

Nortel

Converged Data Network Solution with Ethernet Routing & Application Switch



Test Summary

Evaluation of Resilient Routing Switches for Real-Time Multimedia Traffic on Nortel Converged Data Solution Supporting Microsoft Office Communications Server 2007

Premise: *The convergence of voice, data and video services onto enterprise LAN demands that the underlying infrastructure delivers resiliency for servers. True multi-path resiliency and server-load balancing have become requisites to ensure the success of converged networks.*

Nortel commissioned The Tolly Group to evaluate a converged network infrastructure for enterprise users utilizing its Ethernet Routing Switch (ERS) 5500 and ERS 8600 series switches for their support of Nortel's Split Multi-Link Trunking (SMLT) and Routed SMLT (RSMLT) technologies.

Telephony and video services were built on the Microsoft Office Communications Server 2007 running in a resilient, multi-site network with each site consisting of multiple ERS 8600 units at the core, communicating with ERS 5500 and 8600 switches at the network edge. Users placed voice and video calls across the test network.

Tests attempted to show the Nortel Converged Data Solution with SMLT/RSMLT technology can support uninterrupted Microsoft Office Communications Server 2007 live communications either locally, or across the network.

Tests were conducted in February 2008.

Test Highlights

- ▶ Provides uninterrupted real-time videoconferencing with Microsoft OCS 2007 when active links fail at the core and within edge networks
- ▶ Maintains multimedia sessions in connection with Nortel's Application Switch in the event of a link outage connecting to a primary Microsoft OCS 2007
- ▶ Shows no signs of service degradation during conference calls that experience a link failure protected by Nortel's SMLT/RSMLT sub-second resiliency

Nortel Converged Data Solution

Impact of Network Failures on Videoconference Sessions Running on Microsoft Office Communications Server 2007

Link Failure	Videoconference Status
Link fail-over at the core network using RSMLT	Uninterrupted
Link fail-over at the edge network using SMLT	Uninterrupted
Link fail-over to the stand-by Microsoft Office Communications Server 2007	Uninterrupted

Source: The Tolly Group, March 2008

Figure 1

Executive Summary

Nortel's Converged Data Solution, consisting of ERS 5500, and 8600 switches and Nortel's Layer 4-7 application switches, ensure high availability and uninterrupted user experience with Microsoft Office Communications Server 2007 during a major fail-over due to Nortel's robust switch cluster at the core and at the network edge.

Enterprise-class networks deploying converged network services demand an "always on" infrastructure

with robust resiliency and high availability for uninterrupted multimedia services and mission-critical applications.

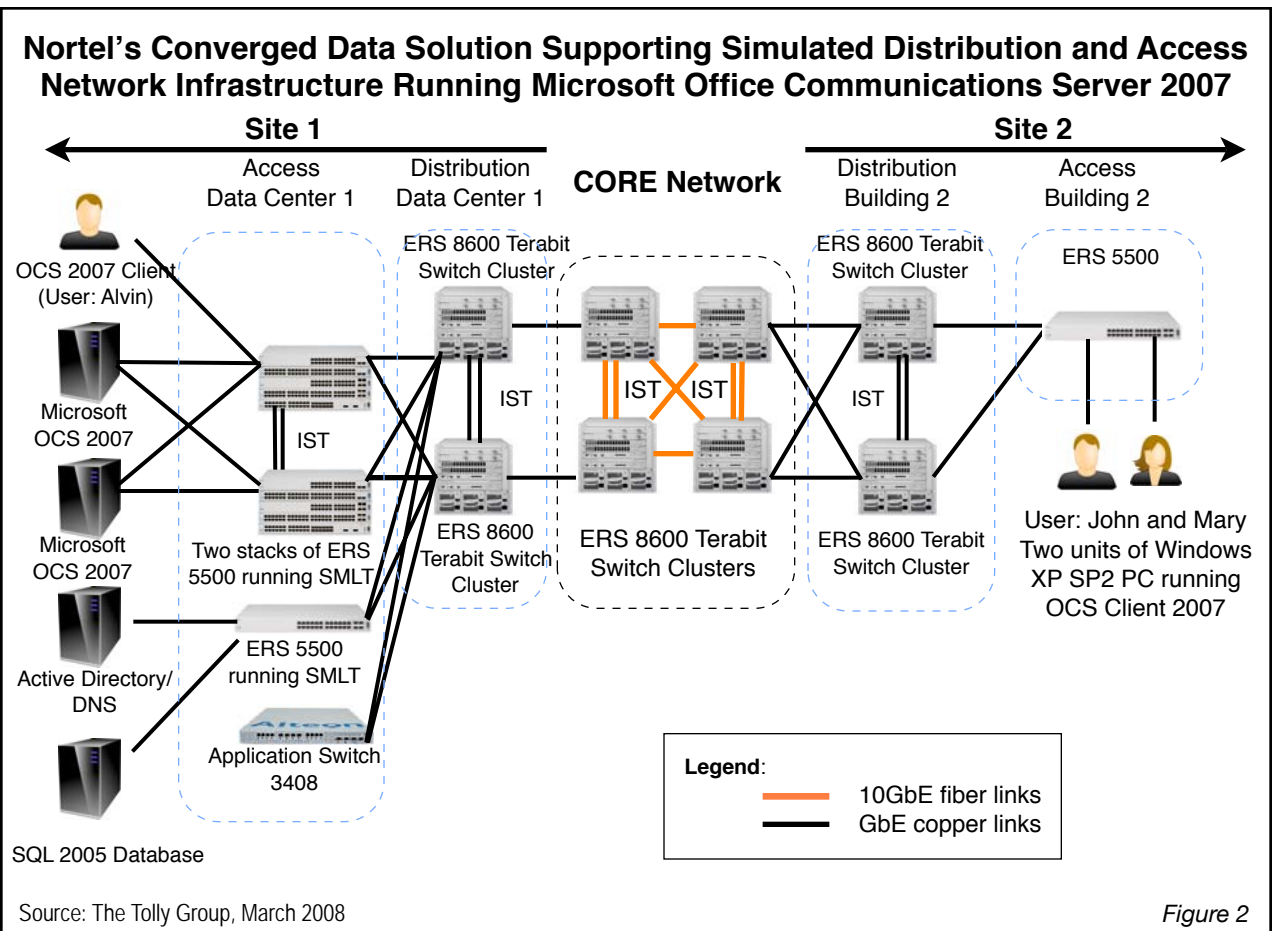
The Tolly Group's hands-on evaluation of Nortel's Converged Data Network Solution running SMLT/RSMLT is capable of providing uninterrupted voice and videoconference calls running on a Microsoft Office Communications Server 2007 (referred to as "OCS 2007" hereafter) in various failover scenarios.

