

Tasman Networks, Inc.

Tasman 1004 Router versus Cisco Systems, Inc. 1720, 1751, 2691 and 3725 Routers

Competitive Performance Evaluation

Test Summary

Premise: Customers who deploy enterprise-class access routers have come to expect line-rate throughput and non-blocking architectures as the norm. Customers need to be confident that the access routers they deploy can, in fact, deliver wire-speed, zero-loss throughput for multi-link configurations over multiple aggregated T1 connections.

Tasman Networks, Inc. commissioned The Tolly Group to evaluate its Tasman 1004 router, a four port T1-based router for small and medium businesses that gives multiple users access to the Internet or to wide area networks (WANs) over reliable broadband T1 lines. Tasman Networks also requested that The Tolly Group compare the performance of the Tasman 1004 to four Cisco routers, the 1720, 1751, 2691 and 3725. The Tolly Group conducted tests to determine each device's steady-state, zero-loss ($\leq 0.001\%$) bi-directional throughput when transmitting data across multiple T1 connections handling a variety of Ethernet frames sizes with 100 sessions running and Quality of Service (QoS), Network Address Translation (NAT), Open Shortest Path First (OSPF) and Access Control Lists (ACL) services enabled across two and across four multi-linked PPP, aggregated T1 connections. Testing was performed in January 2003.

Test results show that the Tasman 1004 forwarded 100% of line rate in all scenarios tested for the complete range of packet sizes. In contrast, while the Cisco devices were capable of wire speed in some scenarios, they faltered when handling a range of smaller-sized packets.

RESULTS

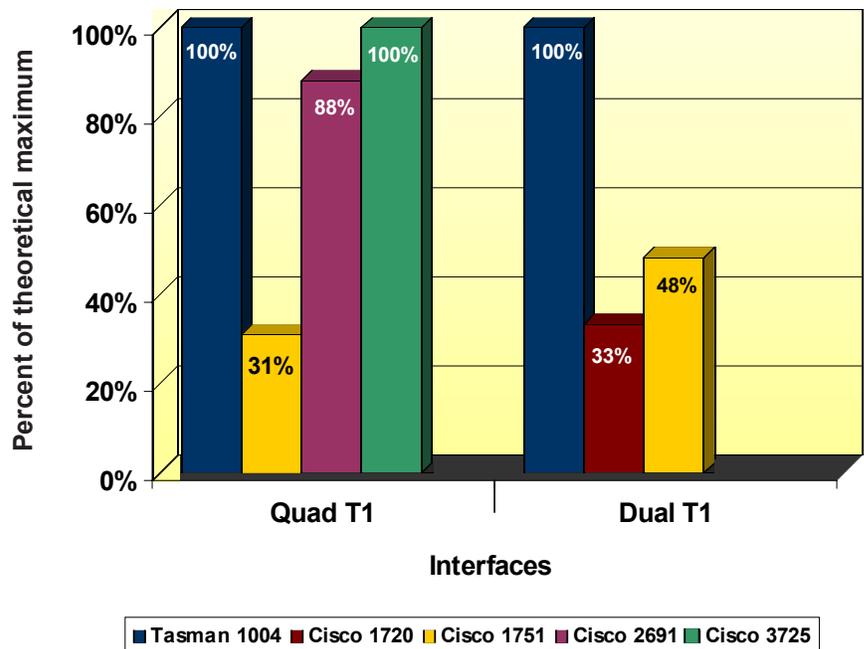
ZERO-LOSS THROUGHPUT ACROSS FOUR AGGREGATED T1 LINKS

The Tolly Group tested the Tasman 1004 and the Cisco 1751, 2691 and 3725 to determine

Test Highlights

- Achieves 100% zero-loss throughput in multi-link configurations of dual and quad T1 interfaces for all packet sizes tested with QoS, NAT, OSPF and ACLs enabled
- Provides up to 3X the throughput of the Cisco offerings in tests of 64-byte packets in all scenarios tested
- Delivers line-rate bi-directional (full-duplex) throughput of 12 Mbps and 6 Mbps across four and two aggregated multi-link PPP T1 links, respectively

