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Ivy+ Network / Telecom Update

Bob Johnson

Kevin Miller

April 29, 2008

• WWW.OIT.DUKE.EDU •

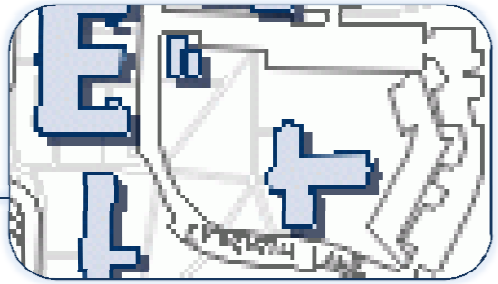
Metrics

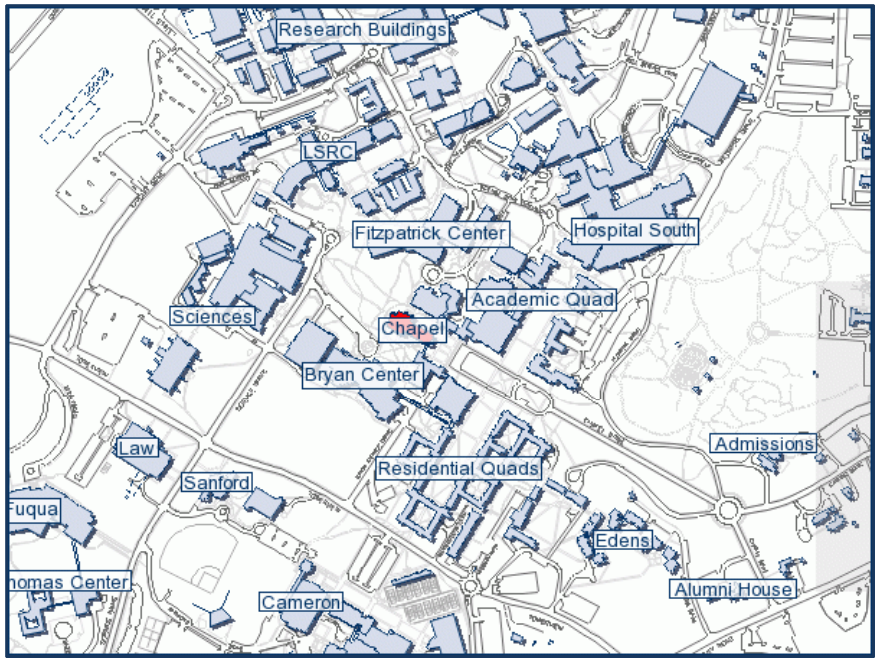


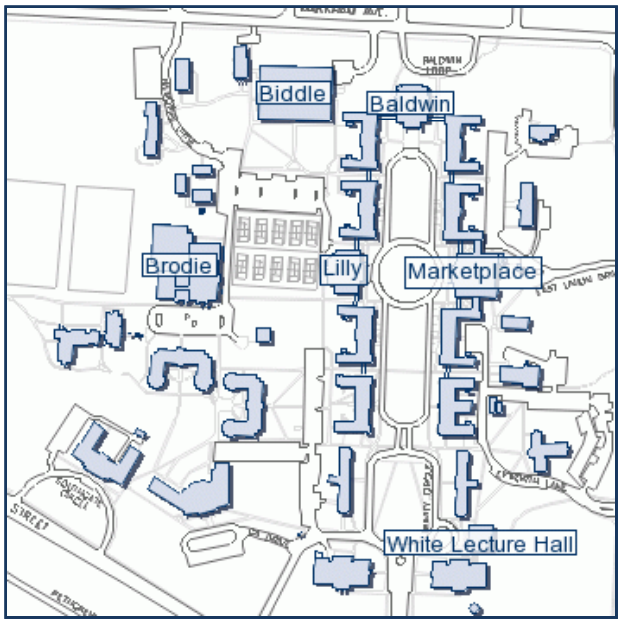
- 6,247 undergraduate
- 6,744 graduate
- 2,730 faculty
- 30,700 staff (incl. med)
- 8,600 acres
  - 1,400 developed
- 48,000 wired ports (excl. med)
- 7TB/day to & from Internet
- 28K telephone lines
- 7 NXXs
- 15K voicemail boxes
- ~430 ACD agents
- 5K CATV drops
- 800 – 800MHz radios

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Campus Maps







OIT Organization



Credit: http://atom.smasher.org/construction/

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Fitzpatrick East Data Center

12,500 f^2 total

Phase 1
- 4,000 f^2 raised flr
- 1,000 f^2 mech.
- 4KW/rack
- 167 racks
  - ~80% med
  - ~20% campus

