



QUESTnet 2008



Watts Up? Green IT *Energy Efficient Solutions from Nortel*

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BUSINESS MADE SIMPLE

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Biography – Jean Turgeon



- Jean Turgeon, MBA
 - Director, Enterprise Campus & Data Center Solutions at Nortel
 - 24 years of experience in networking solutions
- Jean Turgeon speaks frequently on this and other Enterprise related topics at:
 - Nortel Enterprise Technology Forum (NETF) – Formally NPW
 - Distributor Alliance Council (DAC)
 - Global Sales Customer & Partner events
 - Executive Business Center visits
 - Networld Interop (N+I) Asia & NA
 - QUESTnet 2007/2008
 - Asia Partner TIG



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Agenda



- Quick recap from last year....
- Did You Know?
- Network designs (Data Center, Campus & Branch)
- Case Studies & available Tools for EE
- Q & A

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What we presented in 2007.....



- Always On Networking is critical....
"Gartner January 2008 says"
 - There's a lot of talk about the **data center**, but **don't overlook the network itself and your wiring closets**. An enterprise network **has a big impact on your company's total environmental footprint**, according to a new report from Gartner.
 - "Unlike client computing, where significant footprint reduction can arise from simply turning off devices when they are not in use, **the network needs to be 'always on' regardless of its utilization**," said Neil Rickard, research vice-president Gartner. "As organizations can't turn their network off to reduce their environmental footprint, they must **take simple steps to reduce it**."
- Use Two Tiers & Active-Active Architecture when possible.
"Gartner January 2008 says":
 - "**Buy only what you need**" Don't let vendors pressure you into buying gear you don't need
 - **Reduce the number of layers and devices**. Certain network design practices can over-layer devices and create performance bottlenecks
 - Factor in **power consumption** when choosing products. Seek **power efficiency** in both new gear and in replacing legacy equipment
- Always On is what you need to successfully deploy UC !!!

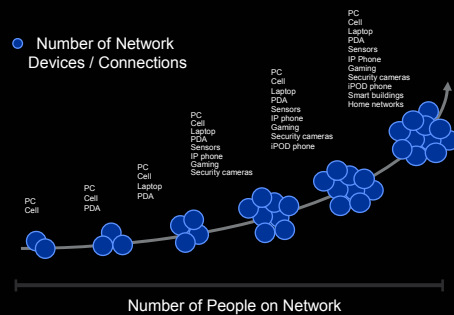
3

Hyperconnectivity – Recap 2007

A foundational catalyst that is driving change in the communications world

Hyper-Connectivity: Addressing the Challenge of Density and Diversity

● Number of Network Devices / Connections



- Will put staggering loads on enterprise networks
- *Identity Mgmt & RFID/Sensors*
- *Accelerates the need for True Broadband and Communication Enabled Applications*
- Makes us fundamentally rethink *how we build applications, services and networks (SOA)*
- Prepare for UC

Enterprises must be prepared for the disruptions and opportunities presented by this catalyst

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Unified Communications – Recap 2007

Solving The Hyperconnected User Challenge

- Leverage Converged Infrastructure
- Puts the user in control
 - Where, when, who, how
- Simplifies the user experience
 - Unified Client (desktop and mobile, phone)
 - Integration with email
 - Integration with Desktop apps
 - Collaboration tools
 - Single mailbox
- Delivers consistent QoE
- Addresses employee facing or customer facing environments



Communicating at the Speed of Thought

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Web - Current market view – Recap 2007



- **Web 1.0** (pre 2000) - **Connecting computers** and making technology more efficient for **computers**; an integrated experience; example of choosing and buying a book on Amazon
- **Web 2.0** (post 2000) - **Connecting people** and making technology efficient for **people**; it is all about **mashups**; all about **communities** and **social networks**; enabled new ways to use the web with **quick and simple** “social tools”

New Era Services: Facebook

- 2004: Launched as social network site for Harvard
- Sept. 2006: Opened to general public
- Today
 - 21 million users worldwide
 - 2 million Canadian users (one in 10 Canadian Internet users has a page on Facebook)
 - Toronto: largest geographic Facebook community in the world

New Era Services: Second Life

- Started in 1999 by Linden Lab
- User-created environment, with chat and IM
- 5.845 million “residents” (avg age 33, 60% male, 4 hrs/day)
- Real economy in a Virtual world
 - \$US 50 million transactions / month (average 1\$)
- Compelling social experience
- Next steps: Voice telephony?

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Reproduced with permission from IBM

Did you know?

