Integrated services Digital Network

Integrated Services Digital Network

- Public networks are used for a variety of services
  - Public Switched Telephone Network
  - Private Lines (leased)
  - Packet Switched Data Networks
  - Circuit Switched Data networks

ISDN

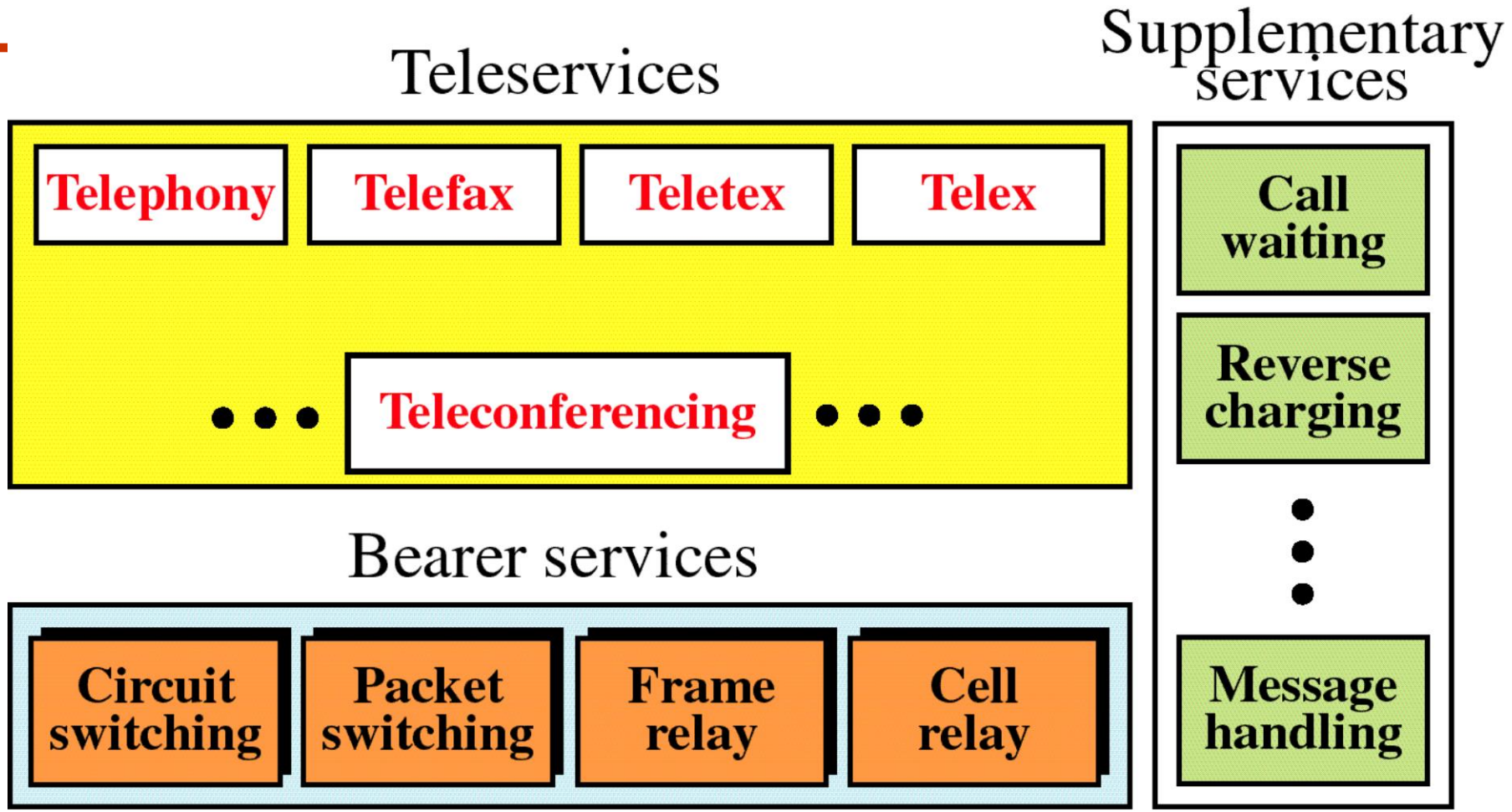
- Users have a variety of equipment to connect to public networks
  - Telephones
  - Private Branch Exchanges
  - Computer Terminals or PCs
  - Mainframe Computers
- A variety of physical interfaces and access procedures are required for connection

