



Product Information

Nortel Secure Routers 1004 and 3120 deliver impressive VoIP throughput results

Branch Office Nortel Secure Router VoIP performance evaluation

Test highlights

- Effective transport and prioritization of VoIP, even in congested/oversubscribed networks
- Toll-quality voice demonstrated by high MOS scores, regardless of load or enabled services
- WAN bandwidth is fully utilized (with mixed voice and data traffic) even when filtering, encryption and firewalls are enabled

Nortel Secure Routers combine robust IP routing, flexible WAN connectivity and security in a single, cost-effective device. Ideal for enterprise branch, remote or regional site environments, Nortel Secure Routers deliver the low-latency, high-packet throughput required by IP telephony and multi-media applications.

In October 2006, Nortel put its Secure Routers 1004 and 3120 to the test to prove that these offerings deliver superior performance and Voice over IP (VoIP) quality of service, regardless of the level of traffic on the network or the IP services enabled.

Nortel conducted a series of tests using an Ixia Traffic Generator running Chariot — the industry’s leading test tool for emulating real-world applications to predict device and system performance under realistic load conditions.

Results showed, unequivocally, that the Secure Routers effectively transport and prioritize VoIP traffic in congested and oversubscribed network environments, and deliver business-quality voice to users. These results, measured by Mean Opinion Scores (MOS), were consistently high in all test scenarios, even when traffic loads were increased and complex IP services such as Access Control Lists (ACL) and firewalls were added to the test mix.

Note: The MOS or Mean Opinion Score is a measurement of the quality of human speech at the destination end of the circuit. MOS is expressed as a single number in the range of 1.0 (lowest perceived quality) to 5.0 (highest perceived quality). Scores over 4.0 indicate “toll-quality”.

Tests yielded consistently high MOS in the area of 4.4 (i.e., toll-quality voice), regardless of traffic load or services enabled.



Test configuration

Within a sophisticated lab environment, a Nortel Secure Router 1004 and a Secure Router 3120 were configured to simulate a typical branch office connection. The routers were connected via dual-T1 cross-over cables and configured as a Multi-Link-PPP WAN bundle. One Ethernet port from each Secure Router was connected to an Ethernet Switch. All Ethernet connections were fixed at 100 Mbps/Full-Duplex.

Quality of Service (QoS) was configured on the WAN link to prioritize voice traffic. Various levels of simulated voice and data traffic were transmitted through the test network, and results recorded. In subsequent scenarios, additional services — including filters, encryption and firewall — were added to the connection.

Figure 1. Nortel Secure Router 1004 and Secure Router 3120 test network setup

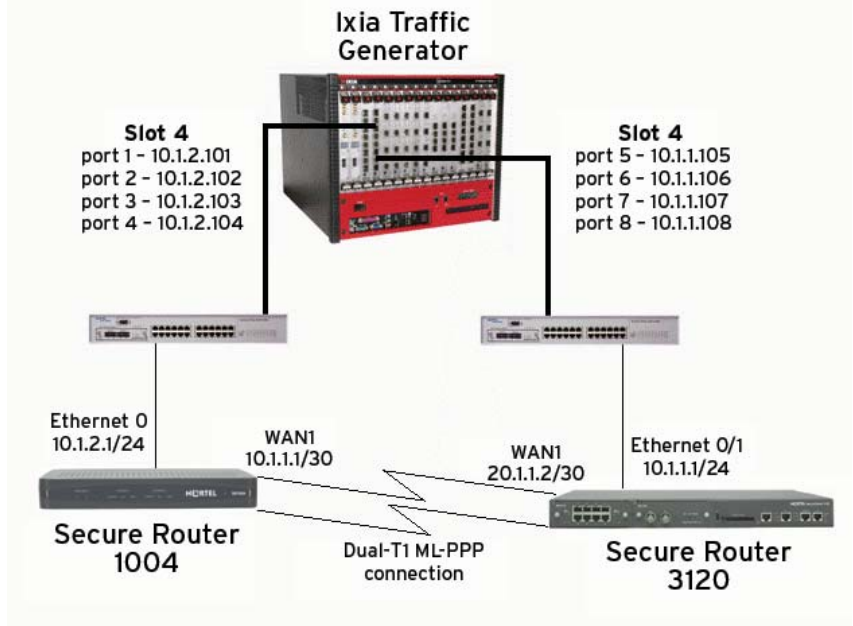
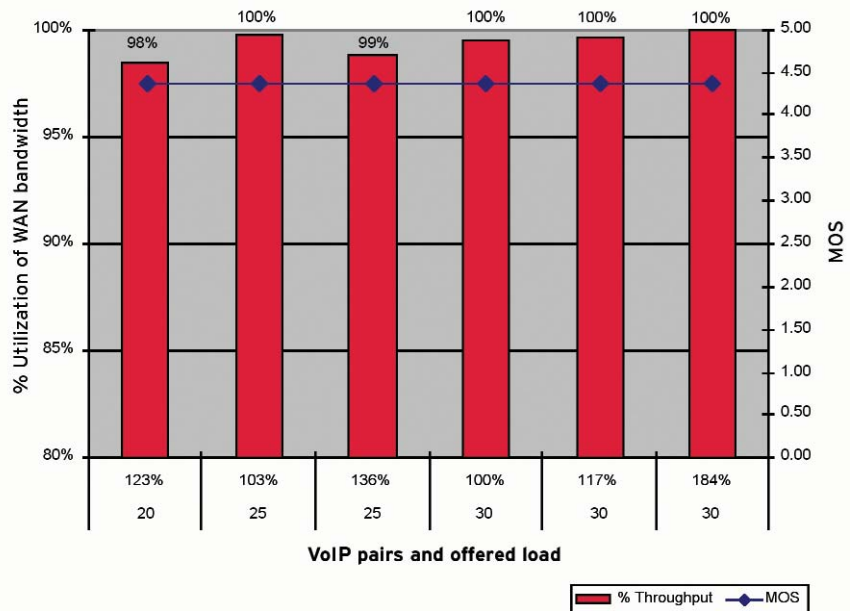