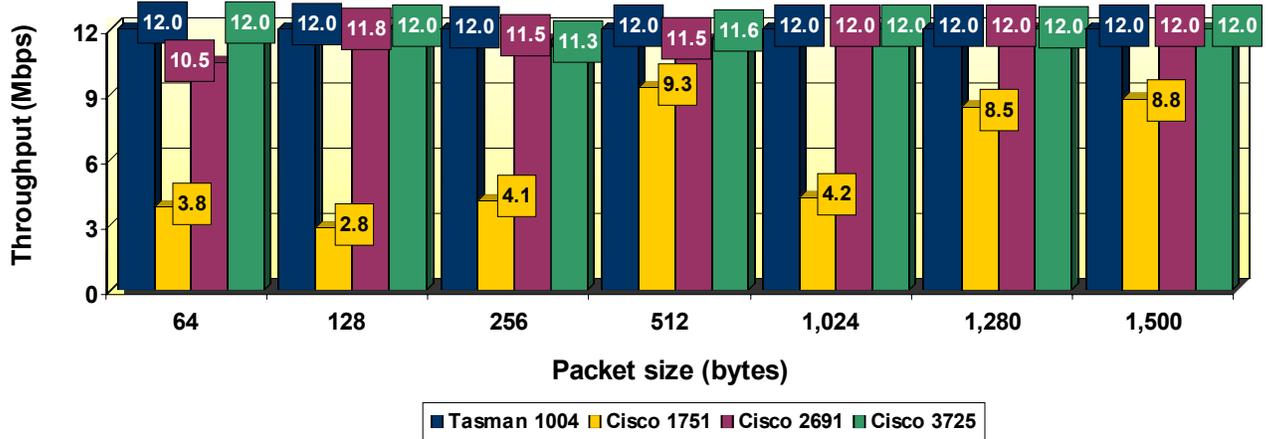
Zero-Loss ($\leq 0.001\%$) Bi-directional Throughput using 64-byte Packets via Multi-Link PPP 100 Sessions, 25 ACLs, NAT and QoS Enabled as reported by SmartFlow



Source: The Tolly Group, January 2003

Figure 1

Zero-Loss ($\leq 0.001\%$) Bi-directional Throughput via Multi-Link PPP across four T-1 Interfaces with 100 Sessions, 25 ACLs, NAT and QoS Enabled as reported by SmartFlow



Source: The Tolly Group, January 2003

Figure 2

the percent of theoretical maximum zero-loss ($\leq 0.001\%$) bi-directional (full-duplex) throughput each device under test (DUT) provided via multi-link PPP across four aggregated T1 WAN interfaces when processing a range of packet sizes from 64- to 1,500-byte packets (including 14 bytes for Fast Ethernet header and four bytes for IP headers) with 100 sessions running and NAT, QoS, OSPF and IP filtering services active.

Test results show that the Tasman 1004 forwarded 100% of the theoretical maximum throughput, an aggregate of 12 Mbps for all packet sizes tested. In comparison, the Cisco 1751 only forwarded between 3.8 and 9.3 Mbps;

the Cisco 2691 forwarded between 10.5 Mbps to 12 Mbps and the Cisco 3725 forwarded 11.3 to 12 Mbps. (See Figures 1 and 2.)

ZERO-LOSS THROUGHPUT ACROSS TWO AGGREGATED T1 LINKS

The Tolly Group also tested the Tasman 1004 and the Cisco 1720 and 1751 in the same scenario as above across two aggregated T1 WAN interfaces.

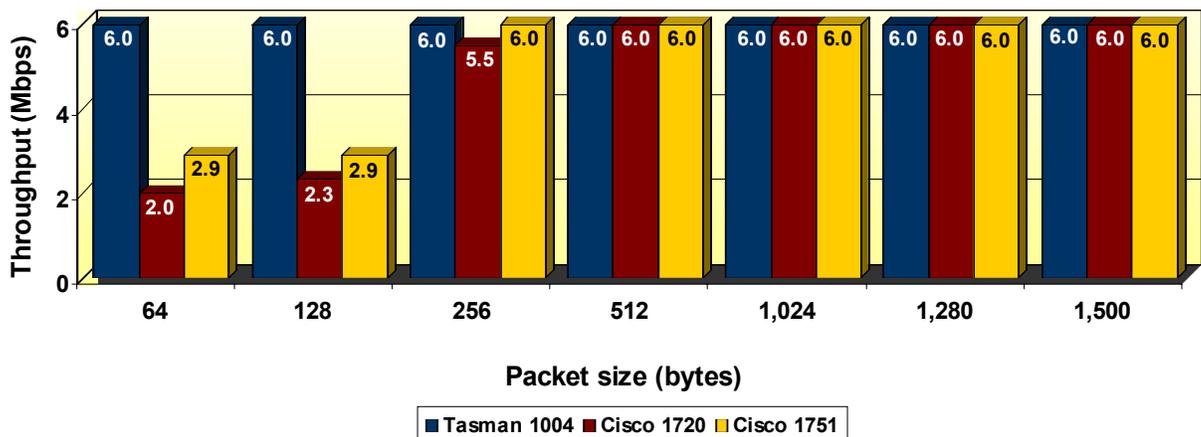
Test results show that the Tasman 1004 forwarded 100% of the theoretical maximum throughput, an aggregate of 6 Mbps for all packet sizes tested. In

comparison, the Cisco 1720 forwarded only between 2 Mbps to 6 Mbps and the Cisco 1751 forwarded only between 2.9 Mbps and 6 Mbps. (See Figures 1 and 3.)

