High data volume applications such as ipoque’s PRX-10G Traffic Manager rely on the power of 10 Gigabit Ethernet provided by BLADE Network Technologies’ BNT Layer 2/3 10 Gigabit Ethernet Switch Module in the IBM BladeCenter H to build robust, fast, and cost-effective traffic management and deep packet inspection solutions for telecom providers.

PRX-10G is a carrier-grade Traffic Manager that scales up to 60 gigabits per second and is based on the IBM BladeCenter® technology. Up to six fully loaded 10 Gigabit Ethernet links provided by the BNT high-speed switch/routers can be managed in a single chassis, where up to twelve load-balancing blades share the traffic load. 10 Gb Ethernet NIC daughtercards enable 10 Gb Ethernet connectivity directly to the blade servers over the high-speed backplane of the BladeCenter H. The built-in high availability with automatic hardware fail-over ensures uninterrupted network connectivity in case of a blade failure. With the optional NEBS (Network Equipment-Building System) compliance, the PRX-10G can be installed in provider networks with particularly strict requirements on their infrastructures.

PRX Traffic Manager is a comprehensive and cost-effective bandwidth management solution enabling network operators to monitor and control network traffic per application and per subscriber. PRX Traffic Manager detects applications with a combination of layer-7 deep packet inspection (DPI) and behavioral traffic analysis. All major protocols including peer-to-peer file sharing (P2P), instant messaging (IM), media streaming and Internet telephony (VoIP) are supported. The integrated quality-of-service (QoS) management allows prioritization, shaping and blocking of classified traffic. Extensive accounting features provide in-depth application- and subscriber-aware network visibility.

Highlights

- 60 Gbit/s and 4.2 million packets/s throughput
- six 10 Gigabit Ethernet links can be managed per BladeCenter chassis
- 240 million concurrent flows
- 12 million subscribers
- Blade-based load balancing with full redundancy
- Optional NEBS compliance
- Subscriber- and application-aware bandwidth management
- Layer-7 signatures using deep packet inspection (DPI) and behavioral analysis
- Rapid signature update service
- No latency impact on delay-sensitive applications such as Voice over IP (VoIP)
- Market-leading price-performance ratio

The PRX-10G allows network operators to monitor and regulate applications- and user-based network traffic. The system was designed for the highest levels of performance and safety requirements and is optimized for demanding network environments. The PRX-10G waives internal queues to control traffic and thus has virtually no negative impact on the packet latency (which never exceeds 0.1 millisecond).
The PRX-10G is able to process 12 million active users with over 240 million simultaneous connections. In the case of a blade failure the internal trunk configuration of the blade server’s network connections using the Link Aggregation Control Protocol (LACP) permit the remaining blades to carry on processing the remaining traffic without impact to the user, and the faulty blade can be replaced without interruption of network traffic. With optional hot standby blades, the full performance can even be guaranteed during a failure. Most of the other system components can be replaced without interruption of traffic as well.

Despite the high performance, the IBM BladeCenter® is very energy efficient compared to other rack servers of this category: It takes up to 35 percent less energy without reducing the performance. The proven technology also simplifies the support, as parts can easily be supplied through the IBM global support network anywhere.

Traffic management applications typically process large quantities of network packets. Low latency and high throughput are requirements to ensure the impact on traffic flows is kept to an absolute minimum. Blade Network Technologies’ BNT Layer 2/3 10Gb Ethernet Switch Module for IBM BladeCenter provided the industry’s first all 10Gb Ethernet switch module—with six external and 14 internal 10Gb ports—for the IBM BladeCenter® H. Since the time we have seen it leveraged in high-performance computing (HPC) clusters and bandwidth-intensive applications such as video on demand, high definition Internet protocol TV (HD IPTV) and voice over IP (VOIP). Some IT departments have also enjoyed the fact it helps eliminate the complexity of managing separate network fabrics by enabling consolidation onto 10Gb Ethernet for networking and iSCSI storage. But one thing that is clear is that this switch designed by BLADE Network Technologies has simplified deployment and helped reduce costs by integrating Layer 2/3 LAN switching and routing into a single BladeCenter chassis.