Figure 2. Baseline test (no services) with WAN/data oversubscription



Establishing a solid baseline

To set a baseline for testing, a mix of VoIP and data traffic was transmitted over the WAN link between Secure Routers — without any services enabled. VoIP traffic consisted of a range of 20, 25 or 30 simulated VoIP calls (or pairs), along with varying data traffic loads. In all cases, QoS was enabled on the Secure Routers to ensure that higher-priority VoIP traffic was transmitted ahead of lower-priority data traffic.

In all cases, MOS scores in the 4.4 range were achieved for all VoIP calls. Figure 2 shows representative test results for an oversubscribed WAN link where traffic was varied from 100 to 184 percent of total WAN bandwidth. Despite the load, MOS scores in the 4.4 range were achieved, along with WAN utilization at 98 to 100 percent of WAN bandwidth.

Nortel Secure Router 3120 –
 A modular system that converges routing, security and multimedia traffic forwarding in a single, cost-effective platform. Delivering fast, secure, reliable and scalable wide area network (WAN) access, this powerful router is perfect for enterprises requiring high-speed IP or Internet access.

Nortel Secure Router 1004 –
 A scalable router that provides high-performance WAN access for enterprise branch offices and remote sites. The versatile Secure Router 1004 platform offers a single T1 or E1 port, plus the ability to upgrade to four-port (T1/E1) capacity.

These baseline results demonstrate the Secure Router’s ability to forward VoIP traffic regardless of data traffic load — while maintaining toll-quality voice as demonstrated by consistent 4.4 MOS scores.

Enabling interface filters

During the next test phase, the Secure Router’s Access Control List (ACL) service was configured to observe the effect on VoIP quality when other router services are turned up. Two access lists were defined on the WAN bundle of each system — one for inbound traffic, the other for outbound traffic. Each access list consisted of nine ‘deny’ rules that blocked traffic between two subnets. The tenth rule in the access list was a ‘permit’ between the two subnets used for voice and data traffic. This forced all traffic to be evaluated by all rules before being forwarded through the routers. Voice and data traffic was passed through the network, as was done for the Baseline testing.

Results (see Figure 3) were identical to the baseline testing. That is, MOS scores remained in the 4.4 range, even when the WAN link was oversubscribed. Consistently high percentage WAN utilization rates were also maintained.

Adding a VPN tunnel and stateful firewall

In the final test case, a VPN tunnel was defined between the Secure Router 1004 and the Secure Router 3120 over the WAN connection using encryption that was set to 3DES-MD5. Firewall rules were further added to the VPN configuration. The Secure Router was configured with 52, 202 and 1002 firewall policies respectively, and VoIP and data traffic was sent through the network.

