N+1 Networking

Jimmy Ray Purser
ProCurve Engineer,
Midwest

Chasing the “nines”

Availability %	Annual Downtime	Required Annual Uptime
90.000%	36.5 days	473,364 minutes
99.000%	3.5 days	520,700.4 minutes
99.900%	8.5 hours	525,434 minutes
99.990%	1 hour	525,907.4 minutes
99.999%	5 minutes	525,954.7 minutes
99.9999%	32 seconds	525,959.5 minutes

N+1 Terms

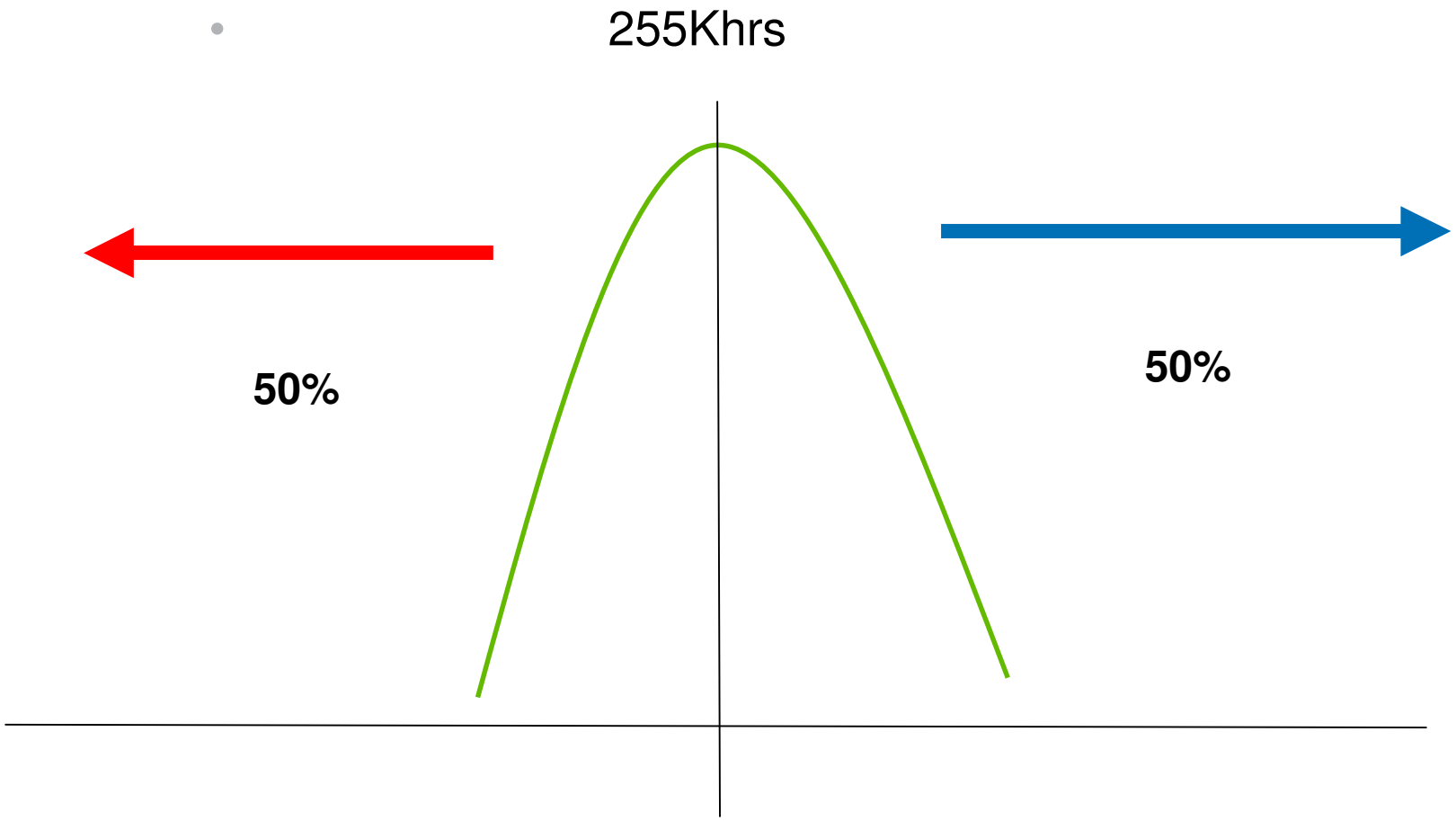
Servers
- FEC
- LACP

L2
- MISTP
- Switch Meshing

L3
- OSPF
- VRRP
- XRRP

Management
- SFlow

MTBF



Telcordia TS-332 and Mil-Dbk-217

N+1 is a combo of MTBF and MTTR

$$\frac{\text{MTBF}}{\text{MTBF+MTTR}}$$

- Therefore; If a HP 5308 had a composite MTBF rating of 384Khrs and it took 2.4 hrs to detect, repair/replace the defective part, then:

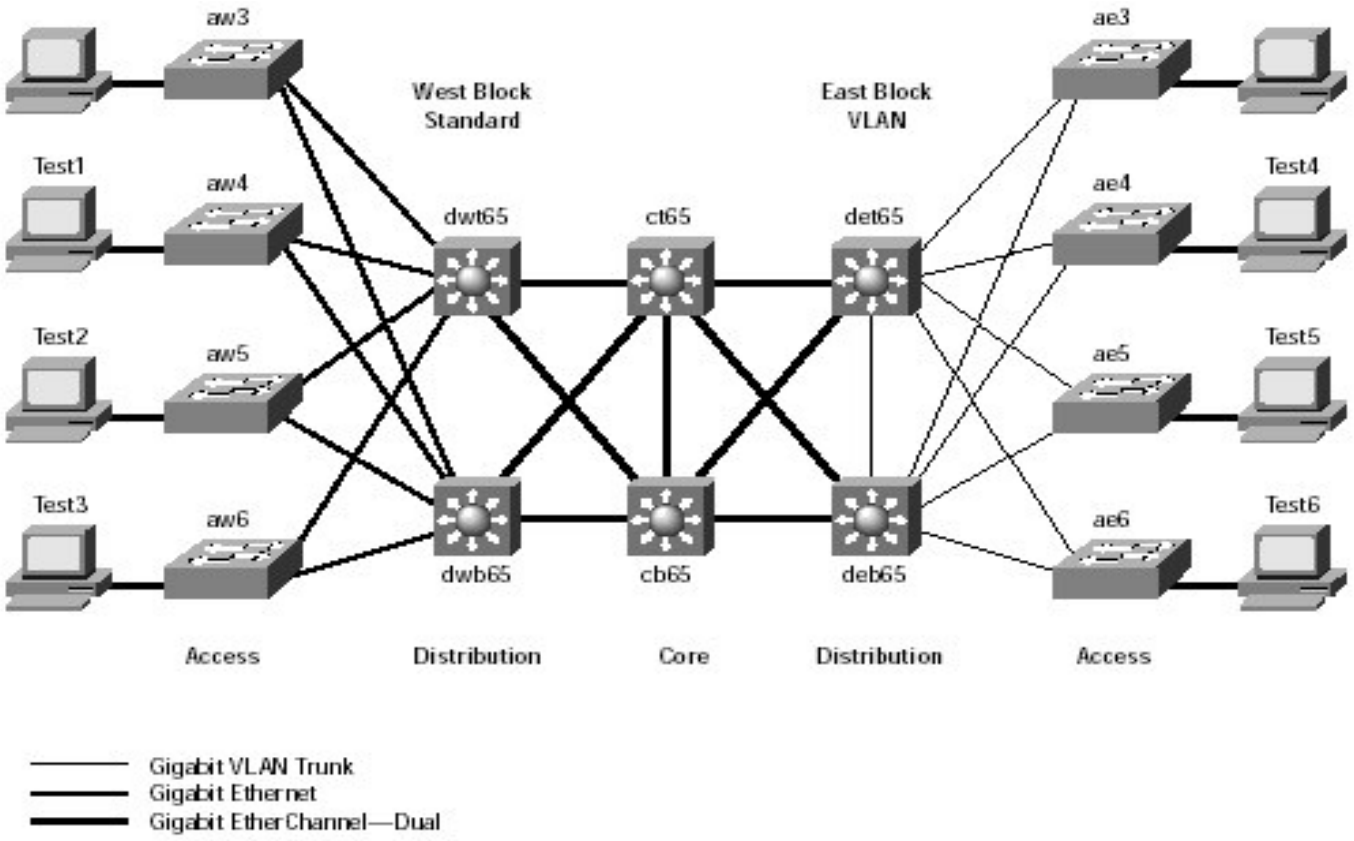
$$\frac{384{,}000}{384{,}000+2.4}$$

Availability = 99.9994%

- Everyone LOVES to sell L3 at the core. But why?

Cisco Says……

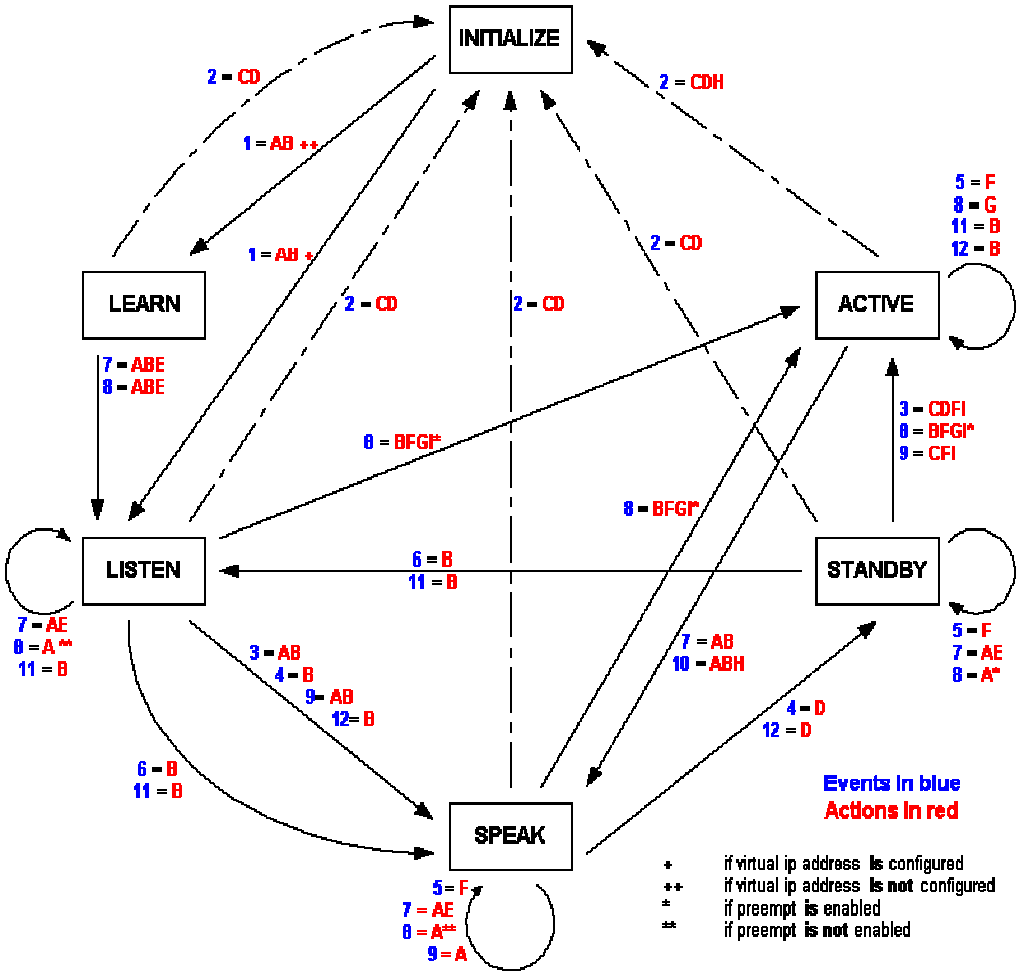
- HSRP is the way to go:



