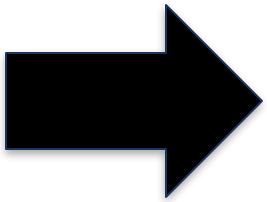
Architecture

Part 1:

Telephone network and circuit switching

Telephone networks

- 1 application (voice)
- Long unicast connections/sessions (calls)
- Almost constant traffic generation during the connection
- Sparse call arrival



Network design

Topologies

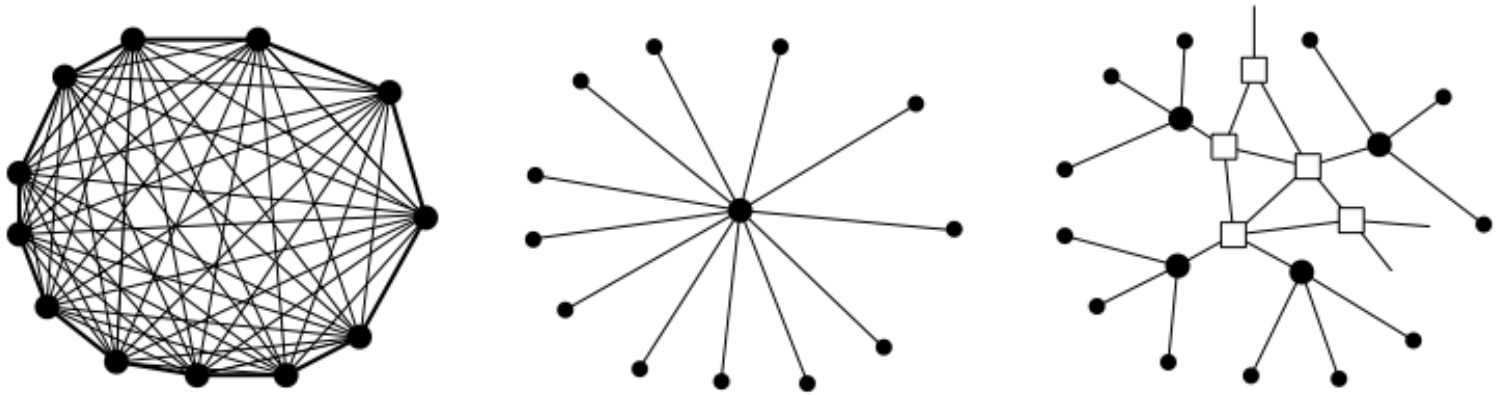
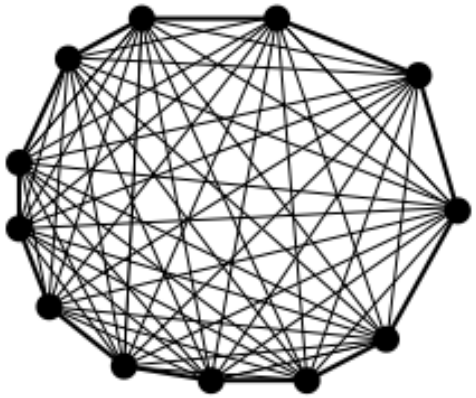


Figure 2-29. (a) Fully interconnected network. (b) Centralized switch. (c) Two-level hierarchy.

Tanenbaum fig. 2-29

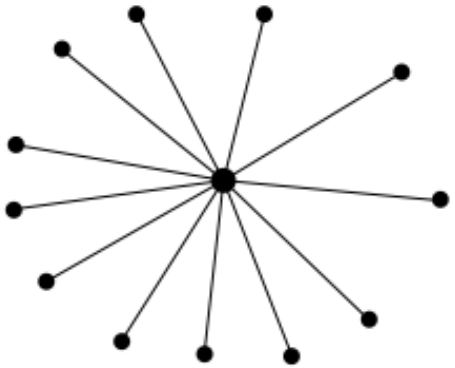
Fully-connected topology



- Large number of links

Expensive infrastructure!

