



Best Current Practice

## Best Current Practice

OCSBC – Geographic Redundancy – Acme Packet 6350

Category: Informational

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## Revision History

Version	Author	Description of Changes	Date Revision Completed
1.00	Devon Thomas	Initial version	

## Abstract

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

The information, provided in this document, is intended to provide insights into the resilience of OCSBC High Availability pair, when different propagation delays exist between peer devices.

The focus is on showing the maximum calls per second achieved on a High Availability (HA) pair of Acme Packet 6350s (AP6350s) when different Round Trip Times (RTTs) are between them.

## Applicability

The details provided is based on tests performed using Oracle Communications Session Border Controller (OCSBC) model AP6350.

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## 1. Network Functions

A pair of AP6350s (each configured as ACLI product: “Session Border Controller”) was used to identify the maximum number of calls per second possible (when configured as a High Availability (HA) pair) when there are different delays between them.

## 2. Software

OCSBC s/w release nnSCZ920p4.bz

## 3. Introduction

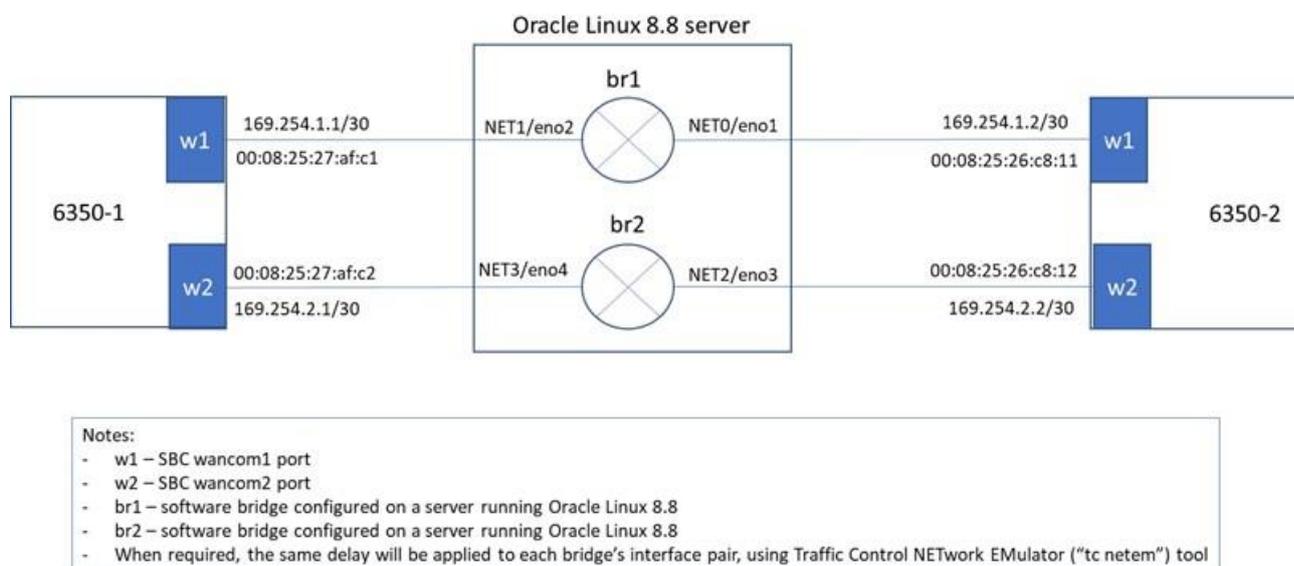
This document is based on (520-024-04 NN3000-4000 Series Geographic Redundancy, 2014) which documents the HA behaviour of older OCSBC models.

The following scenarios were assessed:

- SIP Registering endpoints behind NATs with hair-pinned calls.
- SIP Peering/Trunking calls.

Figure 1 shows the setup used to simulate Geo-redundancy between the OCSBCs wancom1 & wancom2 interfaces.