HSRP Recovery Times

Test	Failure	Time of Interruption	Recovery Mechanism
Wiring Closet Uplink			
	Fail	4s	HSRP
	Restore	1s	HSRP
Distribution Switch			
	Fail	4s	HSRP
	Restore	1s	HSRP
Core Switch			
	Fail	4s	HSRP
	Restore	30s	(See note below)

However, troubleshooting HSRP is another story…..



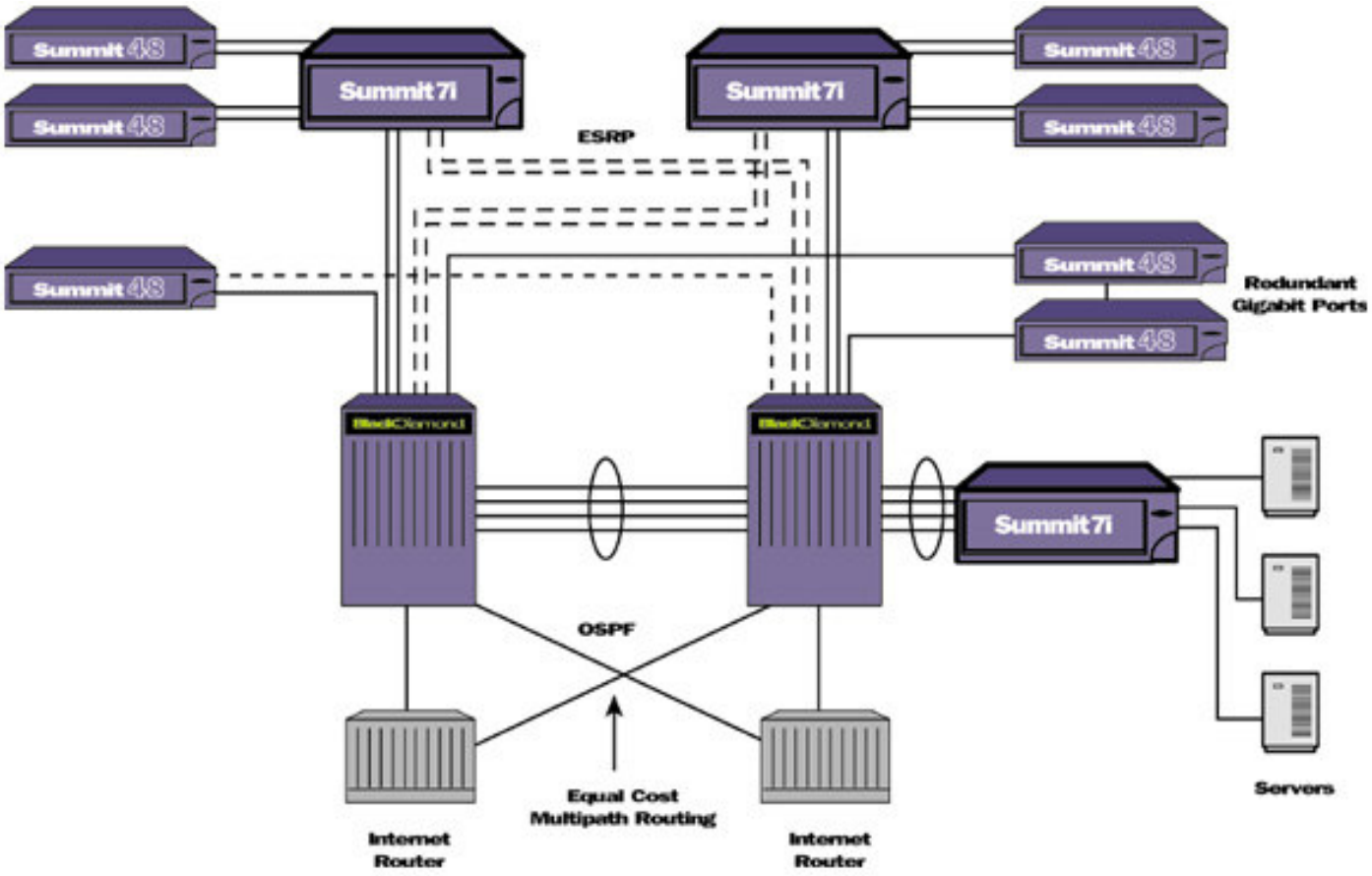
CORRECTION

The China Seafood Restaurant ad that ran in last Saturday's Green Section was incorrect. It read 中国海鲜餐厅. It should have read 店饭鲜海国中. We regret any inconvenience this may have caused.

