



Customer Premise Equipment

- Phone Systems
- Centrex

What is CPE?

Customer Premise Equipment.

- ▶ CPE includes *Key systems, PBX, Centrex, Voice Mail, CSU, DSU, Wiring, jacks, Call Accounting Systems, fax machines, Channel Banks, Modems, single line phones*
- ▶ Customers are free to buy or lease CPE from the telephone company or any other vendor. Companies who provide CPE are called Interconnects.
- ▶ The FCC and LEC sets standards for CPE to make sure it will work properly with the telephone company's network and equipment.

Dmarcs and Control Units

- ▶ The Demarcation point or Dmarc is where the telephone company's ownership and responsibility ends and the customer's begins.
- ▶ The control unit (CU) of a business telephone system is similar to a Central Office.
- ▶ Having it's own distribution system and endpoints, the CU performs 3 basic functions: switching, signaling and supervising.
- ▶ The CU is sometimes referred to as the "box" or "brains".

The Telephone

- The telephone is an electrical device, which requires electricity to create a telephone signal. The electricity is supplied by the telephone company, not the electric company, which is why a telephone operates even when the electricity goes out.
- When the telephone is installed, it includes a wire that carries electricity (Direct Current) from the telephone network to the telephone in the home or business.



The Telephone Set

- The switch hook signals the central office in originating and finalizing calls.
- Lifting the handset from the telephone base is referred to as going "off hook", meaning that a request for a dial tone has been made.
- Hanging up the phone is referred to as going "on hook", which relinquishes the connection, disconnecting the telephone set from the central office.



Telephone Components

- The telephone base:
 - the unit that holds the components and circuits that make the telephone set operate.
- The handset:
 - contains the transmitting and receiving components.
- The coiled wire connecting the handset to the base contains four wires, two from the transmitter and two going to the receiver. The cord is connected at each end by RJ-11C connectors.

Converters

- Converters - change human speech into an analog electrical signal.
 - Each telephone has two converters: one is in the portion of the telephone handset used for speaking (the transmitter); the other is in the part of the telephone handset used for hearing (the receiver).

Transmitter Conversion

- The conversion begins at the transmitter.
 - The soundwaves of a person's voice cause vibrations, which cause the transmitter (Diaphragm) to vibrate.
 - The diaphragm is connected to a chamber filled with carbon. Each vibration causes the carbon granules to compress, which causes more electrical current to flow through the circuit.
 - The vibrations (human voice) are converted into an electrical signal and transmitted over the telephone lines of the telephone network.

Receiver Conversion

- The receiver at the other end takes the electrical signal that it receives from the telephone network and converts it back into human sounds.
 - The receiver contains a magnet on the outer ring of a diaphragm and an opposing electromagnet.
 - Electrical signals from the telephone line cause the two magnets to interact, which pulls the diaphragm in and out (depending on the electrical current).

- The movement of the diaphragm causes a vibration in the air, which generates the human voice over the receiver.
- The telephone also contains a rotary dial or set of push buttons to allow the user to access the telephone network.
- The telephone network is made up of telephones in homes and businesses, the wires that connect the homes and businesses, one or more telephone switching offices, and local or long distance telephone circuits.

Key Systems

- ▶ There are 3 types of Key Systems: Electromechanical, Electronic and Hybrid.
- ▶ Found in small to medium businesses needing more than one telephone line, with limited growth.
- ▶ On a Electromechanical Key System, CO lines are connected to a piece of equipment called a KSU (Key System Unit).
- ▶ Each phone is connected to the KSU using 25 pair wire.
- ▶ Three major components of a key system are:
 - ▶ 1) KSU 2) Key Sets 3) Cabling

Key Systems

Electromechanical

- ▶ In a electromechanical key system, if all the telephones have the same set of line appearances it is called squared key configuration. To make an outside call you would press an outside line and dial the telephone number.
- ▶ On a Key System the CO lines use loop start signaling. This is why there is "glaring" on Key Systems and on your home computer.

Key Systems

Electronic

- ▶ Electronic Key Systems use integrated circuits for voice amplifications and switching of calls.
- ▶ Electronic Key Systems require only 2 or 4 pair wire. (Skinny Wire)
- ▶ With modular electronic telephone sets, an electrician or technician is not needed to install, disconnect or replace them.

Key Systems

Hybrids

- ▶ Hybrids can be configured as a Key or a PBX.
- ▶ Hybrids were developed to combine the best of Key and PBX technology, including features like: Overhead Paging, Alarms & Alerts, Music On Hold Station Message Detail Report and Line Pooling

PBX

- ▶ PBX or Private Branch Exchange is a telephone switch located at the customer premise.
- ▶ The 3 types of PBX's are Cord, Dial and Microprocessor.
- ▶ Developed to provide local switching for internal calls and pooled access to a reduced number of outside facilities.

PBX

Cord & Dial

- ▶ The oldest PBX is the Cord PBX where an operator would plug the calls into the switchboard and complete the call.
- ▶ PBX's after Cord PBX's get their dial tone from CO. Each station terminal gets dial tone from the PBX.
- ▶ With a Dial PBX, the incoming calls are handled by an attendant, unless the calls were placed over DID lines. If the PBX is set up for DID or Direct Inward Dial, then people in the office can receive calls directly at their stations.



PBX

(continued....)

- ▶ The Ratio used for DID lines (and key system lines) is for every line there are 10 DID numbers.
- ▶ PBX trunks connect to the CO or other switch, and can be incoming, outgoing, or a combination of both. PBX lines connect to station sets.
- ▶ Depending on system size and manufacturer, a PBX can support from 1 up to an unlimited amount of station sets and lines.
- ▶ PBX trunks use loop start or ground start signaling.

- ▶ Direct Inward System Access. Allows caller to remotely access their PBX. It is subject to fraud.
- ▶ The Microprocessor PBX handles incoming, outgoing and interoffice telephone calls. The computer's processor is the "brains" of the system.
- ▶ If electrical power goes out in your home, the phone still works, since the telephone companies lines are separate from those of the power company. This is NOT True for a business telephone system.

Centrex

- A Central Office based business communications service.
- Switching equipment connects telephone sets to Central Office.
- Many features, just like a PBX but user leases these features from the RBOC by paying a monthly fee.
- No Maintenance or Capital Investment for the customer.
- An advantage to Centrex is that it can function like a PBX with DID lines, except the Centrex lines may be used for incoming as well as outgoing calls.
- Also known as Essex, Plexar and Inteletrex.

Automatic Call Distribution

(ACD)

- Route incoming calls to agents based on criteria such as the agent that has been idle the longest.
- Provide call queuing, reports on agents and telephone lines.