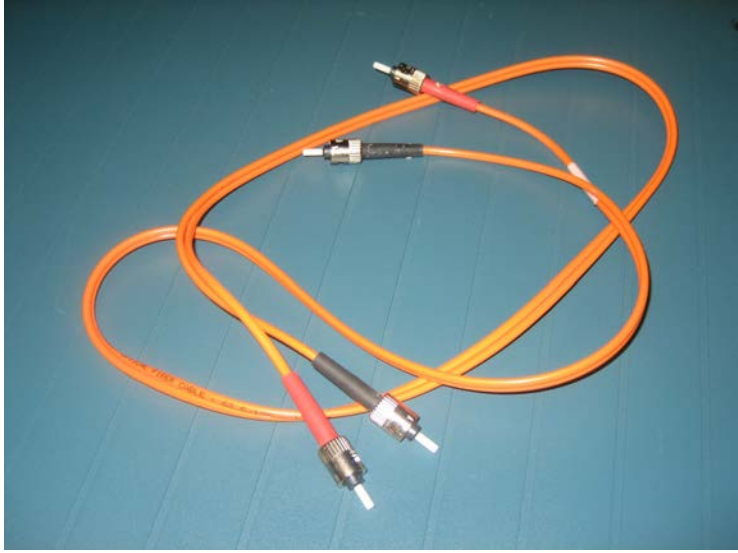
COLLEGE OF TECHNOLOGY
University of Houston



Technology's Testbed

An Introduction

Motivation

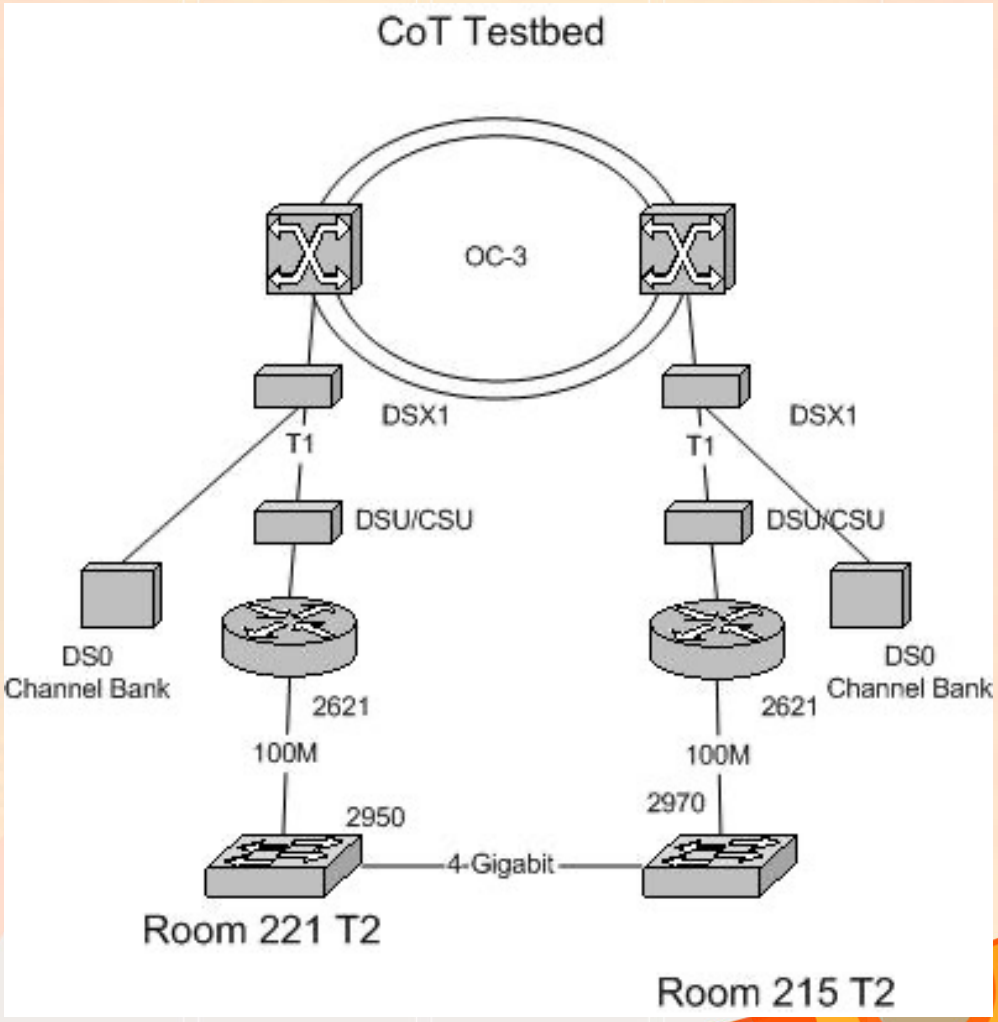
- *Education*
  - *Introduction to technologies*
    - *Graduate and undergraduate classes*
    - *Student lab projects*
- *Research*
  - *Faculty/Staff research*
  - *Collaboration with other institutions*
  - *Graduates and undergraduates*
- *Industry research*
  - *Development of new technologies*
  - *Product testing*