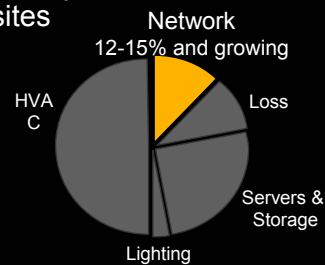


- Gartner’s Top 10 Technology to watch for 2008....
 - <http://www.networkworld.com/news/2007/100907-10-strategic-technologies-gartner.html?page=1>
 - #1 : **GREEN IT**
 - #2 : **Unified Communication (UC)**
 - #3 : **Business Process Management (SOA)**
 - #4 : **MetaData Mgmt (Identity & Policies Management)**
 - #5 : **Virtualization 2.0** (adds move & changes – apps/services)
 - #6 : **Mashups & composite apps**
 - #7 : **Web Services & WOA (Web Oriented Architecture) - SOA**
 - #8 : **Computing Fabric**
 - #9 : **Real World Web (True Broadband)**
 - #10 : **Social Networking**
- CIO Magazine – Top 10 Virtualization Vendors....
 - http://www.cio.com/article/160951/Virtualization_Vendors_to_Watch_in_07
 - Most are all about DC Virtualization & Optimization (Backups, Servers mgmt)
 - Majority focusing on VMWare integration & inter-operability
 - # 6: iSCSI Storage - EqualLogic (Dell)

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Did you know?

- More facts.....
 - IDC predicts cost to **cool and power servers globally** will increase from **\$26Billions to \$44Billions** in 2010
 - Most servers run at **10-15% utilization** !
 - A server costs \$300 to \$600 each year in direct energy costs, and another \$300 to \$600 a year in cooling costs
 - Power company in Boston will write cheque for **\$4M** if you break ground and move **Data Centre outside city** !
 - In London, Mumbai, Tokyo and New York City, data center operators can't get more power to their sites
 - IT typically represents **30 to 40%** of a company's energy consumption



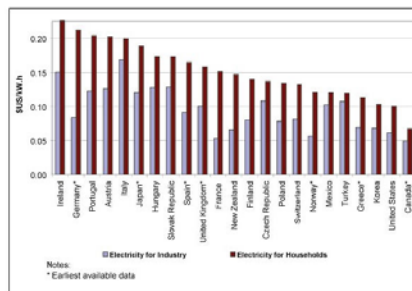
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Did You Know?

energy costs global view

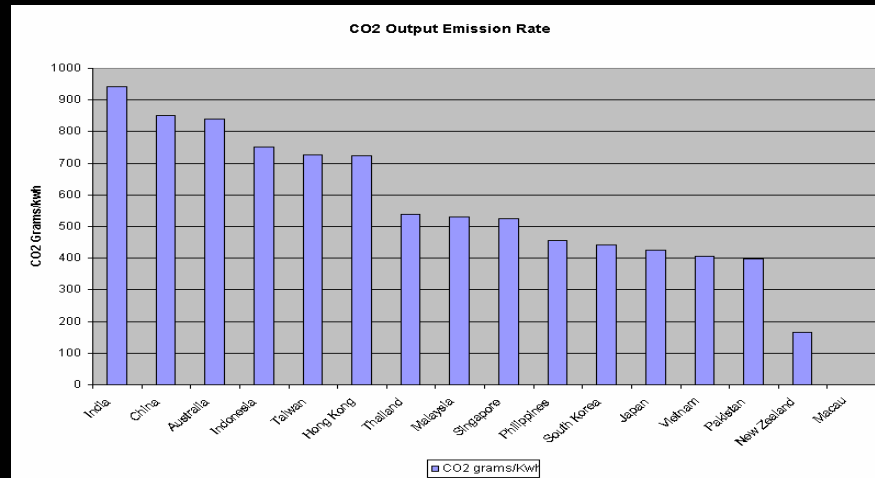
Energy Costs expected to rise 3.1% in 2008-combined with consumption increase of 1.3%, leading to a cost increase of 4.4%. Wages are only expect to rise 3.2%*

Figure 1 - Industry and Household Electricity Prices in Select Countries - 1st Quarter 2007



International Energy Agency - Key World Energy Statistics (2007)
www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1199

Did you know? *Australia is #3 in APAC*



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Did you know? *But APAC cares....*



Garnaut Report recently released !!!

• <http://www.theaustralian.news.com.au/story/0,25197,23978367-7583,00.html>

• <http://www.garnautreview.org.au/CA25734E0016A131/pages/reports-and-papers>

global executives
regard climate change
as strategically
relevant and important
to consider in many of
their key decisions

Role of climate change in overall corporate strategy considered very, somewhat important



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Source: McKinsey How companies think about climate change: A McKinsey Global Survey page 3

Did you know?

Top 10 Sources pressuring CIO's to go GREEN

- #1 - CFO (Reduce Costs)
- #2 - Electric Utilities
- #3 - CEO
- #4 - Lawmakers (compliance)
- #5 - IT Vendors
- #6 - Media
- #7 - Competitors
- #8 - Generation Y
- #9 - Employees
- #10 - The community

* Source: <http://www.networkworld.com/news/2008/070708-green-cios-pressure.html?page=1>



Did You Know?

low cost
systematic
abatement
option – cap
and migrate

“...there is a real difference in the power consumption of various equivalent products. It is enough that if you replace all the gear from our main competitor in the world with Greener products, it is equivalent to 20% of the US automobiles in carbon emissions.