Figure 1 - OCSBC wancom1 & wancom2 connectivity



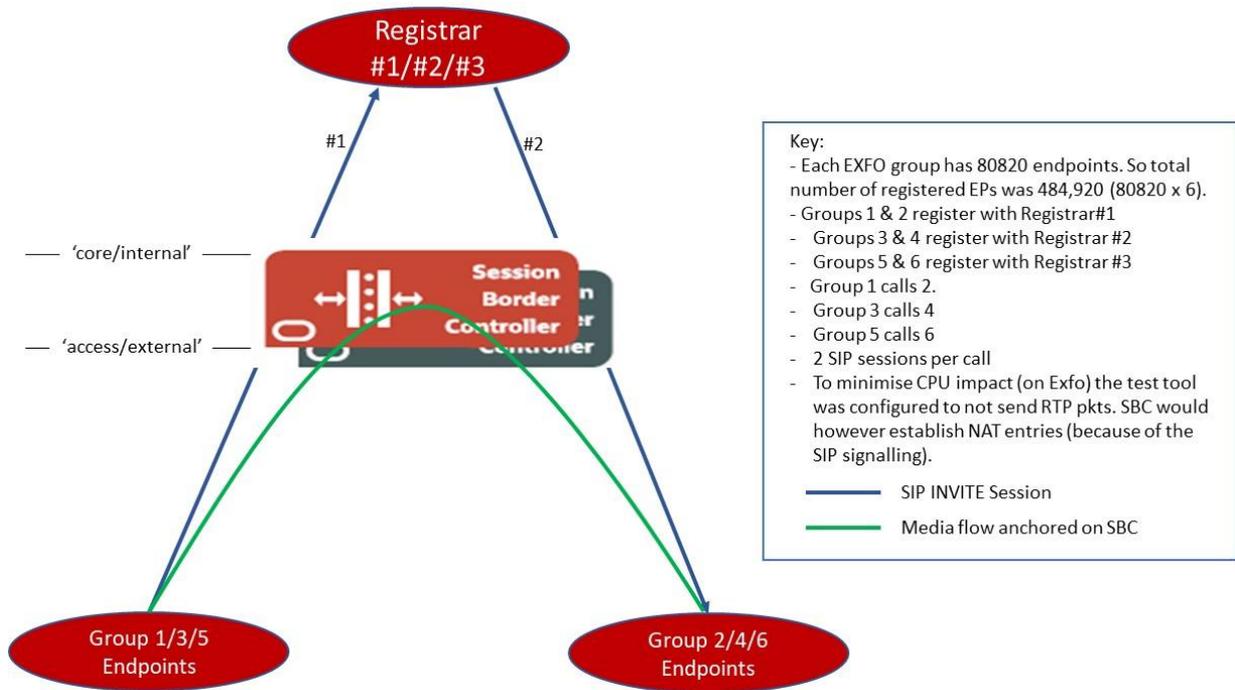
## 4. Registration with Hair-pinned calls

Figure 2 shows (at a high level) a hair-pinned call flow. A call consists of 2 SIP sessions. Although media flows will be anchored on the ‘access’ side of the OCSBC, the OCSBC also reserves media ports on the ‘core’ side just in case they are required following a session update that involves core side devices. The test tool (Exfo) was configured, so that registering endpoints would appear (to the OCSBC) to be behind NAT devices. The SIP session associations were as follows:

1. Exfo End Point Group (EPG) #1 & EPG#2 register with Registrar#1. EPG#1 calls EPG#2.
2. Exfo End Point Group (EPG) #3 & EPG#4 register with Registrar#2. EPG#3 calls EPG#4.
3. Exfo End Point Group (EPG) #5 & EPG#6 register with Registrar#3. EPG#5 calls EPG#6.

Endpoints REGISTER attempts are challenged by the registrars, so 4 SIP messages are involved on those occasions. Test calls are based on 7 SIP messages. As the calls are hair-pinned 2 SIP sessions (14 messages) are consumed on the OCSBC.