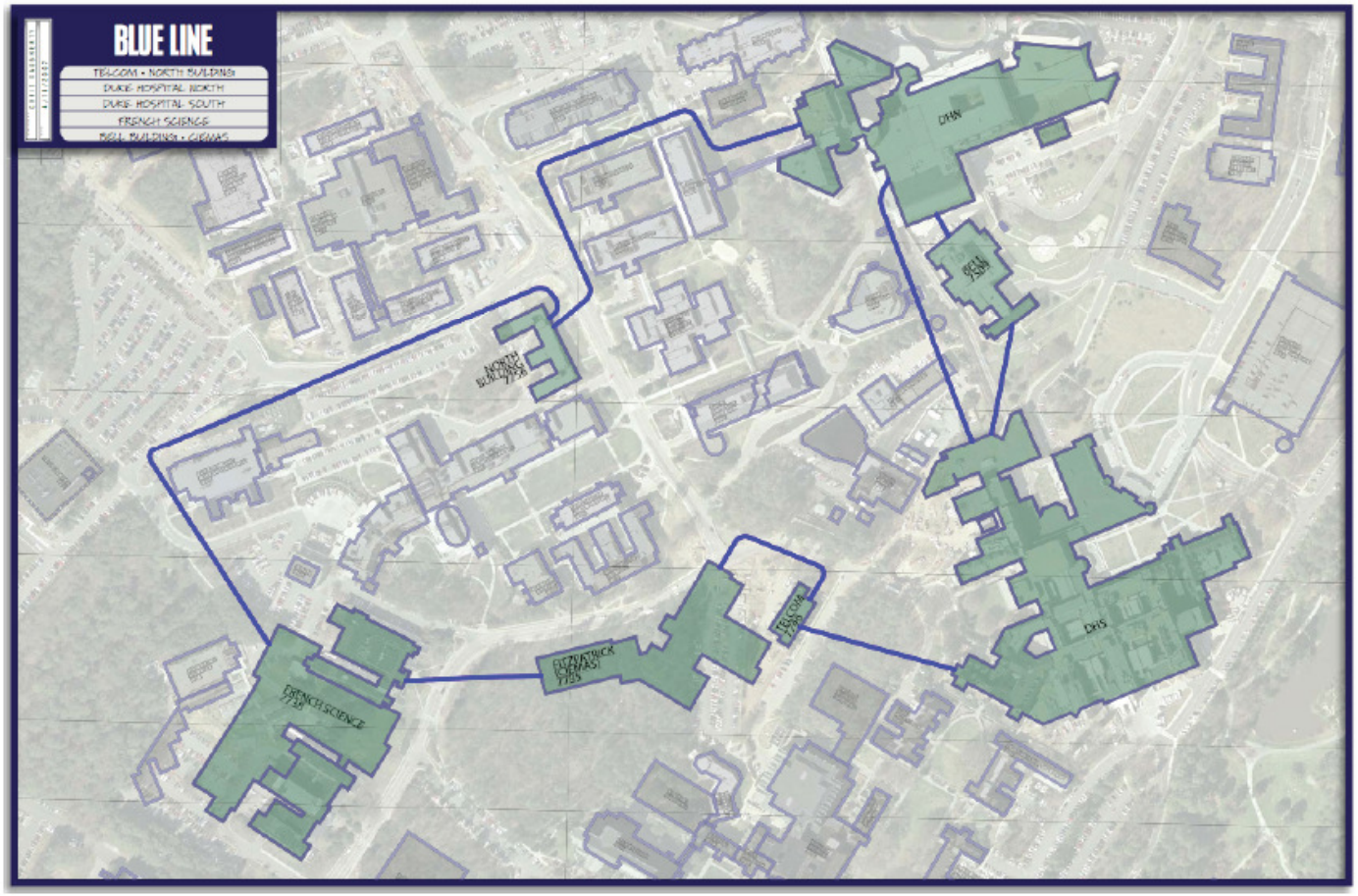
Phase 2
- 7,500 f^2
- "more" KW/rack
- fewer racks



