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Force10 Achieves Number One Market Share in Layer 3 Ten Gigabit Ethernet

Force10 Networks became the networking industry's leading provider of Layer 3 Ten Gigabit Ethernet (GbE) ports during the first quarter of 2004, according to the most recent Layer 2/Layer 3 Ethernet report from Dell'Oro Group. Force10 achieved a 36 percent share of the market, an increase of nine percent over the fourth quarter of 2003. In addition, Force10 was the number two supplier of 10 GbE ports for the total Layer 2 and Layer 3 markets, up from number three in the fourth quarter.

"The first quarter was a period of tremendous expansion for Force10. Existing customers expanded their networks, and new customers initiated significant deployments in data centers, service provider networks and Grid/cluster environments," said Stephen Garrison, vice president, corporate marketing for Force10. "We achieved a record sales level and customer base during the quarter. This is definitive validation that the Force10 E-Series switch/routers deliver the resiliency, reliability and scalability that high performance network customers require."

Layer 3 Ten GbE Port Market Share



Source: Dell'Oro Group 1Q 2004 L2/L3 Ethernet Report

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Force10 Closes \$75 Million Mezzanine Funding Round

Force10 Networks has closed a \$74.9 million mezzanine round of funding, one of the networking industry's largest in two years. Crosslink Capital joined co-leads Meritech Capital Partners and Morgenthaler Ventures as new investors in the company. Existing investors, including U.S. Venture Partners, New Enterprise Associates and Worldview Technology Partners, also participated in the round.

"Closing one of the industry's largest funding rounds in recent history is a testament to our best-in-class technology, rapidly growing customer base and market share leadership," said Marc Randall, CEO of Force10 Networks. "By establishing a tradition of innovative technology with unsurpassed resiliency and scalable performance, Force10 is now positioned to extend its successes to new products, markets and customers." Recent customer deployments, including the European Centre for Mid-Range Weather Forecasts, NTT-ME, NASA, the Department of Homeland Security, MCI, Lawrence Berkeley National Lab, Hanaro Telecom, Petroleum Geo-Services and Veritas DGC, highlight Force10's globally diverse customer base and rapid market share growth.

"Force10 has leading technology, an extraordinary list of loyal customers and the vision to make resilient 10 Gigabit Ethernet the technology of choice."

Paul Madera
Managing Director,
Meritech Capital Partners

According to Dell'Oro Group's most recent Ethernet switch report, Force10 led the industry in

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NTT-ME Deploys Force10 E-Series for 10 Gigabit Ethernet Upgrade to Deliver Advanced Voice and Data Services

Force10 Networks has announced that NTT-ME, a strategic subsidiary of Nippon Telegraph and Telephone East Corporation, has deployed the E-Series in a 10 Gigabit Ethernet core upgrade to provide new advanced services to its growing base of broadband subscribers. The Force10 E600 delivers the reliability and scalability at the network core that allows NTT-ME to extend its WAKWAK broadband service to subscribers across Japan.

"The Force10 E600 switch/routers provide the resilient foundation for the reliable delivery of services and the scalability that will enable us to grow into the future."

Taichi Igarashi
Backbone Technical Engineer,
NTT-ME

"Our rapidly growing base of customers are demanding more advanced, bandwidth-intensive services, prompting our upgrade of the capacity of our network," said Taichi Igarashi, backbone technical engineer at NTT-ME. "The Force10 E600 switch/routers provide the resilient foundation for the reliable delivery of services and the scalability that will enable us to grow into the future."