Figure 2 - Hair-pinned call flow



**Error! Not a valid bookmark self-reference.** contains the SBC configuration, during this section's tests.

TextFile 1 - SBC Registration configuration



20240218-showRun  
Short-access.txt

#### 4.1. Test Environment Summary

Table 1 & Table 2 provide information regarding the test environment. The values shown in Table 2 were primarily taken from (520-024-04 NN3000-4000 Series Geographic Redundancy, 2014). The following OCSBC parameters (see also Table 2) were set to their maximum values, rather than the values in (520-024-04 NN3000-4000 Series Geographic Redundancy, 2014):

- 'redundancy-config>cfg-max-trans'
- 'sip-config>red-max-trans'
- 'media-manager>red-max-trans'

Table 1 -Hair-pinned calls - Platform metrics

SBC H/W	SBC s/w Rel.	SBC Config size (Number of objects)	Multi-channel redundancy Configured?	Total Number Reg. EPs	EP side Reg interval (sec)	Registrar side Reg interval (sec)	Concurrent SIP Sessions Range
6350	SCZ920p4	15,000> objects <16000	No	484,920	899	3600	72000> sessions <77000

Table 2 - OCSBC redundancy settings)

Advertisement-time (msec)	Percent-drift	media-if-peercheck-time (msec)	becoming-standby (msec)	'redundancy-config' cfg-max-trans	SIP & MBCD red-max-trans
500	210	250	1800000	50,000	50,000

Table 3 shows the number of SIP messages involved in a hair-pinned call & an endpoint registration. It also shows the number of SIPD & MBCD redundancy transactions sent from the active to the standby OCSBC, in each scenario. As mentioned in (520-024-04 NN3000-4000 Series Geographic Redundancy, 2014) MBCD has the highest number of redundancy transactions and is potentially a limiting factor with respect to max CPS.

Table 3 – Hair-pinned calls - HA redundancy transactions & SIP messages

SIP Scenario	Number of SIP Messages	Number of SIPD Redundancy Transactions	Number of MBCD Redundancy Transactions
Hair-pinned call flow	14	4	8
Registration with dynamic ACL promotion	2/4	2	1

The maximum CPS was determined to be the maximum rate that can be sustained (for 3 hrs) without:

1. Loss of HA synchronisation . To detect this the 'show health' command was entered on both OCSBCs every 30secs (using an expect script). An example of an errored output is :

```
6350-1# show health

Media Synchronized           false
SIP Synchronized             true
REC Synchronized             disabled
XSERV Synchronized           true
Config Synchronized          true
Collect Synchronized          disabled
RADIUS CDR Synchronized      disabled
Rotated CDRs Synchronized    disabled
IPSEC Synchronized           disabled
Iked Synchronized            disabled
Lbpd Synchronized            disabled
tCCD Synchronized            disabled
Service Health Synchronized  true
Active Peer Address

Redundancy Protocol Process (v3):
State                         Active
Health                        100
```

```

Lowest Local Address          169.254.1.1:9090
1 peer(s) on 2 socket(s):
6350-2: v3, Standby, health=100, max silence=1050
      last received from 169.254.1.2 on wancom1:0

```

Switchover log:

6350-1#

2. Exfo statistics exceeded those seen during baseline tests (i.e. test when delay was 0 msec). Table 4 shows the metrics used to decide if a test (when delay was added) was successful.

*Table 4 – Hair-pinned calls - Baseline test indicators - Metrics for a successful test when delay is added.*

Number of 4xx (excl. 401/407) responses	Number of 5xx responses	Number of concurrent calls matches the calculated number (Y/N)?	Number of expired registrations
< 50	0	Yes	0

Typically when the maximum CPS threshold was exceeded, the number of 4xx responses and/or expired registrations would increase (before completion of the 3hrs) to numbers in of the order of thousands.

## 4.2. Test Results

Table 5 & Figure 3 show the effect of RTT on the maximum calls per second (CPS) (for hair-pinned calls) while HA resilience is maintained.