Intro to Transmission Speeds

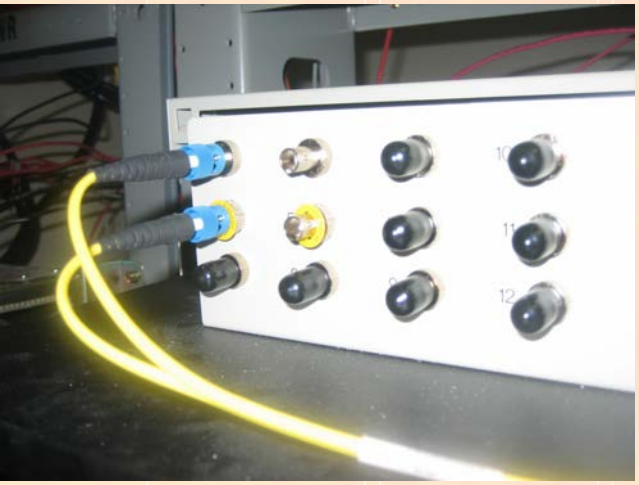
- *Low Speeds*
  - *DS0 = 8000 x 8 bits = 64Kbps*
  - *DS1/T1 = 64Kbps x 24 lines = 1.544 Mbps*
  - *DS3 = 1.544 Mbps x 28 lines = 44.736 Mbps*
- *Mid Speeds*
  - *OC-3 = 3 x DS3 = 155.336 Mbps*
  - *OC-12 = 621.84 Mbps*
- *High Speeds*
  - *OC-48 = 2.488 Gbps*
  - *OC-192 = 9.95 Gbps*

