Definitions

- **CPE** - Customer Premise Equipment
  - Correctly defined as “anything the customer connects to the network”
  - In practice, we use CPE to mean “equipment other than simple terminals” (phones, PCs, etc.)
- We will discuss mainly voice, but the arguments apply to video and data also

Rationale

- Placed between End-Users and CO connections
- Provide on-premise functions
- Make cost-efficient use of CO connections

Different Types...

- **PBX** - Private Branch Exchange
  - Full Premise Based Switching
- **Key System**
  - Smaller System, usually non-switching
  - Difference to PBX often unclear
- **CENTREX**
  - PBX functionality, but implemented in the Central Office Switch
Cross-Point Switching
“Space Division Switching”

Time Division Switching

- Each Line Card “Samples” the inbound signal (8000 times per second, each sample is taken over 0.125 msec)
- While the cards collect the next sample (during the next 0.125 msec), the Time Slot Interchanger collects all samples and delivers them to the correct line card outputs
- The TSI must process 8000*2*(number of conversation) samples
Handling Outbound Calls

- Call destination restrictions
- Least cost route selection
- Automatic redial

Handling Inbound Calls

- Routing Calls
  - Attendant
  - Direct Inward Dialing
- Handling Unanswered Calls
  - Call Forwarding -- General
  - Call Forwarding -- Busy/No-Answer
  - Hunt Groups
  - Queuing and Message Services

Signaling Call Information

- Calling number
  - ANI - Automatic Number Identification
    - Used in "800" services
  - Caller ID
    - Retail-level "CLASS" service
- Called Number
  - DNIS - Dialed Number Identification Service
    - Used in "800" service
  - DID - Direct Inward Dialing
    - CO to PBX Trunk Signaling

Handling Unanswered Calls

- Hunt Groups
- Queuing
- UCD
  - Universal Call Distributor
- ACDs
  - Specialized PBX software for inbound call handling
Call Centers

- Provide a business function
  - Maximize revenue or customer service, while
  - Minimizing cost to provide the service
- Components:
  - Automated Attendant
  - Audiotex(r)
  - IVR - Interactive Voice Response
  - ACD - Automated Call Distributor
  - Predictive Dialers

ACDs

- Inherently an ACD is a PBX, but
  - It is optimized for handling in-bound calls
  - It has extensive queuing functions
  - Almost always more trunks than lines!
  - Sophisticated internal routing function
    - What is agent is best matched to the customer/caller?
  - Extensive reporting options
    - Real-time - what is going on right now
  - Planning and Performance reports

PBX Capacity

- Traffic (usually measured in call minutes per hour)
  - How Many Simultaneous Calls
- Processor:
  - Total Calling Volume
  - Busy Hour Call Attempts
- Physical Interfaces
  - Stations and Trunks

“Programming a PBX”

- Moves, Adds, and Changes (MAC)
  - Establish New Service
  - Disconnect Service
  - Change Features On Existing Service