CHINA SEAFOOD RESTAURANT
6400 HORSEPEN RD. 282-7055

Extreme Says…

- ESRP is the way to go:

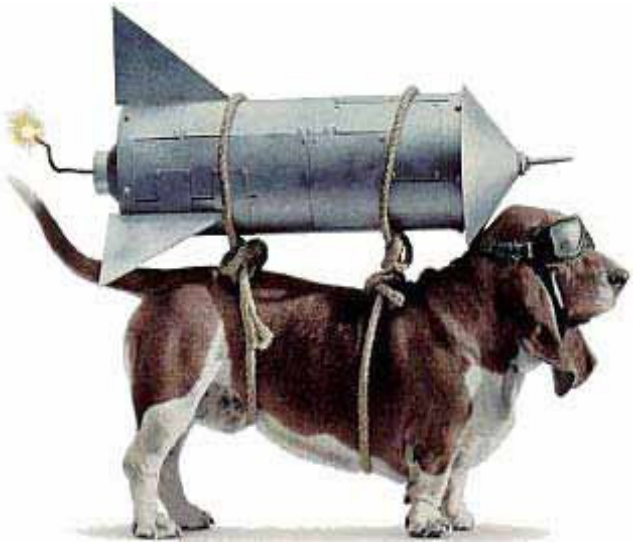


ESRP Recovery Times

- Failure Detection: 4 Seconds
- Recovery: 2-8 Seconds
- *Hmmmm…..*What is the recovery time for RSTP?

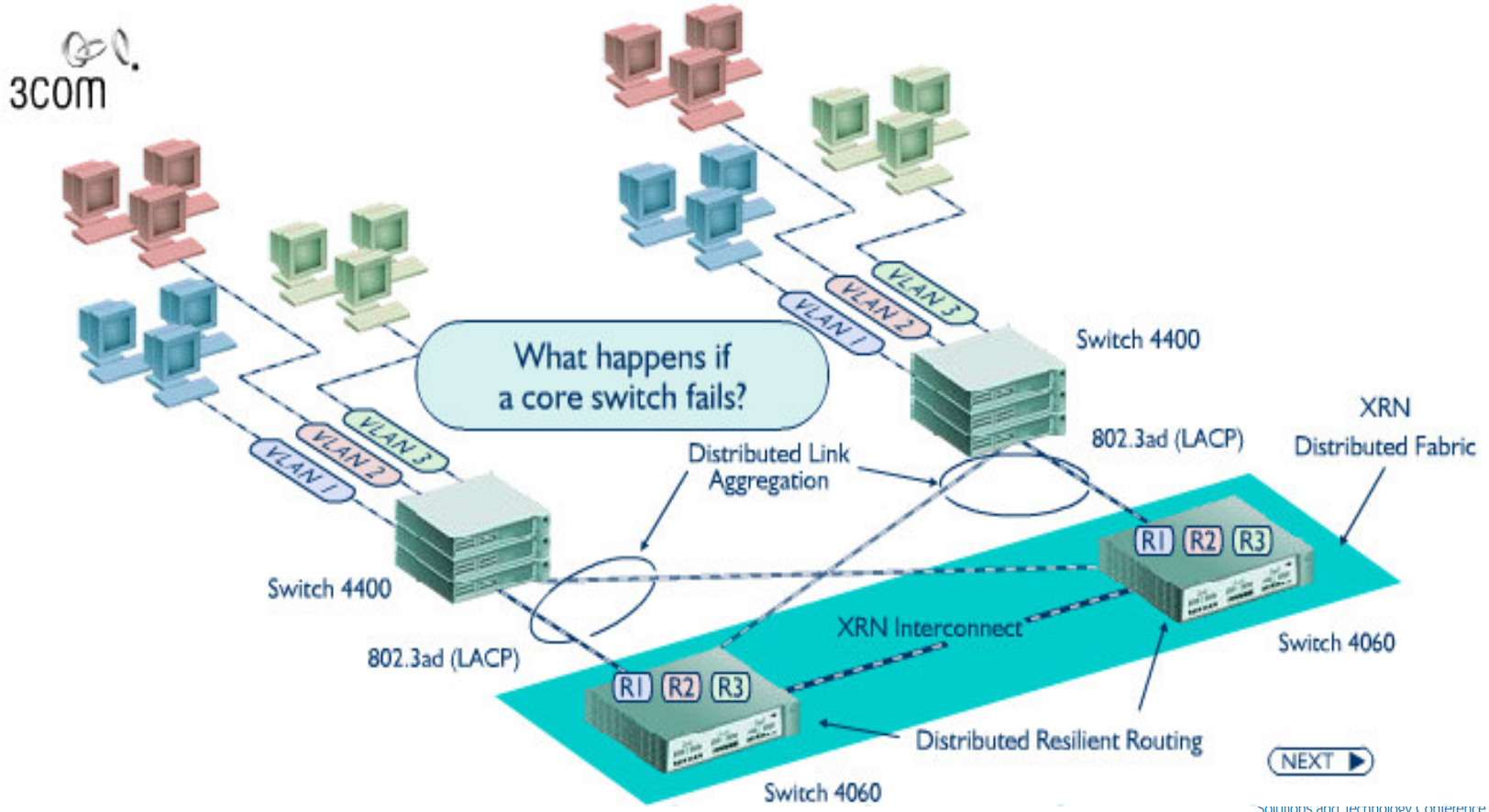
Troubleshooting Issues:

- Same as Cisco complicated HSRP state changing…
  - A rose by any other name……
- **BIG TIME BUGGY FIRMWARE PROBLEMS!!!**



3Com Says…

- XRN is our next “New” thing:



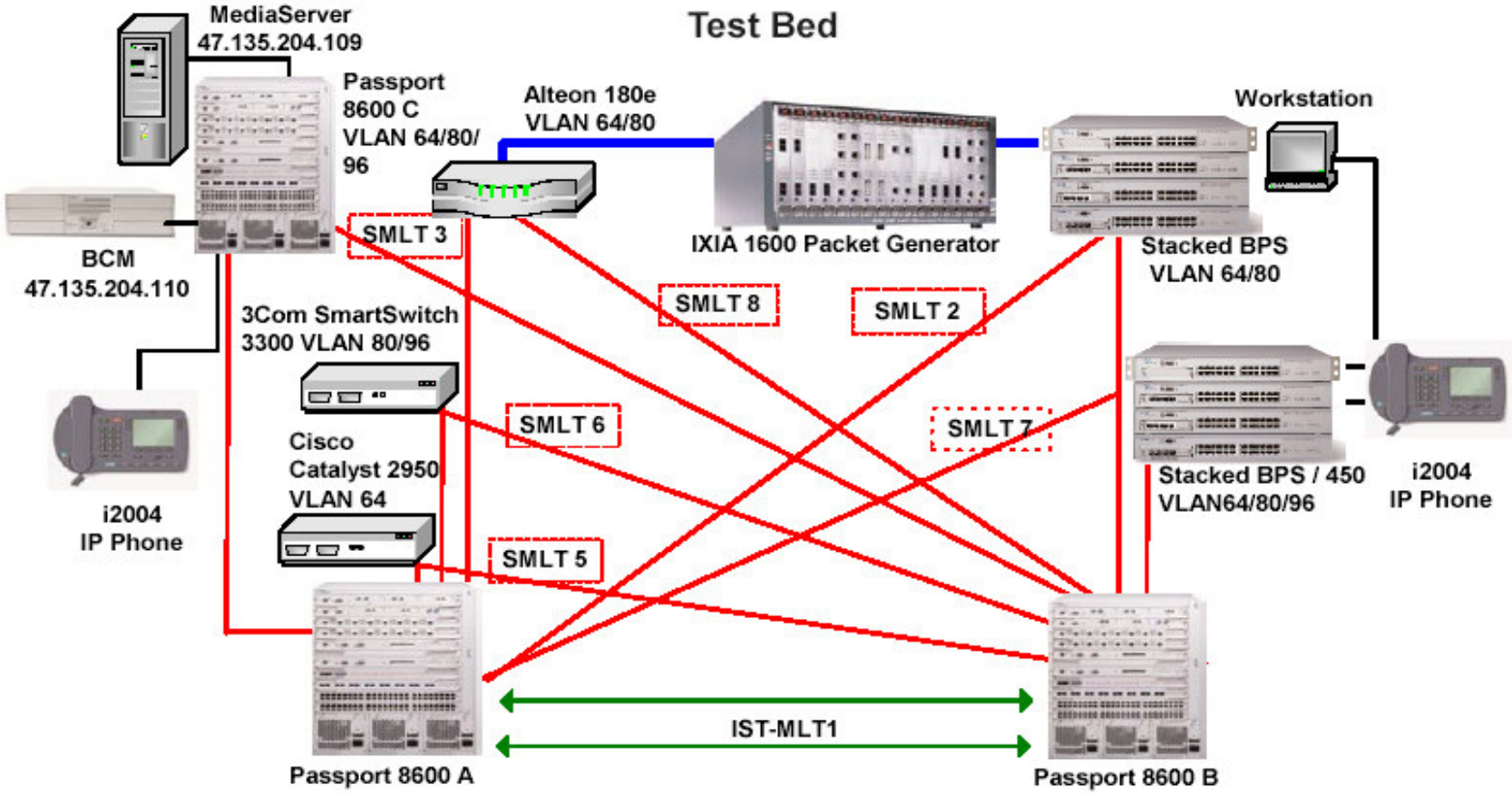
The Problem is:

- - Sucks at L3. Really for L2.
- - Does not scale very well
- - Requires extra hardware
- - Very New and unproven. Since this is 3Com, this is BIG DEAL
- - In the end, it's just stacking chassis with a proprietary protocol to manage it (DDR).

No, Brian! Don't do it!

Nortel Says…

- SMLT is the way to go:



SMLT Recovery Times

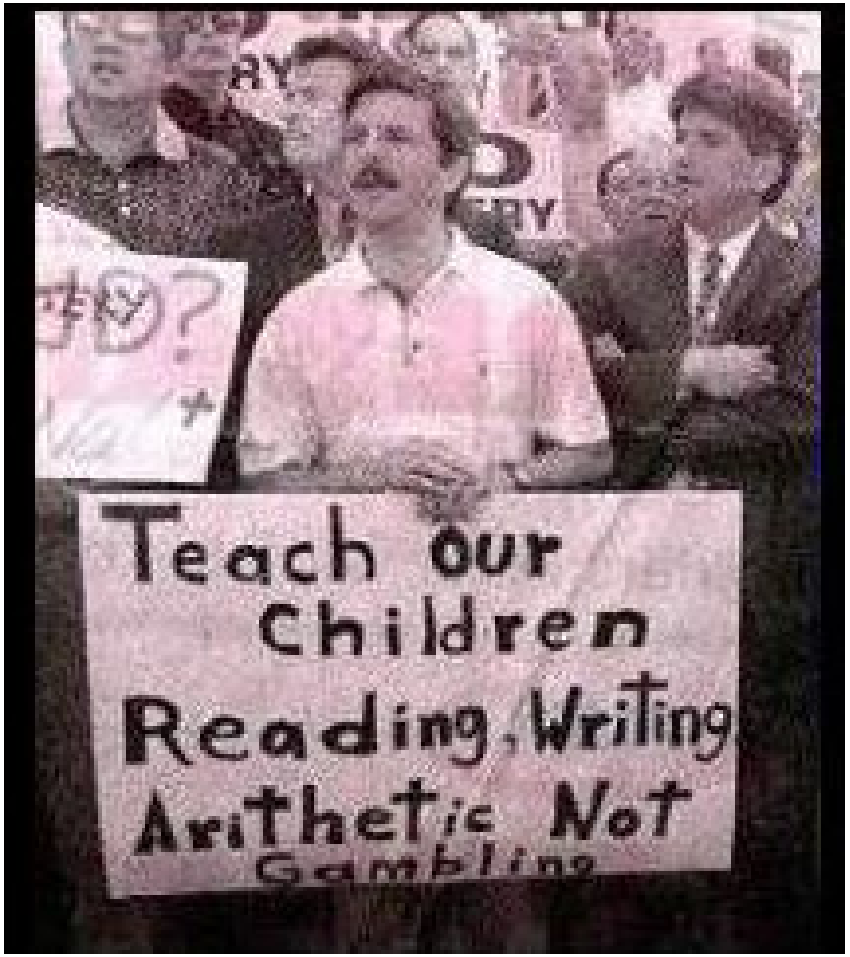
High Availability/Reliability of Nortel Networks Passport 8600 Routing Switch

