



Cold Spring Harbor Laboratory

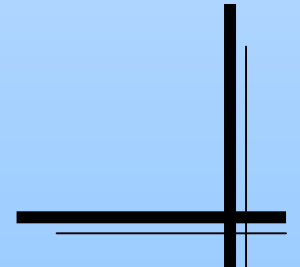


R. Michael Townsend

Director of Information Technology



Delivering Basic IT Infrastructure: Biomedical vs. Financial Institutions



Environment Comparison

BioMedical

- Scientific Labs, Clinics, Hospitals
- non-profit / R&D
- Long term process based metrics (e.g. reviews)
- Technology augmented
- Increasingly IT centric
- Heterogeneity & diversity common
- High user cost from diversity
- High throughput on networks
- Regs: HIPAA; CFR21 Part 11

Financial

- Bus. Divisions, Banks, Brokerage Houses
- For profit / profit margin
- Short term metrics (e.g. ROI)
- Technology driven
- Mission Critical IT centric
- Homogeneity & standards mandated
- High core cost due to superior technology
- High volume of networks
- Regs: SEC; SOX; GLB; CSBIA

Information About CSHL

CSHL is a well recognized research and educational institution on the North Shore of Long Island.

The Laboratory has research programs focusing on cancer, neurobiology, plant genetics, genomics and bioinformatics, and a broad educational mission, including the recently established Watson School of Biological Sciences.

There are about 1000 people total at the CSHL:

- **~52 Labs**
- **168 Post Docs**
- **99 Graduate Students**
- **179 Laboratory and other scientific staff**
- **Of the ~50% remaining ~23 are in the IT Dept.**

Technology & Communications cost: ~2.7M (central)

Information about Financial Institutions

FI's cover all financial investment vehicles globally. Specialization varies by firm, but principle areas of focus (or Divisions) typically include: Equities, Fixed Income, and Investment Banking.

| "FI" | | 2002 | 2003 | 2004 |
|------|----------|-----------------|-----------------|-----------------|
| LB | emp | 12,343 | 16,188 | 19,579 |
| | T&C cost | \$552,000,000 | \$598,000,000 | \$764,000,000 |
| | ratio | \$44,722 | \$36,941 | \$39,021 |
| MS | emp | 51,196 | 53,284 | 53,718 |
| | T&C cost | na | na | na |
| | ratio | na | na | na |
| GS | emp | 19,739 | 19,476 | 20,722 |
| | T&C cost | \$529,000,000 | \$478,000,000 | \$461,000,000 |
| | ratio | \$26,800 | \$24,543 | \$22,247 |
| ML | emp | 31,900 | 30,200 | 31,000 |
| | T&C cost | \$1,741,000,000 | \$1,457,000,000 | \$1,461,000,000 |
| | ratio | \$54,577 | \$48,245 | \$47,129 |

I'm small, but
I think big!



IT functions

- **Server Support**
- **Network Support**
- **User Support**
- **Technical Support**
- **Web Services**
- **Business Services**
- **Science Services**
- **Security**
- **Data Center & Env.**
- **E-mail Support**
- **Training**
- **Licensing**
- **Procurement**
- **Strategic Planning**
- **Project Management**
- **Automation**
- **Reporting**
- **SLA's, BC, DR, ...**

Ideas emphasized at large, mission critical, environments at FI's:

- **Analyze environment (efficiency, SPOF, security)**
- **Improve user perception (e.g. SLA's)**
- **Plan for Business Continuity (special case is DR)**
- **Consolidate server environment and promote scalability**
- **Improve network to accommodate multiple locations and failsafe connections and improve speed**
- **Make improvements in major applications**

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Found

- **Too many areas to examine thoroughly**
- **Disparate requests and solutions to common IT issues**
- **Legacy systems stranglehold**
- **IT department mostly reactive**
- **No contingency plans**
- **Little documentation**
- **Many single points of failure**
- **Many inadequate systems**
- **Change not well accepted**

... “hit the ground running” ... “back me up” ...

Game Plan

- **Departmental changes**
- **Environmental changes**
- **Technology changes**
- **Procedural changes**
- **User perception**

... “roll up the sleeves, we’re in for a long night” ...

“shake the tree”

...

“safety in numbers”

...

... “build it and they will come” ...

Environmental Changes

Inadequate UPS

- **30 minutes only**
- **Inadequate emergency arrival time**

Solution

- **Significant injection of battery time**
- **Load balance power use**
- **Set up preventative maintenance schedules**
- **Installation of automated monitoring device**
- **Result: 92 minutes on the clock & faster error notifications, lowering response times**

Environmental Changes

Inadequate AC

- **Need 23% more AC than available**
- **AC not available during power loss**
- **Building built around existing AC unit**

Solution

- **Remove walls**
- **Bring in the big gear**
- **Cut stuff up.**





Environmental Changes

No Backup Generator!