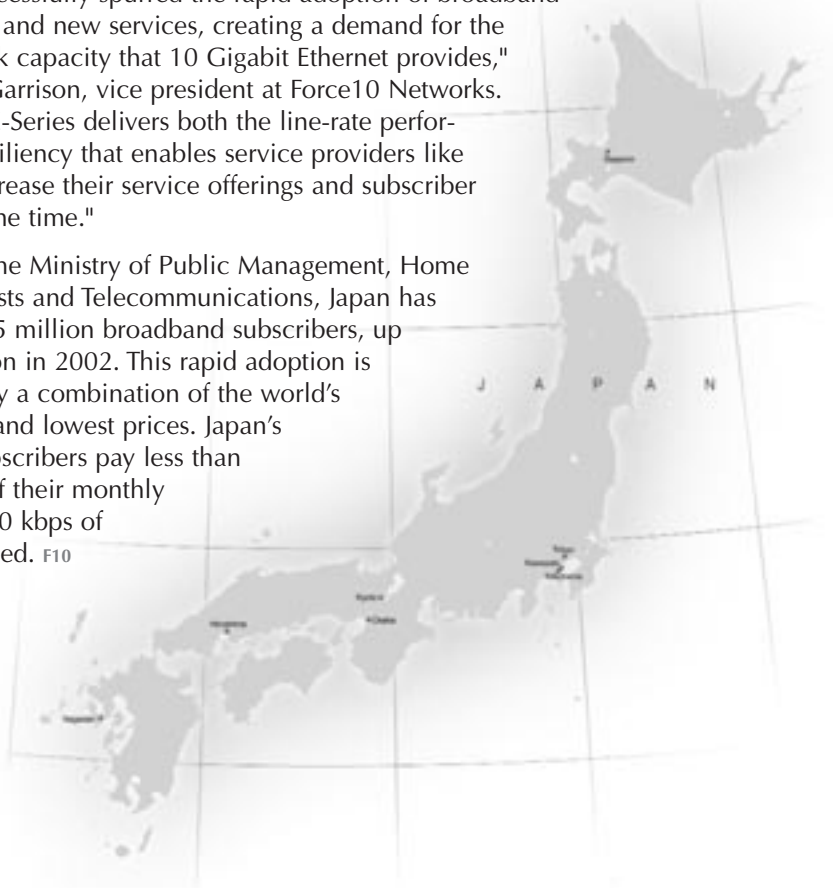
Introduced in 1999, NTT-ME's WAKWAK service delivers broadband connectivity and advanced applications to home and small office/home office users. As the foundation of NTT-ME's 10 Gigabit Ethernet network, the Force10 E600 enables NTT-ME to expand its WAKWAK service to include such advanced applications as IP telephony, streaming media and telenetworking.

The Force10 E-Series delivers resilient IP switching and routing at line-rate Gigabit and 10 Gigabit speeds. Combining a fully distributed hardware architecture with built-in redundancy and resiliency, the E-Series provides line-rate Gigabit and 10 Gigabit throughput regardless of traffic type or condition. Leveraging these functions, NTT-ME can reliably provide the high quality services its increasing subscriber base demands. "Japan has successfully spurred the rapid adoption of broadband with low costs and new services, creating a demand for the greater network capacity that 10 Gigabit Ethernet provides," said Stephen Garrison, vice president at Force10 Networks. "The Force10 E-Series delivers both the line-rate performance and resiliency that enables service providers like NTT-ME to increase their service offerings and subscriber base at the same time."

According to the Ministry of Public Management, Home Affairs, and Posts and Telecommunications, Japan has more than 13.5 million broadband subscribers, up from 7.8 million in 2002. This rapid adoption is being driven by a combination of the world's fastest speeds and lowest prices. Japan's broadband subscribers pay less than 0.01 percent of their monthly income per 100 kbps of broadband speed. F10



Force10 E-Series E600



Building a Highly Reliable Data Network: The Value of Resiliency, Density and Security

There is a surge like never before in an interesting milieu of traffic on the network. Some traffic is time sensitive, some other traffic assumes priority over others while some may need significant bandwidth.

Enterprises and service providers are now faced with similar issues. Networks need to be resilient, extremely reliable, real time with low latency, fail safe and for the most part always on. Network managers will be challenged to not only provide a secure and reliable network but also to guarantee predictable service levels. The ability to predict and guarantee service levels and maintain Quality of Service (QoS) will not only add to customer or user satisfaction but also open up new competitive advantages by leveraging the network as a strategic asset.

The Cost of Downtime can be Catastrophic

A recent article in Network World estimated the cost of downtime for different types of businesses. Cost can vary from \$700 a minute for a basic infrastructure to \$11,000 a minute for a full blown supply chain management implementation where a broken network can mean the production lines stop and the customer deliveries cannot be made.

The industry analyst group Gartner has studied typical levels of planned and unplanned downtime in major companies and have found that an uptime of 99.5% is better than average. This equates to nearly 44 hours of unplanned downtime a year. For a large e-commerce company such as Amazon.com this would equate to \$20 million a year in lost revenues.

At the heart of Force10's resiliency technology is the three CPU architecture in the Route Processor Module (RPM). A separate CPU is used for L2 switching, L3 routing and system management. If either the L2 or L3 CPU is being swamped

with traffic, it is still possible to process traffic on the remaining CPUs — preventing catastrophic failure of the device and thereby enabling more network availability.