May 16, 2007

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Data Center Network



Outside Plant to Data Center



September 6, 2007

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Data Center Cold Aisle



December 27, 2007

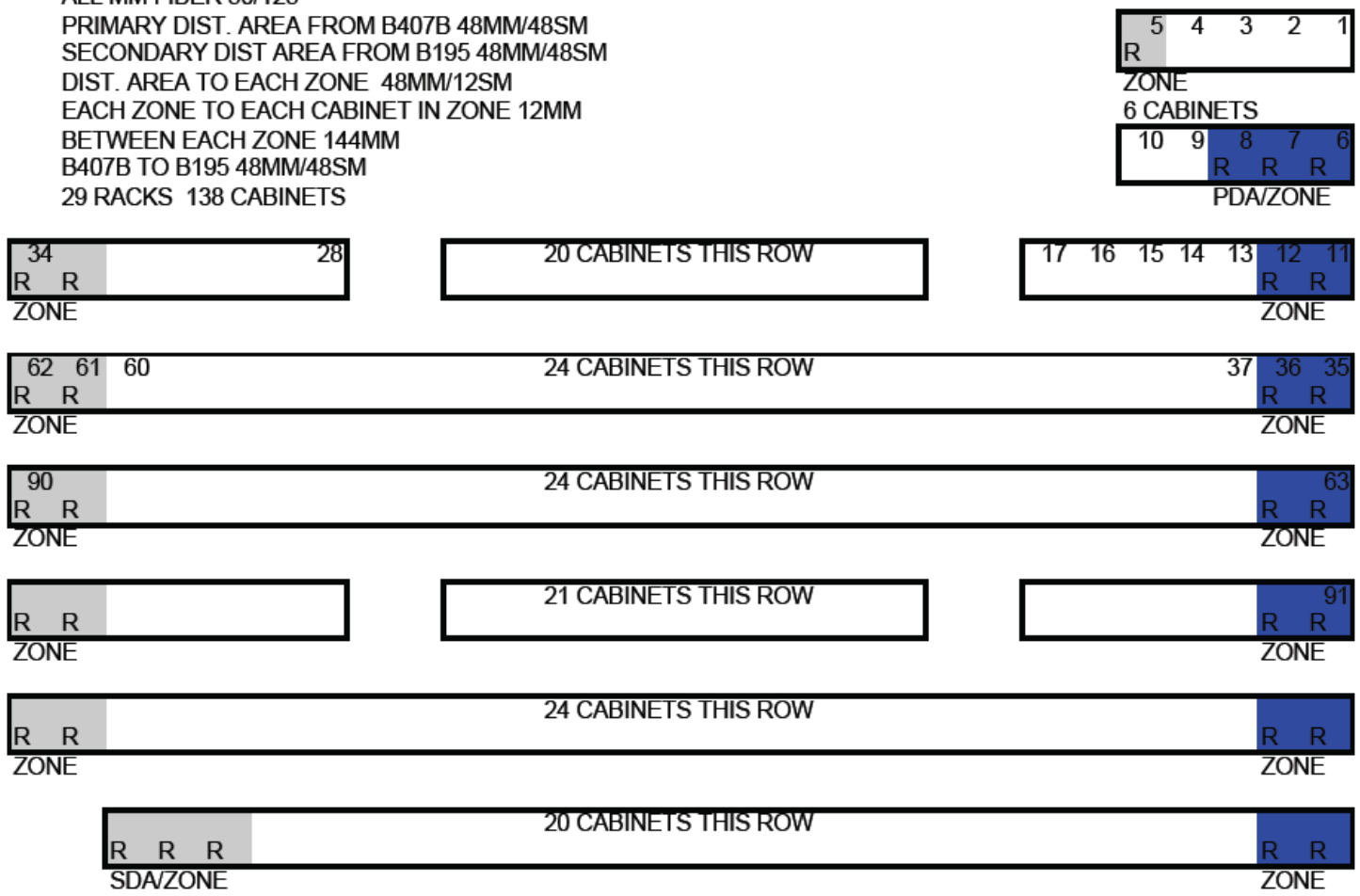
Data Center Network

- Pre-term fiber; dual paths to each rack
  - Minimal infrastructure copper
- Rack level network switches (Cisco 3750E)
- Distinct broadcast domain from other data centers
  - Migrating existing network and moving hosts in old data center
- Shared broadcast domain for VMWare/VMotion
  - Asking VMWare for ‘vRouter’ functionality

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Data Center Fiber

ALL MM FIBER 50/125
PRIMARY DIST. AREA FROM B407B 48MM/48SM
SECONDARY DIST AREA FROM B195 48MM/48SM
DIST. AREA TO EACH ZONE 48MM/12SM
EACH ZONE TO EACH CABINET IN ZONE 12MM
BETWEEN EACH ZONE 144MM
B407B TO B195 48MM/48SM
29 RACKS 138 CABINETS