*Table 5 – Hair-pinned calls - Effect of RTT on Max CPS*

RTT Delay (msec)	Hair-pinned calls - Max CPS
0	626
2	600
4	590
6	525
8	460
10	300
30	260

Figure 3 – Hair-pinned calls - RTT delay effect on Max CPS

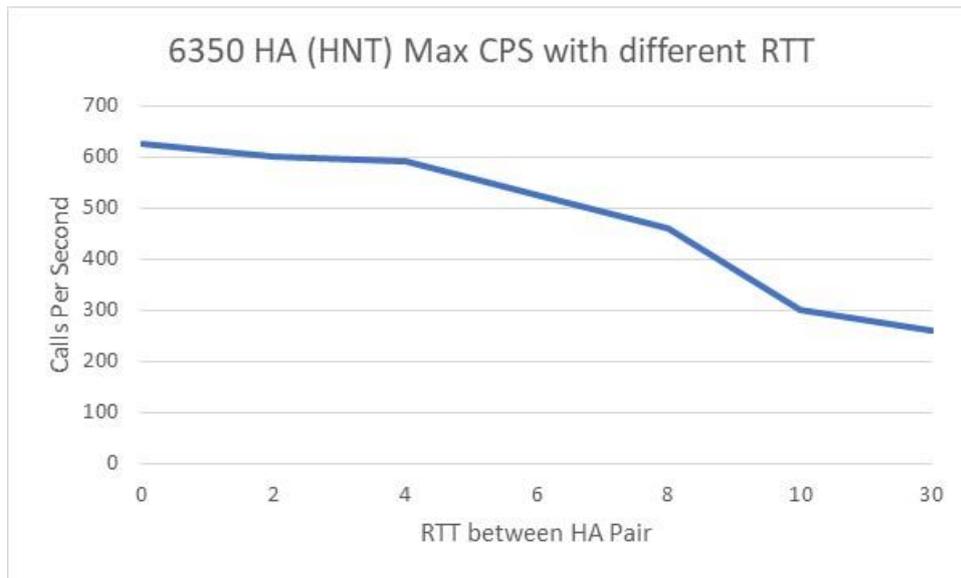


Table 6 shows the peak cpu utilisation while maximum CPS was in progress for different delays. The results suggest that CPU usage was not the limiting factor in the test environment.

Table 6 - HNT - Peak CPU Utilisation for maximum CPS with varying delays

HNT calls - peak CPU usage during test														
RTT	Max CPS	mbcd01 (%)	sipd01 (%)	sip02 (%)	sipd03 (%)	sipd04 (%)	sipd05 (%)	sipd06 (%)	sipd07 (%)	sipd08 (%)	sipd09 (%)	sipd10 (%)	sipd11 (%)	SBC state
0	626	70.01	43	43.7	43.2	43.1	44.1	43.4	43.7	42.8	43.8	42.8	43.8	active
0	626	65.6	6.1	6.2	6.2	6.2	6.2	5.9	6.2	6	6.2	6.4	6.1	standby
2	600	67.2	42	41.5	41.3	41.1	41.6	40.6	40.6	41.1	41.2	42.6	42.1	active
2	600	63.2	5.7	5.5	5.4	5.7	5.3	5.4	5.6	5.5	5.3	5.7	5.6	standby
4	590	67.5	41.3	40.2	40.5	41.4	41.8	41.2	42.8	41.8	40.8	41.7	41.8	active
4	590	63.5	6	5.8	6.2	6.1	5.9	6.2	6.2	6.3	6	6.1	6.1	standby
6	525	58.9	36.5	36.6	36.4	36.6	36.5	36.7	36.3	36.3	36.6	35.9	36.3	active
6	525	64.6	5.4	5.4	5.4	5.4	5.7	5.7	5.5	5.8	5.2	5.2	5.3	standby
8	460	51.5	32.8	32.5	32.4	32.2	32.8	33.5	32.9	32.4	32.3	33	32.3	active
8	460	57.9	4.7	4.6	4.6	4.8	4.8	4.7	4.8	4.9	4.9	4.8	5	standby
10	300	32.8	21.9	22.6	22	21.9	22.1	21.8	21.9	22	22.1	21.7	22.1	active
10	300	36.4	3.2	3.2	3.7	3.5	3.4	3.5	3.4	3.2	3.2	3.5	3.5	standby
30	260	31.9	20	19.7	20.6	20	19.9	19.9	20.7	20.1	20.1	20.9	19.7	active
30	260	31.2	3	3.1	3	3	3	2.9	3	3	3.2	3.1	3	standby

