



Presentation to the UNIX Administrators

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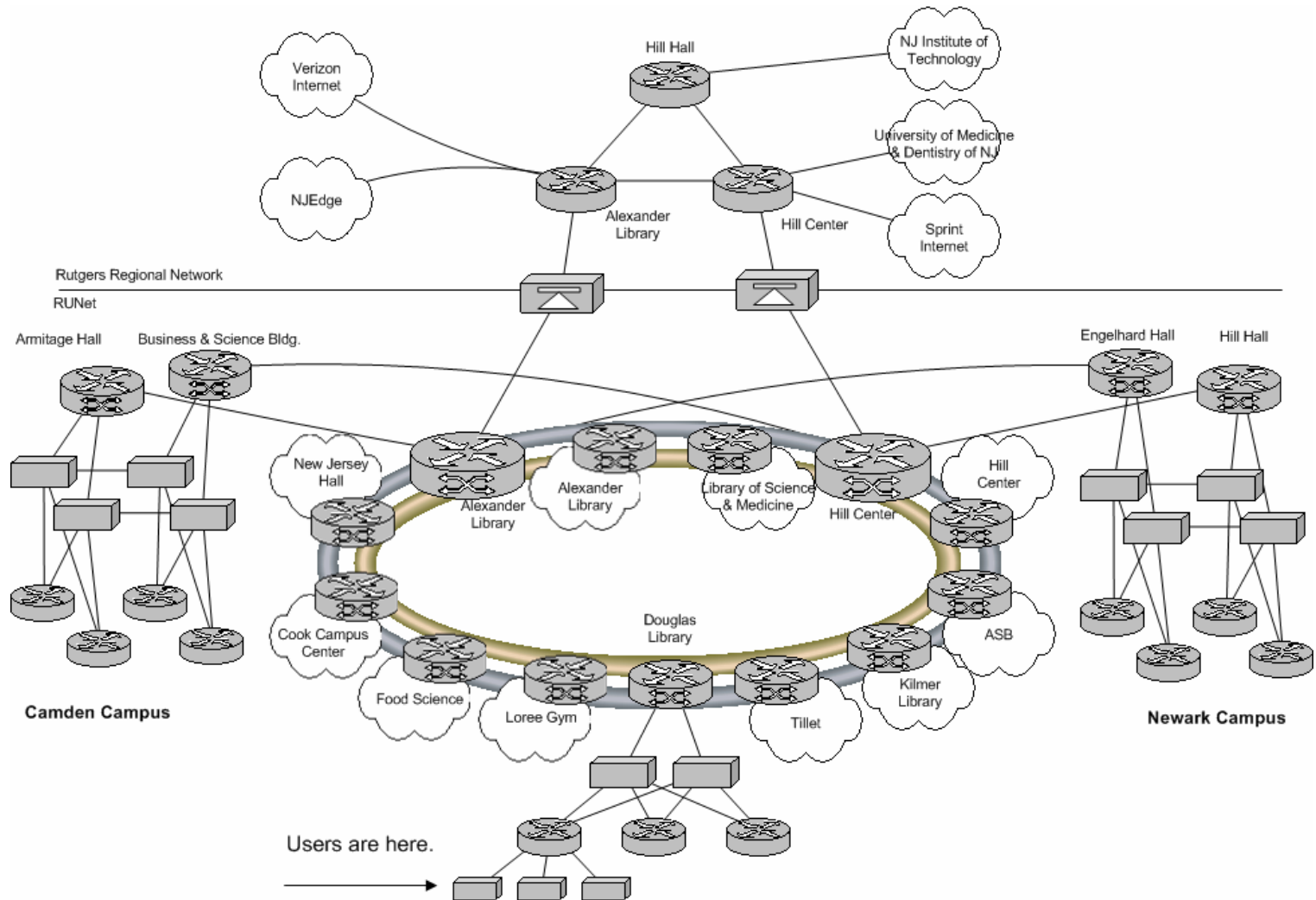
Today's discussion

- Quick review of RUNet structures and services
- Current RUNet technologies
- Evergreen proposal
- New RUNet technologies