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Overhead Cable Trays

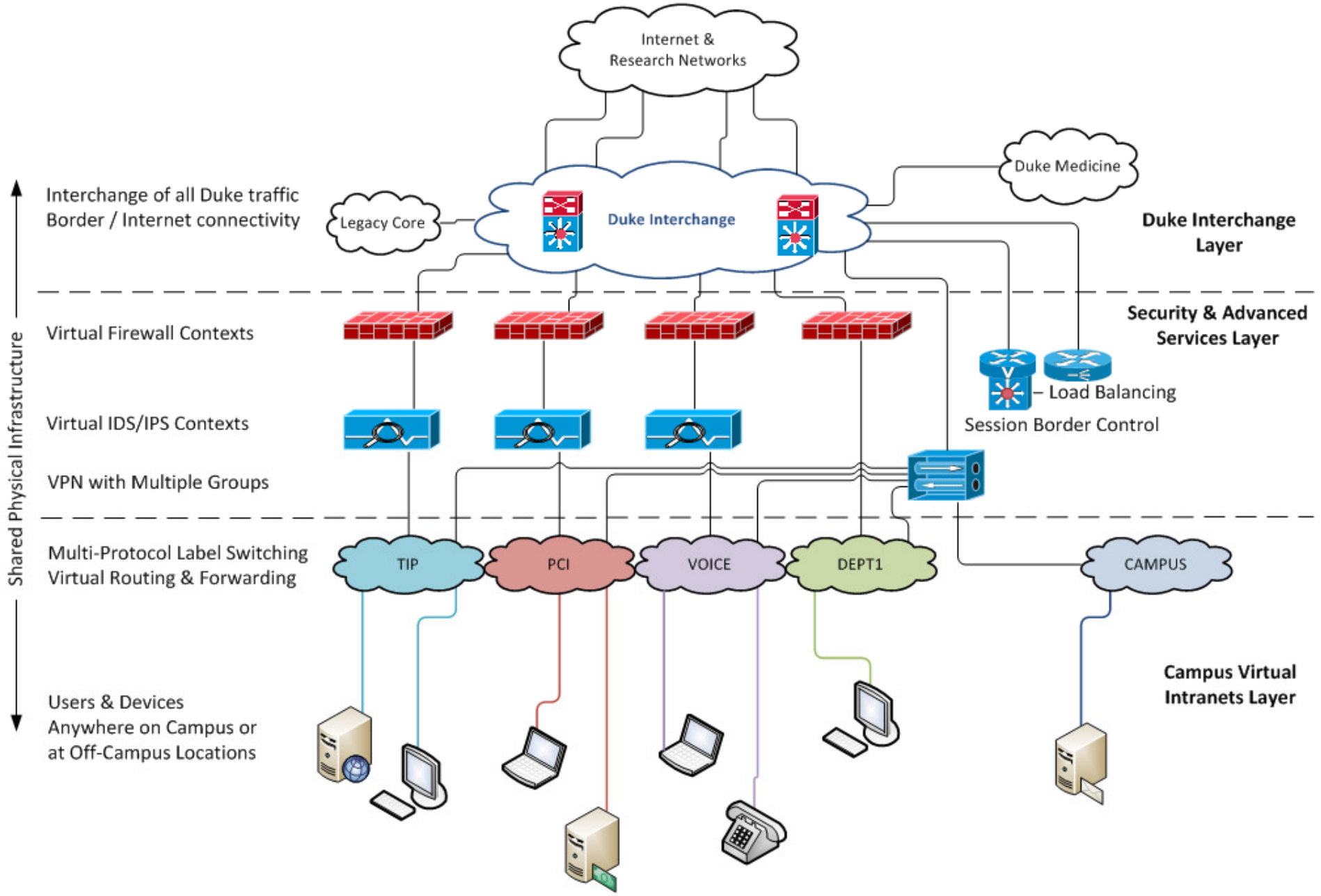


December 27, 2007

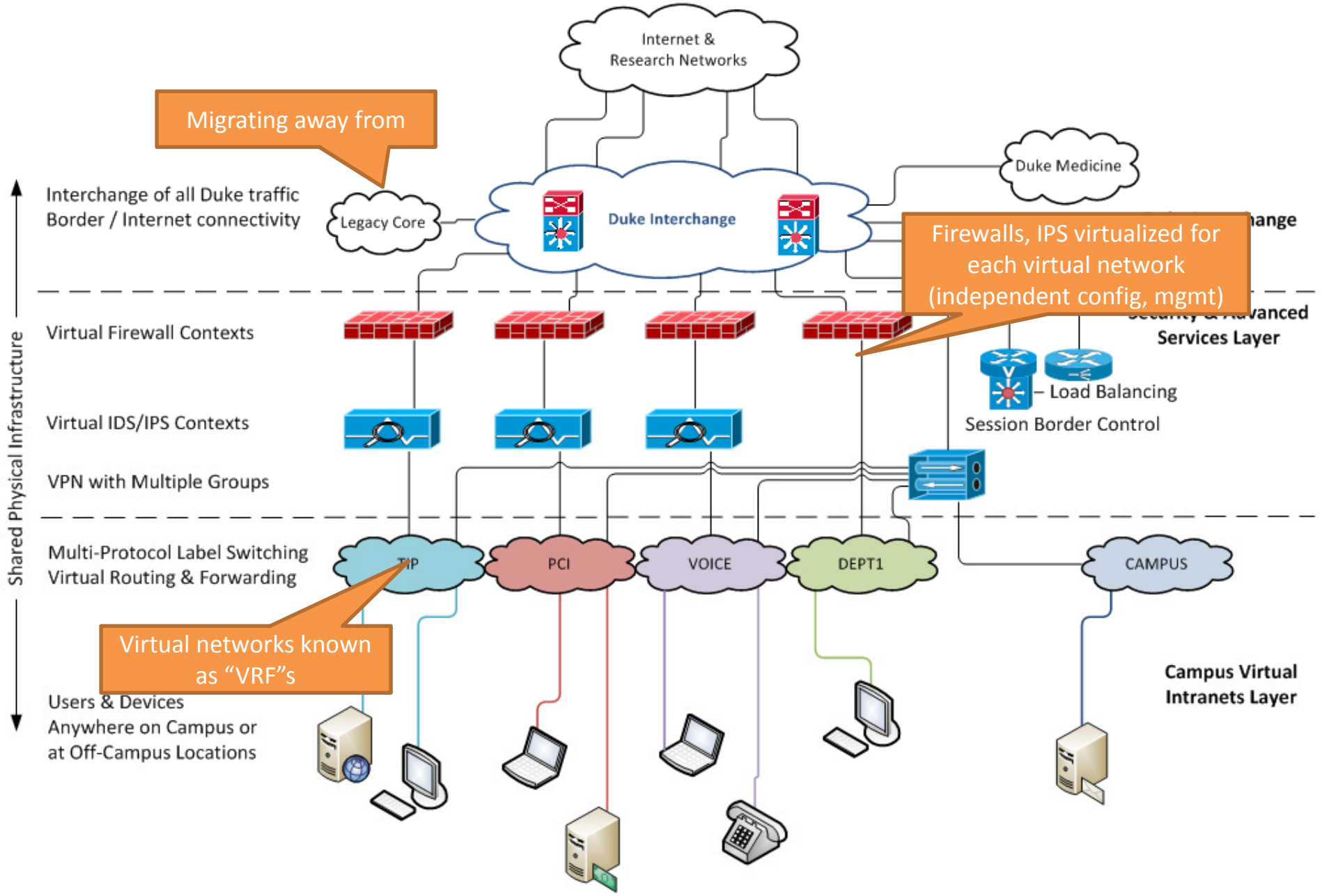
Current Voice Projects

- Unity Voicemail
  - Migrating users
  - Voicemail to email
- SS-7 to PRI conversion
  - Almost complete
- Session Border Controller
  - Planning deployment
- Contact Center
  - Planning Cisco UCCE
  - UCCX systems operational
- IVR
  - In testing now