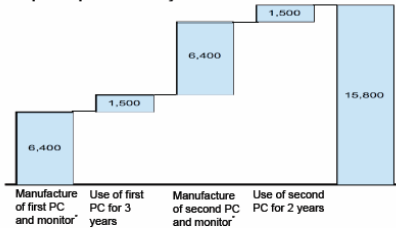
Phil Edholm Nortel CTO Enterprise



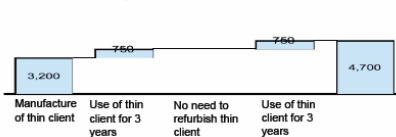
Did you know?

① REPLACING DESKTOP PCs WITH THIN CLIENTS (AS PART OF DESKTOP REFRESH PROGRAM) CAN REDUCE ENERGY CONSUMPTION IN USE BY UP TO 50%, AND LIFETIME ENERGY USE BY UP TO 70%

Desktop PC replaced after 3 years



Thin client used for 6 years without refurbishment

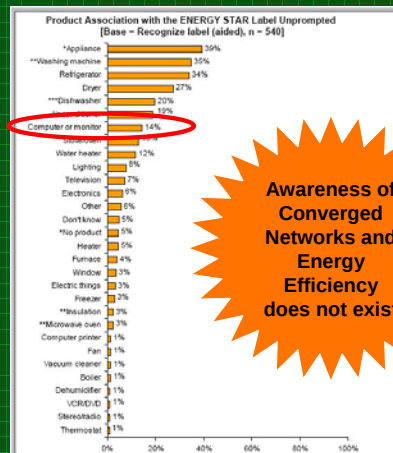


- Replacing a PC after 3 years will require a total of 15,800 MJ of energy in manufacture and use over 6 years
- Using a thin client over the same 6 year period will require 4,700 MJ of energy in manufacture and use - reduction of around 70%
- Thin clients are less complex than PC and contain fewer components, reducing the energy and materials required for manufacture, and making them cheaper to purchase (this includes a share of the server required to run the thin client)
- However, thin clients are generally network-based and may not be appropriate for all users

Source : UK Cabinet Office – Greening Government IT

What don't we know?

energy star



Awareness of Converged Networks and Energy Efficiency does not exist

legislation

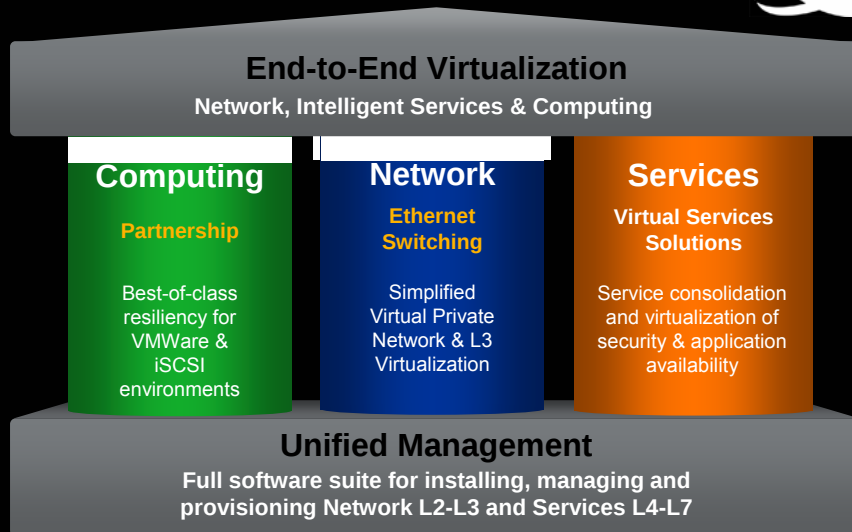
1-2007 US President signs Executive Order 13423

Section 2 (h) of E.O. 13423 requires that Federal agencies:

When acquiring an electronic product to meet its requirements, meets at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product.

Enterprise Virtualization to be Greener

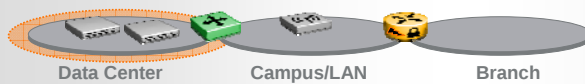
End-to-End Virtualization of Converged Network



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Business Optimized Networking

Greener ... in the Data Center



Delighting customers with the highest quality experience possible

What's required ...