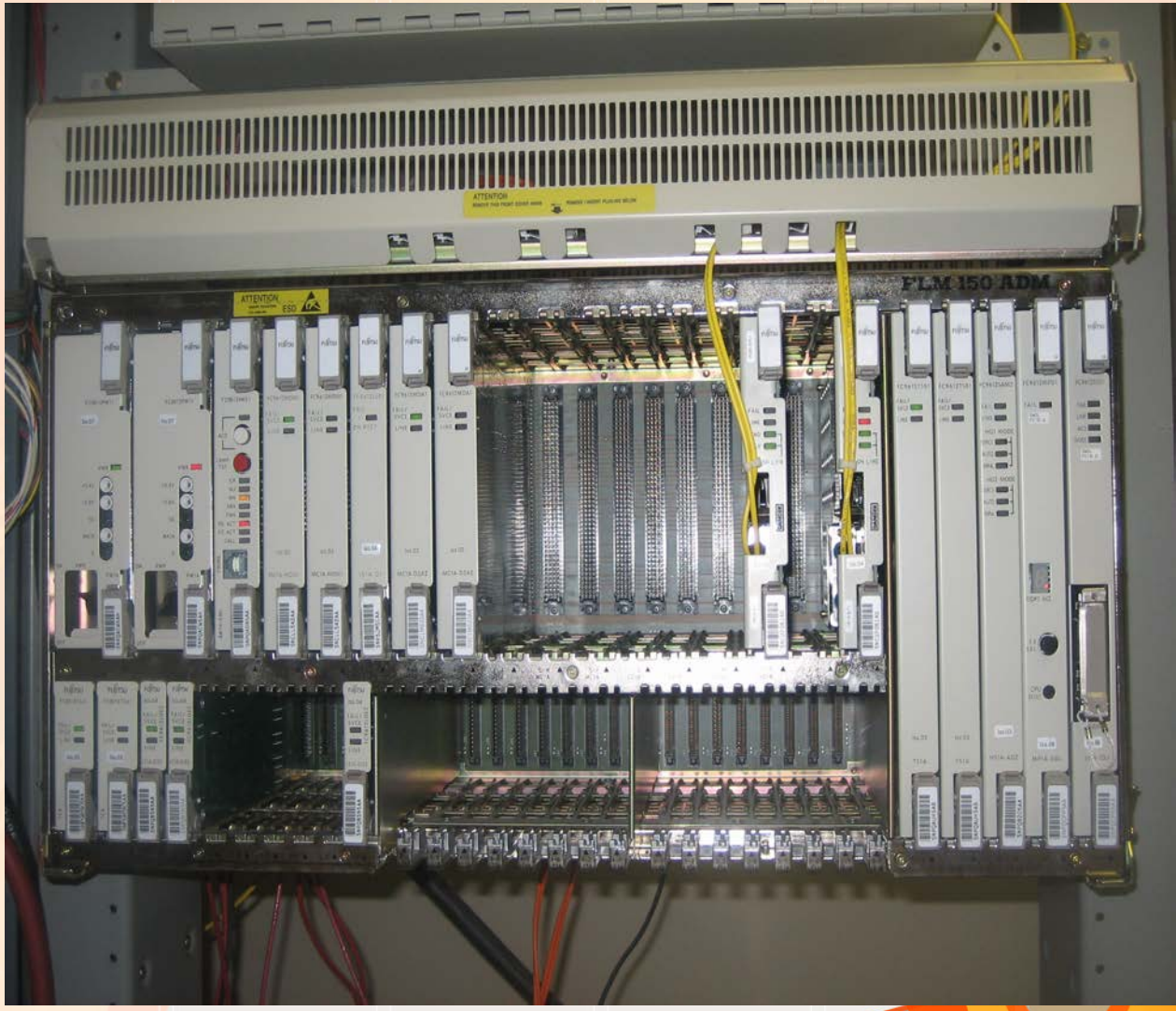
Testbed Now

- SONET OC-3
  - 155.5 Mbps
- T1 Hand Offs
  - 1.544 Mbps
- DSU/CSU
- D4 Channel Bank
- Routers
- Switches
  - 4-Gigabit Ethernet
- VLANs