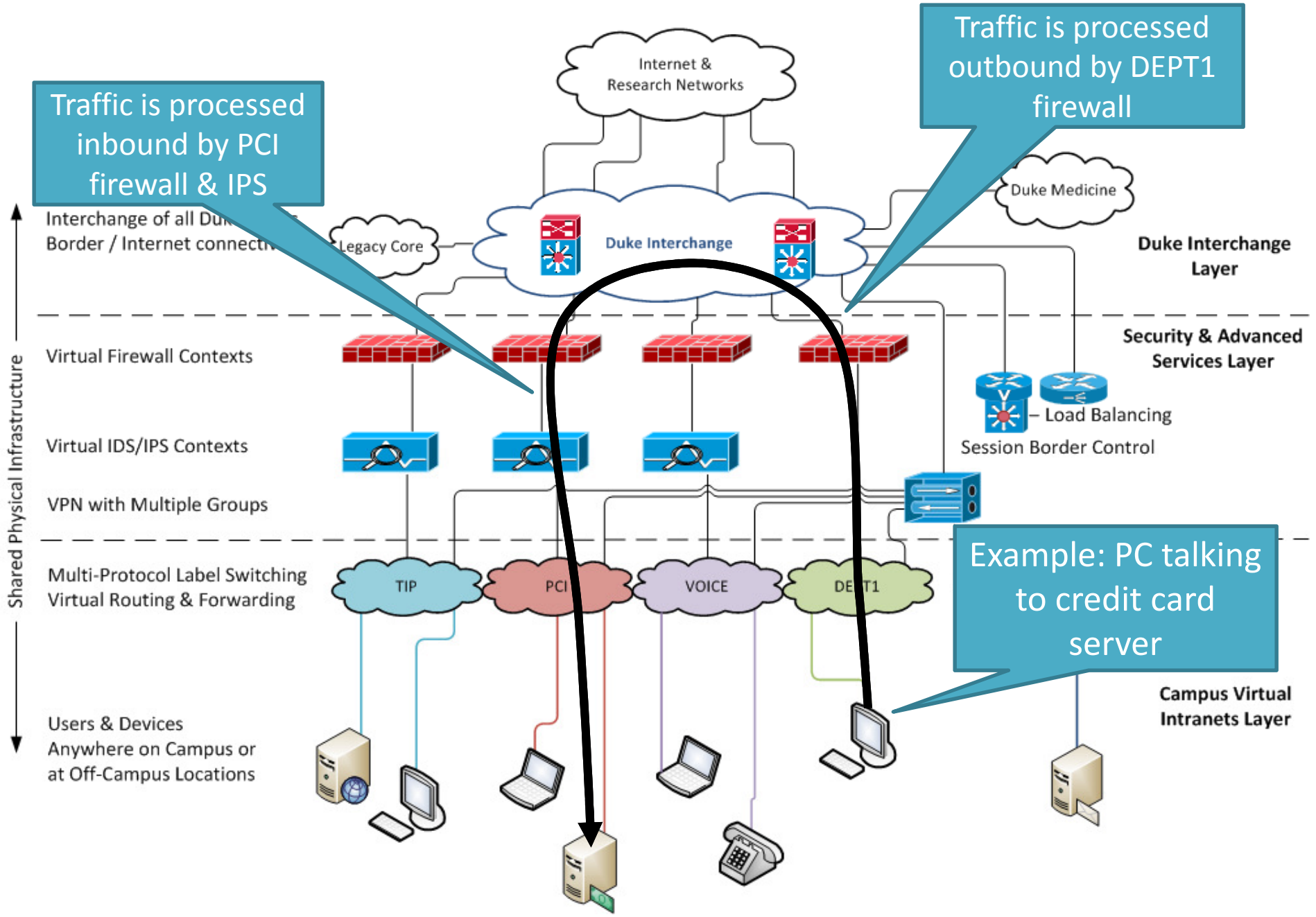
Duke Interchange and University Core Network – Logical Topology