ISDN

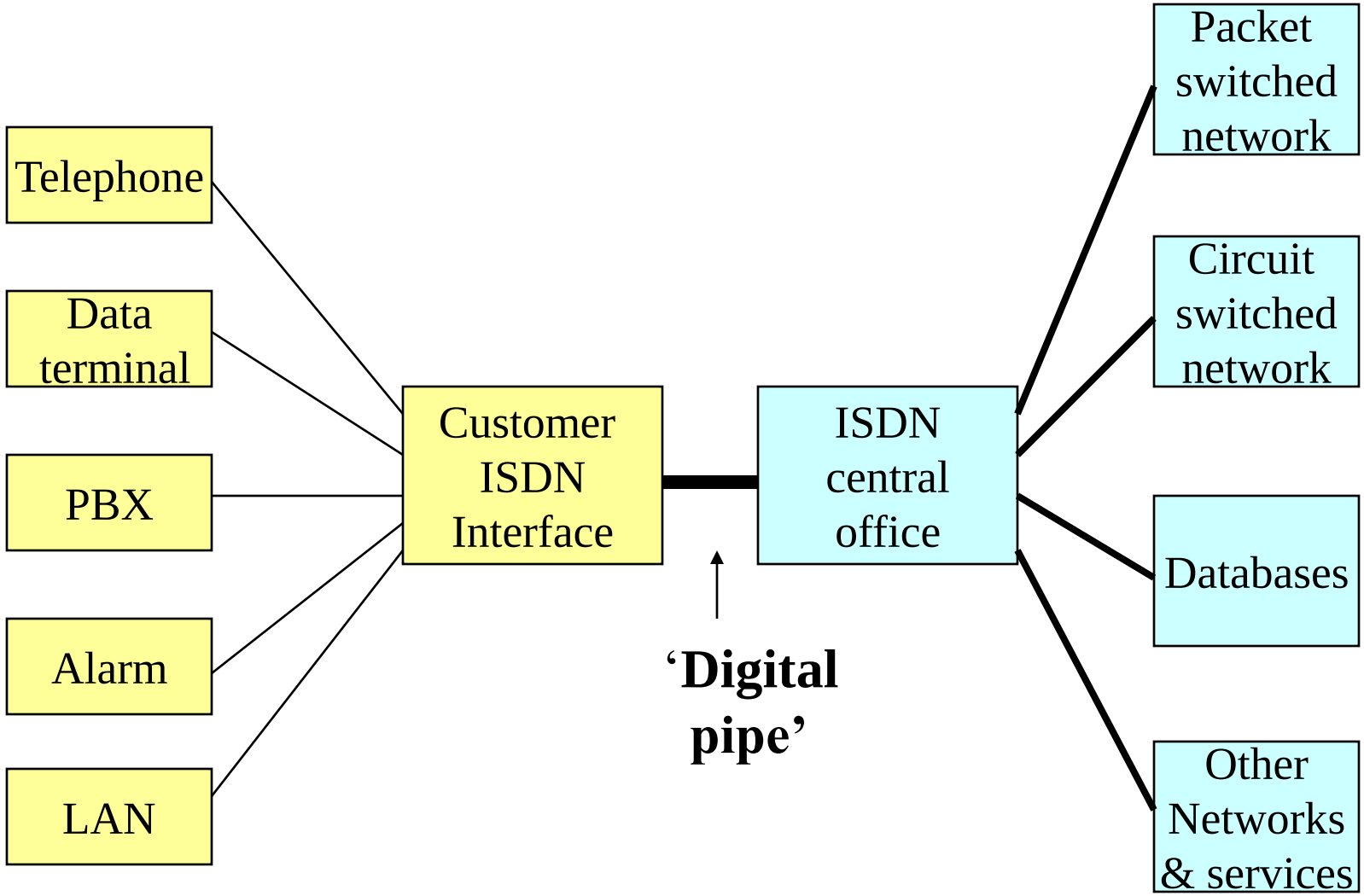
- The telephone network has evolved into a digital one with digital exchanges and links
- The signalling system has become a digital message-oriented common channel signalling system (SS#7)
- The term ‘Integrated Digital Network’ is used to describe these developments