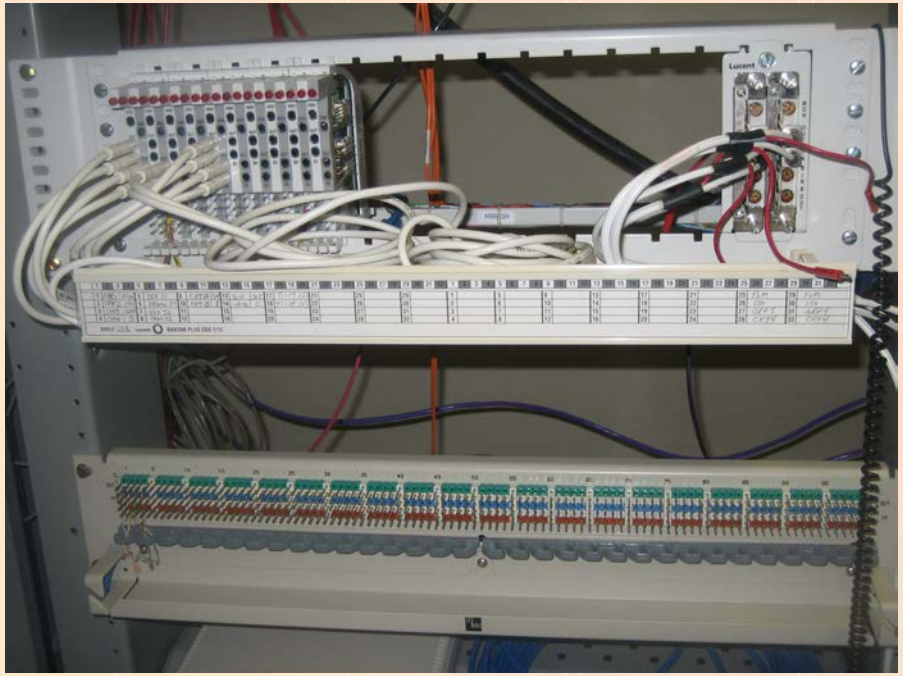


Fujitsu FLM150 Add/Drop Mux





DSX-1 and CSU/DSU



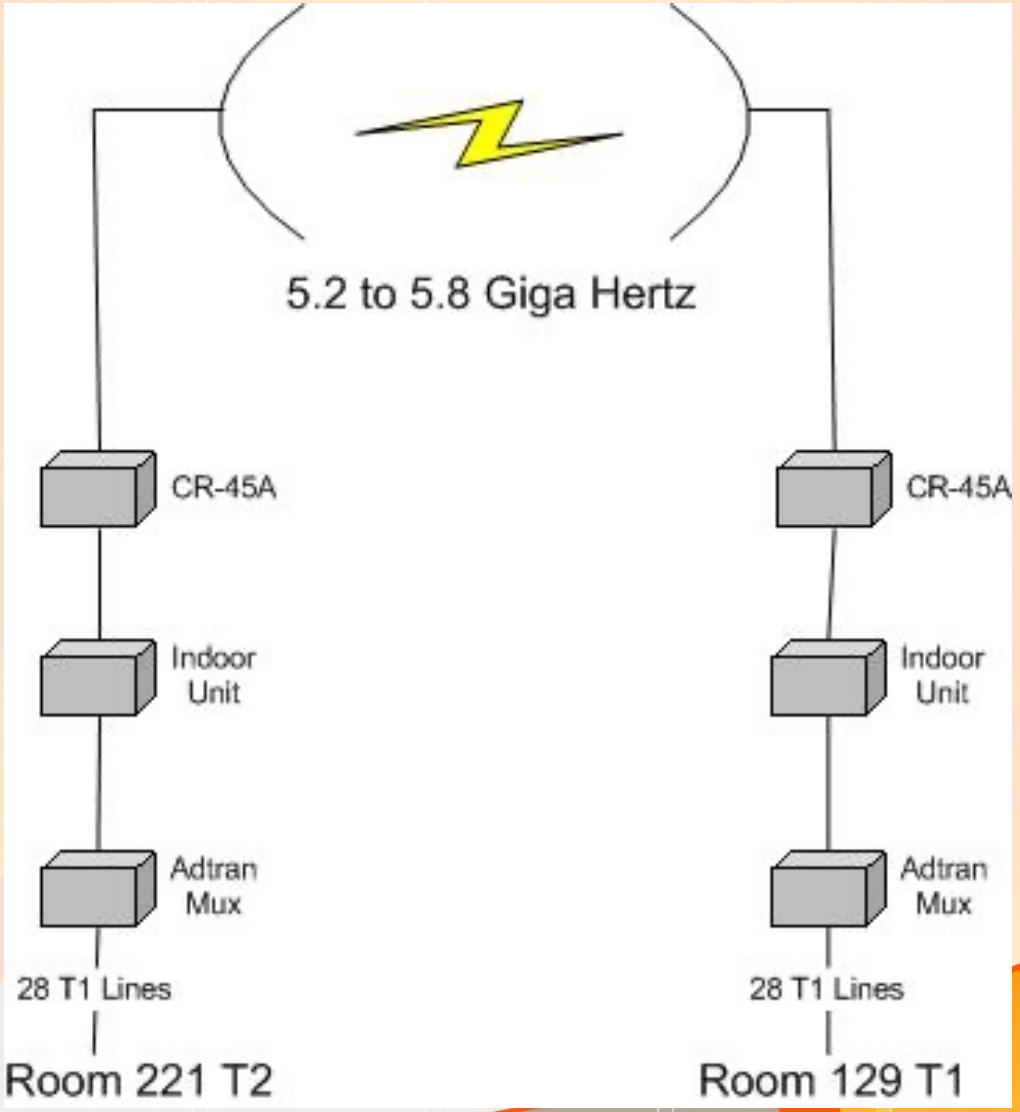
DSX-1: Provides Termination, Cross-Connection, Access
CSU/DSU: The Channel Service Unit/Data Service Unit converts data frame from LAN to a WAN frame. The Channel Service Unit (CSU) receives and transmits signals from and to the WAN line and provides a barrier for electrical interference from either side of the unit. The Data Service Unit (DSU) manages line control, and converts input and output between RS-232C, RS-449, or V.35 frames from the LAN and the time-division multiplexed (TDM) DSX frames on the T-1 line. The DSU manages timing errors and signal regeneration.

D4 Channel Bank (DS0)

The standard D4 frame is 193 bits long (1 Framing bit + 24 8-bit timeslots).
Each timeslot is scanned at a rate of 8000 times per second. Therefore, in one second, there are: 8000 * 8 bits/TS * 24 TS = 1,536,000 Bits of "Payload" data transmitted. There are: 8000 * 1 = 8,000 Bits of synchronization bits transmitted within a one second interval. Therefore, the total aggregate rate of the T1 signal is 1,544,000 BPS (1.544 MBPS).