Average recovery time (in seconds) of induced failures of network and system functions

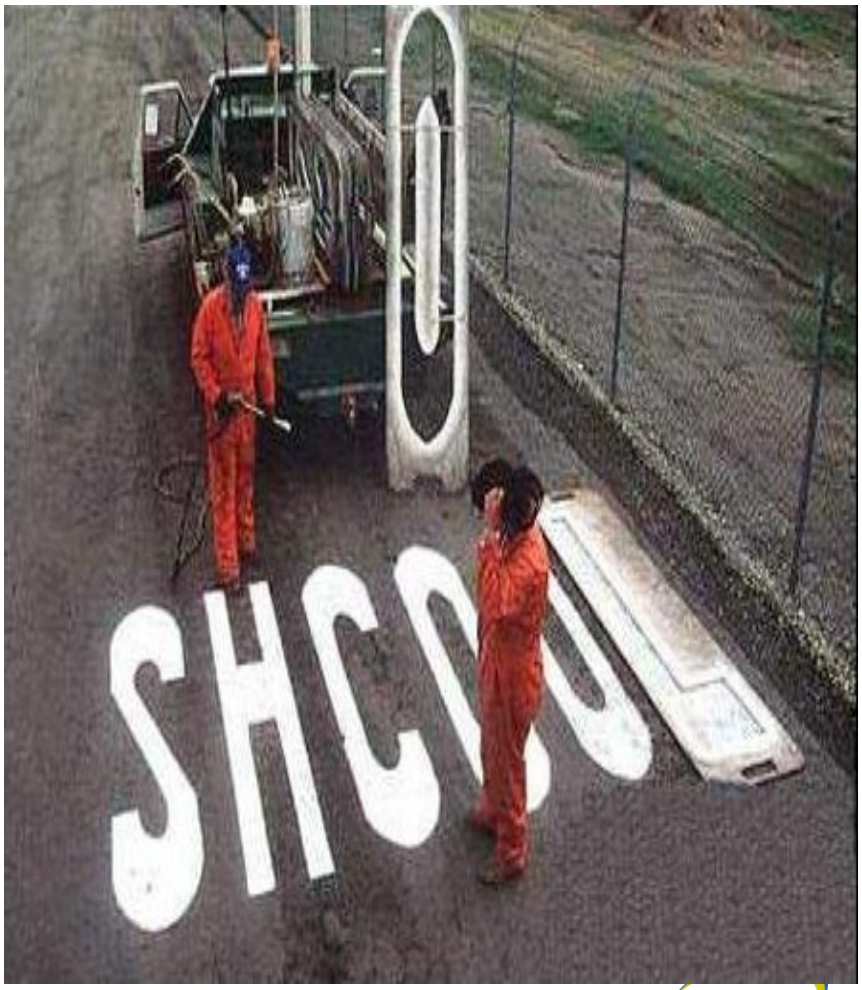
Type of induced failure	Average recovery time (seconds)
Passport 1 failure/Link failure (master switch)(Split MLT)	0.91
Passport 1 (Fast or Gigabit) Ethernet module	0.38
Passport 1 master CPU	0.00
Passport 1 loss of single power supply	0.00
Passport 1/Passport 2 loss of IST	0.53
Passport 2 failure (standby switch)(Split MLT)	0.00
BPS hybrid stack link 1 (primary) of 2GigMDA (Split MLT)	0.74
BPS hybrid stack link 2 (backup) of 2GigMDA (Split MLT)	0.00
Passport 3 master switch fabric (Layer 2)	0.00