## 5. Peering Calls

This section provides details of the maximum CPS in a peering scenario, given three scenarios:

1. Max CPS over 1-hour
2. Max CPS that supports 2 HA failovers
3. Max CPS over 3-hours that also can support 2 HA failovers.

Figure 4 provides a high-level view of the call flow used during the 1-hour & HA failover tests, while Figure 5 provides a similar view for 3-hour test scenario.

Note: For the 3-hour test scenario, to minimise the CPU impact on the test tool, the OCSBC configuration ensures each call uses 5 SIP sessions (as indicated in Figure 5).

Figure 4 - Peering calls – 1-hour & Failover Tests

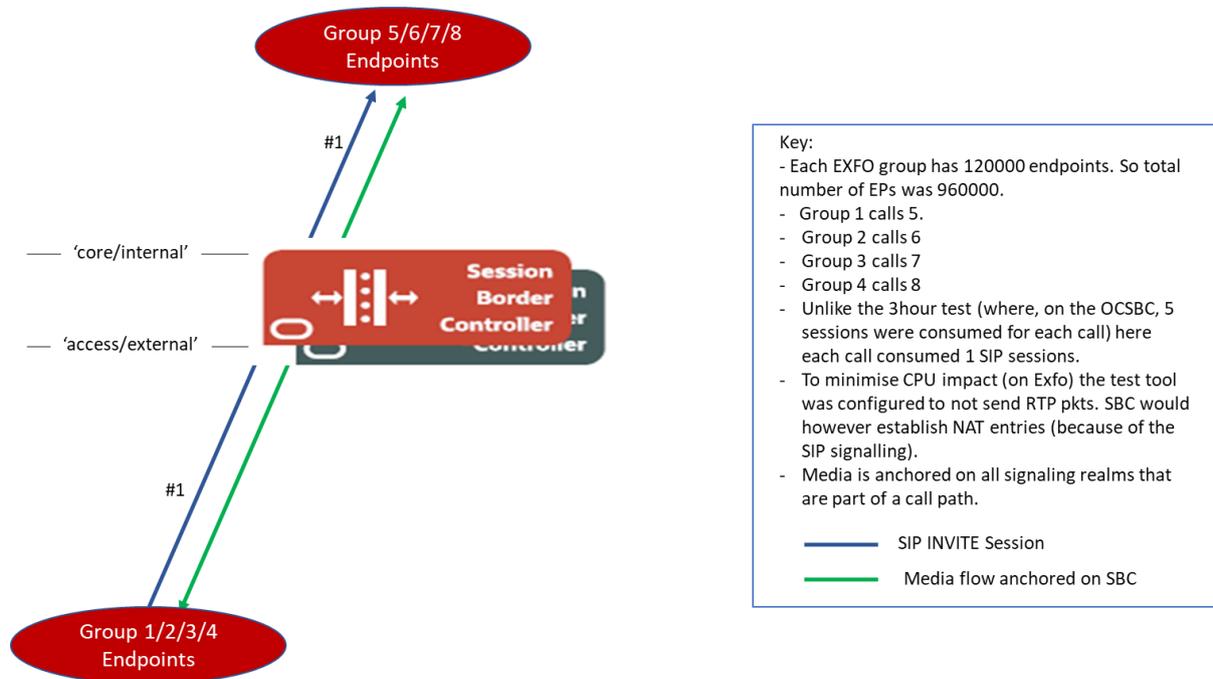
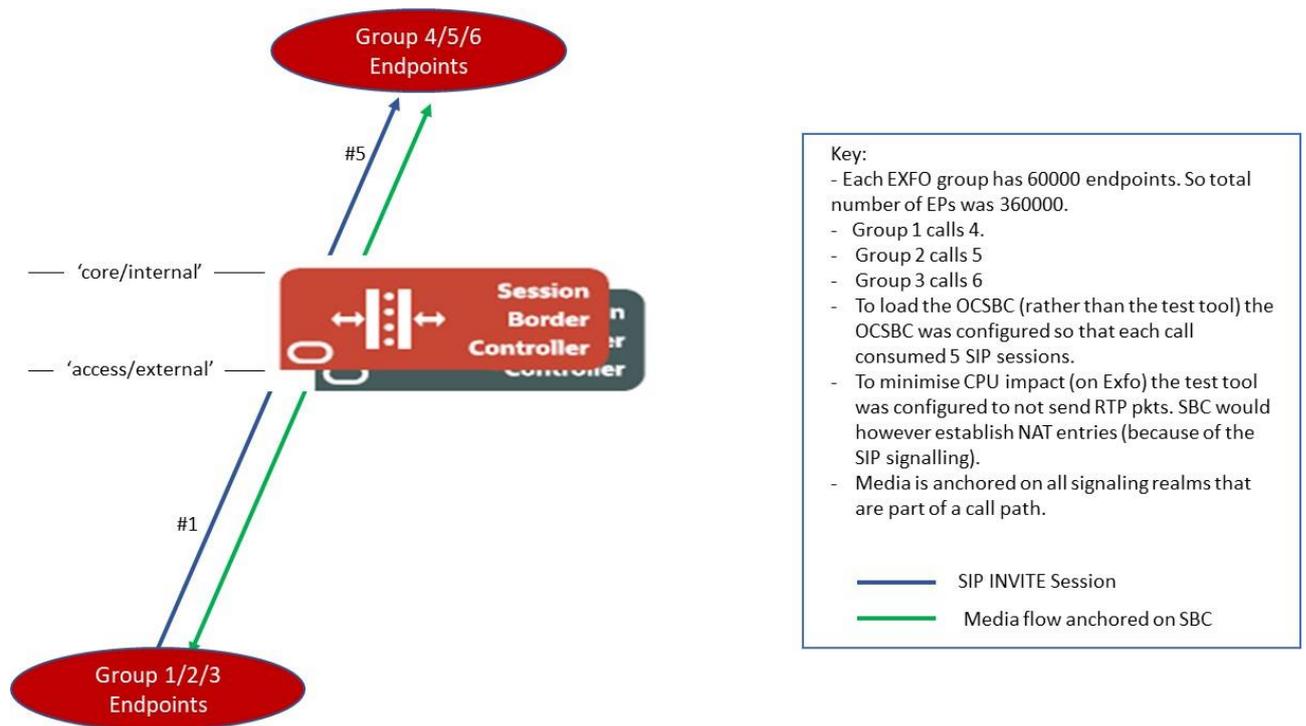


Figure 5 - Peering calls – 3-hour Test



TextFile 2 & TextFile 3 show the SBC configurations for both peering scenarios.

TextFile 2 - SBC Peering configuration - 1hr



20240418-showRun  
Short-1hr-peer.txt

TextFile 3 - SBC Peering Configuration - 3hr



20240321-showRun  
Short-3hr-peer.txt

## 5.1. Test Environment Summary

Table 7 & Table 2 provide generic information regarding the peering environment. The values shown in Table 2 were in general taken from (520-024-04 NN3000-4000 Series Geographic Redundancy, 2014). The following OCSBC parameters (also shown in Table 2) were set to their maximum values:

- 'redundancy-config>cfg-max-trans'
- 'sip-config>red-max-trans'
- 'media-manager>red-max-trans'

Table 7 – Peering calls – Generic Platform Information

SBC H/W	SBC s/w Rel.	SBC Config size (Number of objects)	Multi-channel redundancy Configured?	Concurrent SIP Sessions Range
---------	--------------	-------------------------------------	--------------------------------------	-------------------------------