Figure 3. ACL throughput with oversaturated WAN link

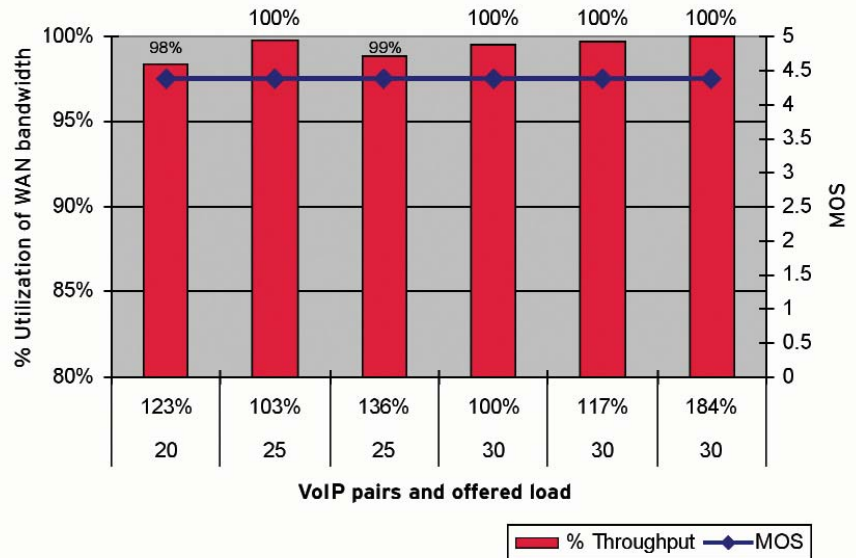


Figure 4. Encrypted throughput vs. number of firewall policies

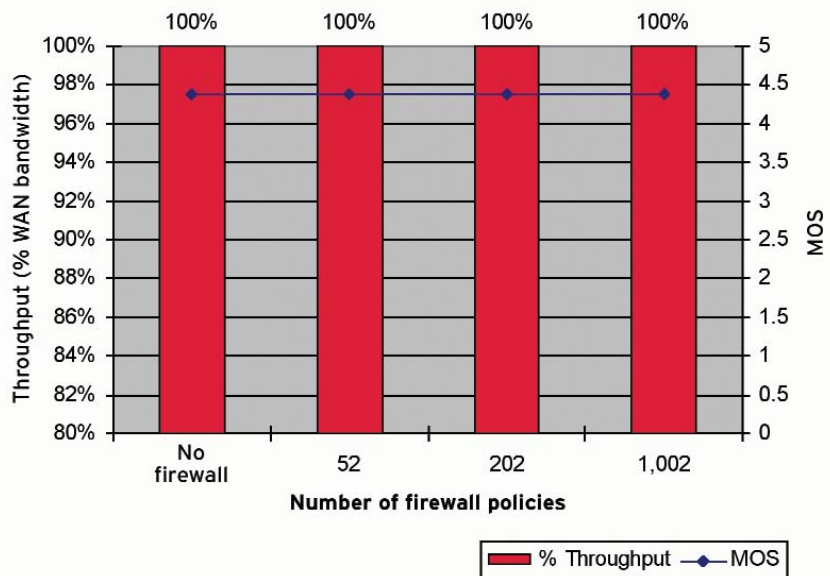


Figure 4 shows throughput for the test case of 20 simulated VoIP calls with data overhead of 3,072 kbps (WAN link is oversubscribed to 189 percent) while varying the number of policies in the firewall. Again, no degradation of the voice occurred and the WAN link was fully utilized.

Summary

Regardless of the amount of traffic or services applied, Nortel Secure Routers were able to successfully prioritize and forward IP voice traffic, and pass some or all of the data traffic — resulting in a fully-utilized WAN circuit. When additional complex IP services were added to the link, the routers’ sophisticated QoS mechanisms ensured that there was no degradation of VoIP quality or in the handling of traffic.

Product specifications

Nortel Secure Router 3120

- Two-slot modular 1u chassis with two 10/100 Ethernet ports, compact flash, USB, console and AUX ports
- Module options:
 - Four- and eight-port T1/E1 cards
 - Channelized DS3 and Clearchannel/fractionalized DS3 cards
 - Two- and four-port serial cards
- On-board VPN encryption chip
- Wire-speed performance with services enabled

Nortel Secure Router 1004

- Half rack-width 1u chassis with two 10/100 Ethernet ports, 256MB RAM, console and AUX ports
- 4T1/E1 ports; T1/E1 ports can be remotely enabled via software license key
- On-board VPN acceleration chip
- Wire-speed performance with services enabled

Secure Router advanced software features

- Full-featured routing (RIP, OSPF, BGP4, PIM-SM/SSM)
- Sophisticated multi-class QoS, DiffServ
- Frame Relay and PPP wide area networking, including multi-link services
- Stateful firewall and IPsec VPN (3DES/AES) security
- Industry-standard CLI and intuitive GUI for ease of management

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