- **immediate need**
- **Must cover both UPS and AC unit**

Solution (Phased)

- **Temporary generator**
- **Permanent generator**

400 Kilowatts WOW!



Technology Changes

- **Replace legacy equipment where possible**
- **Seek maintainability**
- **Consolidate servers**
- **Increase capacity**
- **Match technology to user needs AND support staff**
- **Initiate BC and DR infrastructure**

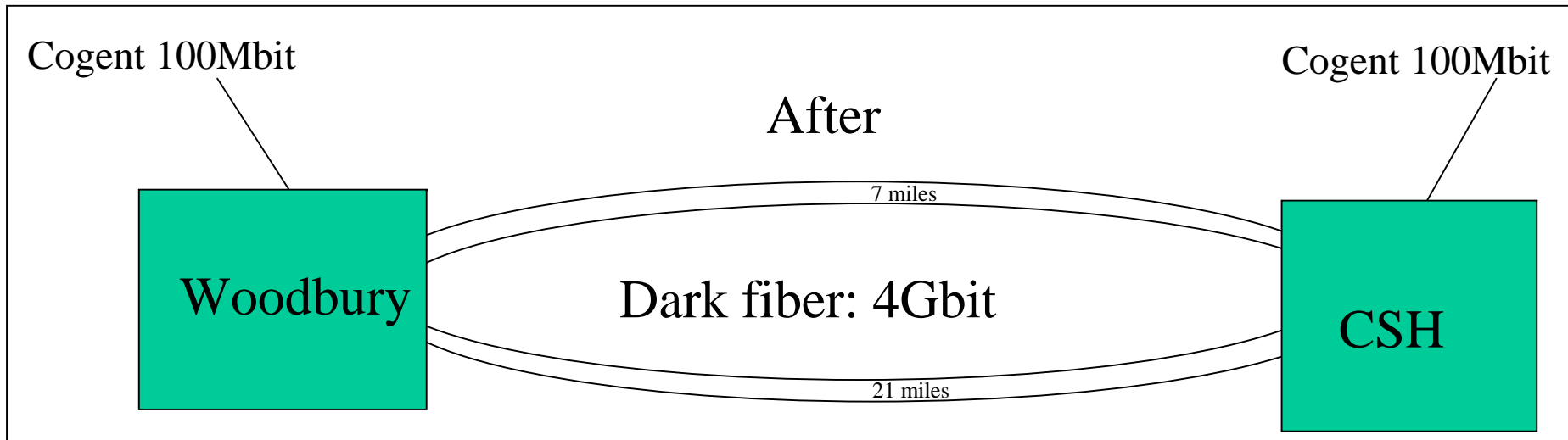
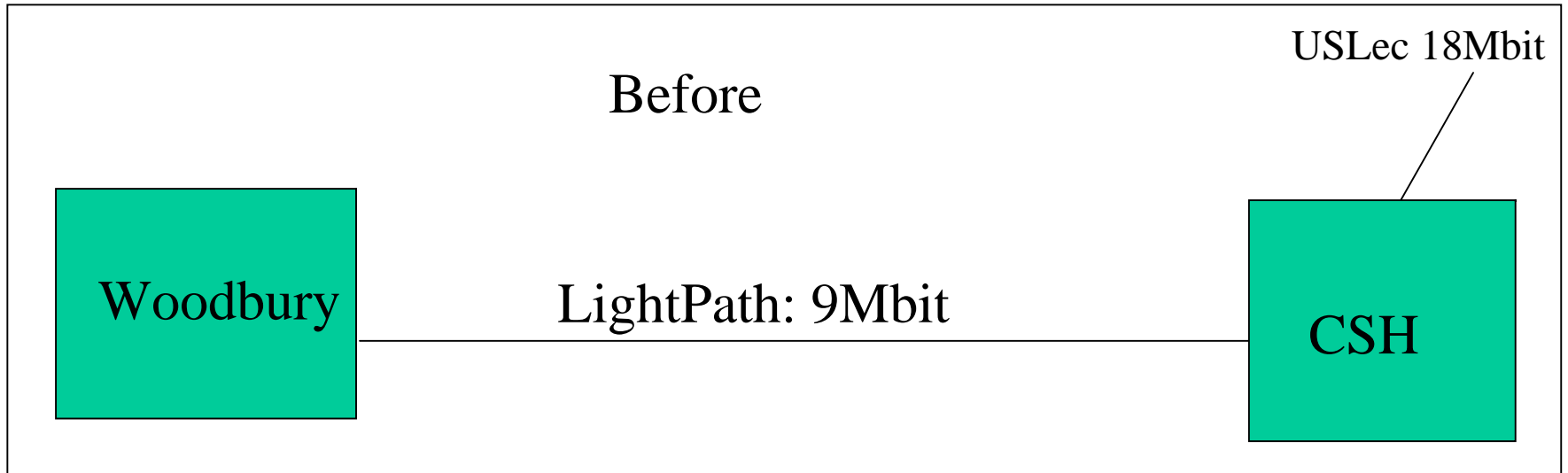


