aggregator.
Perform one of the following tests:

1. Start a VoIP call. The call quality should be poor.

2. Perform a ping of 100 packets between the CPE and aggregator. Record the ping results.

Stop the upload and allow the network latency to return to normal.

2.4.2   Latency-sensitive traffic with bulk upload- QoS enabled

Enable QoS. Duplicate the test from 3.4.1. The result should be significantly better than the result from 3.4.1. The VoIP call quality should be acceptable and/or ping results should show significantly lower latency and jitter.

2.5   Traffic shaping

Traffic shaping is a technique used to limit throughput on a connection. In particular, this is used to ensure that throughput on an Internet connection is always less than the rate at which the modem begins to queue traffic and increase latency. Purposefully limiting traffic to slightly below this rate ensures that link latency remains low, even when the bonded connection is saturated.

Traffic shaping is integrated with Quality of Service (QoS) to prioritize important traffic (such as VoIP calls) over low-priority traffic (such as HTTP downloads).

2.5.1   Leg traffic shaping

Change the download speed on all legs to half of their previous speed. Do a download test. The throughput should be about half the result of test 3.2.1.