Bitrage Microwave Radio

- *Transmits DS3*
- *Up to 10 miles*
- *Unlicensed Frequencies*
- *5.2 to 5.8 GigaHertz*
- *Adtran muxes take DS3 and provide 28 T1 lines*



Microwave Antennas

UH/att Technology Center

- *CoT and att met Fall 05*
  - *UH/att Center was proposed*
  - *att donated $250,000*
  - *Center to be located in rooms 110H and J, T1 Bldg*
  - *Under construction Spring 06*
- *Fujitsu donated third mux*
- *Nortel donated trial Multimedia Communication System (MCS)*

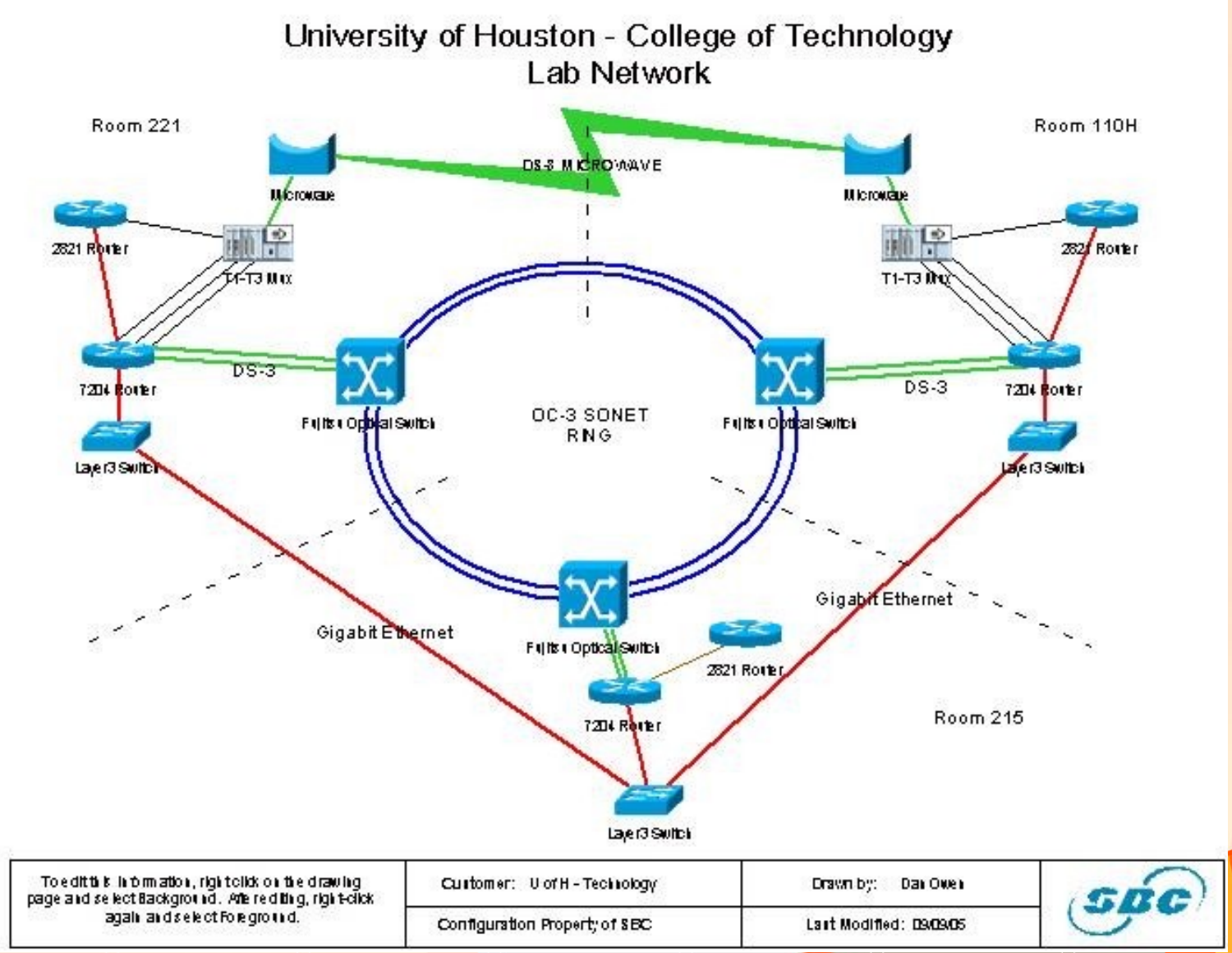
Testbed is Moving from TDM to IP

Convergence

- *data, voice, video*

- *Multi-Protocol Label Switching (MPLS)*
- *Gigabit Ethernet*
- *OC-48/192 SONET (2.5/10 Gbps)*
- *DWDM (Dense Wavelength Division Mux)*
- *Wireless*

State of the Network



End of Presentation

- *Invitation to Technology Students*
  - *Sergio, Lab Manager, room 215, x34690*
  - *schacon@uh.edu*
- *Optical Networking Research Lab website*
- *Questions*
- *Thank you*