Technology Changes

Solution

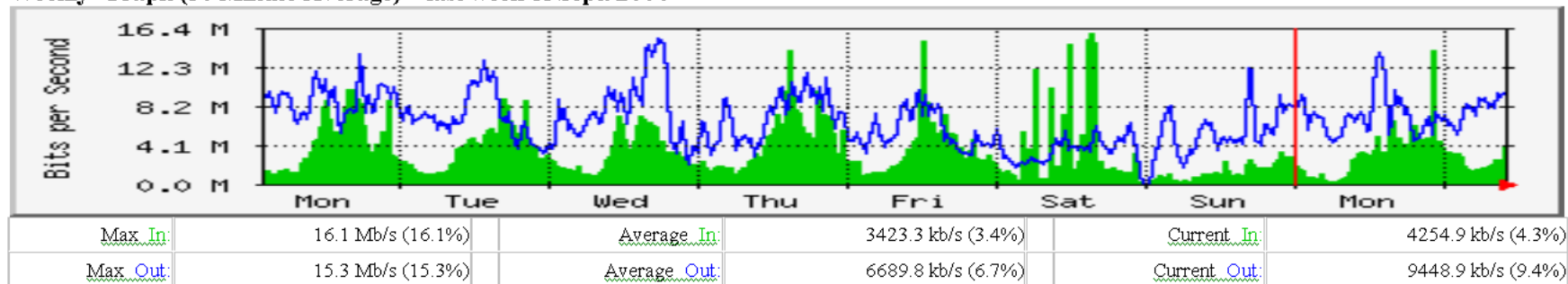
- **Reengineer network**
- **Shift to blade technology**
- **Modify Storage & backup strategies**

Network Infrastructure: Inter-campus pipe and ISP

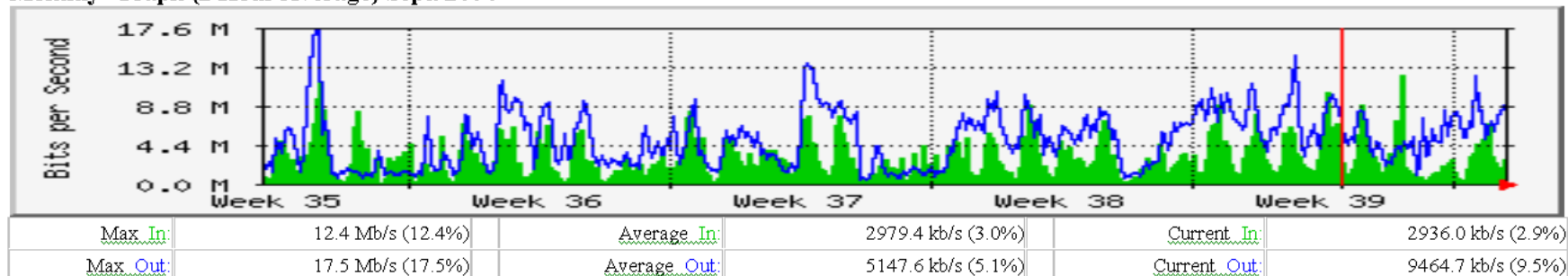


Network Stats (graphs = historical; comments at bottom = current)

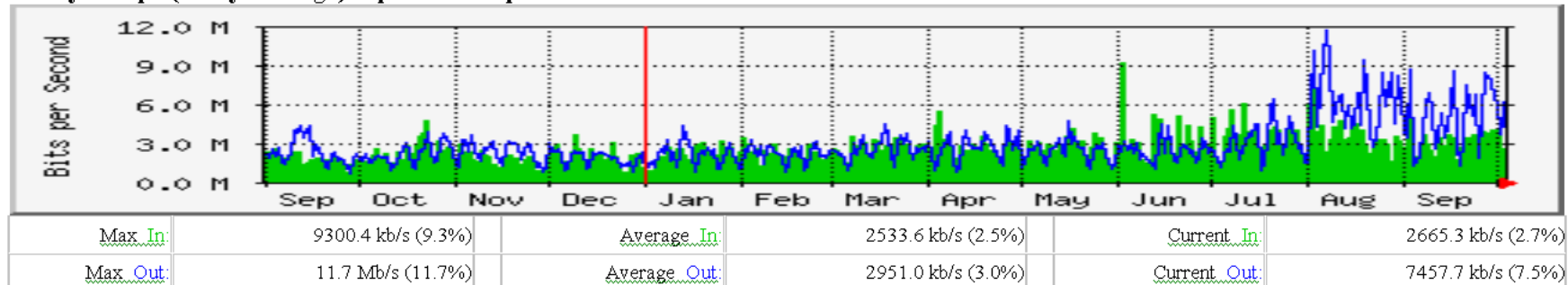
Weekly' Graph (30 Minute Average) – last week of Sept. 2004



Monthly' Graph (2 Hour Average) Sept. 2004



Yearly' Graph (1 Day Average) Sept.2003 – Sept. 2004

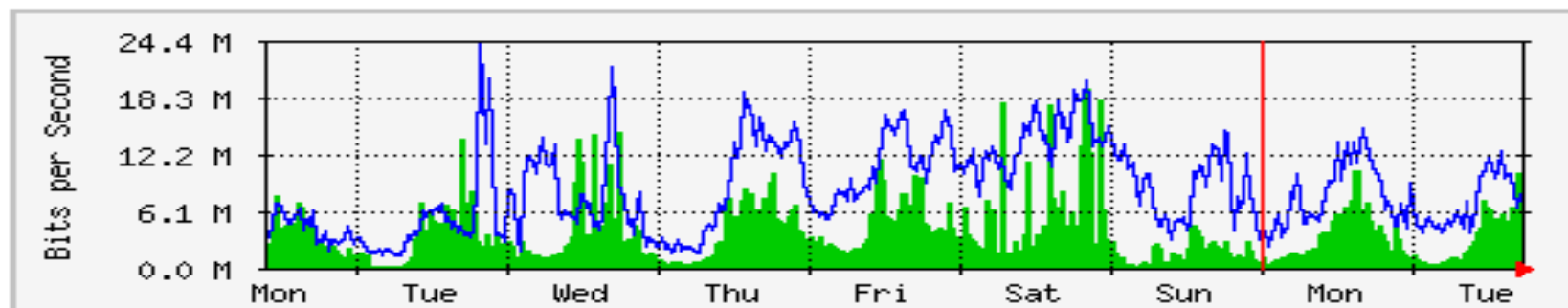


Post cutover to high bandwidth ISP (Cogent), Oct. 2 2004 – present:

Main Campus ISP traffic is similar to historical pattern, but spikes up to 30-45Mbs on the main campus firewall.