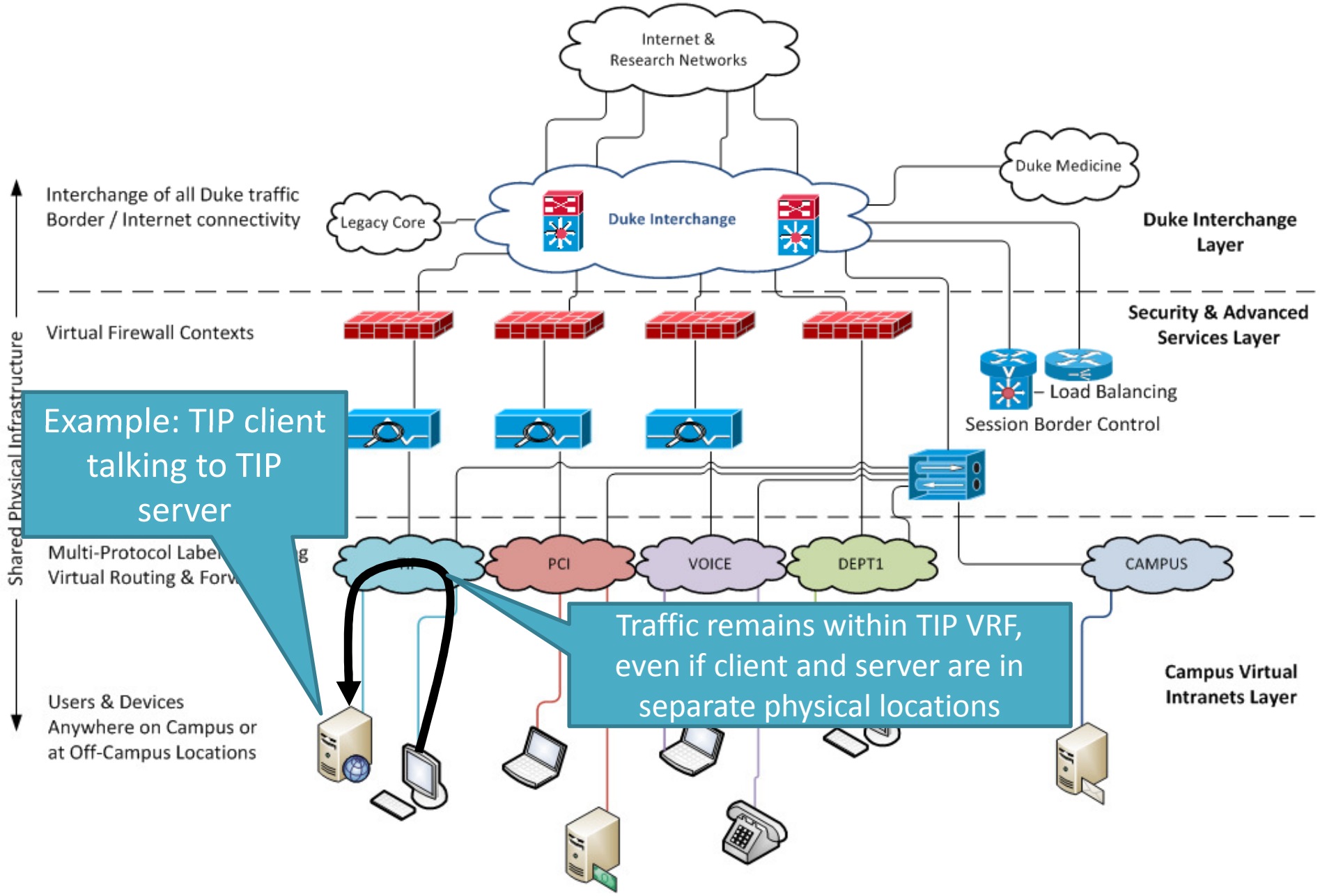
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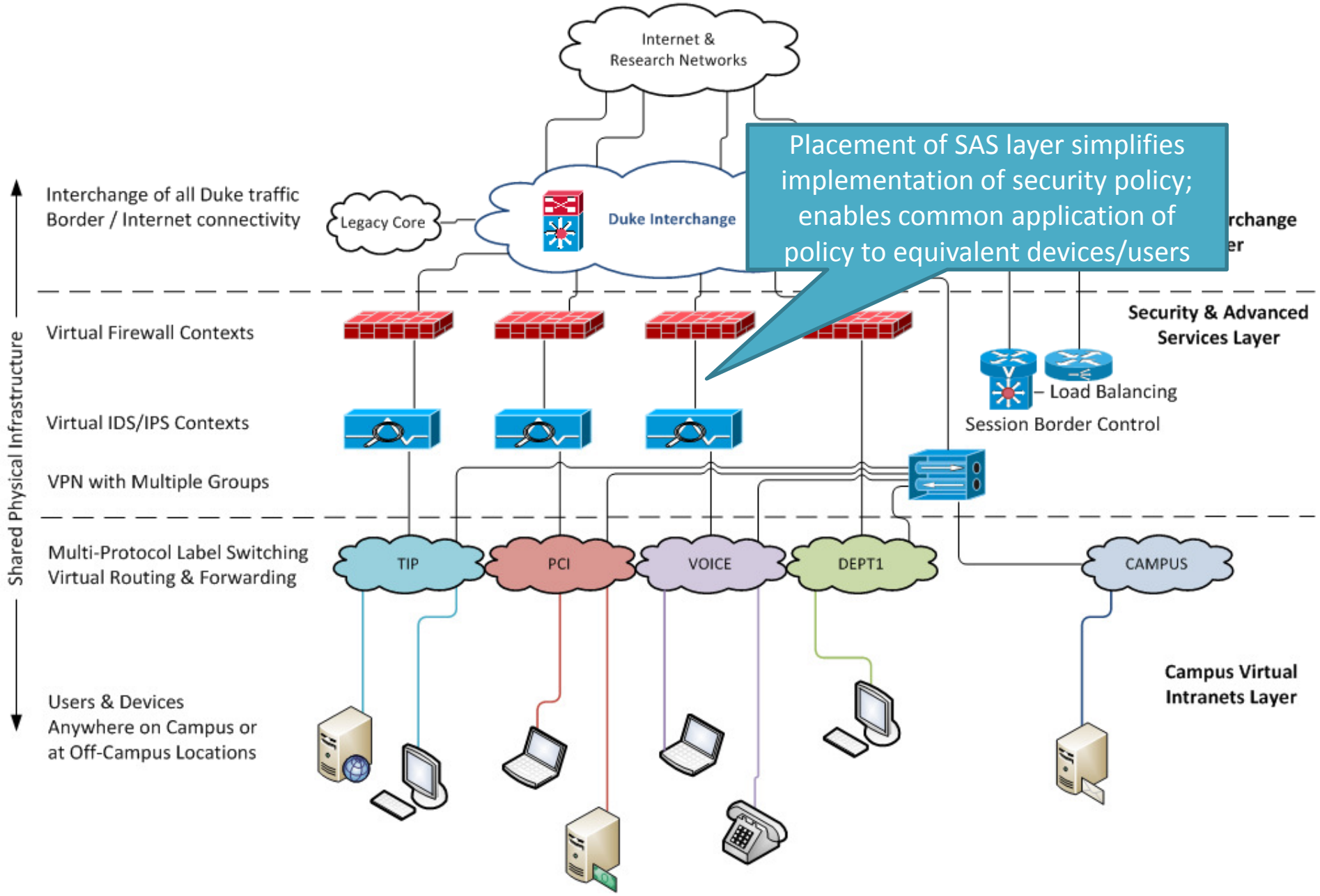
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Duke Interchange and University Core Network – Logical Topology