- Resiliency, scale and performance
- Application optimization
- Virtualization
- Simplification
- Lower total cost of ownership



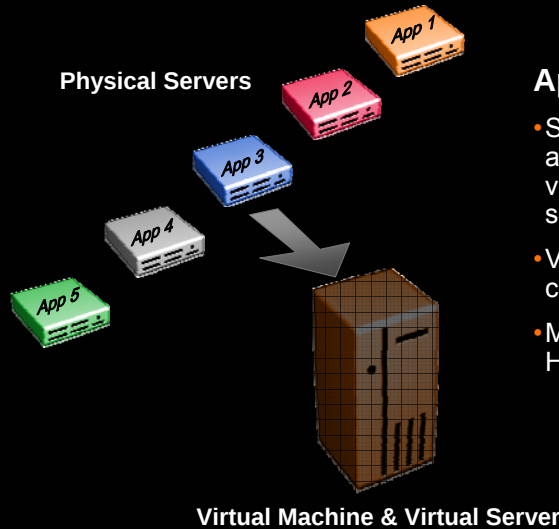
How BON delivers ...

- High performance Terabit Clustering with for the 24x7x365 data center
- High quality, uninterrupted service regardless of network condition
- Network, services virtualization
- Simple, high performance and low cost Ethernet Fabric

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Data Center Application Virtualization

Virtual Machine & Virtual Server = Greener



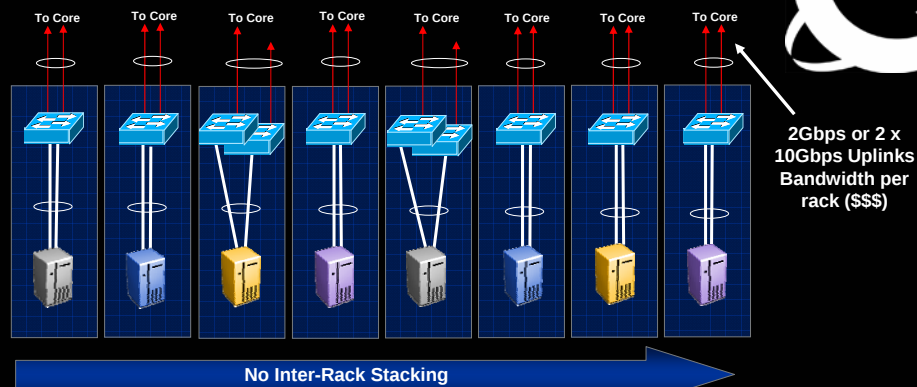
Application Virtualization

- Server Virtualization allows to aggregate multiple independent virtual servers on a physical server
- VMware Virtual Machine concept with ESX Infrastructure
- Microsoft Virtual Dedicated Hosting (VDH)

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Vertical Stacking – ToR

1st Generation ToR – HIGH CAPEX

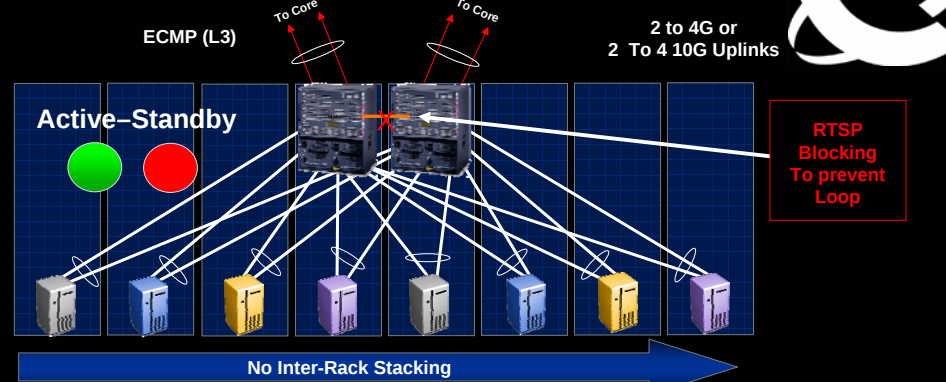


- Very high 10GIG density required in Core and 2 x GIG or 2x10GIG minimum for resiliency. 16 x 10 GIG got 8 Racks. High CAPEX.
- Single point of failure with single unit
- Higher Latency due as all traffic flows through Core
- Requires two units per rack for redundancy
- All traffic sent to core, no inter-rack traffic flows

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Dual Chassis Data Center Solution - GIG

