King Fahd University of Petroleum & Minerals

Electrical Engineering Department

EE 400, Experiment # 9

KFUPM Data Network: Study of Real-World Networking Equipment and Servers

Objectives:

The objective of this demonstration is to familiarize students with the real-world network example in order to show them the network components working in place and to give an idea of how the actual networks are designed and maintained.

Present KFUPM Enterprise Gigabit Network (Figure 1a and 1b)

It comprises of

- Cisco 7206 router for WAN connectivity.
- PIX firewall for enhancing security.
- Two core switches at the backbone for redundancy and load balancing.
- Layer3 switch/router at the distribution.
- Layer2 switches at the access layer.
- 20 Academic Buildings are connected using Single Mode Fiber
- 15 Remote Locations are connected using HDSL links
- More than 3000 network points

Core Layer

- Cisco 6509 switch
- Modular switch with 256 Gbps switching fabric
- Two GBIC based GE modules each with 16 ports
- One GE module with 16 UTP based giga speed ports
- One module with 48 FE ports
- Two power Supplies for redundancy
- Two supervisor engines
- Non blocking architecture

Distribution Layer

- Cisco 3550-12T
- 24 Gbps switching fabric
- non blocking architecture
- 10 UTP based giga speed ports
- 2 GBIC based ports

Access Layer

- HP procurve 2524
- 9.6 Gbps switching fabric
- Non blocking architecture
- 24 Fast Ethernet ports
- 2 open transceiver slots for Gigabit or 100BASE-FX

KFUPM Internet Connectivity (Figure 2)

- Directly connected to KACST Riyad using STC ATM backbone
- 8Mbps of bandwidth is available
- PIX firewall is being used to ensure high level of security
- ATM (Asynchronous Transfer Mode) is being used for internet connectivity
- Directly connected to KACST Riyadh using STC ATM backbone over fiber
- 8 Mbps of bandwidth (being fully utilized)
- Technically can go up to 155Mbps
- PIX firewall is being used to ensure high level of security

Internet Bandwidth usage statistics (Figure 3)

Last updated at Tue Oct 7 16:15:28 2003

- Bandwidth (for the day):
  Cur: 8.19 Mbits/sec
  Avg: 8.19 Mbits/sec
  Max: 8.19 Mbits/sec
- Average in (for the day):
  Cur: 736.99 kbits/sec
  Avg: 823.78 kbits/sec
  Max: 1.59 Mbits/sec
- Average out (for the day):
  Cur: 7.46 Mbits/sec
  Avg: 6.57 Mbits/sec
  Max: 7.76 Mbits/sec

Project of providing network connectivity to student dorms (Figure 4)

Scope of Work

- Four groups of buildings based on similarity
- Group A Twelve Buildings (801-812)
  - 32 rooms -> 64 network nodes
- Group B Three Buildings (813-815)
  - 76 rooms -> 154 network nodes
- Group C One Building (816)
  - 88 rooms ->176 network nodes

- Group D Three Buildings (901-903)
    - 102 rooms -> 204 network nodes

Features

- Gigabit IP technology is being used
- 21 new buildings will be connected
- Each room equipped with 2 network pts
- More than 2000 network pts
- Has doubled the network size