Figure 15-1

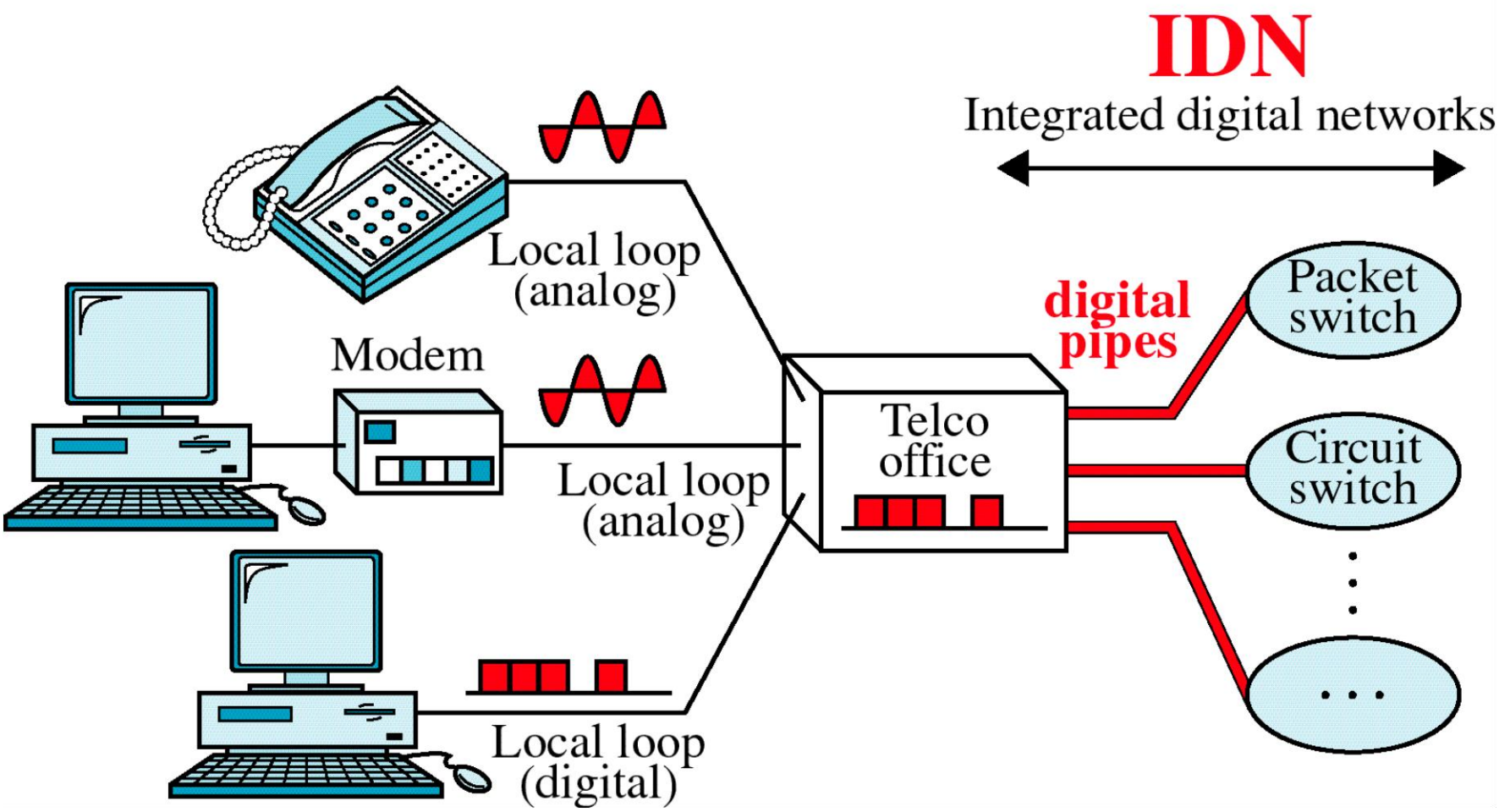
ISDN Services



Integrated Services Digital Network



Integrated Digital Network



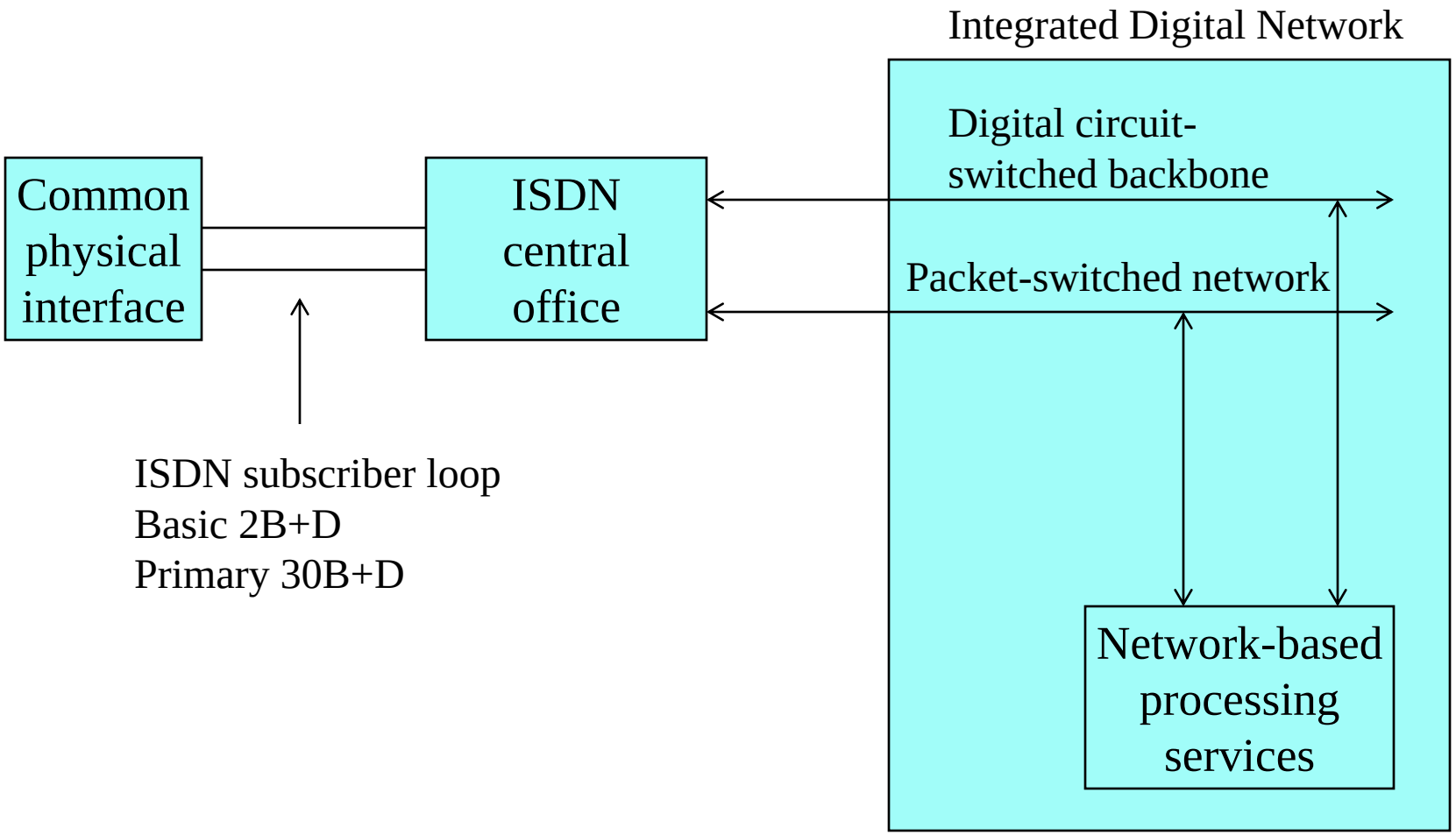
ISDN

- In Practice there are multiple networks providing the service nationally
- The user however, sees a single network

Benefits to Subscribers

- Single access line for all services
- Ability to tailor service purchased to suit needs
- Competition among equipment vendors due to standards
- Availability of competitive service providers

Architecture



ISDN Channels

- The Digital pipe is made up of channels - one of three types
- B channel, D channel or H channel
- Channels are grouped and offered as a package to users

B Channel

- B channel-64 kbps
- B is basic user channel
  - can carry digital data or PCM-encoded voice
  - or mixture of lower rate traffic.