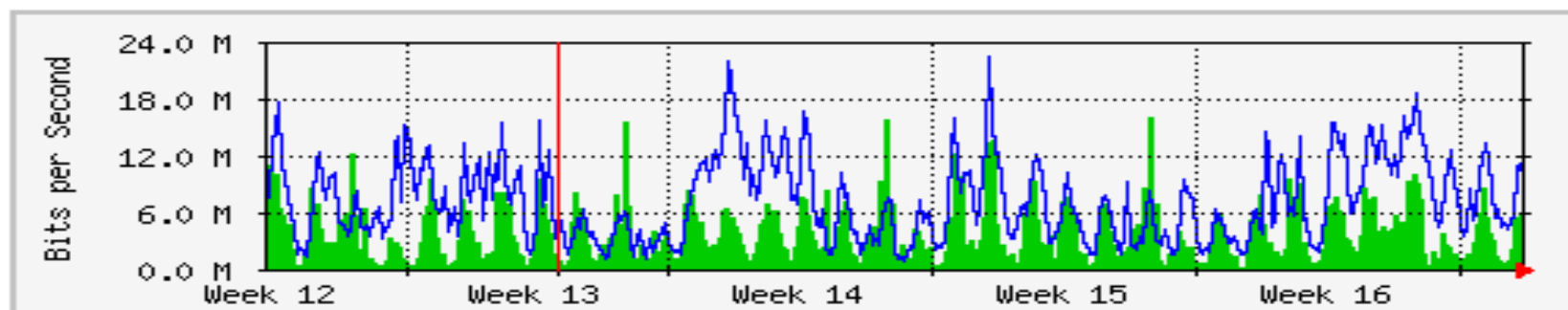
Woodbury ISP traffic runs on a separate firewall. Average daily bandwidth usage 2-3 Mbs. Occasional Spikes to 10-15Mbs.

'Weekly' Graph (30 Minute Average)



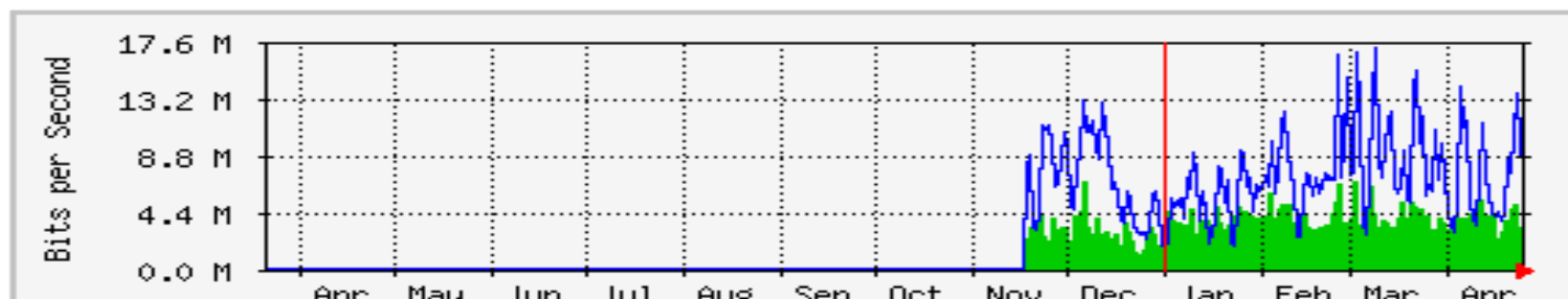
Max **In**:19.3 Mb/s (19.3%) Average **In**:3825.6 kb/s (3.8%) Current **In**:7014.4 kb/s (7.0%)
Max **Out**:24.3 Mb/s (24.3%) Average **Out**:8543.5 kb/s (8.5%) Current **Out**:7092.7 kb/s (7.1%)

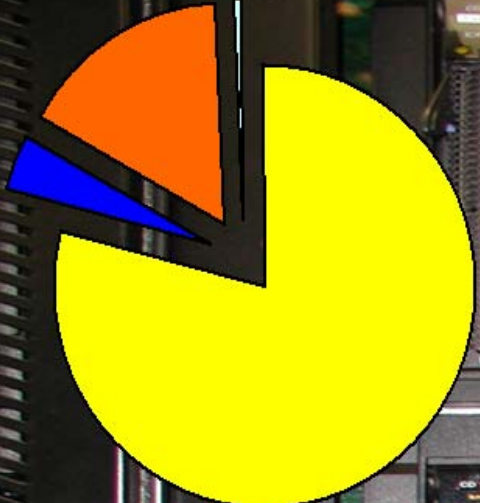
'Monthly' Graph (2 Hour Average)