Wow…Kinda Cool

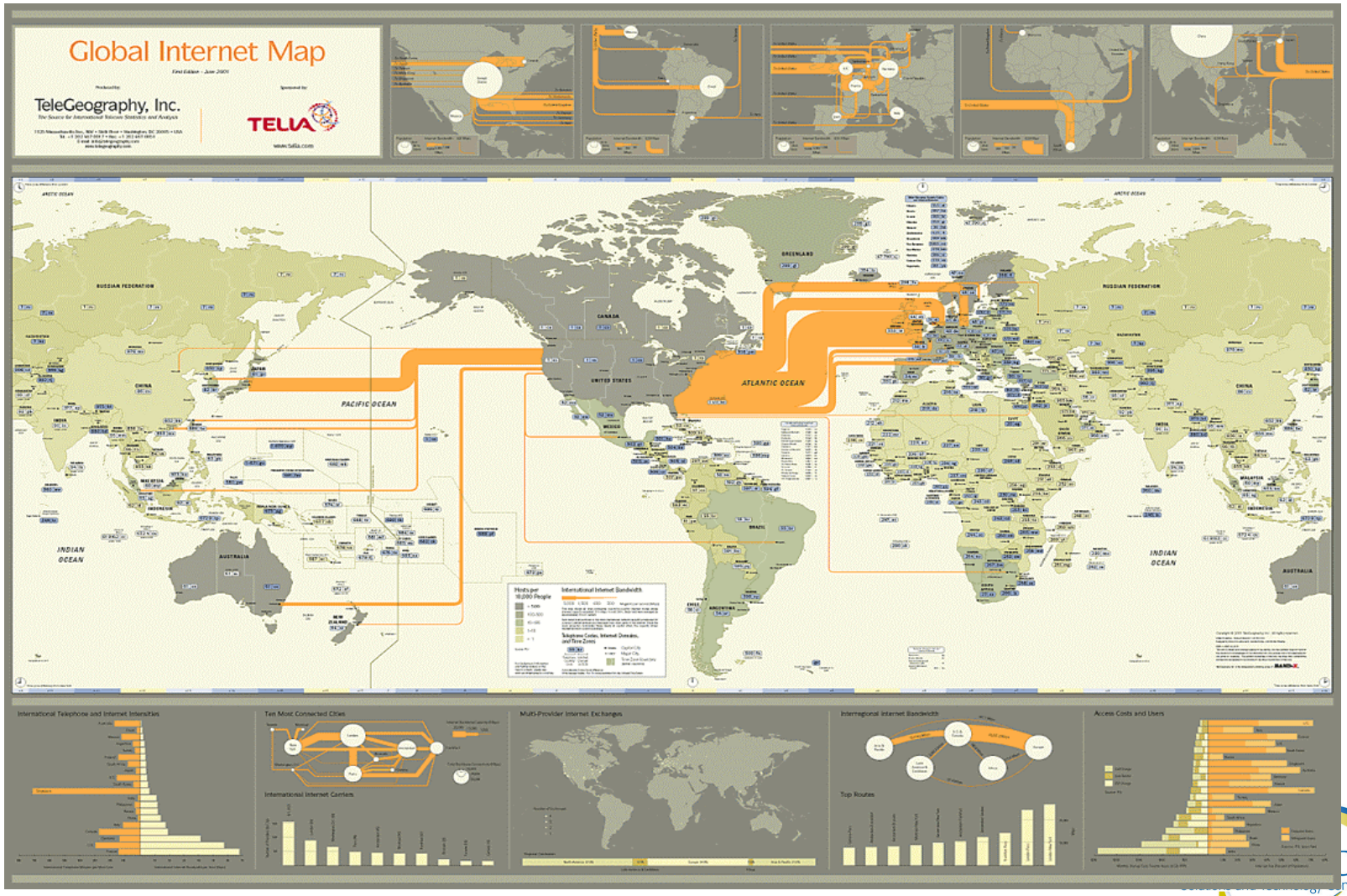
- - SMLT works good. In the end, it is really just standards based 802.3ad link aggregation at L3.
- - Results are confirmed by Tolly Report 202123
- - Been there done that….



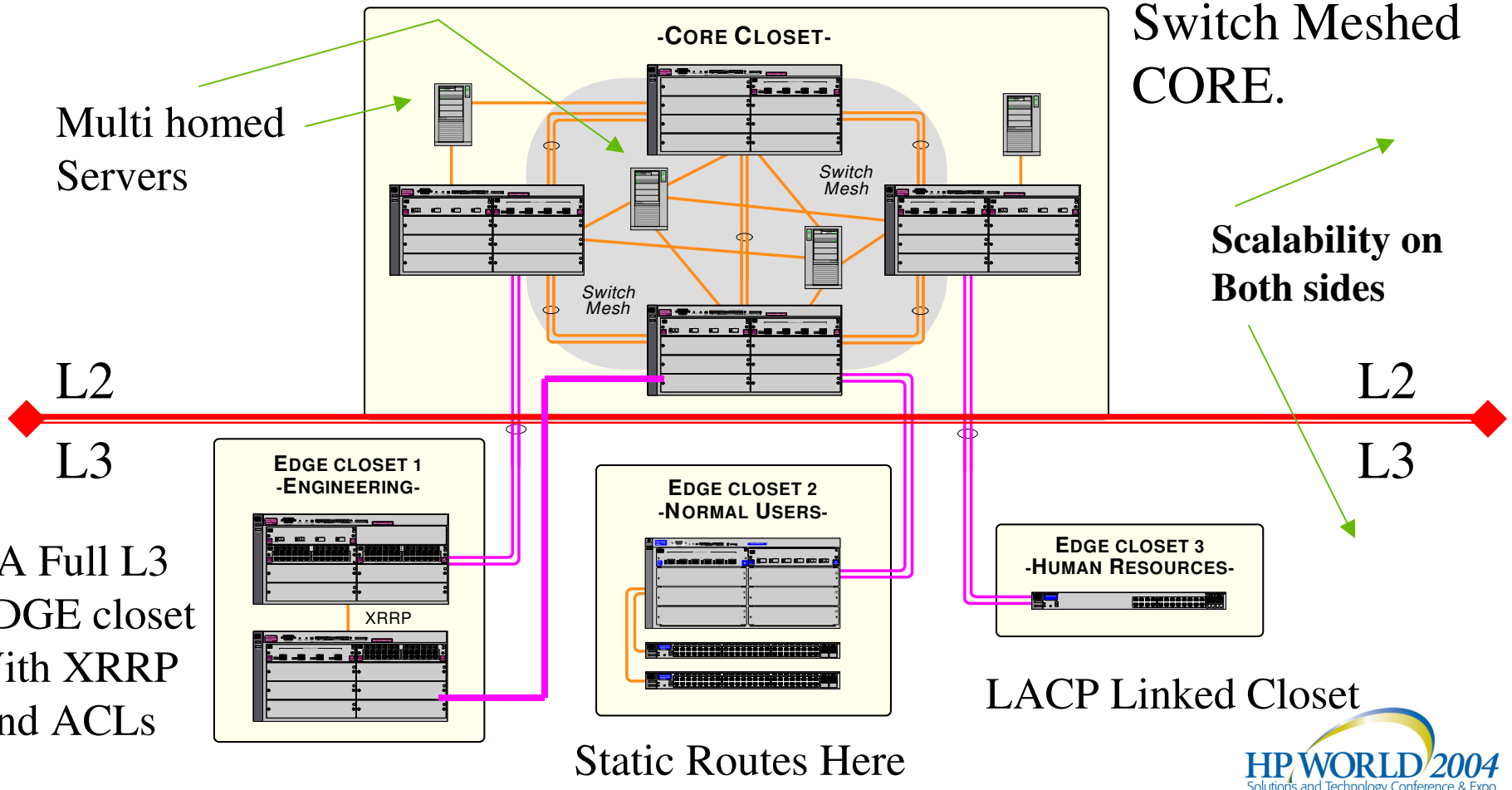
- Why Re-Invent the Wheel? Let's learn from history and use something that already works…



The Internet!!!