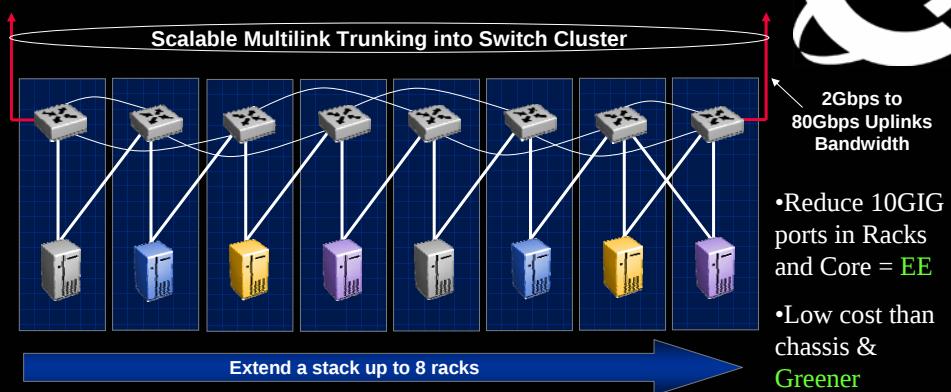
EoR/MoR – (5,309 Watts & 18,127 BTU/Hr)



- Very High Cost Dual Chassis for Server connectivity (HIGH CAPEX)
- Poor cable management
- Requires L3 license with ECMP to provide load balancing to Core
- Requires RSTP to prevent Loop
 - Or VSS (\$\$\$\$\$)
- HIGH CAPEX + VERY HIGH OPEX (NOT A GOOD SOLUTION) – likely 6500 + Nexu\$

Horizontal Stacking – 2nd Gen ToR

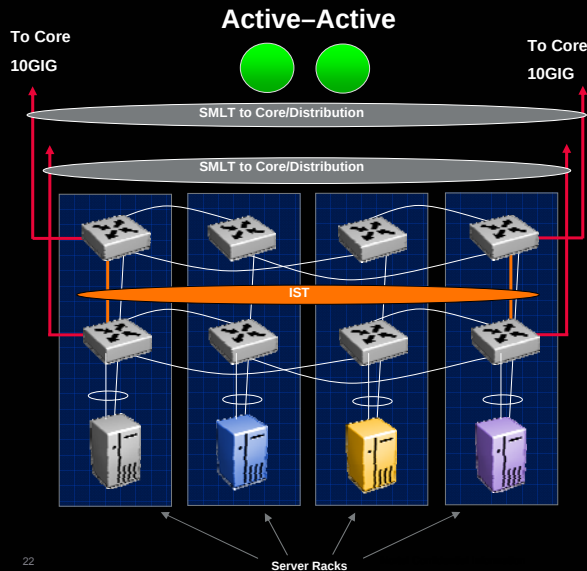
Using Right ToR (1,080 Watts, 3,685 BTU/Hr) = 8 Racks



- Fault-tolerant or Load sharing NIC teaming into stack
- L2 Edge & Switch Clustering Dual Homing Core (L3 Optional)
- Highly resilient stacking technology with scalable uplinks – 640Gbps
- Flexibility to spread across multiple data cabinets (100s of servers)
- Ideal for Grid Computing / High-Performance Computing Solutions
 - Very High Node-to-Node Communications Bandwidth
- Reduce 10GIG ports in Racks and Core = EE
- Low cost than chassis & Greener
- Servers to Servers High speed Comms
- Offload Core Traffic

Horizontal Stacking – 3rd Gen ToR

**Ultimate Resiliency – (2,160 Watts & 7,370 BTU/Hr)
(16 Units & 8 Racks) = 768 Resilient Ports**



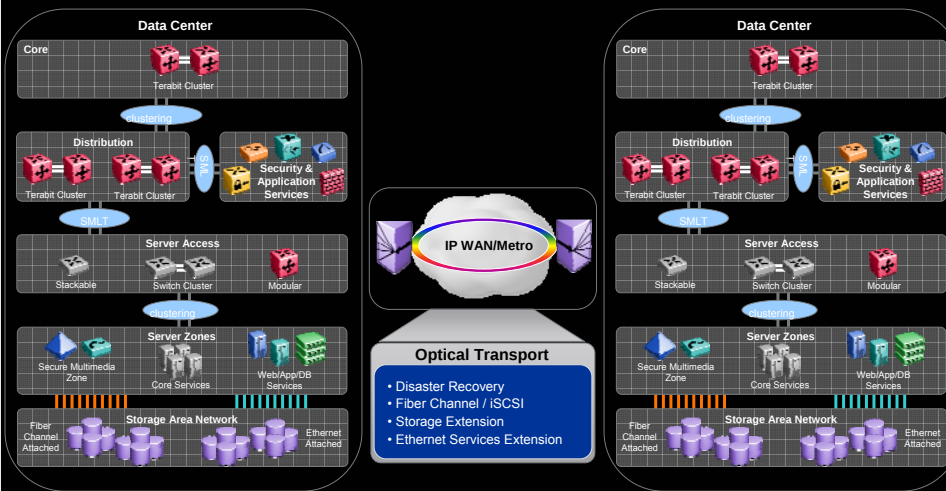
- Eliminate all Single point of failure
 - Highly Resilient/Zero Downtime
 - Low cost & **Green**
 - But don't compromise Performance & Reliability
- Ensure inter-operability with