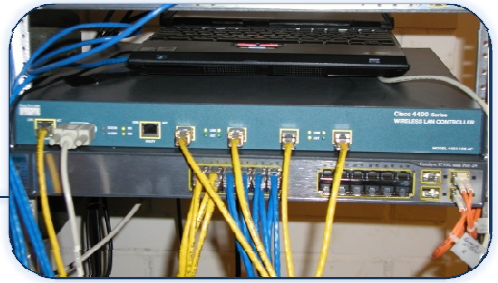
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802.11n

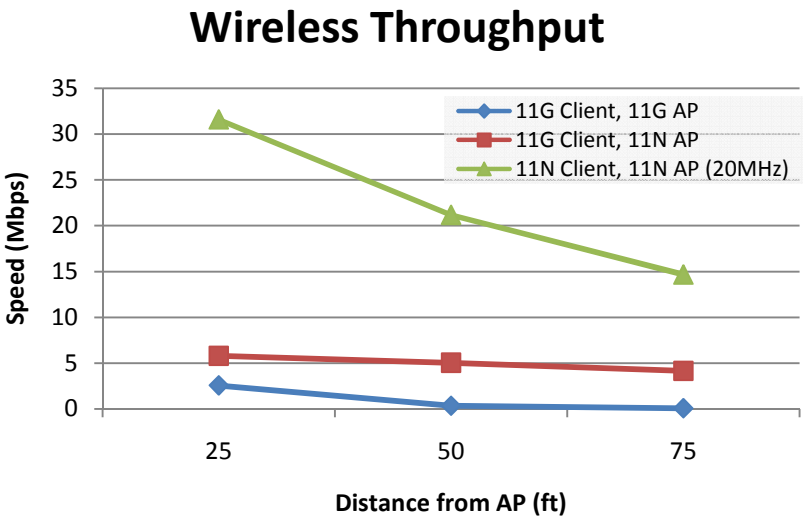


- Current 802.11a/b/g coverage – 60% of campus (residence halls – hotspot only)
- 1:1 replacement of all 1,700 APs with 802.11a/b/g/n
  - Completion targeted for end-of-year 2008
- Adding ~800 APs in res halls (to 100% coverage)
  - Completion by August 2008
- Powered with existing 802.3af (1x3 MIMO)
  - Spot upgrades to pre-802.3at (2x3 MIMO)

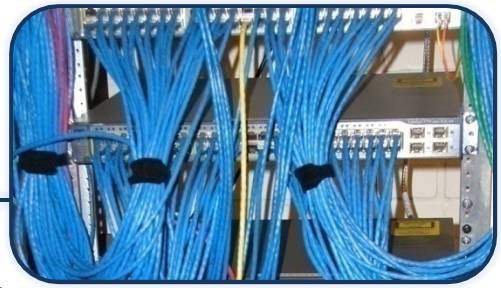
802.11n Pilot Experiences



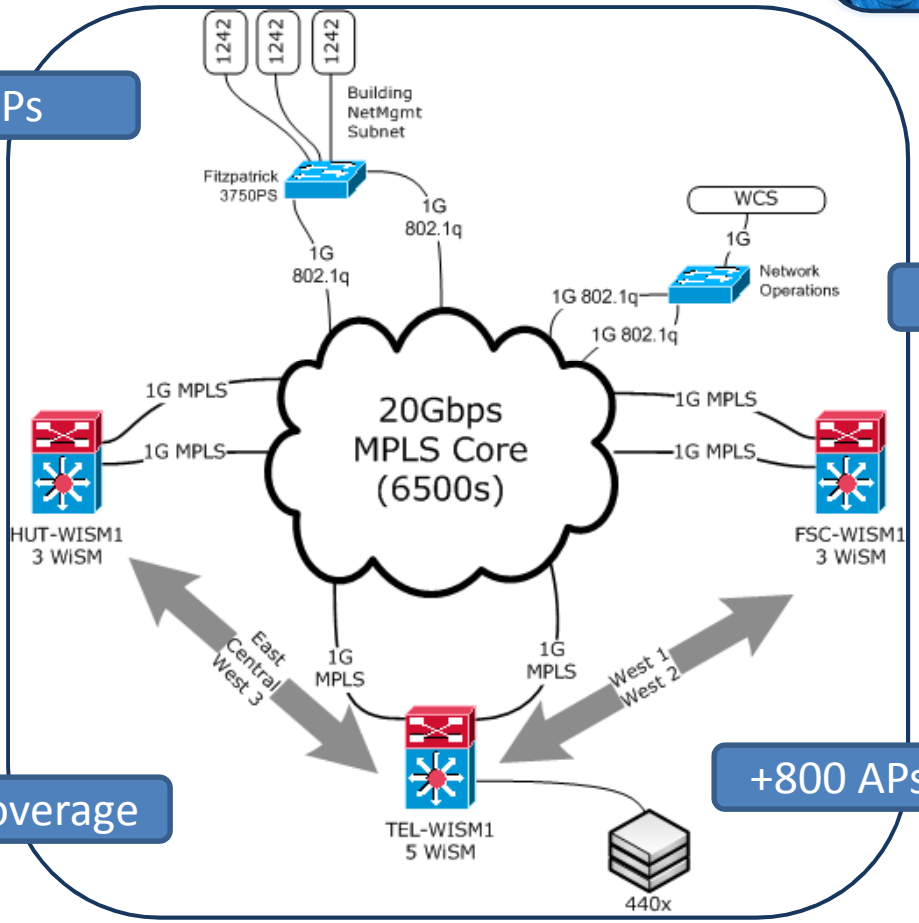
- 40%+ connecting with 802.11n
  - MacBook
  - Dell, Lenovo, others
- 129Mbps+ peak throughput (11n clients)
- 802.11g client: 2x faster on 11n AP compared to 11g AP
  - Especially pronounced at greater distances



