



## Product Brief

### Nortel Ethernet Routing Switch 1600

#### Ethernet Routing Switch 1600 benefits

- > Core switch functionality in a small form factor
- > Switch Clustering utilizing Split Multi-Link Trunking
- > Multi-cast for streaming applications
- > Security for trusted communications
- > Wire-speed Quality of Service for converged networks
  - VoIP
  - Applications

As competition grows for customers in the marketplace, enterprises are relying on technology to help them differentiate their business. Many of the applications used to provide services and increase productivity require reliable, secure communications. Network resiliency, security of data and application-driven performance are the mainstays of a network built to provide services.

Aggregating network traffic from wiring closets and servers provides increased network performance and aids in troubleshooting. By aggregating wiring closet traffic into a hardware-based routing switch, inter-network traffic can be routed at wire speed, ensuring application response times, required by bandwidth-sensitive applications, are met. Additionally, fewer high-speed router ports are required since high-speed wiring closet links are consolidated before connecting to the WAN router. Troubleshooting is made easier by providing clear distinctions for traffic segmentation.

The Ethernet Routing Switch 1600 is a high-performance fixed port Layer 3 solution that provides the resiliency, performance and security required by today's application and competition-driven enterprise networks. Delivering application performance with proven reliability allows businesses to differen-

tiate themselves with tools for everything from customer service to productivity or collaboration. Resiliency delivers maximum availability critical for bandwidth-sensitive and revenue-generating applications. Application performance decreases the chance that data will be dropped when traffic load increases on the switch. Security features provide added protection for switch configuration data, while packet filtering helps secure and segment sensitive traffic or network access.

The Ethernet Routing Switch 1600 is available in three models:

- Ethernet Routing Switch 1648T with 48 10/100 ports plus 4 connections for small form pluggable (SFP) GBICs
- Ethernet Routing Switch 1612G with connections for 12 SFP GBICs
- Ethernet Routing Switch 1624G with connections for 24 SFP GBICs

The Ethernet Routing Switch 1600 series provides a unique fixed port routing switch solution designed to provide the resiliency, performance and security required by today's application-driven networks.



Nortel Ethernet Routing Switch 1600

## Resiliency

The Ethernet Routing Switch 1600 provides increased reliability for small network cores. Dual redundant power supplies ensure maximum availability of networking hardware. Support for Split Multi-Link Trunking (SMLT) and Link Aggregation (802.3ad static compliant) provides redundant load sharing connections to one or more desktop switches. Resiliency is addressed at multiple layers ensuring the highest availability of resources and the lowest network downtime.

## Split Multi-Link Trunking (SMLT) and Link Aggregation

Link Aggregation support allows up to four ports to be grouped as a single trunk, providing increased bandwidth and resilient connections. Combined with Nortel's unique SMLT technology, switches can be dual homed or have multiple active connections to a network core. By utilizing these dual connections and bypassing traditional solutions like Spanning Tree Protocol, customers can increase available bandwidth and decrease network downtime with a simple keystroke. Customers can now increase reliability and performance without restructuring the network.

## Convergence-based performance

Application performance minimizes packet delay and jitter when the traffic load increases on the switch. Wire-speed routing and Quality of Service (QoS) mechanisms deliver the performance required for applications such as IP Telephony, as well as multimedia and collaboration applications. A non-blocking switch fabric, together with hardware-based routing, decreases the chance that data will be dropped when the traffic load increases on the switch. The policing and shaping features permit traffic flows to be controlled based on applications needs. With support for 48 10/100 ports (Ethernet

Routing Switch 1648T) or up to 24 SFP GBIC ports (Ethernet Routing Switch 1624G), application performance can be delivered anywhere in the network.

## QoS

Being able to classify, process and expedite traffic based on an application's requirements is more important than ever. QoS and the ability to prioritize traffic are what enable a switch to support bandwidth-sensitive applications. By assigning QoS levels to traffic flows, applications can get the bandwidth and network priority demanded by specific applications. Four priority queues are the basis for QoS in the Ethernet Routing Switch 1600. Combined with wire-speed routing and filtering, the Ethernet Routing Switch 1600's QoS features enable application-based solutions to be implemented when and where you need them most.