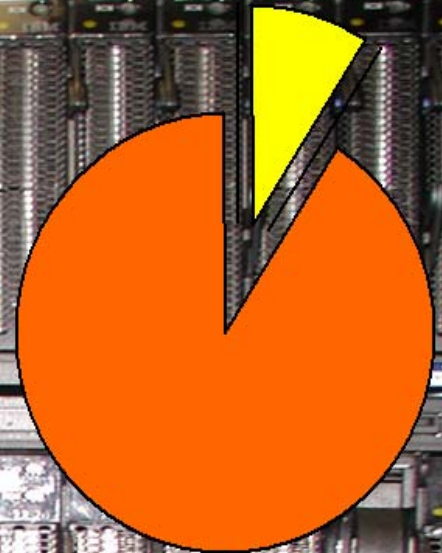
Max **In**:16.2 Mb/s (16.2%) Average **In**:3734.3 kb/s (3.7%) Current **In**:5785.7 kb/s (5.8%)
Max **Out**:22.5 Mb/s (22.5%) Average **Out**:7310.2 kb/s (7.3%) Current **Out**:9640.2 kb/s (9.6%)

'Yearly' Graph (1 Day Average)

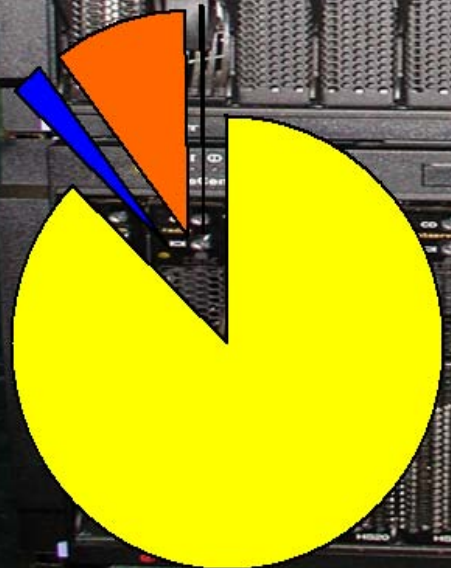




CSHL 2003



LB 2001

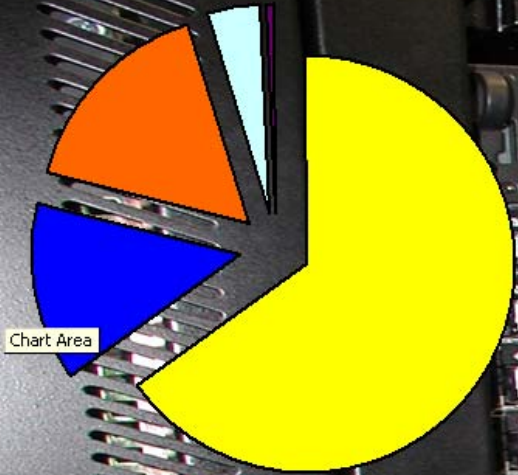


CSHL 2004

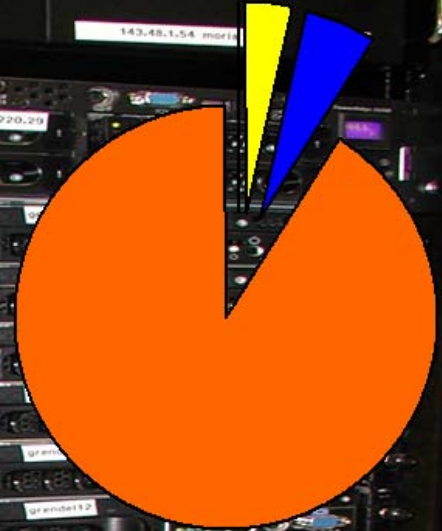


LB 2002

- Intel