Current infrastructure



1700 APs

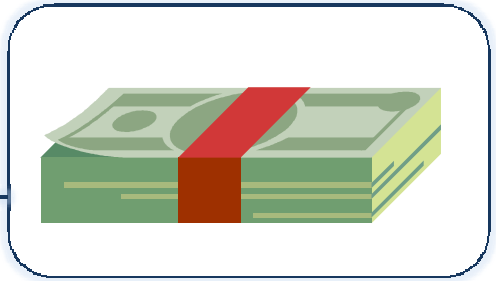


11 WiSM

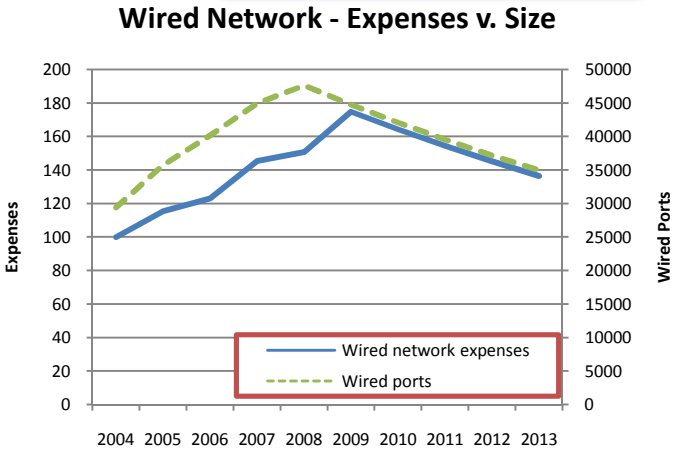
60% Coverage

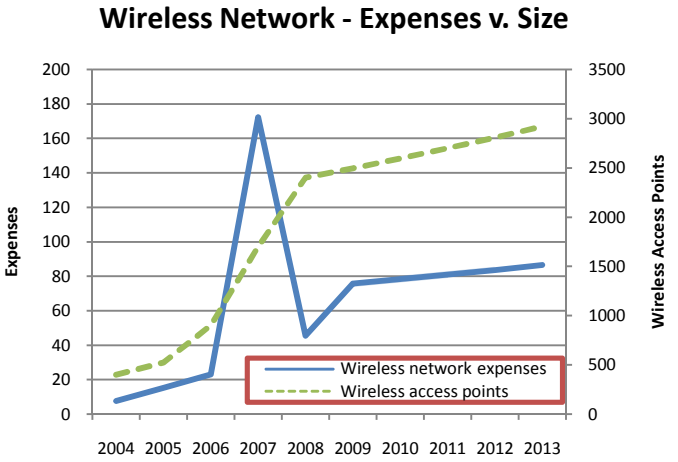
+800 APs – Res. Halls

802.11n Finances



- Evaluation of funding approach for wired and wireless networks
  - Wireless installed with one-time funds
  - Wired network: ongoing refresh budget
- 802.11n upgrade: advancing planned 4 year refresh cycle
- Observation: wired network size decreases, yet cost per port will increase (GbE, 10GbE)





Other Data Projects

- Research Network Needs
  - NLR FrameNet: 1Gbps path to Fermi Lab as prototype for LHC connections
  - Establishing 10Gbps to buildings for iSCSI, large scale data transfer
- Commodity Internet
  - Significant growth w/ peering services (NTR, CPS)

CATV / IPTV Options

	Content	Middleware	CAS	Viewers
Time Warner Cable	TWC IP Feed (SD, HD)	Minerva	VeriMatrix	Minerva (Win), Motorola STB
Cisco (Scientific Atlanta)	TWC, Satellite IP Feed (SD, HD)	Minerva	Widevine	Minerva (Win), SA STB
InfoValue	TWC, Satellite IP Feed (SD, HD)	IV	IV	IV (Win, Mac), Amino STB
VideoFurnace	Composite / component video (SD)	VF	VF	VF (Win, Mac, STB)

Emergency Communications

- Integration with text message aggregator
  - Emergency and non-emergency, using LDAP groups
- Outdoor alert system – Federal, installed by 8/1
- Mass email system – complete
  - Get us out of the critical path (web-based initiation)
  - Bypass normal queues to guarantee rapid delivery
- Infrastructure upfit
  - Cell/wifi network installations ramped up for campus
- Amcom e.Notify – “top 50” notification

Home Access

- Time Warner Cable Business Class
- Discontinuing DSL reseller relationship
  - Poor customer service
  - Low utilization
  - Not competitive with underlying carriers
- Modem pool – 23 modems – discontinuing