High-Density Switch/Routers Mean More Cost-effective Aggregation

The total port capacity of the aggregation device is critical not only to the equipment costs, but also to the ongoing operating costs of the data center. Consider a data center with 256 server connections and four 10 GbE uplinks. Since each server of storage connection can run at full line-rate 1 Gbps throughput, the interconnecting switches must be

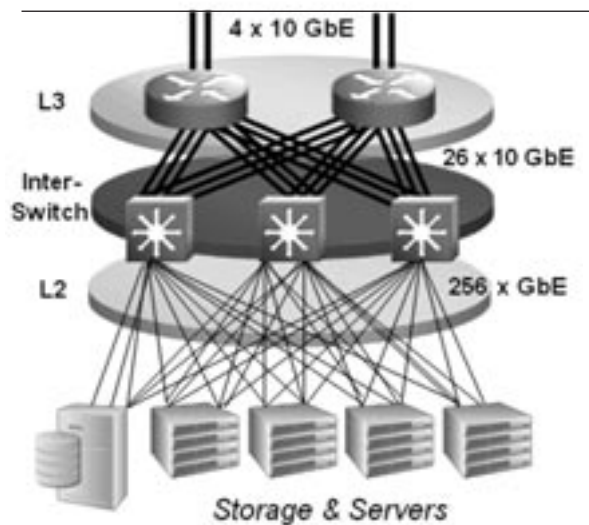


Figure 1: Cisco 6509 solution for 256 node data center

able to support a full 256 Gbps. Also, the switch fabric must be non-blocking to allow any-to-any switching between the servers and storage.

To implement this configuration using the Cisco 6509 switches requires five chassis systems with twenty-six 10 GbE cards in order to provide a full non-blocking, line-rate solution as shown in Figure 1. Remember that 256 servers generating a full line-rate capacity of 256 Gbps will require nine 10 GbE interfaces to

connect each aggregation switch to the other two switches as well as to the main trunk switches. A further four 10 GbE interfaces are then required for the uplinks giving a total of fifty-two separate 10 GbE fibre optic interfaces.

The higher density Force10 E1200 can support up to 336 line-rate non-blocking GbE ports per chassis. Thus the Force10 solution can easily support the 256 servers running at line rate with a single chassis equipped with a single four port 10 GbE line card as shown in Figure 2. It also does not require the extra inter-switch layer as all switching can be done over the E1200 switch fabric at full line rate with no blocking. By reducing the equipment involved, this simpler design decreases management costs. Additionally, the E-Series resilient switch/routers are the only 10 GbE products already 100 GbE ready with a patented 5 Tbps passive copper backplane.

Force10 has an extensive total cost of ownership model and welcomes inquiries to work with customers or partners directly on specific network topologies. In the data center example, the Force10 solution is 27% of the cost and has 1/3 less of the number of components of the equivalent Cisco solution. It is also worth emphasizing that the savings are not just in capital expenditure (CAPEX). Ongoing operating expenses (OPEX) are greatly increased by having five times the number of chassis and more than twenty 10 GbE line cards to operate, maintain and support. For instance the Cisco solution requires 62% more power and uses over 260% more energy than the Force10 solution. When the costs of service, support engineering and interest repayments on the capital are added in, the Force10 single chassis annual costs are a quarter of the cost of the five chassis Cisco solution.

A Network is only as Secure as its Weakest Link

An increasingly common cause of application failure is the Denial of Service (DoS) attack where the application is swamped by repeated service requests that it can't handle. Aggregation devices can also come under attack through their management interfaces or through

Continues on next column

unauthorized or malicious attempts to log in and alter settings. These attacks are just as likely to come from inside the network as from outside.

Force10 views the security problem as one that is transitioning from a 'perimeter model' to a 'holistic model'. Firewalls at the perimeter of the network can no longer be the only security tool. Every device in the network must have some level of DoS protection.

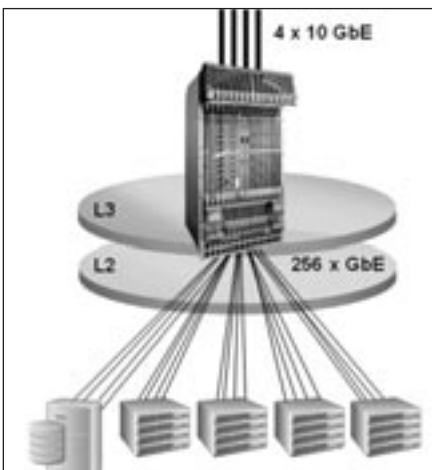


Figure 2: Force10 E1200 solution for 256 node data center

To protect from DoS attacks, the E-Series CPU control traffic is filtered and rate limited to prevent critical control traffic from being blocked. And since the control and data paths of the EtherScale™ Architecture are separate, switching and routing will continue even during an attack.