Centralized switch topology

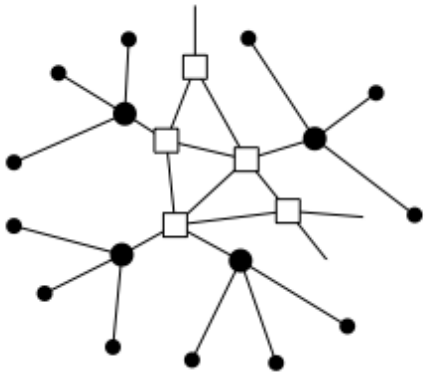


- Small number of links

Local infrastructure:

- Connections from any point to a central switch
- Very long wires

Multi-level hierarchical topology



- Slightly larger number of links (2 levels)

Scalable infrastructure:

- Many short connections
- Fewer long-distance connections

Topology with long distance

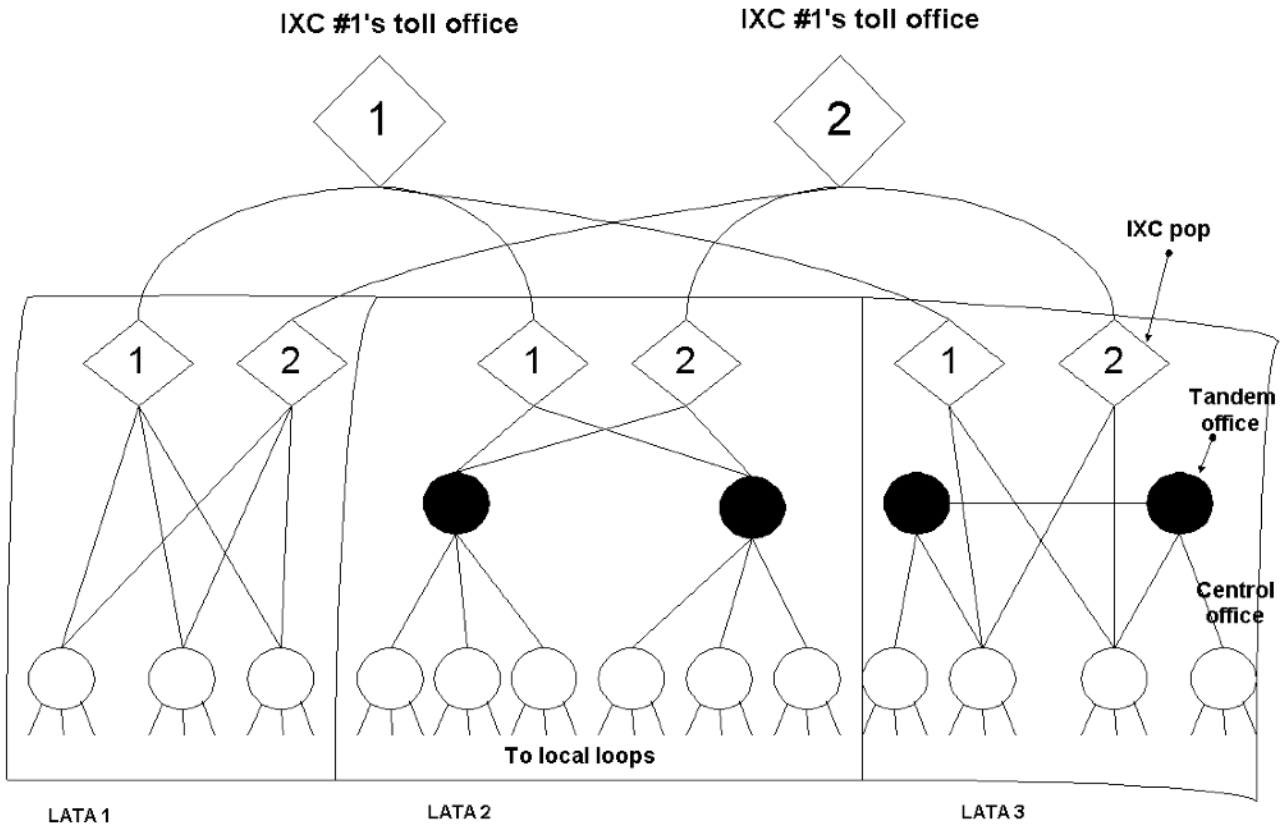


Fig. 2-16. The relationship of LATAs, LECs, and IXCs. All the circles are LEC switching offices. Each diamond belongs to the IXC whose number is in it

