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| TO | GCSN, Wranglers, Ann Bentley, Warren Hall |
| CC | NEN Sponsors (Donald Clark, Rodger Auld) |
| FROM | Roger Foote- NEN Trial Extension Project Manager |
| DATE | 5 November 2010 |
| SUBJECT | Investigation of Asymmetrical speeds pilot GCSN Schools |

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# Previous Related Documents

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| --- | --- | --- |
| DATE | SUBJECT | SUMMARY |
| 12 October 2010 | Report of the test migration of GSCN pilot Schools | Asymmetrical speed test results. Continue with migration. |
| 27 October 2010 | Investigating asymmetrical speeds for GSCN 7 pilot schools | Proposed test plans |

# Introduction

This memo describes the investigation and resolution of asymmetrical speeds recorded during testing of the seven pilot GCSN schools after they were migrated to KAREN on 14th – 15th October 2010.

Preliminary diagnosis suggested that the number of variables in the testing regime were a potential source of the asymmetry. These variables included:

* Wrangler hardware & software
* Testing protocol
* Testing server

The initial approach was to develop a standard test plan that used the same wrangler hardware and tests. This testing also produced asymmetric results.

Subsequent testing at SNAP and REANNZ indicated that the asymmetry was also being contributed to by variability of the NDT server. A new test server Iperf was therefore built at REANNZ, baseline tested and installed at the Wellington POP.

The wrangler resumed testing at SNAP data centre and then tested all 7 pilot schools completing on 4th November 2010.

# Summary

The testing has proven that the bandwidth supplied to schools is working as expected.

The NDT server was found to be unsuitable for this testing and has been replaced by the Iperf server for testing future school migrations.

Two schools recorded lower speeds than the other five due to the configuration of their firewalls (SNAP hosted). REANNZ does not consider the lower than line-speed performance of this service will affect the project, as throughputs still exceed 100Mb/s. The speed performance of schools using the SNAP hosted firewall has been shared with GCSN and SNAP.

Refer to: Appendix I for Test Plans

Refer to: Appendix II for Results

# APPENDIX I – Test Plans

## Testing Hardware

### 1. Testing Client

The hardware and software used at the client end was standardised by using the same device for testing using software that had the same configuration. This was achieved by using a wrangler’s laptop, running a boot version of Knoppix from a CD. (In previous tests this varied by wrangler and equipment)

### 2. Testing server

Investigating asymmetrical results from the NDT server, the following information on the Wellington NDT server was obtained.

The Wellington NDT server was built:

* with hardware known to be sub-optimal
* using old web100 version of software
* approximately 3 years ago

Rather than attempt to repair or reconfigure the server, a new server (Iperf server) was commissioned. The server was benchmark tested at REANNZ offices then retested once the server was installed at the Wellington POP.

Features of this server include:

* High performance network cards
* Optimised for testing at 600mbs

### 3. Testing Protocol

The KAREN NDT and SNAP speedtest servers require the use of the TCP protocol for testing. The project team recognised that testing using TCP through a number of points in the network could require tuning at these points which would be a large exercise, and was not pursued.

Accordingly, the UDP protocol was chosen for testing giving the best indication of line speed for schools. The tests were performed at speeds of 250mbs and 600mbs.

### 4. Testing Plans

Figure 1 shows the logical diagram of test points for the GCSN pilot schools.



Figure 1 - Logical diagram GCSN pilot schools test points

The test sets described in the 27 October memo[[1]](#footnote-1) were altered from those initially proposed. A summary of the changes for each test set is described below.

**Test Set One** – Test from edge device to SNAP Speedtest server and to NDT server.

Removed the SNAP speedtest server, NDT server and replaced it with the Iperf server.

Reason for Change: The SNAP speedtest server is public facing, and accordingly any results obtained would have to be considered including usage of the server by other external users, utilisation of the server, and other network traffic. NDT server removed for reasons above.

**Test Set Two** -Test from SNAP Network to SNAPs speedtest server (two tests)

Removed from test plan.

Reason for change: Due to the concerns of the SNAP speedtest server above and the testing performed for both VRF’s is covered in test set three.

**Test Set Three** - Test from SNAP network to KAREN NDT servers, and iperf server (4 separate tests).

NDT server removed from testing.

Reason for change: NDT server returning variable results

**Test Set Four** - SNAP to alternate Internet speedtest server (two tests)

Removed from test plan.

Reason for change: Reduce the number of variables to consider when testing.

**Test Set Five** – Test from another KAREN members site to NDT server and SNAP speedtest server.

Removed from test plan.

Reason for change: Unable to arrange a member within the given timeframe.

# Appendix II- Results from testing

## Results

### 1. Wednesday 27 October 2010

Two tests were conducted via the KAREN\_PUBLIC VRF and the KAREN\_WF VRF.