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Data Center Architecture

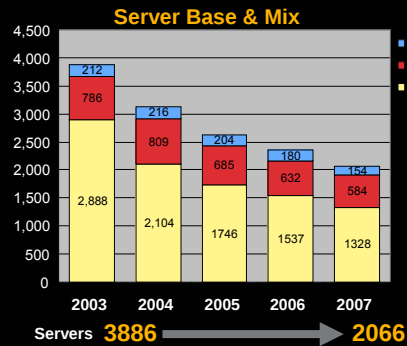
High Level Overview – Multiple Site



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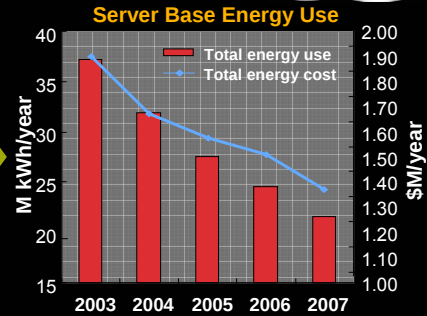
Case Study Nortel IS - Server Optimization Results

>12,000 servers in 2000; 10-15% utilization



Significant reduction in server counts

Newer generation lower cost servers offering application flexibility and efficiency



An estimated 15M kWh of energy was eliminated valued at ~\$530K

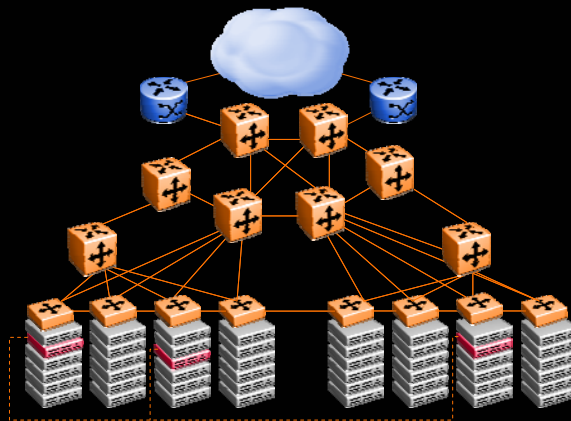
Equivalent to operating ~465,000 compact fluorescent bulbs 4 hrs a day for a year

The Future & The alternative...

Simpler DC to DC virtualization

Build the layer 2 network you need so you can best reach your resources where ever they are. Once installed, the physical network won't need to change!

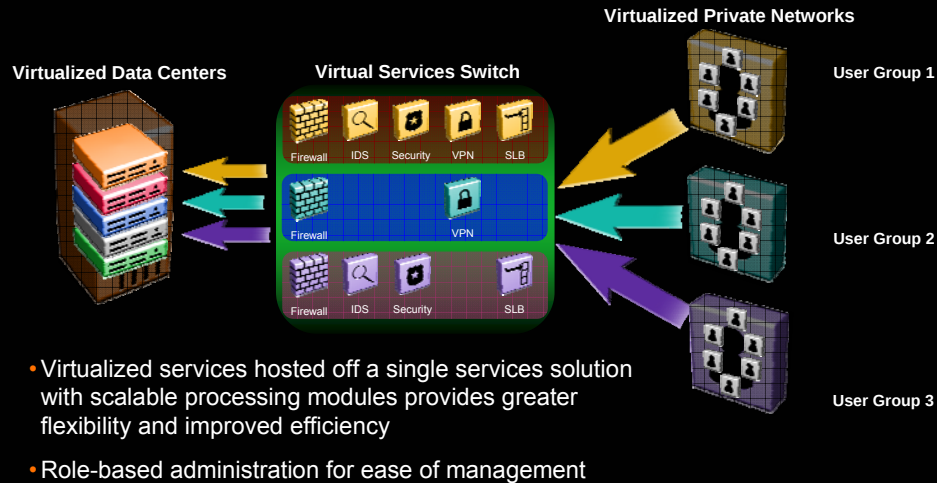
Only use those expensive routers where you really need them



Just a few simple CLI commands connect your virtual servers to their secure "community of interest" with no need to change the network!!!

Services Virtualization

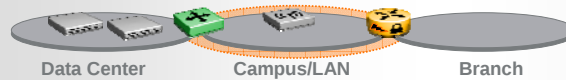
Consolidating Appliances = Greener



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Business Optimized Networking

Greener... in the Converged Campus/LAN



Providing a reliable, scalable, always-on network infrastructure

What's required ...

- Network reliability
- Scalable performance
- Mobility
- Network simplification
- Lower total cost of ownership

How BON delivers ...