Engineers repeatedly introduced failures (by unplugging cables) between ERS 8600 switches at the network edge and ERS 8600 switches in the network core running the RSMLT protocol. (See Figure 2.) Engineers also repeatedly failed (powered down) one of the core switches running an inter-switch trunk (IST) in the network core.

Together, with the Server Load Balancing Solution supplied by a Nortel Application Switch 3408, Nortel delivered uninterrupted multimedia service to Microsoft OCS 2007 when the link to the primary OCS 2007 was failed and switched over to a standby OCS 2007 server.

In fact, during a three-way videoconference call between three users on two sites, the conference call remained active even though engineers failed a primary connection between the OCS 2007 server and its locally attached ERS 5500. Instead, the standby ERS 5500, running SMLT software, transitioned the call as instructed by an Application Switch 3408 running load-balancing software.

This proves that Nortel's Converged Data Solution, along with Nortel's Layer 4-7 Application Switching Solution, provides an end-to-end resiliency



solution for enterprise networks.

TEST SETUP & METHODOLOGY

Tolly Group engineers tested a Nortel-based converged network using Nortel ERS 5500/8600 switches and Nortel Application Switch 3408 with Microsoft Office Communications Server 2007. Using the Nortel solution, engineers simulated two sites that had Distribution and Access Data Centers on each site where a simulated core network was sitting between the two sites, (See Figure 2).

Site 1 contained a Distribution Data Center with two ERS 8600 switches running an IST between them to form a terabit switch cluster that provides resiliency. An Access Data Center within Site 1 was made up of ERS 5500 Switch Cluster consisting of two stacks of ERS 5500 switches running IST; another ERS 5500; and one Application Switch 3408.

Site 2 was made up of an ERS 8600 Terabit Switch Cluster, a pair of ERS 8600s running IST in the Distribution Building; and one ERS 5500 in the Access Building.

Each site also had several user terminals like PCs with Web cameras and equipped with the appropriate client software, Microsoft OCS client 2007, which provided multimedia communication services.

Engineers tested three failure scenarios: 1) an active link failure on the OCS 2007 server, 2) an active link failure on the core cluster of ERS 8600 switches running RSMLT, and 3) an ERS 8600 switch, running SMLT, failure at one of the Site 1 Distribution Data Centers.

Before any of the tests started, engineers established a three-way videoconference call using a Microsoft OCS 2007 client across the network. After the three users successfully connected with continuous audio and video feeds, engineers started the tests. All tests were run three times and engineers observed the connections, video, and audio qualities.

SPLIT MULTI-LINK TRUNKING (SMLT)

Split Multi-Link Trunking (SMLT) is Nortel's proprietary protocol, which enables a resilient switch cluster. Engineers used SMLT technology on all the Nortel's core and edge switches in the test and showed uninterrupted voice and videoconference calls using OCS 2007 client and server.