## Routing performance

Wire-speed routing and a non-blocking switch fabric provide the basis for a network designed to increase collaboration and productivity. IP Telephony, Customer Relationship Management (CRM) and collaboration applications promise great increases in employee productivity.

However, these applications have stringent requirements on the network. The Ethernet Routing Switch 1600 is designed to be able to route, filter and queue traffic so that no data is lost, dropped or delayed. Applications get the bandwidth they need, when they need it, without delay or jitter.

## Security

Security features provide added protection for switch configuration data, while packet filtering helps secure and segment sensitive traffic or network access. Support for Simple Network Management Protocol (SNMPv3) and Secure Shell (SSHv2) supply protection for

sensitive switch configuration data. Multi-level access and defined access policies help secure the switch against unauthorized management access. Packet filtering provides an additional means to segment and secure sensitive traffic or network access. Support for RADIUS and TACACS+ gives customers the freedom to use current security databases.

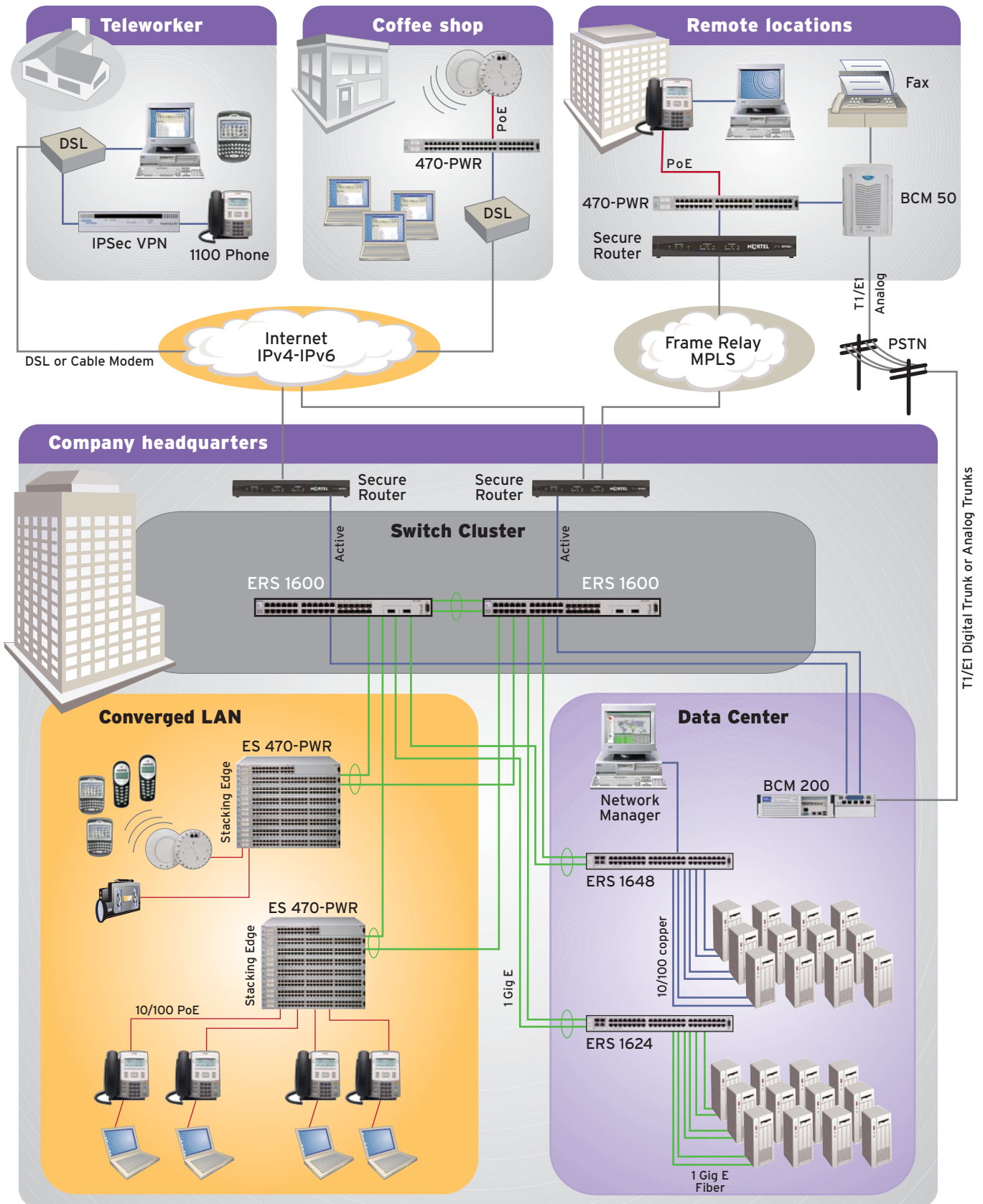
## Simple network management

Protocol and Secure Shell Altering device configurations or eavesdropping on configuration command sessions represents real security concerns. Switch configuration information and its integrity are critical to maintaining a mission-critical network. The Ethernet Routing Switch 1600 supports SNMPv3 and SSHv2 for controlling switch configuration information. SNMPv3 provides services for sending and receiving messages, authenticating and encrypting messages, and controlling access to managed objects. SSH specifies the way to conduct secure communications over a network. Together, these protocols help ensure that access to critical network resources, like the Ethernet Routing Switch 1600, is maintained.