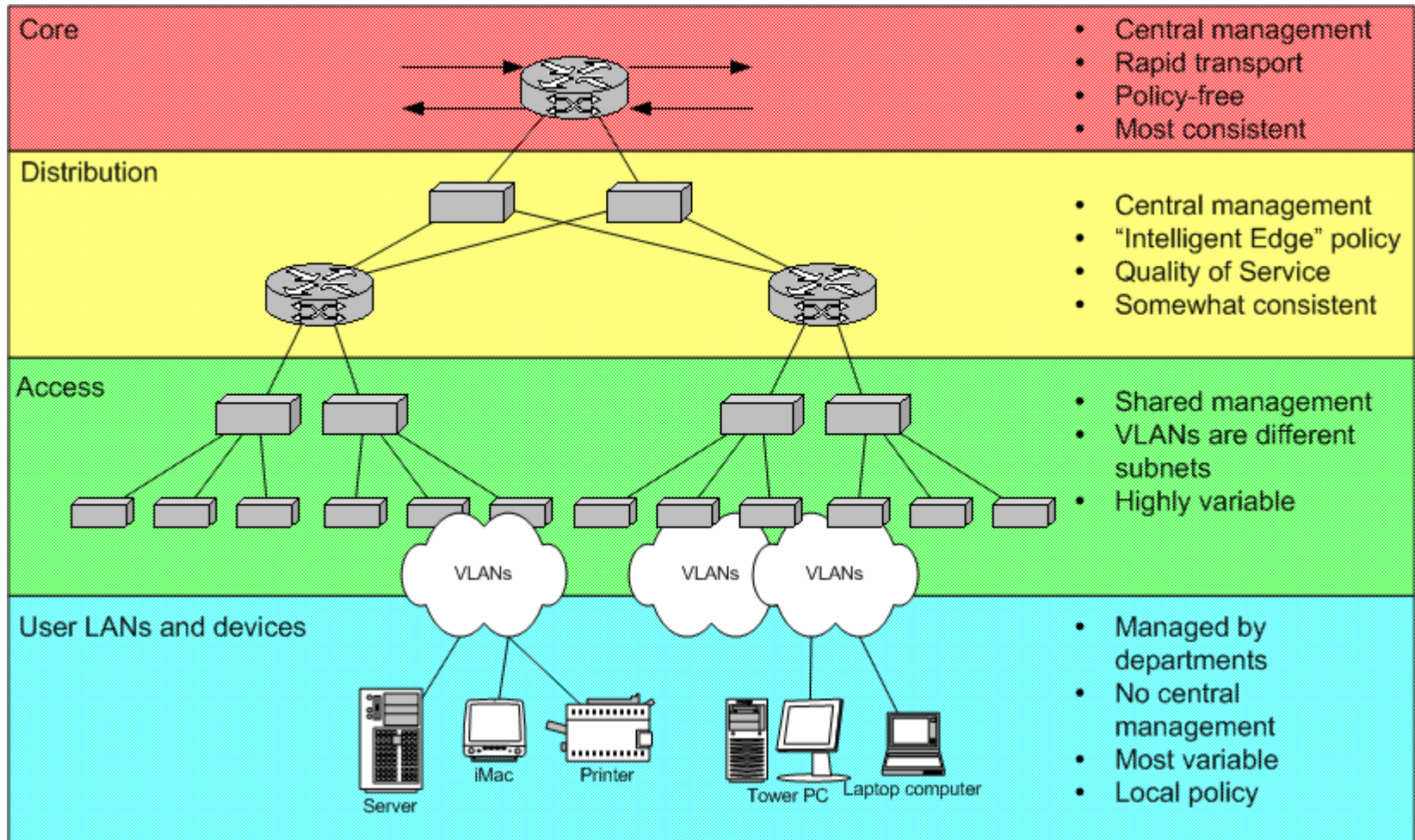
Why is RUNet successful?

- Design standards and best practices
- Common, modular solutions replicated many times
- Core – Distribution – Access
- Planned aggregation practices
- Designed-in fault management
- Automated monitoring and management
- Our staff!

RUNet Structure



RUNet Layers



Access Layer

- Shared access introduces management challenges
 - Many VLANs across several devices
 - Shared occupancy buildings mean several groups making changes
 - Need for strict configuration management
- Size and scale
 - Access layer is the most challenging layer to manage
 - Most devices on RUNet are in the access layer
 - Balance need for consistency with flexibility
- TD evolving its standards and practices
 - Access layer reference standard evolving with technology
 - New technologies introduce new service opportunities
 - New ways of addressing old challenges

Introducing the Catalyst 4500

- New access layer switch selection
- Modular chassis
- High density port capacity
- New capabilities in the closet
 - 28 or 64Gbps; 21 or 48Mpps
 - L3/L4 capability
 - Supports current 802.1 standards
 - Support for anticipated demands
- Reduces access layer complexity
- Projected 7 year life cycle
- Cost effective