- Resilient terabit clustering, virtual chassis architecture (stacking)
- Always-on resiliency and performance – wired and unwired
- High quality, uninterrupted service regardless of network condition
- Unmatched price/performance and simplified network designs

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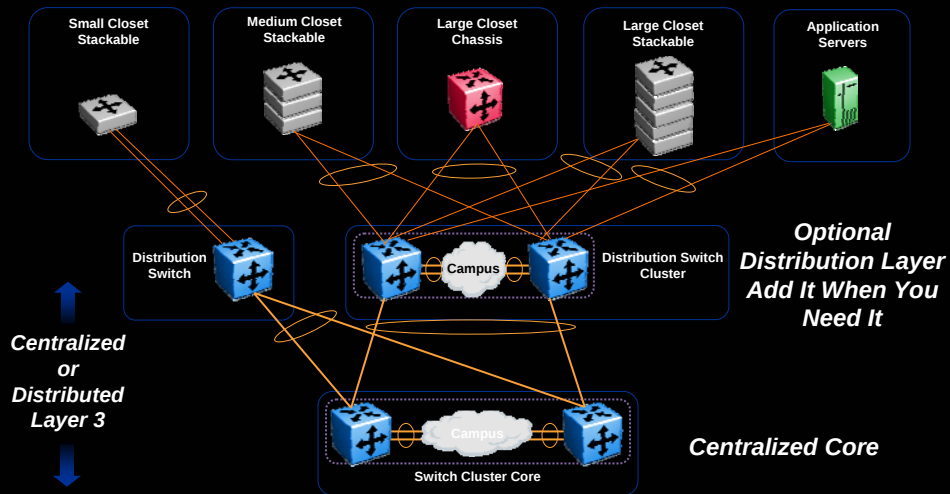
Network Design Flexibility

Greener Campus !!!

Active-Active



Two & Three Tier Architecture



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Enterprise Network Virtualization

Greener Alternatives



Your needs $\neq$ MPLS

- Don't let Vendor define your needs
- Don't let Vendor define which technology you should use
- Be aware of available alternatives solutions available NOW
 - Simpler, Easier, Lower TCO and more **ENERGY EFFICIENT**

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Third largest educational entity in the state of Ohio.

25,000 customers spanning three (3) campuses

Vendor standardization mandate for all campuses

After a full competitive vendor analysis – A new primary Ethernet switching vendor was selected offering **Greener** Products

In addition to lower price, without compromising performance and support ...

The **\$1.5 million in estimated costs savings*** on electrical consumption over 5 years provided a compelling case for making a switch from the Universities incumbent networking vendor

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Business Optimized Networking

Greener ... in the Branch



Extend consistent, high quality access/services to your extended enterprise locations/users

What's required ...

- The same level of service Campus/LAN users get
- Resiliency, scale and performance
- WAN/application optimization
- Deployment simplification
- Low total cost of ownership

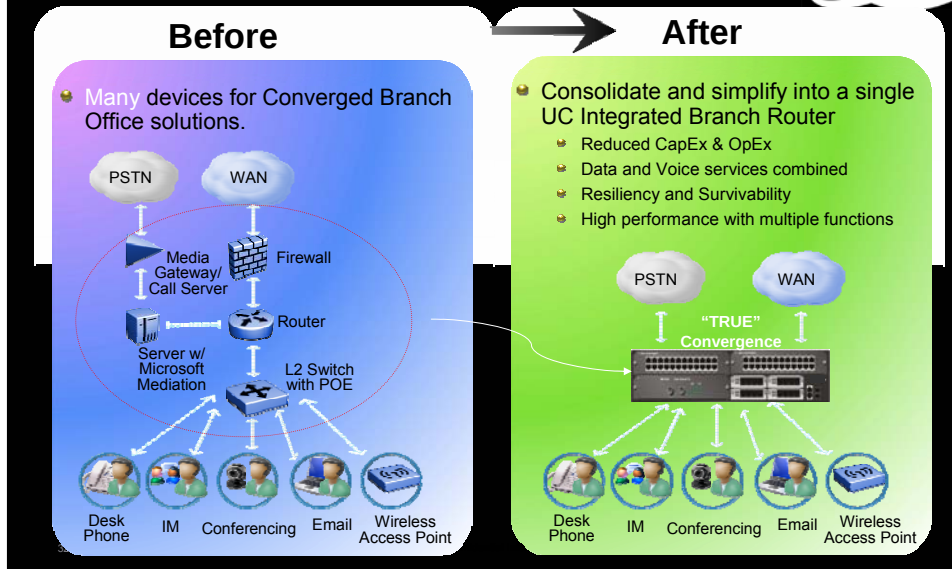


How BON delivers ...