## Summary

As competition in the marketplace intensifies, there will be more pressure for networks to support additional applications and the ability for a network to adapt and perform will become more critical. Core network routing represents an area where technology will be asked to deliver much in the way of performance and resiliency. The Ethernet Routing Switch 1600 Routing Switch meets these challenges head-on by combining resiliency, performance and security into a high-performance 1U high solution. With this addition to the Ethernet Routing Switch LAN portfolio, Nortel continues its position as a complete "end-to-end" enterprise solution company.

Figure 1. Nortel Ethernet Routing Switch 1600 Network diagram



## Technical specifications

### Interfaces

- 48 10/100 Mbps Ethernet ports + SFP GBICs
- 12 1000 Mbps Ethernet SFP GBICs
- 24 1000 Mbps Ethernet SFP GBICs

### Performance specifications

- 1648T Non-blocking Switch Fabric of 24 Gbps providing 13 Mpps
- 1612G Non-blocking Switch Fabric of 24 Gbps providing 18 Mpps
- 1624G Non-blocking Switch Fabric of 48 Gbps providing 36 Mpps
- Frame length: Up to 1,522 bytes
- Multi-Link Trunks: Up to 7 trunks with 4 ports per trunk
- VLANs: Up to 2,047 port- or protocol-based; per VLAN Tagging option
- Multiple spanning tree groups: Up to 64 (STGs)

### Network protocol and standards compatibility

#### IEEE

- IEEE 802.1d MAC Bridges and Spanning Tree Protocol
- IEEE 802.1p Prioritizing
- IEEE 802.1Q VLAN Tagging
- IEEE 802.1s Multiple Spanning Tree Groups (MSTP)
- IEEE 802.1w Rapid Spanning Tree (RSTP)
- IEEE 802.1x Extended Authentication Protocol (EAP)
- IEEE 802.3 CSMA/CD Ethernet (ISO/IEC 8802, 8802-3)
- IEEE 802.3ab Gigabit Ethernet 1000BaseT 4 pair Cat5 UTP
- IEEE 802.3i 10BaseT (ISO/IEC 8802-3)
- IEEE 802.3u 100BaseT (ISO/IEC 8802-3)
- IEEE 802.3x Flow Control on Gigabit Uplink port
- IEEE 802.3z Gigabit Ethernet 1000BaseSX and LX

#### IETF RFCs

##### Basic RFC support

- draft-ietf-idmr-dvmrp-v3-10 DVMRPv3
- RFC 768 Unreliable Data gram Protocol (UDP)
- RFC 783 Trivial File Transfer Protocol (TFTP)
- RFC 791 Internet Protocol (IP)
- RFC 792 Internet Control Message Protocol (ICMP)

- RFC 793 TCP protocol
- RFC 826 Address Resolution Protocol (ARP)
- RFC 854 Telnet
- RFC 1519 Classless Inter-domain Routing (CIDR)
- RFC 1591 Domain Name Server (DNS) Client
- RFC 1812 Router Requirements
- RFC 1866 Hypertext Markup Language - v2.0
- RFC 2068 Hyper Text Transfer Protocol