Conclusion

When choosing network infrastructure for your next generation data network, it is crucial that you consider the impact a weak or slow component can have on your business. Any solution must have the headroom to handle (without a fork-lift upgrade) not only what you throw at it today but also for the next 2-3 years as your business grows. And finally, make sure that your security is not compromised by introducing a network element that can be attacked or infiltrated by outsiders or insiders. F10



European Weather Service Deploys Force10 E-Series to More Rapidly Predict Medium-Range Forecasts

Force10 Networks has announced that the European Centre for Medium-Range Weather Forecasts (ECMWF) has deployed the Force10 E-Series to increase the reliability of its data center network. Leveraging the scalability and predictable performance of the Force10 E-Series, the ECMWF is increasing the speed with which it analyzes meteorological observations to forecast the evolution of weather for up to 10 days.

"The ECMWF makes substantial use of numerical experimentation and maintains extensive research archives for investigative studies – bandwidth intensive applications that require an underlying high performance network," said Matteo Dell'Acqua, head of the Networking and Computer Security Section at the European Centre for Medium-Range Weather Forecasts. "Force10's E-Series strengthens ECMWF by bringing a new level of network reliability that allows us to more rapidly analyze data, simulate weather patterns and store the results."

As the backbone of the ECMWF data center, the Force10 E600 interconnects storage, simulation and other application subsystems in a 10 Gigabit Ethernet network. The distributed architecture of the Force10 E-Series guarantees that as traffic increases, the network will maintain line-rate throughput, enabling the ECMWF to more rapidly process meteorological data with parallel applications.

"The ECMWF works with massive amounts of data to provide an invaluable service to European states and needs an infrastructure that can keep pace with the increasing demands placed on it," said Michael Augustine, Force10 Networks' country manager for the United Kingdom. "With the Force10 E600, the ECMWF gains a reliable and scalable foundation for its data center infrastructure, ensuring that it acts to support business objectives."

An international organization supported by 25 European states, the UK-based European Centre for Medium-Range Weather Forecasts develops dynamic models of the atmosphere for the production of weather forecasts. The organization conducts scientific and technical research directed at the improvement of weather forecasts and stores appropriate meteorological data and products for its member states.

Prime Business Solutions, a U.K.-based systems integrator, provided network integration and technical support for the deployment. Delivering solutions for enterprise and public sector customers, Prime Business Solutions provides a wide range of network design and managed services. F10

Force10 Number One in Market Share [Continued from p. 1]

Universities, large enterprises and service providers around the world are deploying the Force10 E-Series to increase network performance. Recent Force10 customer deployments include Korea's Chung Cheong University and Sangji Youngseo College and Japan's second largest service provider BIGLOBE. The company was also recently named the number one private company by LightReading for being a "leading player in one of telecom's hottest markets – 10 Gigabit Ethernet switching."

According to the Dell'Oro Group's Five Year Ethernet Forecast, 10 GbE deployments will be on high-end modular platforms, such as the Force10 E-Series, in large campus backbones, inter-campus connections and larger data centers. Driven by the bandwidth demand of Grid/cluster computing environments and parallel applications, the 10 GbE switch market will grow from \$39 million in 2002, to \$1.6 billion in 2007. F10



Marc Randall
President and CEO

Marking Another Milestone for Ethernet

Last month, the second anniversary of the adoption of the 10 Gigabit Ethernet standard passed with little notice or fanfare from an industry that has alternatively maligned and embraced the technology as it has evolved through the hype of the bubble, the deepfreeze of the downturn and the guarded optimism of recovery.

Now, in this period of expansion, 10 Gigabit Ethernet has the opportunity to prove itself as the true successor of Fast and Gigabit Ethernet. To do so, the 10 Gigabit Ethernet market must mature, a process that exposes the technology to market forces with the primary goal of finding the balance between performance and price, supply and demand, end user and vendor.

To date, the price/performance premium of 10 Gigabit Ethernet over Gigabit Ethernet has relegated the technology to research institutions and national laboratories. It is only when there is a price/performance advantage to 10 Gigabit Ethernet that enterprises, universities and service providers will consider the technology as a viable networking infrastructure technology.