ROUTED SPLIT MULTI-LINK TRUNKING (RSMLT)

At the simulated core network, engineers used Nortel's Routed Split Multi-Link Trunking (RSMLT) to enable full redundancy in the core network and allow rapid fail-over when handling interruption on the active link.

SERVER LOAD BALANCING (SLB)

At the Site 1 Distribution Data Center, engineers deployed a Nortel Application Switch (NAS) 3804 to ensure continuous connectivity between OCS 2007 servers and clients during the tests. Together, the Windows Sever 2003 Enterprise running Active Directory/DNS, and SQL 2005 Database formed an OCS 2007 pool. Clients registered at the OCS 2007 pool were directed to a specific OCS 2007 server within the pool created by the NAS. The NAS had two available virtual server IP (VIP) addresses for the clients (Alvin, John and Mary) and only one VIP per client was used.

Nortel

Nortel
Converged
Data Network
Solution



Network Resiliency in a
Simulated Enterprise Scenario
Running Microsoft OCS 2007

Product Specifications

Vendor-supplied information not necessarily verified by The Tolly Group

Nortel Converged Data Solution

Benefits:

- Resiliency**—Voice calls stay connected, applications remain enabled and streaming media continues to flow even under link, switch and/or site failures by using Nortel's switch clustering solution using Split Multi-Link Trunking and intelligent stacking technologies.
- Scalability**—IPv6, Multicast, high-density ports and software functionality future-proof your network today given tomorrow's requirements.
- Security**—Nortel provides a secure network with encrypted SSL and IPsec VPNs. A trusted network is enabled by IPFIX and the Service Delivery Module with Threat Protection System and Firewall. Nortel Secure Nortel Access is Nortel's Network Access Control solution designed to inspect, assess, ensure compliance to policy, and remediate at the network endpoint source prior to network access.
- Total Cost of Ownership (TCO)**—Nortel's converged solutions are designed to lower TCO by providing competitive reduced capital and operational expenditures.

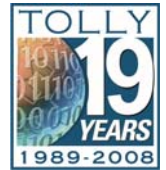
Resilient Switch Cluster:

- Resilient switch clustering using SMLT, Open Shortest Path First (OSPF) and Virtual Router Redundancy Protocol (VRRP) for medium core networking available in an Advanced Routing License
- Nortel Secure Network Access (NSNA) supported for building a secure converged network with host integrity

Nortel
195 The West Mall
Toronto, Ontario, CANADA
M9C 5K1
Phone: 1-800-4NORTEL
URL: www.nortel.com

Test Bed Equipment Summary	
Product Model	Software
Nortel Ethernet Routing Switch 5500	SW ver. 5.1.0
Nortel Ethernet Routing Switch 8600	SW ver. 4.1.5.4
Nortel Application Switch 3408	SW ver. 24.0
Microsoft Office Communications Server 2007	SW ver. 3.0.6362.0, running on Windows Server 2003 Enterprise Edition SP1
Microsoft Office Communications Server 2007 Client	SW ver. 2.0.6362.0, running on Windows XP SP2
Microsoft SQL Server 2005	SW ver. 2005.90.2047
Web-cam - Creative VF-0040	SW ver. 1.0.8.416

The Tolly Group is a leading global provider of third-party validation services for vendors of IT products, components and services.



The company is based in Boca Raton, FL and can be reached by phone at (561) 391-5610, or via the Internet at:
 Web: <http://www.tolly.com>,
 E-mail: sales@tolly.com

Source: The Tolly Group, March 2008

Figure 3

Terms of Usage

USE THIS DOCUMENT ONLY IF YOU AGREE TO THE TERMS LISTED HEREIN.

This document is provided, free-of-charge, to help you understand whether a given product, technology or service merits additional investigation for your particular needs. Any decision to purchase must be based on your own assessment of suitability.

This evaluation was focused on illustrating specific features and/or performance of the product(s) and was conducted under controlled, laboratory conditions and certain tests may have been tailored to reflect performance under ideal conditions; performance may vary under real-world conditions. Users should run tests based on their own real-world scenarios to validate performance for their own networks. Commercially reasonable efforts were made to ensure the accuracy of the data contained herein but errors and/or oversights can occur. In no event shall The Tolly Group be liable for damages of any kind including direct, indirect, special, incidental and consequential damages which may result from the use of information contained in this document

The test/audit documented herein may also rely on various test tools the accuracy of which is beyond our control. Furthermore, the document relies on certain representations by the sponsor that are beyond our control to verify. Among these is that the software/hardware tested is production or production track and is, or will be, available in equivalent or better form to commercial customers.

When foreign translations exist, the English document is considered authoritative. To assure accuracy, only use documents downloaded directly from The Tolly Group's Web site.

All trademarks are the property of their respective owners.