- PowerPC
- SPARC
- Other



CSHL 2008



LB 2001



CSHL 2004

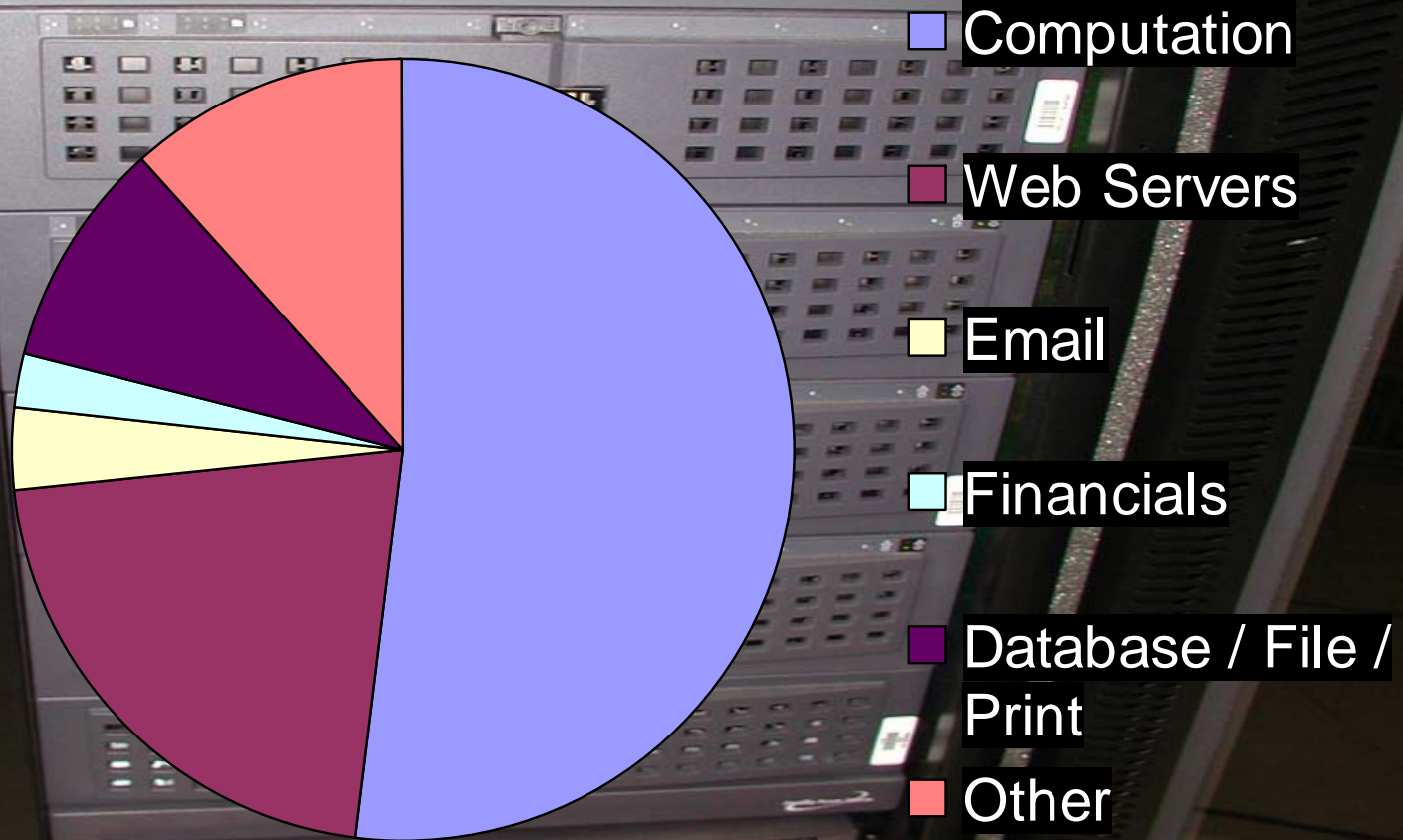


LB 2002

- Linux
- Windows
- Solaris
- MacOS
- Other

Chart Area

CSHL Server Functions



Storage & Backups

CSHL old (~26TB)

- Sun, Dell, PSSC, Rackable
- SCSI, ATA, FC
- JBOD, RAID
- Overland SDLT, ...

CSHL new (~50TB)

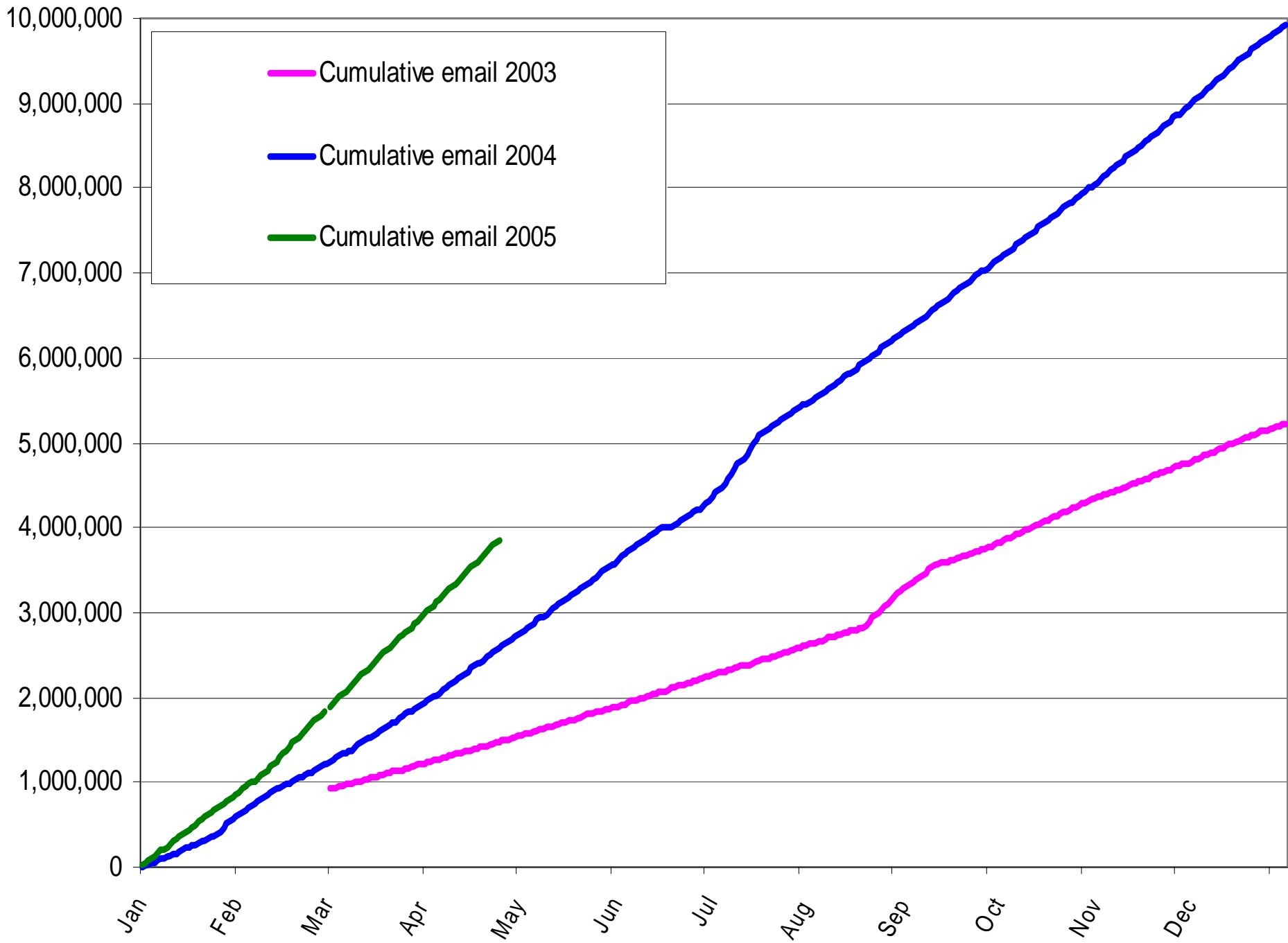
- Aberdeen, Nexan, XOSoft
- SCSI, SATA
- RAID & WanSync HA
- ??? ST w/SDLT or LTO?