HP ProCurve Brings the Reliability of the Internet to your LAN:



Step into the 21st Century of Networking

- - Sub Second Fail Over >.02mS. Both STATES!
- - Easy Troubleshooting
- - No end user configuration
- - No end user Intervention
- - Mature, Proven Technology
- - Very easy to set up
- - Interoperates with all other standards (RSTP,STP, LACP)
- - This design allows TONS of flexibility and config options. RSTP,LACP,OSPF etc…
- - Control at the EDGE, reliability at the CORE.

Keep in Mind

- In the core, ***ALL*** vendors use a proprietary technology for redundancy. Even vendors pushing VRRP use proprietary extensions.

- - Too bad for them since ours is much better then anything out there today.

Putting it all together

Company Y is a manufacturer with just over 300 employees. Once a month, they experience around 3-4 hours of downtime. So breaking this down per day, a normal month has 22 working days. 3 hours per month is 8 minutes of downtime a day. Consider the following:

- Company Y brings in approx $34,000 per day. That's $4250.00 per hour
- Company has 308 employees. An estimated overhead for 308 employees is $7.58 per hour. Therefore, 308x7.58=$2334.64 per hour in overhead.
- Average hourly pay for 308 employees is $12.85. Therefore, 308x12.85=$3957.80 per hour.

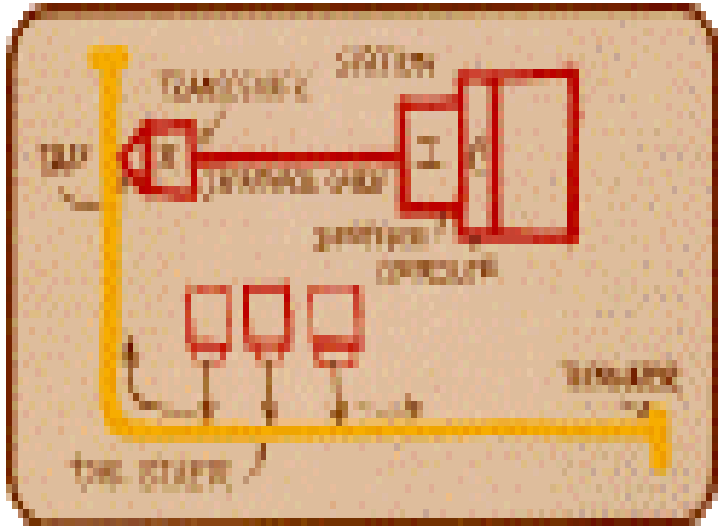
Now that the background is established, lets throw in a network outage.

- Consider 3 hours of downtime that effects only 50% of your staff 154 employees.
- Lost revenue 3 hours x 4250.00=$12750.00
- Cost of lost overhead 3 hours @ $7.58 x 158=$1197.64
- Cost of lost pay 3 hours @ 12.85 x 158=$2030.30

Total cost of 3 hours downtime per month: **$15,977.94** Computed annually this would come to a grand total of **$191,735.28.** This is only for an outage that effects half of your staff.

Nobody needs the EDGE

- **- 1992: 16 Meg Token Ring will replace Ethernet**
- **- 1995: ATM will replace Ethernet**
- **- 1996: Nobody needs switching at the edge**
- **- 1997: Nobody needs 100meg to the edge**
- **- 1998: Nobody needs 1 GB**
- **- 1999: GB over copper is impossible**
- **- 2000: Nobody needs QoS at the edge**
- **- 2003: Nobody needs L3 at the edge……**

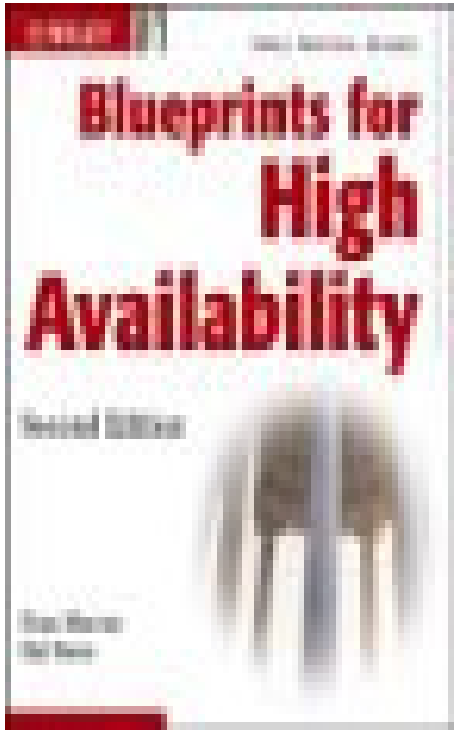


Final Recommendation

- The Defacto Standard on HA Networking:

Blueprints of High Availability

by Marcus and Stern




hp
invent

HP WORLD 2004

Solutions and Technology Conference & Expo

Co-produced by:

interex

shared knowledge • shared power

encompass

AN HP USER GROUP

RECOMMENDED TRAINING VENUE FOR THE

HP Certified Professional