B Channel

- Four kinds of connection possible
- Circuit-switched
- Packet-switched - X.25
- Frame mode - frame relay (LAPF)
- Semipermanent - equivalent to a leased line

D Channel

- D Channel - 16 or 64 kbps
- Carries signalling information to control circuit-switched calls on B channels
- Can also be used for packet switching or low-speed telemetry

H Channel

- Carry user information at higher bit rates 384kbps or 1536kbps or 1920kbps
- Can be used as a high-speed trunk
- Can also be subdivided as per user's own TDM scheme
- Uses include high speed data, fast facsimile, video, high-quality audio

ISDN Channels and their Applications

B Channel (64 kbps)	**D Channel (16/64 kbps)**	**H Channel (384/1536 kbps)**
Digital voice	Signalling (using SS#7)	High-speed trunk
High-speed data (e.g. packet and circuit switched data)	Low- speed data, (e.g. packet, terminal, videotex)	Very high speed data
Other (e.g. fax, slow video)	Other (e.g. telemetry)	Other (e.g. fast fax. Video)

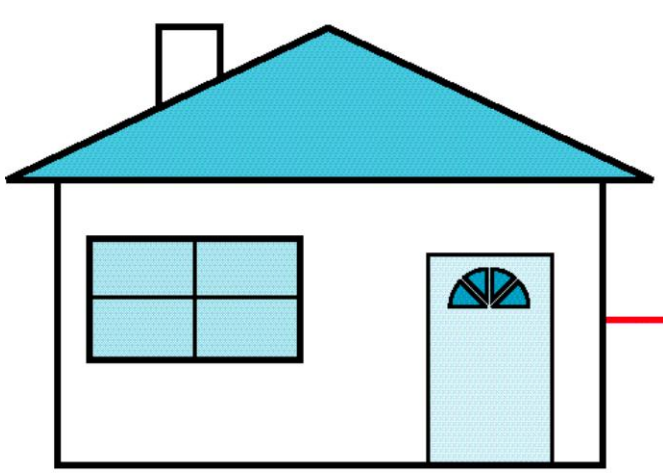
ISDN Channel Groupings

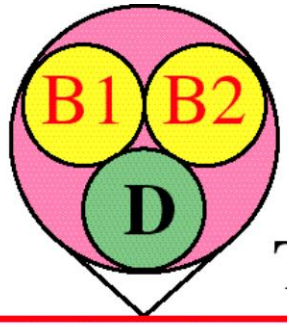
- Basic Access -
  - two 64 kbps B channels
  - plus one 16kbps D channel
- B channels can be used for voice and data
- simultaneous calls to separate destinations supported
- D channel used for signalling and also for data using X.25

ISDN Basic Access

- Intended for small business and residential use
- A single physical interface is provided
- Data rate is 144kbps plus 48kbps overhead bits totalling 192 kbps
- Most existing subscriber loops can support basic access