Multiple long-distance carriers

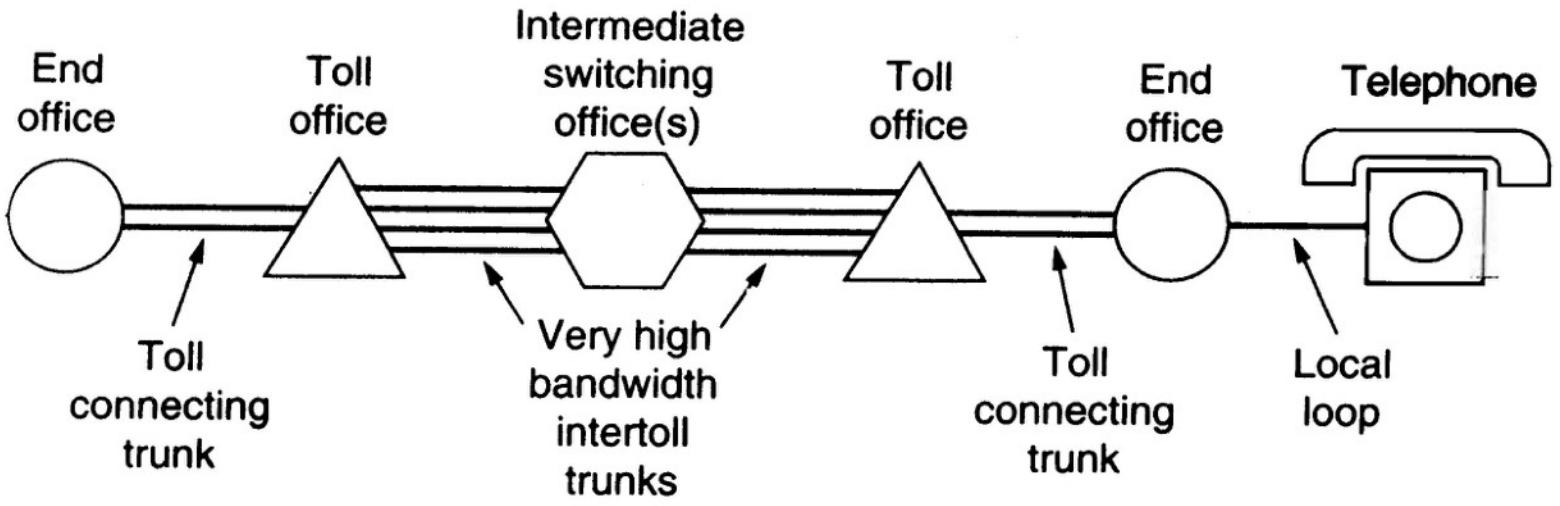
LATA = Local Access and Transport Area

LEC = local exchange carrier

IXC = Interexchange (long distance) carrier

Tanenbaum fig. 2-16

Lines and trunks

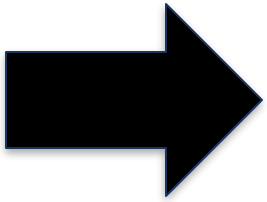


Tanenbaum fig. 2-15

Local loop line is often twisted-pair copper (low capacity, analog)
Trunks are often fiber (high capacity, digital)

Trunks

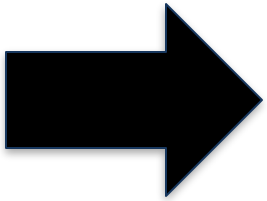
- Trunk lines carry more than 1 call simultaneously (thousands-millions)



High capacity

  - Digital vs Analog

Long distance



Signal degrades with distance

- Analog sensitive to noise
- Digital: regeneration, recovery

Tanenbaum fig. 2-24