FI's old (~200-500TB)

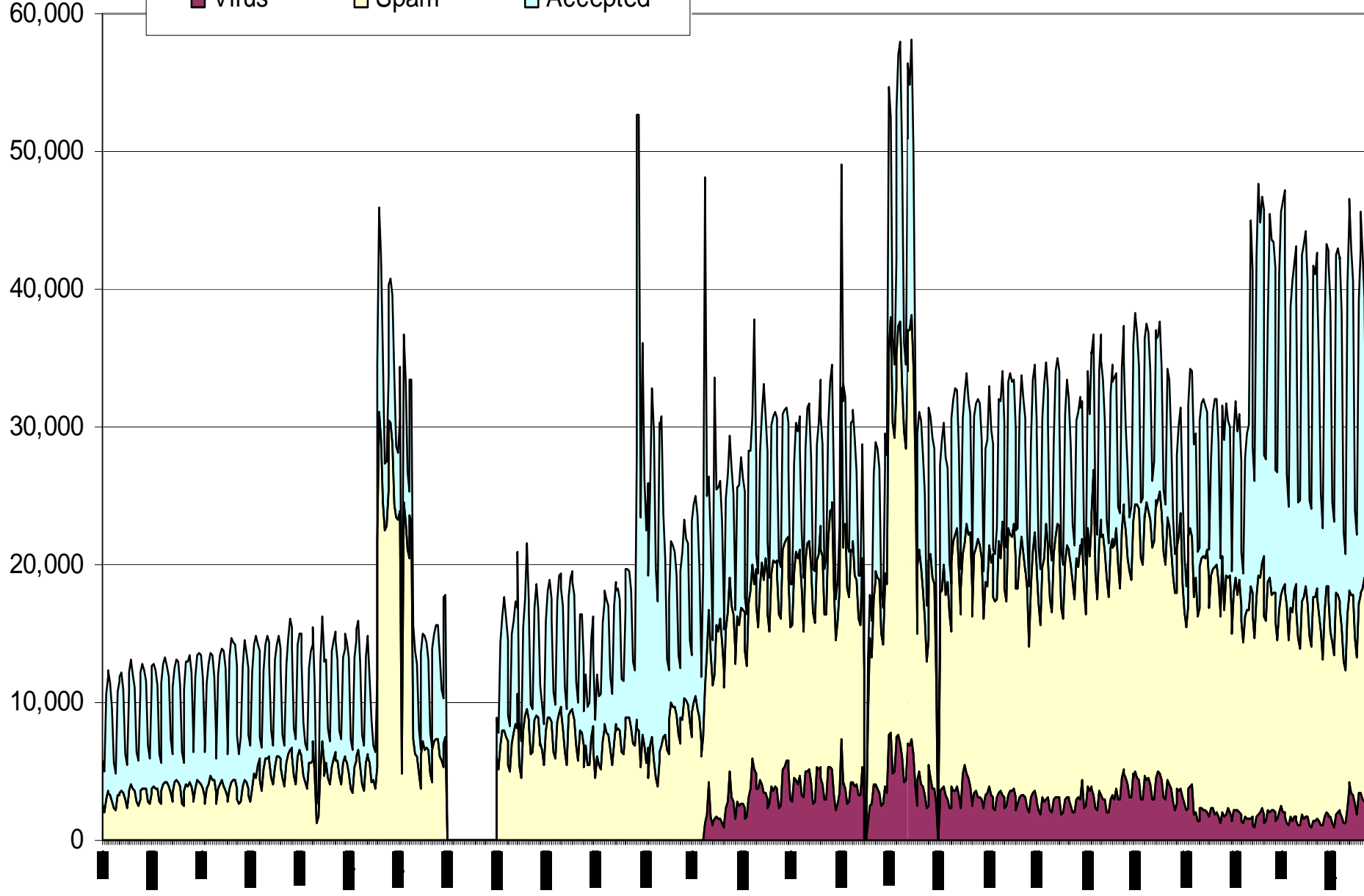
- Sun, Compaq, Hitachi, Clariion, DotHill, ...
- SCSI, FC, ESCON
- JBOD, RAID
- StorageTek Powderhorn