Basic Rate Interface





To ISDN office

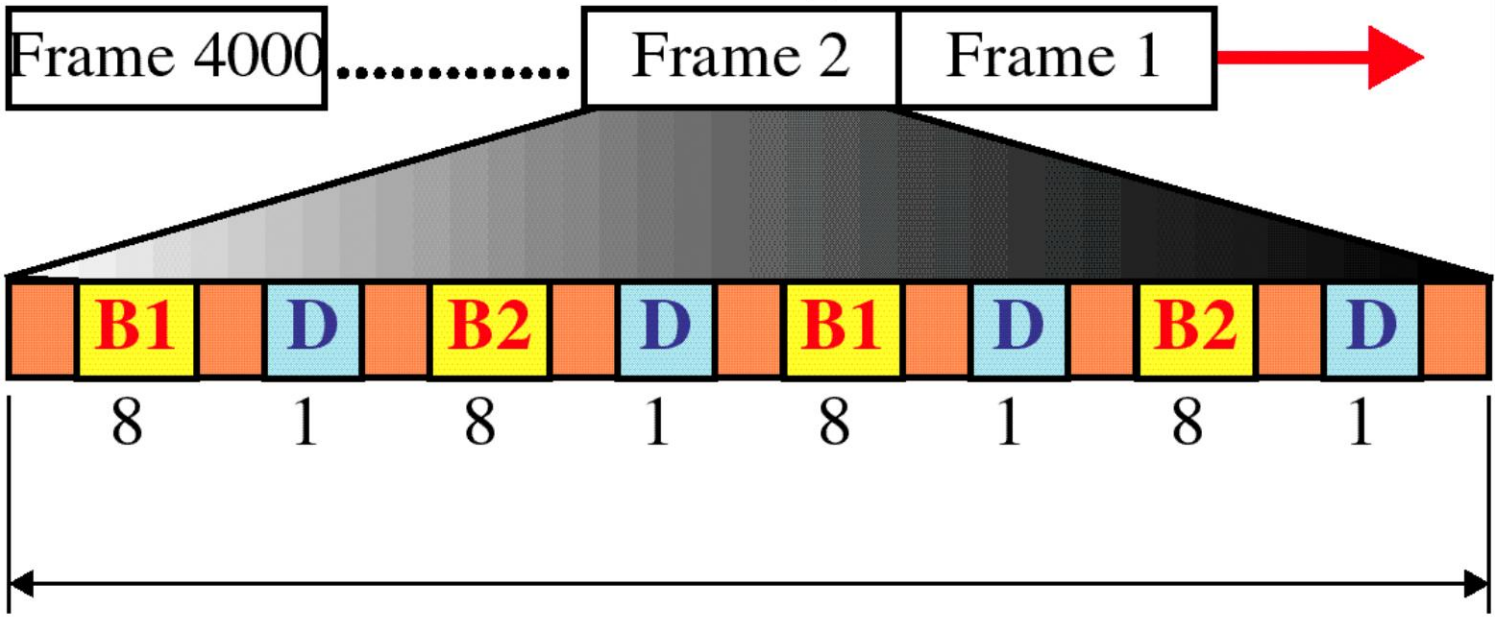
BRI 192 Kbps

64(B1)+64(B2)+16(D)+48 (overhead)

= 192 Kbps

BRI Frame

BRI = 4000 frames/s = 4000 X 48 bits/frame
= 192 Kbps



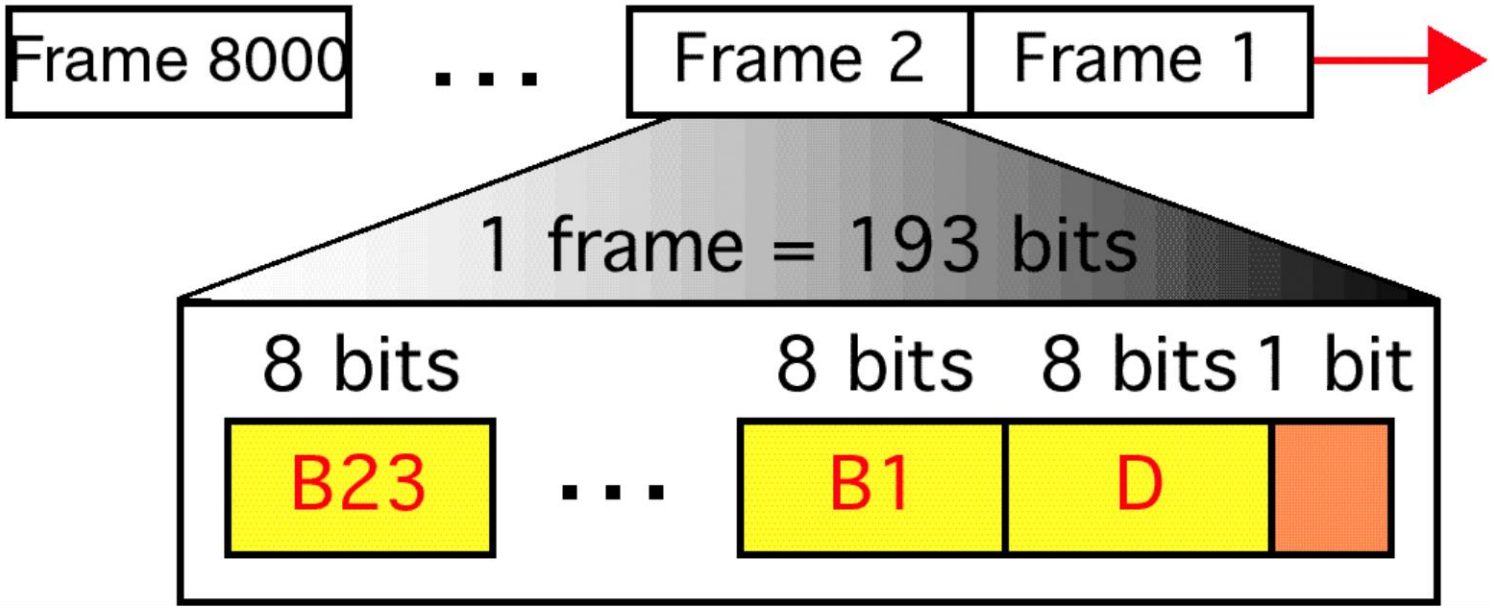
48 bits (16 bits for B1, 16 bits for B2, 4 bits for D, and 12 bits overhead)