The IBM BladeCenter H with the BNT GbESM 10 Gb connectivity provides a combination of economic and performance advantages well-suited to the requirements of a high-performance computing environment:

**Investment Protection** - Since 2002, all IBM BladeCenter server blades, switches and adapters are interoperable in all BladeCenter chassis models.

**Product Flexibility** – The only non-modular part within the IBM BladeCenter is the midplane. All other parts can be chosen based on the applications and requirements of the customer. For example, various types of processors, Intel, AMD, Power PC or Cell can be selected for each server blade.

**Performance** – ipoque selected the IBM BladeCenter H because it offers the opportunity to utilize high performance media such as 10Gb Ethernet. This chassis was developed by IBM especially for high bandwidth, low latency applications. The benefits of 10G are worth the price today and prices will continue to fall. Customers can save costs by consolidating the I/O functionality and aggregating the data traffic inside the Blade Center, thus requiring fewer external 10Gb Ethernet core switch ports.

**Energy efficiency** - Within each datacenter, power and cooling is a big consideration. ipoque selected the IBM BladeCenter due to its integrated power and cooling system that disperses the heat from the blades out the back of the chassis using blowers—thus lowering energy consumption. BLADE’s 10G switches consume between ~3W-6W per 10G port vs. 74W per port (Cisco WS-6704-10GE) 72-79% power savings compared to Cisco 10G LCM1 The power and thus cost efficiency enabled by this reduced power consumption results in a significant reduction in total cost of ownership of the BladeCenter over time, due to reduced electricity, space and HVAC outlays. Such savings are particularly relevant for, but not limited to, high performance computing environments like ipoque’s.

It is also important to recognize the ecosystem that has developed around the IBM BladeCenter. As it is an open standard platform, many companies build products for this ecosystem increasing the value add of the product. ipoque selected BLADE Network Technologies, a founding and governing member of

1 Source: Product Management, Cisco Systems, (and others) from presentations and panels at Server Blade Summit, April, 2006
Blade.org, to be their switch supplier as they are the only vendor in the marketplace who provides 10Gb Ethernet connectivity to the BladeCenter. Without such an ecosystem it is extremely difficult to create a compatible, trusted solution. This is a major benefit for innovative solution providers like ipoque.

**Conclusion**

Ipoque chose a reliable high-performance solution in the IBM BladeCenter with BNT 10Gb Ethernet Switch modules. The interconnects offer proven line-rate throughput, low latency, and 85% cost savings per Gbps than leading standalone 10G switches. This constellation proved to be the best match for the bandwidth-intensive requirements of ipoque’s traffic management application. Importantly, the described 10Gb Ethernet solution delivers the high bandwidth and low latency required by the application at a price performance point which was superior to all others on the market.

**About ipoque**

Ipoque is the leading European provider of deep packet inspection (DPI) solutions for Internet traffic management and analysis. Designed for Internet service providers, enterprises and educational institutions, ipoque’s PRX Traffic Manager allows effectively monitoring, shaping and optimizing network applications. These include the most critical and hard-to-detect protocols used for peer-to-peer file sharing (P2P), instant messaging (IM), Voice over IP (VoIP), tunneling and media streaming, but also many legacy applications. For more information, see: www.ipoque.com <http://www.ipoque.com>

**About Blade Network Technologies**

Blade Network Technologies (Solutions by BNT) is the #1 supplier in the market and has the highest market share in the blade server networking space. As an independent company focused on being a high quality OEM supplier, BLADE is uniquely positioned to provide the right blade networking technology at the right time, for the right price to our valued customers <http://www.bladenetwork.net>

**Competitive Performance Results**

In October 2006, the Tolly Group performed competitive analysis on the two BLADE Network Technologies 10Gb Ethernet Switch Modules with the Cisco Catalyst 6509. Testing included the Layer 2/3 10Gb Ethernet Switch Module employed by ipoque

Tests measured the Layer 2/3 throughput, latency and multicast performance of the switch modules in a variety of common network topologies. Tolly Group also compared the price/performance ratio of each switch module.