6350	SCZ920p4	15,000> objects <16000	No	70000> sessions <79000
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Table 8 – Peering calls - HA redundancy transactions & SIP messages

SIP Scenario	Number of SIP Messages	Number of SIP Redundancy Transactions	Number of MBCD Redundancy Transactions
Peering call	7	2	3

### 5.1.1. 1-hour max CPS determination.

The maximum CPS was determined to be the maximum rate that:

1. Can be sustained (for 1-hour) without Loss of HA synchronisation.
2. Can be sustained (for 1-hour) without Exfo showing errors exceeding those seen during baseline tests (i.e. test result when no delay was configured). Table 9 shows the Exfo metrics used to decide if a test (when delay was added) was successful.

Table 9 – Peering calls - Baseline test indicators - Metrics for a successful test.

Timer B or Timer F expired	Number of 4xx (excl. 401/407) responses	Number of 5xx responses	Number of concurrent calls record, matches the calculated number (Y/N)?
0	0	0	Yes

### 5.1.2. HA Failover max CPS determination.

The maximum CPS was determined to be the maximum rate that:

1. Can be sustained (for 20mins) without Loss of HA synchronisation.
2. Can successfully re-establish HA following 2 failovers, without Exfo showing errors that exceed those seen during baseline tests. Table 10 shows the Exfo metrics used to decide if a test (when delay was added) was successful. The time between failovers depended on the time required for the pair to re-establish synchronisation. The minimum re-synch interval was approximately 5mins.

Table 10 – Peering calls - Baseline test indicators - Metrics for a successful test.

Timer B or Timer F expired	Number of 4xx (excl. 401/407) responses	Number of 5xx responses	Number of concurrent calls record, matches the calculated number (Y/N)?
0	0	0	Yes

### 5.1.3. 3-hour max CPS determination.

The maximum CPS was determined to be the maximum rate that:

1. Can be sustained (for 3-hour) without Loss of HA synchronisation.
2. Can be sustained (for 3-hour) without Exfo showing errors exceeding those seen during baseline tests (i.e. test result when no delay was configured). Table 11Table 9 shows the Exfo metrics used to decide if a test (when delay was added) was successful.
3. Can successfully re-establish HA following 2 failovers, without Exfo showing errors that exceed those seen during baseline tests.

Table 11 – Peering calls - Baseline test indicators - Metrics for a successful test.

Timer B or Timer F expired	Number of 4xx (excl. 401/407) responses	Number of 5xx responses	Number of concurrent calls record, matches the calculated number (Y/N)?
0	0	0	Yes

## 5.2. Test Results

Table 12 & Figure 6 show the effect of RTT on the maximum calls per second (CPS) in a peering scenario, while HA resilience remains.