ANALYSIS

User requirements for full line-rate support are not limited to high-end connections on the LAN but also include WAN connections. Remote connections via frame relay or PPP leased lines via T1 continue to be in demand even with the growth of DSL and cable modem connections. Users in the small- to mid-sized office range want simplicity of set up and single box solutions (integrated DSU-CSU, NAT, routing protocol support and policy control).

Zero-Loss Bidirectional ($\leq 0.001\%$) Throughput via Multi-Link PPP across two T-1 Interfaces with 100 Sessions, 25 ACLs, NAT and QoS Enabled as reported by SmartFlow



Source: The Tolly Group, January 2003

Figure 3

With Tasman Networks' 1004 router, the user has a high function wide area router, delivering full line rate for up to quad T1 connections while performing NAT, QoS, OSPF and IP filtering. Since a majority of Internet traffic (over 50%) consists of small packet sizes, the capability of the router to sustain a minimum packet size load with zero loss is important to the overall performance of the applications within a site.

In these tests, Tasman Networks took an aggressive approach by testing under real-world scenarios with NAT, QoS OSPF and IP filters enabled. While these advanced options add processing overhead on top of the router's load, it delivers a more realistic performance measurement than products that test under a best-case scenario.

Furthermore, Tasman Networks elected to go head-to-head in tests with their device pitted against both high-end (2691 and 3725) and low-end (1720 and 1751) Cisco routers. The Tasman 1004 performs comparably to the high-end Cisco devices as demonstrated in the quad T1 performance results. Performance results in the dual T1 configuration show that the Tasman 1004 provides more than twice the throughput of the low-end Cisco routers when handling 64- and 128-byte packets and the Tasman device provides performance results comparable to the Cisco devices for 256-byte packets and larger.

In the test methodology for this analysis, The Tolly Group rounded theoretical maximum T1 throughput from 1.544 Mbps to 1.5 Mbps so that the full-duplex configuration equates to a maximum aggregate throughput (i.e., all ports running at wire speed with full-duplex traffic) of 12 Mbps and 6 Mbps for the quad and dual aggregated T1 tests, respectively.

Despite the additional overhead, the Tasman 1004 consistently delivered the equivalent of full T1 bandwidth in all test scenarios while the performance of the Cisco devices fluctuated.

TEST CONFIGURATION AND METHODOLOGY

For performance tests, The Tolly Group tested a Tasman Networks, Inc. Tasman 1004 router, version 7.0 in steady-state, zero-loss ($\leq 0.001\%$) bi-directional

throughput tests across two aggregated T1 connections and across four aggregated T1 connections. Tolly Group engineers conducted the same tests on four Cisco devices: a Cisco Systems, Inc. 1720 router, version 12.2(11)T (in dual T1 tests), a Cisco 1751 router, version 12.2(8)YJ (in both dual and quad T1 tests), and a Cisco 2691 router, version 12.2(8)T4 and a Cisco Systems 3725 router, version 12.2(8)T5 (in quad T1 tests).

Each device under test connected via Fast Ethernet to a SmartBits SMB-2000 chassis that generated from 64- to 1,500-byte IP traffic across the LAN to the DUT, which forwarded the traffic across aggregated dual or quad T1 interfaces to a Carrier Access Corp Wide Bank28 DS3 Access Multiplexer connected via Channelized DS3 to a Tasman 6302 which in turn connected to the SmartBits. (See Figure 4.)

Engineers initiated zero-loss throughput tests by first resetting each DUT to its factory defaults. Tolly Group engineers enabled NAT, QoS and IP packet filtering; they disabled Spanning Tree, flow control and all other ancillary features that would otherwise impact device performance. They configured each port for maximum speed and full-duplex operation. Then they configured SmartBits for the correct packet size, correct packet rate and test duration. Engineers then initiated tests and recorded results. If packet loss greater than 0.001% occurred, they repeated the above procedure and lowered the frame rate by 0.25% until no frame loss occurred. Engineers conducted three iterations of each test and results were averaged.

During prototype testing, an Acterna DA-360 Internetworking Analyzer was placed in line to validate traffic flow between the devices, but it was removed prior to performance testing. A DominoPlus (Domino Core 3.1) verified packet sizes and utilization.

EQUIPMENT ACQUISITION AND SUPPORT

Cisco Systems routers were acquired through normal product distribution channels. In accordance with The Tolly Group Fair Testing Charter, The Tolly

Tasman Networks, Inc.