Test results were as follows:

- The BLADE product exhibits up to 9 times less latency than competition.
- In the Layer 2 and 3 Throughput and Latency test, the 10Gb Ethernet Switch Module from BLADE achieved 100% zero-loss throughput for all standard frame sizes (64 to 1518 bytes), with an average store-and-forward latency of around 1.9 microseconds. This was with the 3 10Gb Ethernet ports on the ESM in a full mesh.
- In the same test, Layer 2 and 3 Throughput and Latency test, but this time with 10 * 1Gb Ethernet ports going to 1 * 10Gb Ethernet the results for the 10Gb Uplink ESM were similar. Again, there was 100% zero-loss throughput for all standard frame sizes (64 to 1518 bytes), with an average store-and-forward latency ranging from 2.5 microseconds with 64 byte frames to 6 microseconds for 1518 frames.
- This throughput and low latency means that the download & upload of data are faster, reducing the overall compute time. The HPC Server CPU utilization is increased as compared to 1 GE solutions, since I/O with 10Gb Ethernet enable lower latency. 100% line-rate means that no frames or packets
are dropped, so the probability of re-transmit or restart of errored sessions is avoided. The overall result is available faster with an efficient use of the available resources.

- The test results are summarized in the graphs below:\(^2\):

**Figure 1 10G Throughput (Higher is Better)**

**Figure 2 10G Latency (lower is better)**

**Figure 3 10G Multicast Throughput**

Price Performance


![Figure 4 BNT L2/3 10Gb Uplink ESM Price Performance](image)

**Equipment list**

<table>
<thead>
<tr>
<th>5</th>
<th>IBM BladeCenter H chassis with 6 blade servers</th>
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| 2 | BNT Layer 2/3 10 Gigabit Ethernet Switch Modules from Blade Network Technologies include part#,

**BNT Layer 2/3 10Gb Ethernet Switch Module at a glance features**

- 7 ports: 6 10Gb (850nm short range XFP); 1 10/100/1000
- Copper RJ-45 used for management or data
- Internal ports 2 ports: 100Base-T management
- 14 ports: 10Gb to server blades
- Console interface 1 port: RS232 mini-USB connector
- Full line rate performance 400 Gbps

Latency (average LILO range)

- From 1.60 μsec with 64-byte packets to 4.28 μsec with 1,518 byte packets

Availability/resiliency

- Link trunk failover, NIC teaming
- IEEE 802.1 (s, d, w, q and ad)

| 6-port 10Gb fiber + 1-port Gb |
| 14 10G downlinks |
| Layer 2 Switching |
| Layer 3 Routing |
| Includes High- Availability and Security features |
| Throughput: 400 Gbps |
| Power: 61W |
| $9,799 or $489.95/port $24/Gbps |

“Big Bird”
- UplinkFast and Cisco Port Fast compatibility
- VRRP (RFC2338 + BNT active-active extension)
- Cisco EtherChannel compatibility
- Broadcast storm control
- User configurable hashing options for LACP
  - SMAC, DMAC, SIP, DIP
- MAC addresses • Up to 16K
- VLANs • 1024 configurable VLANs (802.1Q)
- Protocol-based VLANs
- Traffic management and routing
  - BGP 4, RIPv1, RIPv2
  - DHCP/BootP Relay (RFC 3046)
  - QoS (metering, remarking, DSCP/CoS)
  - IEEE 802.1p (priority queues), IEEE 802.3x flow control
  - IGMPv1 (RFC 1112), IGMPv2 (RFC 2236) multicast
  - snooping
  - IGMP filtering, IP forwarding
  - Jumbo Frame (12K), static routing
  - OSPF v2 (RFC 2328) with ECMP, OSPF (RFC 3101) with

3rd party applications

- Microsoft® Windows 2003 Server

Storage

- Storage arrays or Network Attached Storage devices

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