- Simplification via service integration
- Wire speed performance for toll-quality VoIP and UC
- Reduced WAN OPEX through bandwidth efficiency
- Unmatched price/performance
- Seamless deployment into existing networks

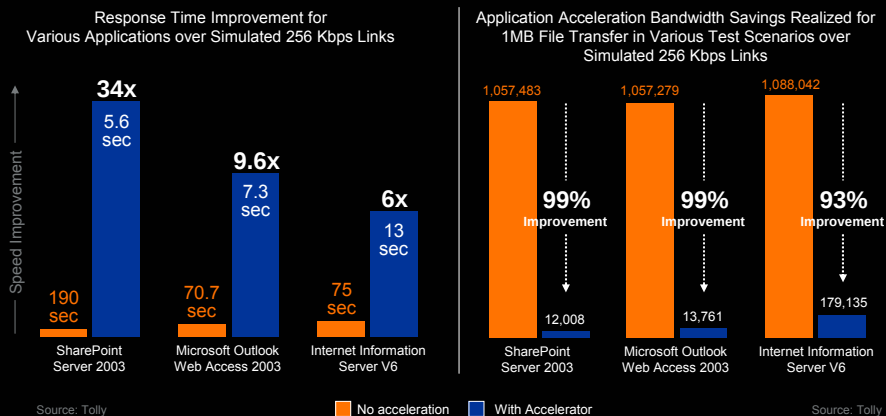
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Appliance Convergence Greener Branch



Don't Compromise Performance Enhanced End User Experience

Application Accelerator reduces download times by as much as 34x while reducing bandwidth by up to 99%



The Challenge

Do I replace inefficient?

- Yes!
- CAP & migrate
- Invest incrementally

Do the math!

- Use Energy Efficiency Calculator for FREE!
- Input your own numbers

Make the change!

- Don't wait, you can save NOW
- Know your power tax
- Reduce carbon footprint



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Case Study - VoIP Solutions with Efficiency

Greener Products = \$ Savings

Like for Like Power Consumption		Maximum System Power Dissipation (Watts)		Vendor A Energy Savings	Vendor B Energy Premium
Vendor A	Vendor B	Vendor A	Vendor B		
Call Servers	Call Servers	792	1095	28%	38%
Contact Center 50 Agents	Contact Center 50 Agents	2910	4224	31%	45%
IP Phone (10/100)	IP Phone (10/100)	3.20	6.30	49%	97%
IP Phone GE	IP Phone GE	8.00	12.9	38%	63%
Emergency Services	Emergency Services	0	501	100%	NA

Lower the Electric Bill: Right Architecture + Right products = Savings

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Independent Labs Testing Summary Case Study Comparison



Energy Efficiency Summary		Maximum System Power Dissipation (Watts)		Vendor A Energy Savings	Vendor B Energy Premium
Vendor A	Vendor B	Vendor A	Vendor B		
Core Switch	Core Switch	1072	1759	39%	64%
Floor/Closet Switch	Floor/Closet Switch	89	149	40%	67%
Branch Office	Branch Office	140	194	28%	39%

Select the right Core & Edge Switches & Branch office solutions

Very Large Enterprise 20,000 user network in NYC (.15c/kwh)

13,500 IP Phones, 8 Call Servers, 400 POE switches, 12 Ethernet Switches and 94 routers
Network costs can be reduced by **\$3.2M less to operate over 5 years !!!!**

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Various Tools



- **Energy Efficiency Calculator - Web**
- <http://www.nortel.com/energycalculator>
 - Easy to use
 - Input your own models and numbers
 - Envision the potential
 - Realize the results
 - Make better educated decisions
 - Save money!
- "Accenture **GREEN** Maturity Calculator"
 - http://www.accenture.com/Global/Technology/Technology_Consulting/GreenMaturityModel.htm
- Blogs
 - <http://blog.tmcnet.com/the-hyperconnected-enterprise/>

The screenshot shows the Nortel Energy Efficiency Calculator interface. It includes sections for 'Core Switch', 'Edge Switch', and 'Branch Office'. Each section has input fields for 'Model', 'Power (W)', 'Power (W)', and 'Power (W)'. There are also 'Calculate' buttons for each section. The 'Results' section on the right shows calculated values for 'Core Switch', 'Edge Switch', and 'Branch Office', including 'Power (W)', 'Power (W)', and 'Power (W)'. The interface is designed to help users estimate energy efficiency and power consumption for their network equipment.

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Tips, Training and reports available



- **Green Tips**
 - **Consolidate Servers**
 - Use **power management & Efficient Power Supplies**
 - Upgrade to **Energy Efficient Servers**
 - Take advantage of evolving standards such as Energy Star & **IEEE P802.3az**, SPEC (Standard Performance Efficiency Corp.)
 - Turn **off Printers, monitors, speakers**, etc..when leaving work
 - Select **Energy Efficient Network products** for your business
 - Buy what **you** need and use it !
- Training available – Videos, etc.
 - <http://www.nortel.com/neec>



36 <http://www.tolly.com/ts/2008/Nortel/ERS8600/Tolly208298NortelConvergedNetEnergyCosts.pdf>

Q & A



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