

IBM TotalStorage Proven™ program

Tellabs 7100 Optical Transport System



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.

High-level architecture/description, include a list of products that meet the compatibility requirements (“Approved Product(s)”) as well as a list of the IBM storage products with which the Approved Products meet the compatibility requirements (“Qualified IBM Storage Products”):

7100 Overview:

The Tellabs 7100 Optical Transport System (Tellabs 7100 system) is a next generation flexible metro dense-wavelength-division-multiplexing (DWDM) system that provides scalable, non-service affecting growth to 32 protected 10G wavelengths without the need to re-engineer or rebalance the network. Tellabs 7100 systems provide cost-effective, reliable, low-maintenance transport of voice, data and video services. A single shelf can support up to 4 protected wavelengths and the system is architected to expand to 64 channels.

The 7100 system offers:

- High speed, 10 Gigabit transponder (TGTM)— 10 Gbps Ethernet (10 GbE) and OC-192/STM-64
- Multirate Transponder Module (MRTM) — 100 Mbps to 2.5 Gbps
- Rate Agile Multiplexer Module (RAMM) — Multiplexes up to eight subrate signals into an OC-48 signal for delivery to an MRTM
- Subrate Multiplexing Transponders (SMTM) aggregate up to 8 channels into an 10 G signal in a single slot
- Reconfigurable Optical Add Drop Multiplexer (ROADM) functionality
- Integrated Optical Protection Switch
- Performance monitoring
- Automatic optical power management and equalization

IBM TotalStorage Proven™ program

- Tellabs 7190 Element Manager — provides integrated management of Tellabs 7100 systems.
- Tellabs 7191 Craft Station is a graphical user interface used to turn-up provision and perform routing maintenance on the 7100.

The Tellabs 7100 technology is protocol and bit-rate independent, it allows various types of traffic over an optical channel regardless of the protocol and allows support of native data interfaces. The solution has been tested with the following IBM server and storage products:

- RS/6000 43P
- IBM z900 2084-108 Enterprise Server
- 3583 LTO Tape Library
- 2105 F20 (with PPRC feature) with *ESCON and Fibre Channel* attachment (2)
- 2109-S16 Fibre Channel 16 port switch (2)

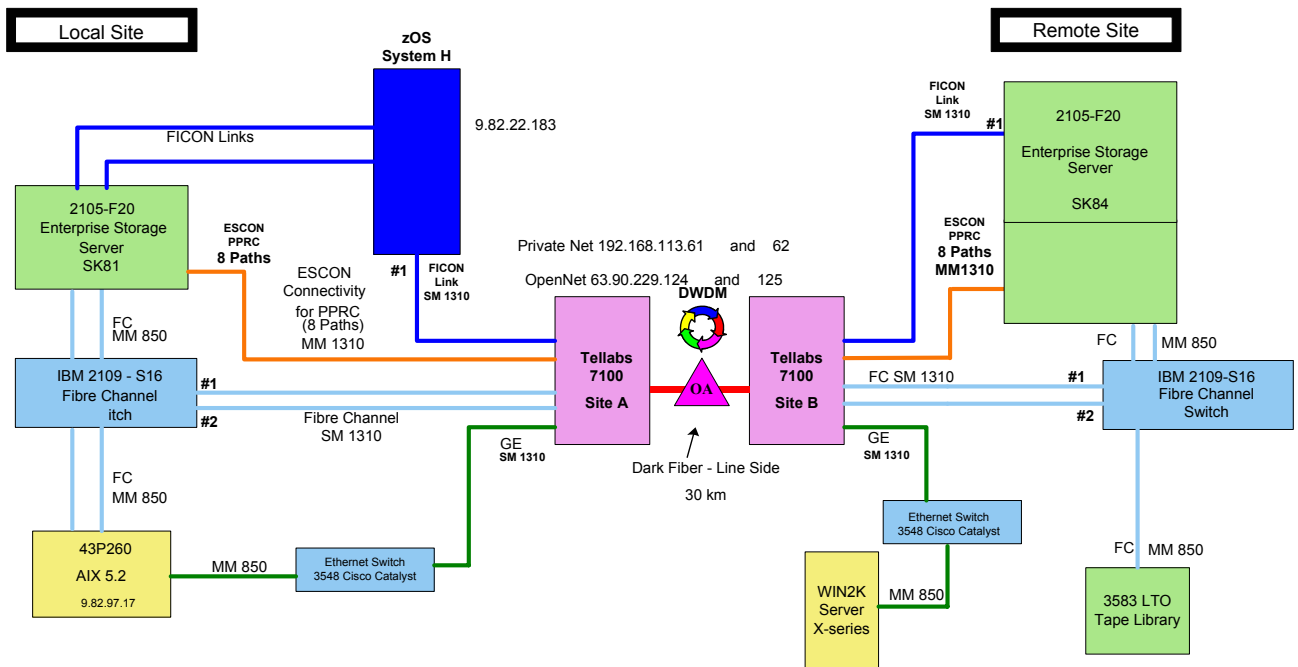
Testing scenario:

The Tellabs 7100 equipment can effectively and reliably play a major role in storage solutions contained within a Metropolitan Area Network (MAN) configuration that includes ESCON, FICON, Fibre Channel, and Ethernet activity. The Tellabs port side equipment used to verify these signal rates were the Rate Agile Multiplexer Modules (RAMM) and Multi-Rate Transponder Module (MRTM) used in the following configuration:

7100 Connectivity for IBM Certification				
Protocol	RAMM Module / Port	Transponder Module	Channel Mux	Amplification
GBE 1310 SM →	RAMM 1 / P1	MRTM 1	FCMM 1/ BMM	MIAM / OLIM
Ficon 1310 SM →	RAMM 1 / P2			
Fiber Channel 1310 SM →		MRTM 2		
Fiber Channel 1310 SM →		MRTM 3		
Escon 1310 MM →	RAMM 4 / P1	MRTM 4		
Escon 1310 MM →	RAMM 4 / P2			
Escon 1310 MM →	RAMM 4 / P3			
Escon 1310 MM →	RAMM 4 / P4			
Escon 1310 MM →	RAMM 4 / P5			
Escon 1310 MM →	RAMM 4 / P6			
Escon 1310 MM →	RAMM 4 / P7			
Escon 1310 MM →	RAMM 4 / P8			
NE Type = PT to PT OLT				
NE Version FP2.1.5 SP079				

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The test network environment diagram:



Legend:



Testing level achieved: **Comprehensive**

- Comprehensive: Comprehensive testing would include the standard testing in addition to a much higher level of integration and failure testing. In either case, these tests are customized for the specific product(s) being tested, and in consultation with the participant.
- The level is determined by IBM based on the test plan and results.

Testing Overview:

The traffic used to pass through the 7100 was generated from three common storage solutions: remote mirroring, remote tape backup and remote data access (video streaming).

- IBM's Peer to Peer Remote Copy (PPRC) service was used to mirror data between two IBM Enterprise Storage Servers. ESCON connections between the two ESS's were extended.
- Solutions were implemented for remote disk mirroring, remote disk access and remote tape backup and recovery.

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Test Configuration:

Hardware Details:

1. Server type(s) and quantity: z900 2084-108 (1)
2. Host Bus Adapter (HBA) vendor model(s): IBM FICON
 - a. Firmware level: EC J11206 Level 016
 - b. Driver level: z/OS V1R6.0
3. Server type(s) and quantity: RS/6000 43P260 (1)
4. Host Bus Adapter (HBA) vendor model(s): IBM 1Gb Fibre-channel Adapter, type 4-S, feature code 6227
 - a. Firmware level: v3.22A0
 - b. Driver level: AIX devices.pci.df1000f7.com v5.2.0.52 and devices.pci.df1000f7.rte v5.2.0.10
5. Network Interface Card (NIC) vendor: IBM
 - a. Model(s): Gigabit Ethernet-SX PCI Adapter, type 9-U, feature code 2969
 - b. Driver levels: AIX devices.pci.14100401.rte v5.2.0.40
6. Server type(s) and quantity: IBM Netfinity
7. Network Interface Card (NIC) vendor: IBM label, made by Intel
 - a. Model(s) – Netfinity Gigabit Ethernet SX Adapter
 - b. Driver levels: 8.0.57.0

Storage Product(s) Used:

1. IBM 2105-F20 (two)
2. Number of Drives: 16
3. Drive Type: 36GB 10K rpm
4. Microcode Level: 2.2.0.487
5. IBM 3583-L18 Ultrium (LTO-1) Tape Library
6. Number of Drives: 6
7. Drive Type: 100GB
8. Microcode Level: Library 3.30.0008 and drive 4561

Switch(es):

1. IBM (manufactured by Brocade) 2109 Fibre Channel Switch (two)
2. Version: Fabric OS v2.6.2b
3. Vendor: Cisco
4. Model Name and Number: Catalyst 3548
5. Version: Cisco IOS 12.0(5)WC3

DWDM Multiplexer:

1. Tellabs Operations 7100 Optical Transport System
2. Version: 2.1
3. Microcode Level: Feature Pack 2.1.5

IBM TotalStorage Proven™ program

Software Details:

1. Vendor: IBM zOS
2. Release level(s): V1R6.0
3. IBM AIX
4. Release level(s): 5.2
5. Software Vendor: Microsoft
6. Software Name: Windows 2000 Professional
7. Release level(s): SP4

Test results obtained:

The following date ranges were the key milestones in this testing effort.

Setup Activities

05/02/2005 - 05/06/2005

Test Execution

05/09/2005 - 05/27/2005

Reporting

05/31/2005 - 06/03/2005

The test scenarios for the successful qualification of the Tellabs 7100 equipment in a multi-site remote data center environment focused on three primary areas: functionality, recoverability, and performance. A combination of one or more workloads were executed during any of the test scenarios.

At the conclusion of a test scenario, logs and monitoring data were collected and reports were generated that support the qualification of the Tellabs 7100 OTS.

A. Functional and Performance Test Scenarios

The functional and performance test scenarios determined how the Tellabs 7100 equipment behaves under normal operating conditions. The functional and performance test scenarios include two elements:

1. Distance Test Scenarios
 - Tape Backup and Recovery
 - Peer to Peer Remote Copy
 - Remote Data Access
 - FICON - ESS Remote Data Access
2. Long Runtime Test Scenario

IBM TotalStorage Proven™ program

B. Recoverability Scenarios

The recoverability scenarios were created by pulling fiber connections to simulate data processing device failures. The purpose of the recoverability scenarios was to determine if the Tellabs 7100 equipment, in the event of a device failure condition, would continue to deliver traffic for all other extended paths in a multi-site remote data center configuration. We also wanted to verify that the Tellabs 7100 would support the successful restart of the data processing device when its connection was restored.

All recoverability scenarios were executed in the full test environment with one or more of the test workloads active.

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