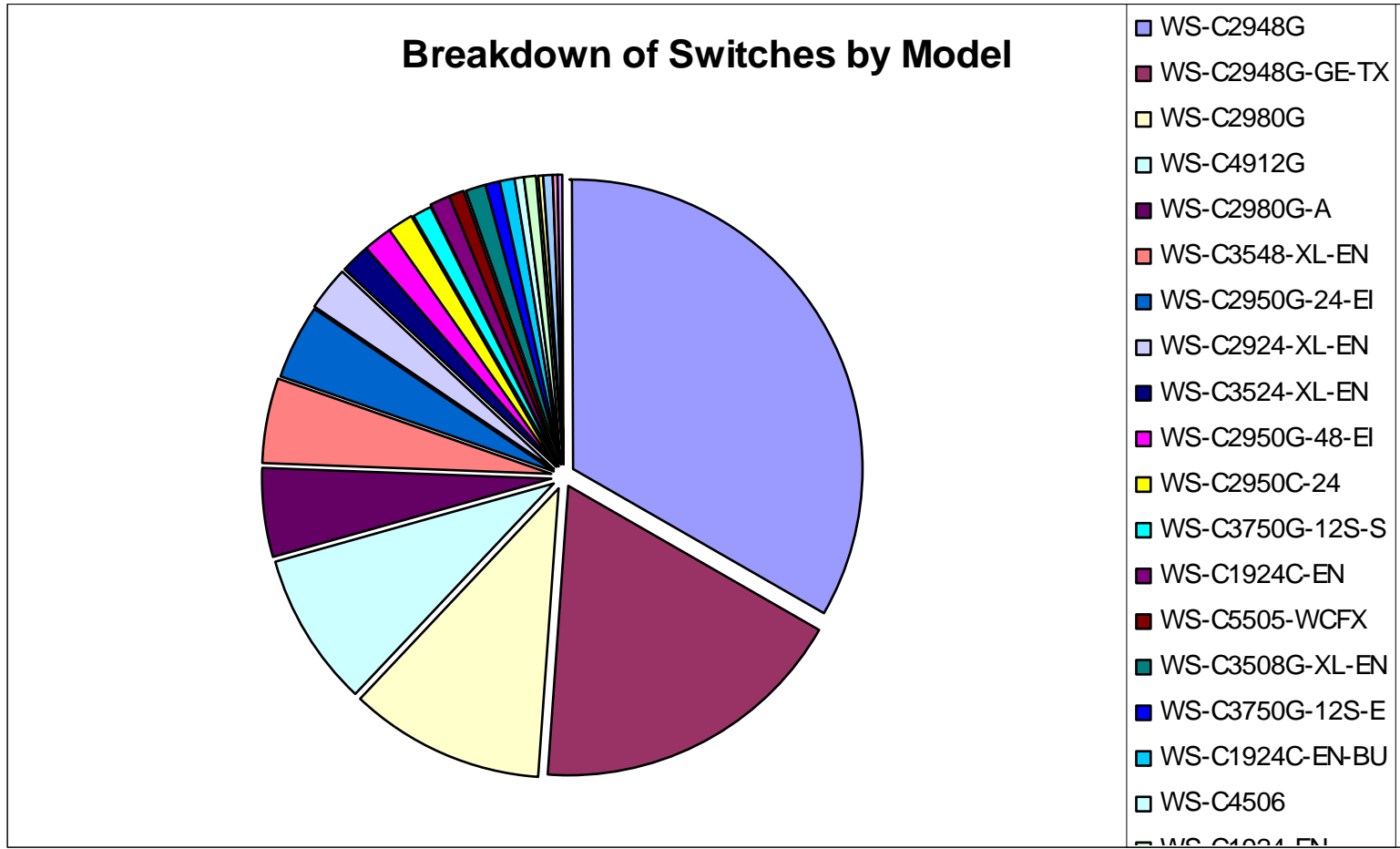
Current RUNet Technology

- A mix of equipment and technology from 1999 through 2007
- Oldest parts of current infrastructure now 8 years old
- Almost 60 different models & variants of switching equipment currently fielded
- Equipment choices were based on technology available at the time
- Rapid turnover in vendor product line meant we were always introducing new models
- Problem most prevalent in the access layer, with LAN and Workgroup switches

Product life cycle

- Networking technology has a typical life-span of 5 to 7 years
- Cisco phases equipment out over 5 years
 - End of Sale announcement indicates last date of sale
 - 3 years after EOS, Cisco stops new engineering for product
 - 4 years after EOS, Cisco stops software engineering, contract renewal
 - 5 years after EOS, Cisco stops supporting hardware
- Significant portion of RUNet is at some phase of this cycle
- TD getting ahead of the cycle by identifying EOS products and prioritizing replacement

Access Layer Switch Quantities by Model



Evergreen proposal

- Establish ongoing capital reinvestment and leverage existing assets
- Life-cycle management
 - Incorporate projected product life spans into fiscal planning
 - Plan for retirement of “new” equipment after 5 years
 - “Current” equipment older than 5 years can be recycled or traded in for credits
- RUNet valued at \$15M - \$18M
 - TD spent nearly \$15M on data electronics for all of RUNet over 5 years, with additional \$3M invested after RUNet 2000 closed its books
 - Figure includes cost of RUNet Core, Access layer, RRN
 - Planned-for money for equipment refresh never materialized
 - No ongoing funds available to replace end-of-life equipment
- Funding proposal requests \$3M per year for upgrades
 - A get-well plan to refresh the oldest, at-risk technologies
 - Incorporate new technologies where it has the greatest impact
 - Recycle current equipment into at-risk locations

RUNet Tomorrow

Technologies being evaluated for use on RUNet

- Wave Division Multiplexing (CWDM and DWDM)
- MPLS Virtual Routers and Traffic Engineering
- 10 Gigabit Ethernet
- Firewall Service Module service
- IPv6
- Wireless backbone connections
- Central VoIP services

Questions?

Websites referenced during the presentation

- TD presentations and papers (<http://www.td.rutgers.edu/papers>)
- TD Tools (<http://www.td.rutgers.edu/tools/>)
- For any follow-up questions about this presentation, please contact the NOC at 5-7541, or by email at noc @ rutgers.edu