The test via the KAREN\_WF VRF caused an outage on the co-located watchdog filtering service. The bridging daemon stopped affecting the service. Watchdog support identified the fault and restored service, a case has been logged in salesforce reference (00000123). The test was repeated on Thursday 28 October with no subsequent loss of service (@ 250Mb/s, 600Mb/s, and 1GB speeds).

|  |  |  |  |
| --- | --- | --- | --- |
| DATE | TIME | LOCATION | DESTINATION (NDT, SNAP speedtest SVR etc) |
| 27/10/10 | 13:00 | KAREN\_PUBLIC VRF |  |
| TEST SET THREE | OUT | IN | COMMENTS |
| NDT | 268 Mb/s | 768 Mb/s | Removed from further analysis |
| IPerf 650m | 635 Mb/s | 635 Mb/s | Incorrect speed tested should have been 600 Mb/s |
| IPerf 250m | 250 Mb/s | 250 Mb/s |  |
| Speedtest.net (SNAP) | 368 Mb/s | 253 Mb/s | Removed from further analysis |

### 2. Thursday 28 October 2010 - Wrangler back at SNAP datacentre

|  |  |  |  |
| --- | --- | --- | --- |
| DATE | TIME | LOCATION | DESTINATION (NDT, SNAP speedtest SVR etc) |
| 28/10/10 | 16:00 | KAREN\_PUBLIC VRF |  |
| TEST SET THREE | OUT | IN | COMMENTS |
| IPerf 600m | 617 Mb/s | 618 Mb/s |  |
| IPerf 250m | 250 Mb/s | 250 Mb/s |  |

|  |  |  |  |
| --- | --- | --- | --- |
| DATE | TIME | LOCATION | DESTINATION (NDT, SNAP speedtest SVR etc) |
| 28/10/10 | 15:30 | KAREN\_WF VRF |  |
| TEST SET THREE | OUT | IN | COMMENTS |
| IPerf 600m | 618 Mb/s | 540 Mb/s | Acceptable differences |
| IPerf 250m | 250 Mb/s | 250 Mb/s |  |
| NDT | 262 Mb/s | 268 Mb/s | Removed from further analysis |

These results show that the speeds from SNAP aggregation points to KAREN are symmetrical and at the rates expected.

### 3. School Testing

Following these results to ensure completeness, the decision was made to test at the edge device for all 7 pilot schools. This required negotiation with the schools as the testing disrupted all connectivity to the school.

Results shown are to the Iperf server only.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCHOOL (INPUT SPEED) | DATE – TIME | SPEED OUT | SPEED IN | COMMENTS |
| PAPANUI HS |  |  |  |  |
| 250 Mb/s | 1/11/10 – 13:05 | 250 Mb/s | 250 Mb/s |  |
| 600 Mb/s |  | 529 Mb/s | 541 Mb/s |  |
| CHC BOYS HS |  |  |  |  |
| 250 Mb/s | 1/11/10 – 15:30 | 250 Mb/s | 250 Mb/s |  |
| 600 Mb/s |  | 591 Mb/s | 559 Mb/s |  |
| MAIREHAU HS |  |  |  |  |
| 250 Mb/s | 2/11/10 – 15:30 | 250 Mb/s | 250 Mb/s |  |
| 600 Mb/s |  | 573 Mb/s | 535 Mb/s |  |
| SHIRLEY BOYS HS |  |  |  |  |
| 250 Mb/s | 2/11/10 – 16:10 | 250 Mb/s | 250 Mb/s |  |
| 600 Mb/s |  | 566 Mb/s | 555 Mb/s |  |
| RICCARTON HS |  |  |  |  |
| 250 Mb/s | 3/11/10 – 09:30 | 178 Mb/s | 218 Mb/s | Hosted f/w @ SNAP |
| 600 Mb/s |  | 176 Mb/s | 247 Mb/s |  |
| FENDALTON OAS |  |  |  |  |
| 250 Mb/s | 4/11/10 – 15:30 | 154 Mb/s | 209 Mb/s | Hosted f/w @ SNAP |
| 600 Mb/s |  | 171 Mb/s | 234 Mb/s |  |
| VILLA MARIA COLLEGE |  |  |  |  |
| 200 Mb/s | 4/11/10 – 16:15 | 250 Mb/s | 250 Mb/s |  |
| 600 Mb/s |  | 557 Mb/s | 582 Mb/s |  |

Riccarton High School & Fendalton Open Air School have the lowest speeds tested this can be explained because both schools use a hosted firewall at SNAP, throughputs still exceed 100Mb/s.

The other schools results are in line with predictions exceeding their allocated bandwidth of 500 Mb/s.

1. Investigating asymmetrical speeds for GCSN 7 pilot schools – 27 October 2010 [↑](#footnote-ref-1)