##### IPv4 Layer 3 / Layer 4 intelligence

- RFC 951 / 1542 BootP / DHCP
- RFC 1058 RIPv1
- RFC 1583 OSPFv2
- RFC 1723 RIPv2
- RFC 1724 RIPv2 MIB
- RFC 1850 OSPFv2 MIB
- RFC 2131 BootP / DHCP
- RFC 2178 OSPF MD5 cryptographic authentication
- RFC 1123 IGMPv1 for snooping
- RFC 2236 IGMPv2 for snooping
- RFC 2328 OSPFv2 Protocol
- RFC 2338 VRRP
- RFC 2453 RIPv2 protocol
- RFC 2474 / 2475 DiffServ
- RFC 2597 / 2598 DiffServ per Hop Behavior
- RFC 2850 OSPF MIB

##### IPv4 Multicast

- RFC 1112 IGMPv1 for snooping
- RFC 2236 IGMPv2 for snooping
- RFC 2362 PIM-SM

##### Network management

- RFC 1157 SNMP
- RFC 1271 / RFC 1757 RMON
- RFC 2138 RADIUS Authentication
- RFC 2139 RADIUS Accounting
- RFC 2570 SNMPv3
- RFC 2571 SNMP Framework
- RFC 2572 SNMP Messaging Protocol
- RFC 2573 SNMPv3 Applications
- RFC 2574 SNMPv3 USM
- RFC 2575 SNMPv3 VACM
- RFC 2576 Co-existence of SNMP v1 / v2 / v3
- RFC 2665 Ethernet MIB
- RFC 2737 Entity MIBv2
- RFC 2819 RMON MIB
- RFC 2863 Interface Group MIB

## Physical specifications

- Weight:
  - Ethernet Routing Switch 1648T – 12 lbs
  - Ethernet Routing Switch 1624G – 13.4 lbs
  - Ethernet Routing Switch 1612G – 11 lbs
- Height: 1.73 in (44 mm)
- Width: 17.3 in (441 mm)
- Depth: 26.9 in (68.5 mm)
- Cooling system: Fans – 3

## Safety agency approvals

- CSA 22.2, #60950 Canadian Certification
- EN 60950 European Certification
- IEC 60950 International CB Certification
- NOM Mexican Certification
- UL 60950 US certification

## Environmental specifications

- Operating temperature: 0°C to 40°C (32°F to 104°F)
- Storage temperature: -25°C to 55°C (-13°F to 158°F)
- Operating humidity: 85% maximum relative humidity, noncondensing
- Storage humidity: 95% maximum relative humidity, noncondensing
- Operating altitude: 3,024 m (10,000 ft) maximum
- Storage altitude: 3,024 m (10,000 ft) maximum
- Free fall/drop: NISTA 1A, IEC 68-2-32 Ed, FCC Part 68 D 302 (1)
- Vibration: NEBS, TR-NWT-000063, GR-63
- Shock/bump: IEC 68-2-27 Ea

## Electromagnetic emissions summary

### Meets the following standards:

- Global: CISPR22, Class A/CISPR24
- US: FCC CFR47, Part 15, Subpart B, Class A
- Australia/New Zealand: AN/NZS 3548: 1995, Class A
- Canada: ICES-003, Issue 2, Class A
- Europe: EN55022, Class A/EN55024
- Japan: VCCI - v3/97.04, Class A
- Korea: MIC, No. 2001-116
- Taiwan: CNS 13138, Class A
- Electromagnetic immunity: Meets the EN 55 022 "B", EN6100-3-2 standard



## Ordering Information

### Switches

Order code	Description
DJ1412x02	Ethernet Routing Switch 1648T with 48 10/100TX ports and 4 SFP GBIC slots. Dual AC power supply.
DJ1412x03	Ethernet Routing Switch 1612G with 12 SFP GBIC slots. Dual AC power supply (No power cord included).
DJ1412x04	Ethernet Routing Switch 1624G with 24 SFP GBIC slots. Dual AC power supply (No power cord included).