Table 12 - Peering calls - Effect of RTT on Max CPS

RTT Delay (msec)	Peering calls Max CPS
0	865
4	850
6	750
8	740
10	570
30	465

Figure 6 - Peering calls - Effect of RTT delay on Max CPS

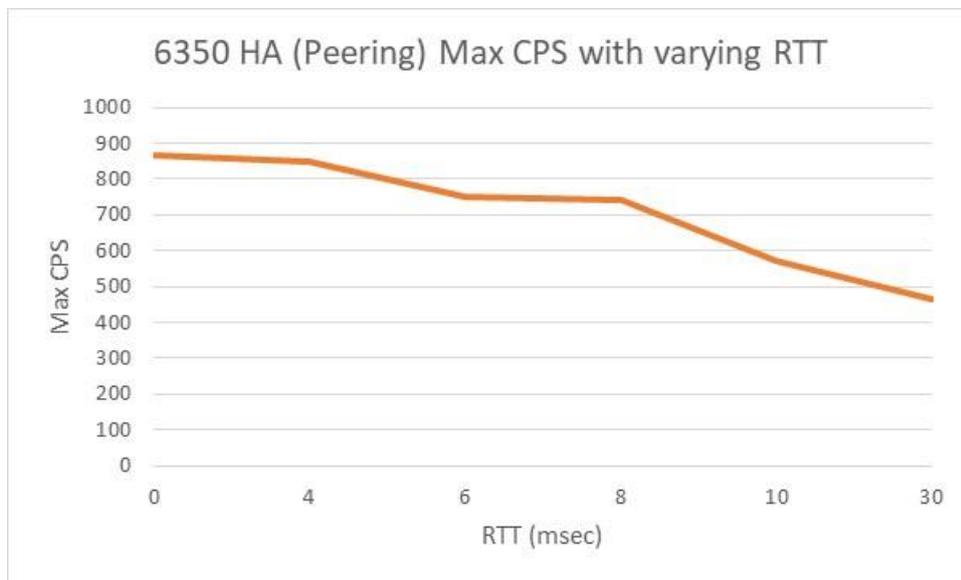


Table 13 shows the peak cpu utilisation while maximum CPS was in progress for different delays. The results suggest that CPU usage was not the limiting factor in the test environment.

Table 13 - Peering - Peak CPU Utilisation for maximum CPS with varying delays

Peering Calls - peak CPU Usage during test														
RTT	Max CPS	mbcd01 (%)	sipd01 (%)	sip02	sipd03	sipd04 (%)	sipd05 (%)	sipd06 (%)	sipd07 (%)	sipd08 (%)	sipd09 (%)	sipd10 (%)	sipd11 (%)	SBC state
0	865	57.6	23.8	23.9	24.4	24.3	23.5	23.3	23.2	23.4	24.4	25.5	24.5	active
0	865	54.4	3.8	4.1	4.1	4	4.2	4	4.2	4.1	4.2	4	4.1	standby
4	850	56.2	23.2	23.6	23.8	23.1	23.3	24.3	23.5	23.8	24.9	23.2	25.2	active
4	850	63.6	4	3.9	3.9	4.2	4	4.1	4.2	3.9	3.8	3.9	4.2	standby
6	750	48.7	21.5	20.7	20.8	21.4	21.7	21.6	21.7	21	20.6	21.9	20.8	active
6	750	50.1	3.5	3.2	3.3	3.2	3.5	3.2	3.1	3.2	3.2	3.4	3.3	standby
8	740	55.5	20.6	20.8	20.1	20.5	20.2	21.5	20.4	21.1	20.2	21	20.9	active
8	740	49.9	3.5	3.4	3.3	3.4	3.5	3.4	3.5	3.3	3.4	3.7	3.6	standby
10	570	38.2	15.9	16.3	16.2	15.9	16.2	15.4	15.3	15.8	15.4	15.8	16	active
10	570	38.5	3.1	2.9	3	3	3.1	2.9	3	3	3	2.8	3	standby
30	465	31.3	12.9	12.8	14.1	12.9	13.9	12.6	14.8	13.3	14.1	13.2	12.9	active
30	465	34.7	9.3	10.2	9.3	10.9	10.8	9.8	9.4	10	9.7	9.7	10.3	standby

## 6. Conclusion

(520-024-04 NN3000-4000 Series Geographic Redundancy, 2014) concluded that network latency had a significant impact on the performance of legacy physical OCSBCs. The test results in this document, shows that network latency continues to have an impact on performance of OCSBC HA pairs. A 10 msec delay between peers reduces the call rate at which a HA pair can maintain redundancy by 34 – 62 % (depending on the platform’s call profile).

## 7. Glossary

Table 14 - Glossary

Term	Notes
ACLI	Acme Command Line Interface
AP6350	Physical OCSBC. Model 6350
EPG	Exfo End Point Group. Group of Exfo endpoints.
HA	High Availability pair of OCSBCs
HNT	Hosted NAT Traversal
OCSBC	Oracle Communication Session Border Controller
RTT	Round Trip Time

## 8. References

(520-024-04 NN3000-4000 Series Geographic Redundancy, 2014)