Figure 1: KFUPM ENTERPRISE NETWORK

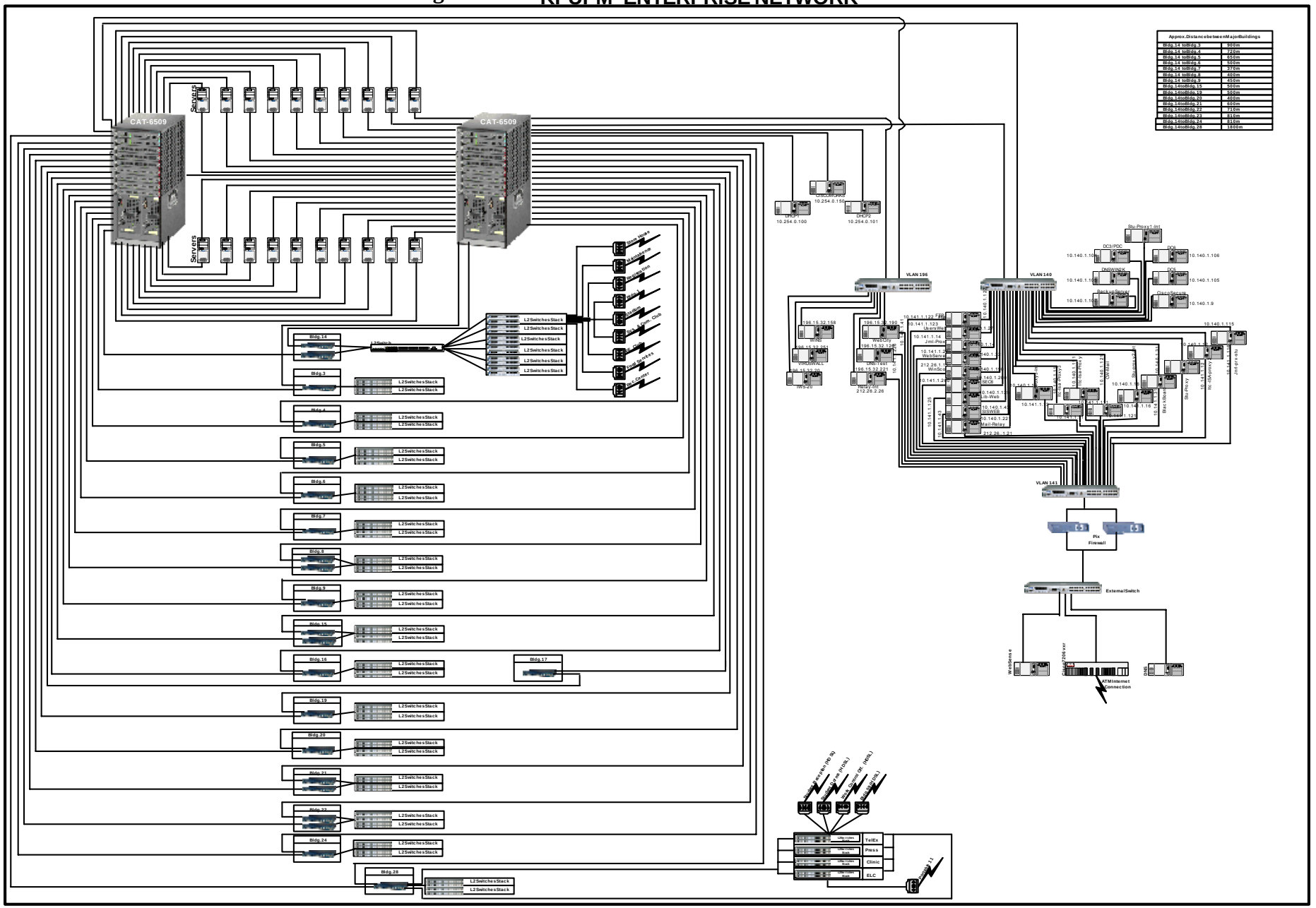

Figure 2

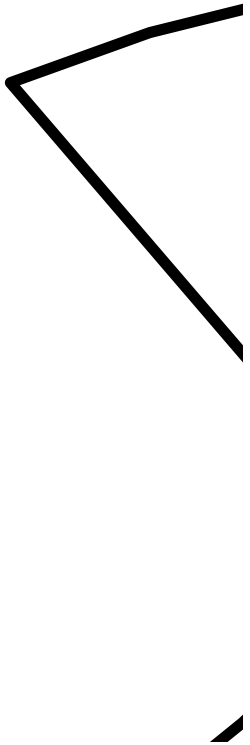

Figure 3

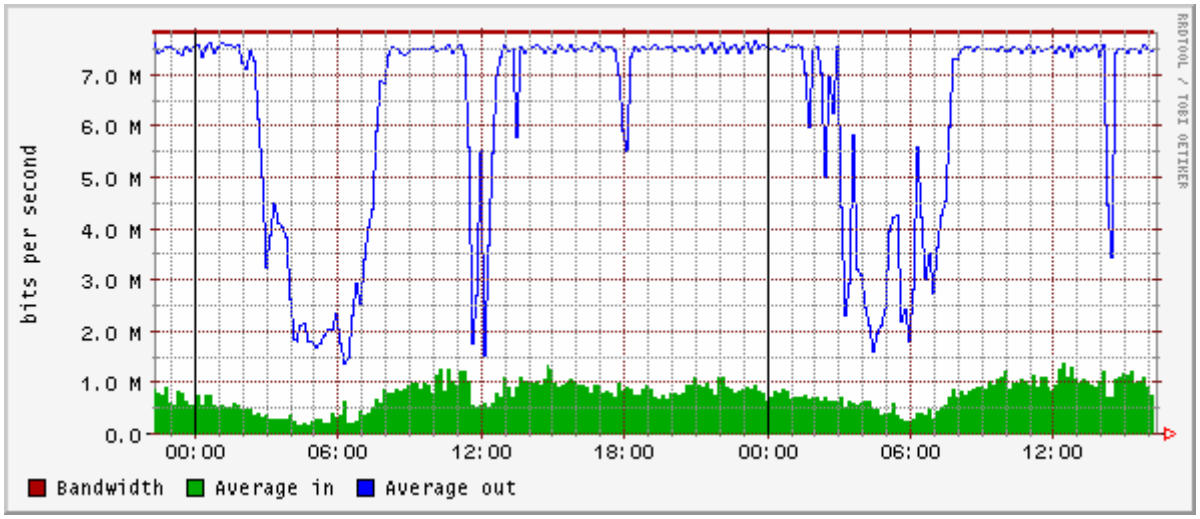

Figure 4