### SFP GBICs

Order code	Description
AA1419013	1-port 1000BASE-SX SFP GBIC (LC connector)
AA1419014	1-port 1000BASE-SX SFP GBIC (MT-RJ connector)
AA1419015	1-port 1000BASE-LX SFP GBIC (LC connector)
AA1419043	1-port 1000BASE-T SFP 8-pin modular connector (RJ-45)
AA1419025	1-port 1000BASE-CWDM SFP GBIC - 1470nm Wavelength (40km), LC connector
AA1419026	1-port 1000BASE-CWDM SFP GBIC - 1490nm Wavelength (40km), LC connector
AA1419027	1-port 1000BASE-CWDM SFP GBIC - 1510nm Wavelength (40km), LC connector
AA1419028	1-port 1000BASE-CWDM SFP GBIC - 1530nm Wavelength (40km), LC connector
AA1419029	1-port 1000BASE-CWDM SFP GBIC - 1550nm Wavelength (40km), LC connector
AA1419030	1-port 1000BASE-CWDM SFP GBIC - 1570nm Wavelength (40km), LC connector
AA1419031	1-port 1000BASE-CWDM SFP GBIC - 1590nm Wavelength (40km), LC connector
AA1419032	1-port 1000BASE-CWDM SFP GBIC - 1610nm Wavelength (40km), LC connector
AA1419033	1-port 1000BASE-CWDM SFP GBIC - 1470nm Wavelength (70km), LC connector
AA1419034	1-port 1000BASE-CWDM SFP GBIC - 1490nm Wavelength (70km), LC connector
AA1419035	1-port 1000BASE-CWDM SFP GBIC - 1510nm Wavelength (70km), LC connector
AA1419036	1-port 1000BASE-CWDM SFP GBIC - 1530nm Wavelength (70km), LC connector
AA1419037	1-port 1000BASE-CWDM SFP GBIC - 1550nm Wavelength (70km), LC connector
AA1419038	1-port 1000BASE-CWDM SFP GBIC - 1570nm Wavelength (70km), LC connector
AA1419039	1-port 1000BASE-CWDM SFP GBIC - 1590nm Wavelength (70km), LC connector
AA1419040	1-port 1000BASE-CWDM SFP GBIC - 1610nm Wavelength (70km), LC connector

\* The seventh character (?) of the switch order number must be replaced with the proper code to indicate desired product nationalization:

"A" - No power cord included

"B" - Includes European "Schuko" power cord common in Austria, Belgium, Finland, France, Germany, The Netherlands, Norway, and Sweden

"C" - Includes power cord commonly used in the United Kingdom and Ireland

"D" - Includes power cord commonly used in Japan

"E" - Includes North American power cord

"F" - Includes Australian power cord, also commonly used in New Zealand and the People's Republic of China

E5 suffix will be added in 2006 to indicate EUED WEEE and RoHS 5/6 Compliance

**In the United States:**

Nortel  
35 Davis Drive  
Research Triangle Park, NC 27709 USA

**In Canada:**

Nortel  
8200 Dixie Road, Suite 100  
Brampton, Ontario L6T 5P6 Canada

**In Caribbean and Latin America:**

Nortel  
1500 Concorde Terrace  
Sunrise, FL 33323 USA

**In Europe:**

Nortel  
Maidenhead Office Park, Westacott Way  
Maidenhead Berkshire SL6 3QH UK  
Phone: 00800 8008 9009 or  
+44 (0) 870-907-9009

**In Asia Pacific:**

Nortel  
Nortel Networks Centre  
1 Innovation Drive  
Macquarie University Research Park  
Macquarie Park NSW 2109 Australia  
Tel: +61 2 8870 5000

**In Greater China:**

Nortel  
Sun Dong An Plaza  
138 Wang Fu Jing Street  
Beijing 100006, China  
Phone: (86) 10 6510 8000

Nortel is a recognized leader in delivering communications capabilities that enhance the human experience, ignite and power global commerce, and secure and protect the world's most critical information. Our next-generation technologies, for both service providers and enterprises, span access and core networks, support multimedia and business-critical applications, and help eliminate today's barriers to efficiency, speed and performance by simplifying networks and connecting people with information. Nortel does business in more than 150 countries. For more information, visit Nortel on the Web at [www.nortel.com](http://www.nortel.com).

For more information, contact your Nortel representative, or call 1-800-4 NORTEL or 1-800-466-7835 from anywhere in North America.

Nortel, the Nortel logo and the Globemark are trademarks of Nortel Networks. All other trademarks are the property of their owners.

Copyright © 2006 Nortel Networks. All rights reserved. Information in this document is subject to change without notice. Nortel assumes no responsibility for any errors that may appear in this document.