Tasman 1004

Competitive Performance



Tasman Networks, Inc. Tasman 1004 Product Specifications*

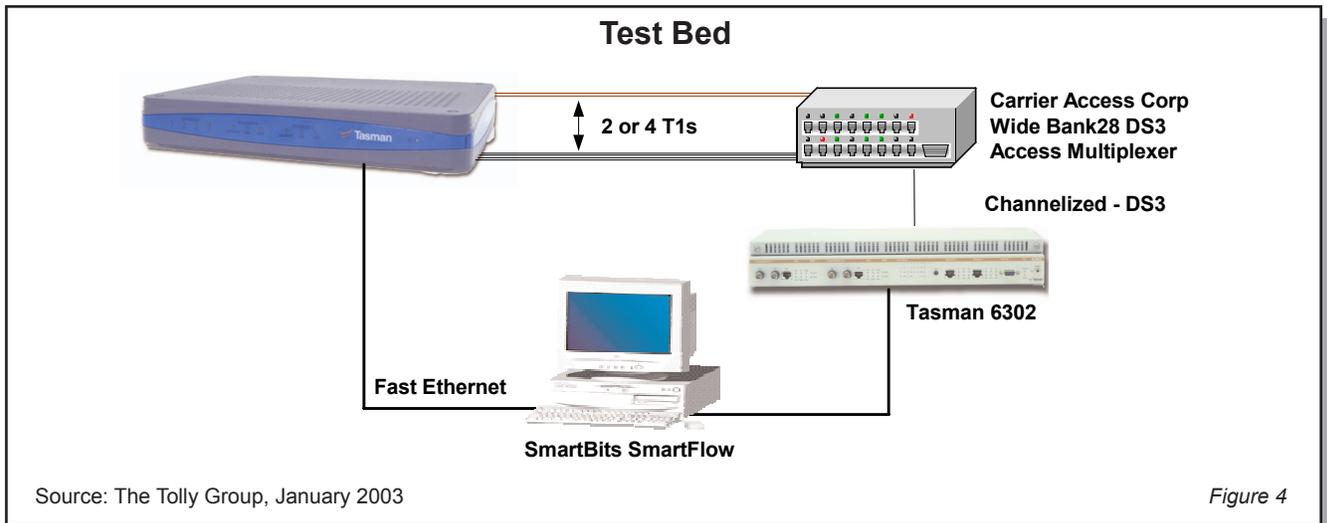
Feature

- WAN protocols
 - MLPPP
 - MLFR - FRF.15 and FRF.16
 - PPP
 - HDLC
 - Frame Relay
- Routing protocols
 - RIP and RIP 2
 - OSPF
 - BGP4
- Other Layer 3 protocols: VRRP, NAT, DHCP, PAP, RADIUS authentication, ACLs
- QoS: RED, DiffServ, CBQ - per IP Address, VLAN Tag or application port
- Frame Relay traffic shaping and policing
- Layer 2 Features
 - VLAN 802.1Q tagging and forwarding
 - Transparent bridging
 - IP multiplexing-transparent Layer 2 packet forwarding
- One to four software keyed T1/E1 ports
- 256 MB of RAM and 32 MB of Flash memory
- DSX-1 interface
- Dual auto sensing Fast Ethernet 10/100 interfaces
- 1.32" h x 6.51" d x 8.65" w
- Integrated CSU/DSU

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**Vendor-supplied information not verified by The Tolly Group*



Group contacted executives at Cisco and invited them to provide a higher level of support than available through normal channels. Cisco executives did not respond until approximately one month

after testing. When results, product release levels and test configurations were shared with Cisco executives, they neither acknowledged nor disputed the accuracy of the results.



The Tolly Group gratefully acknowledges the providers of test equipment used in this project.

Vendor

Acterna Corp.

Spirent Communications

Product

Domino DA-360

SmartBits SMB-2000

Web address

<http://www.acterna.com>

<http://www.spirentcom.com>

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For info on the Fair Testing Charter, visit: www.tolly.com/About/ftc.asp

PROJECT PROFILE

Sponsor: Tasman Networks, Inc.

Document number: 202163

Product Class: T1 access router

Products under test: Tasman 1004 router, version 7.0

- Tasman 1004 router, version 7.0
- Cisco Systems, Inc. 1720 router, version 12.2(11)T
- Cisco Systems, Inc. 1751 router, version 12.2(8)YJ
- Cisco Systems, Inc. 2691 router, version 12.2(8)T4
- Cisco Systems, Inc. 3725 router, version 12.2(8)T5

Testing window: January 2003

Software status: Generally available

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