IBM TotalStorage Proven™ program

LightSand Communications

z10 / z196 – FICON Express4 Interoperability
With LightSand i-8100F FICON extension gateways

Testing Template:

This document will be used to describe, from a technical perspective, the elements that were included as part of the IBM TotalStorage Proven testing. It is intended to give an overall picture of the technical elements of the configuration, with a brief description of the results of the testing including any specific highlights of the interoperability results.

1. The i-8100F FICON extension gateways are utilized to extend FICON channel over MAN/WAN. The solution is exercised in customer production environment in cooperation with IBM. IBM architecture includes DS8300, ESS-800 (Shark™) and z10 with z/OS 1.11 and FICON Express4 Card (41V2538 – FC3322). The effective extension distance is 500km.

2.

<table>
<thead>
<tr>
<th>FICON card / zSeries</th>
<th>z10</th>
<th>z114</th>
<th>z196</th>
<th>REDBOOK</th>
<th>WEB LINK</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FICON Express4 10KM LX</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>FICON Express4 4KM LX</td>
<td>X</td>
<td>X</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>FICON Express4 SX</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FICON Express4-2C 4KM LX</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FICON Express4-2C SX</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
</tbody>
</table>
Statement of General Direction: The IBM zEnterprise 196 and the zEnterprise 114 are the last System z servers to support FICON Express4 channels.

3. Testing scenarios:

3.1. The customer’s ESS-800 Shark™ storage unit is serving as a remote storage at 2nd site. The z10 is directly connected to the DS8300 and they are at another site (1st site) - physical distance between sites of about 500Km. FICON controllers of the z10 and ESS-800 are connected directly to the i-8100F gateways.

3.2. The tests consist in the copy of several local volumes for a remote disc controller. For this purpose, various Jobs were executed using DFSMSdss.

3.3. Example of one of the jobs:

3.3.1. 28 concurrent Jobs, each one copying a Model 9 disc (all the discs had the same type of data).

z10 – FICON Express4
Overview Report with FICON Performance and WAN Link Utilization using LightSand proprietary Compression Feature:

Report Time Span: 12-10-2011 10:45:00 - 12-10-2011 11:45:00
Average (FICON Rx): 56 mega Bytes/s
Total (FICON Rx): 200.484 mega Bytes

Average (GbE Tx): 20 mega Bytes/s
Total (GbE Tx): 73.462 mega Bytes
4. Testing level achieved: **Comprehensive**

The solution is successfully deployed in customer production environment for more than 6 days without any major issues, which substitutes the 72 hours test required for comprehensive level. The “COPYS” are running over the FICON channel established between the z10, ESS-800 and DS8300 over the distance of 500km with wide variety of operations beyond the requirements of comprehensive test. The equipment has been fully benchmarked prior the deployment on distances ranging from local (0km) to 1000km.

5. What was specifically tested and any particular feature exercised as part of the test. An example is interoperability with a number of storage devices, servers, and or application software.

- The solution is deployed in the customer production environment.
- No distance simulation tools used. The connection was achieved between 1st and 2nd BCRS sites. The distance is 500km, RTT is ~5ms.
- For pre-deployment verification distances 0 to 1000km were successfully tested.
- The following IBM products are used for this deployment:
  - IBM ESS-800 (Shark ™)
  - z10 with FICON EXPRESS4 card
  - DS8300

6. Specific versions of products included in the testing with the configuration of specific hardware/software tested with specific hardware and software levels.

<table>
<thead>
<tr>
<th>Servers: Vendor</th>
<th>OS / Version</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM z10</td>
<td>z/Os 1.11</td>
<td>zSeries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Products: Vendor</th>
<th>Model</th>
<th># of Drives</th>
<th>Drive Type</th>
<th>Capacity</th>
<th>Microcode Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>2105-800</td>
<td>64</td>
<td>Model 9</td>
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<tr>
<td>IBM</td>
<td>2107-921</td>
<td>64</td>
<td>Model 9</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extension Gateways: Vendor</th>
<th>Model</th>
<th>Configuration</th>
<th>BBW About</th>
<th>Firmware Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>LightSand</td>
<td>i-8100F</td>
<td>2x BBW + 6x FICON ports</td>
<td>BBW SCT-11 rev.2.10</td>
<td>V4.7.1a</td>
<td></td>
</tr>
</tbody>
</table>
7. Description of the testing results obtained:

The installation and connections were completed in accordance with the i-8100F installation instructions. This simple procedure included configuration of the extension and the management IP interfaces. No special configuration for FICON ports required. Access ID has been assigned to each FICON port in order to allow extending of two (or more) FICON channels over two redundant connections with load sharing.

With this test it was possible to verify the full compatibility between LightSand and the new FICON Express4 cards on Mainframe IBM z10 and z196.

The pre-deployment verification covered distances ranged from local (0m) to 1000km. The production deployment is operating over the distance of 500km.

The solution was implemented in October 2011 and currently is still successfully deployed.

8. List of participant support contacts including phone and web page.

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IBM TotalStorage Proven™ program

• Technical customer support information
  E-mail: support@lightsand.com

Product information:
  http://www-03.ibm.com/systems/z/hardware/z10ec/
  http://www-03.ibm.com/systems/storage/disk/ds8000/
  http://lightsand.com/products/i-8100F.asp

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