Falling prices, fuelled chiefly by technological advancements and economies of scale are continually eroding the premium. Meanwhile, a new generation of 10 Gigabit Ethernet products, with higher port densities and system design efficiencies, will drive further price reductions, eliminating the premium all together.

If history is any indication of the future, these market forces will drive the rapid adoption of 10 Gigabit Ethernet over the next few years. Just as the Fast Ethernet and Gigabit Ethernet markets grew exponentially to \$1 billion within three years of standardization, so too should 10 Gigabit Ethernet.

Two years after adoption of the standard and a long slog through the downturn, it is clear that 10 Gigabit Ethernet will have a significant impact on the networking industry. As 10 Gigabit Ethernet rapidly moves towards the milestones first set by Fast and Gigabit Ethernet, the technology is proving itself as a revolutionary force in the networking industry, just as its brethren did before it. F10



Just as the Fast Ethernet and Gigabit Ethernet markets grew exponentially to \$1 billion within three years of standardization, so too should 10 Gigabit Ethernet.

Force10 Networks Welcomes Mark Cooper as Vice President of Sales

Force10 Networks has named networking industry veteran Mark Cooper vice president sales. Cooper, who has more than 16 years of networking experience, will direct Force10's sales and alliance programs as the company expands into new markets around the world.

"Mark has a wealth of experience, and he has an established track record in sales," said Marc Randall, president and chief executive officer of Force10 Networks. "As Force10 continues to grow, Mark's knowledge of the industry will be key."

"Force10 has the products, the customers, and the partners a company needs to succeed in this industry," said Mark Cooper. "As Force10 continues its global expansion campaign, the opportunity to direct and expand the company's sales is extremely exciting."

Mark is a networking industry veteran with significant enterprise and service provider account experience. Prior to being named vice president of sales, Mark served as vice president of Force10's Worldwide Strategic Alliances, where he developed the company's successful Global Partner Program. Before joining Force10, Mark spent more than four years with Cisco Systems, where he played a leading role in developing and directing a nationwide sales team responsible for supporting SBC Communications. While with Cisco, Mark played a significant role in developing new accounts that increased the company's service provider revenue from \$60 million to more than \$1 billion. Mark has also held sales leadership roles with Nortel Networks and SBC Communications in the enterprise networking division. F10



UPCOMING EVENTS

JULY-AUGUST

12th International Conference on
Intelligent Systems for Molecular Biology
July 31–August 4, 2004
Glasgow, Scotland

OCTOBER

SEG 2004
October 10–15, 2004
Denver, CO, USA

NANOG 32

October 17–19, 2004
Reston, VA, USA

NOVEMBER

SC2004
November 6–12, 2004
Booth 1335
Pittsburgh, PA, USA

For a complete list of events, see:
force10networks.com/news/events.asp

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\$75 Million Mezzanine Funding *[Continued from page 1]*

Layer 3 Ten Gigabit Ethernet port shipments with 36 percent of the market in the first quarter of 2004, a nine percent increase over the previous quarter. "Force10 changed the business of networking when it was the first to market with line-rate 10 Gigabit Ethernet and has continued to capitalize on its early lead in the industry," said Paul Madera, managing director at Meritech Capital Partners. "The company has leading technology, an extraordinary list of loyal customers and the vision to make resilient 10 Gigabit Ethernet the technology of choice for high performance networking environments around the world."

Force10 has recently been recognized as a technology company poised to change the networking industry. On May 11, Force10 was named to the Red Herring 100 list of private technology companies for positively transforming the marketplace. In March, Force10 was singled out for an Investors' Choice award at the Network Outlook Private Equity conference for its prospects in the data communications industry. Independent market research organization Heavy Reading also recently highlighted Force10 as a top beneficiary of the telecom resurgence in its report, "Telecom Recovery Investment Opportunities."

"Force10 customers – whether running data centers, clusters, or carrier networks – depend on Force10 to maximize operating economics and minimize the penalties of down time, which can impact thousands of users and cost millions of dollars in lost productivity," said Gary Morgenthaler, general partner at Morgenthaler Ventures. "Our discussions with Force10 customers turned up some of the most enthusiastic customer endorsements ever encountered."

According to Dell'Oro Group, the 10 Gigabit Ethernet market is projected to reach \$2.4 billion by 2008, driven by early volume deployments on high-end modular platforms in large campus backbones, inter-campus connections and larger data centers. F10