FI's new (~1PB)

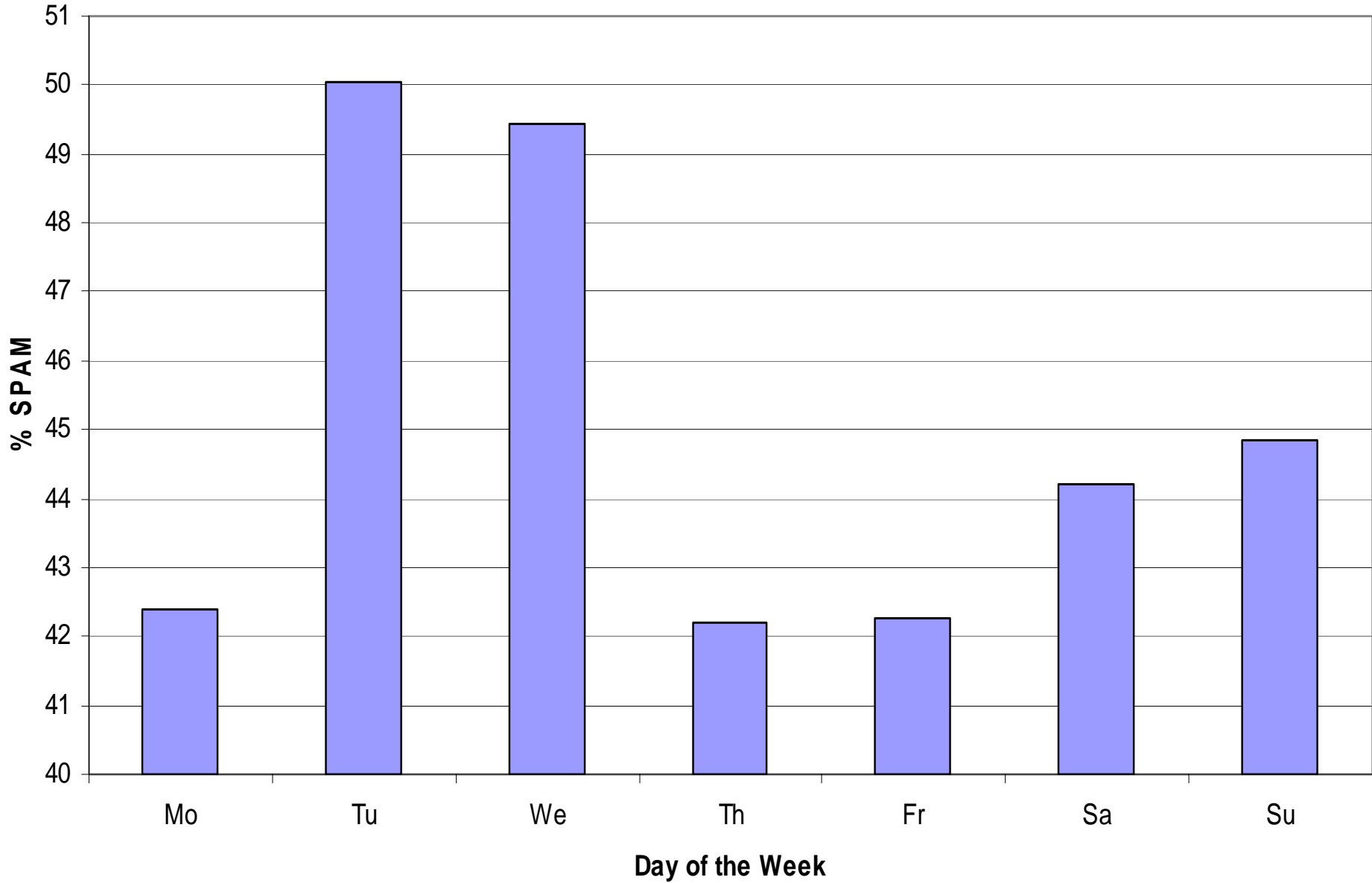
- EMC, NetApp
- FC, SATA
- RAID & SRDF & BCV's
- ???



Daily Email stats



Av. % SPAM for each day of the week



Remaining issues

- SPOF
- Inadequate physical space
- New operations (e.g. UC; Greenlawn)
- HPCC
- Expected growth
- Personnel to accommodate increased coverage!

A photograph of two marine iguanas resting on a dark, textured rock. The iguanas have dark, scaly skin with some reddish-brown patches. One is in the foreground, and another is slightly behind it. Two speech bubbles are overlaid on the image. The first bubble, with a blue border, is at the top and contains the text "Thanks for sharing!". The second bubble, with a pink border, is at the bottom right and contains the text "No problem!".

Thanks for sharing!

No problem!