ISDN Primary Access

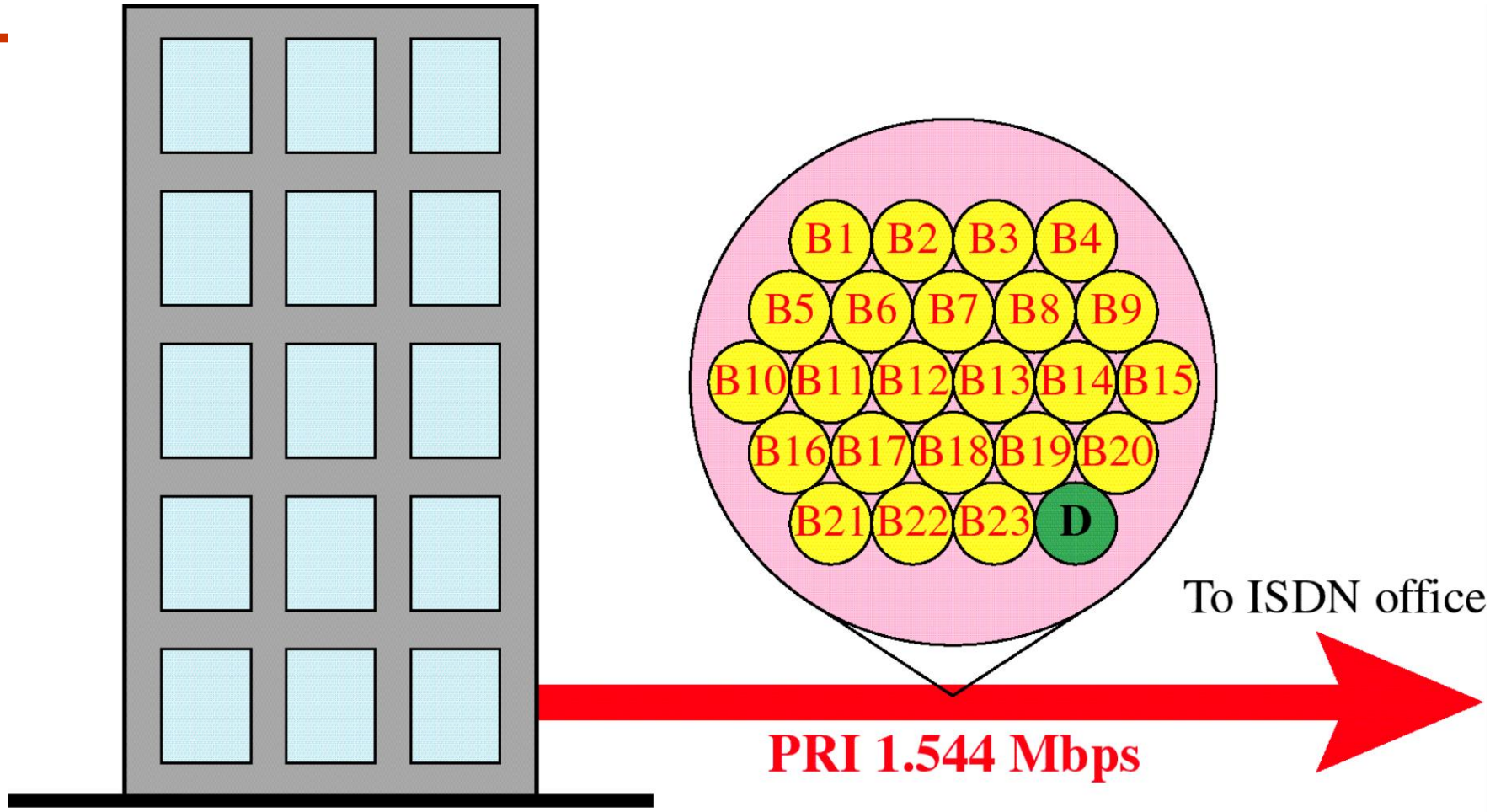
- Intended for users with greater capacity requirements
- Example would be a digital PBX
- Two standards exist
  - 1.544 Mbps American
  - 2.048 Mbps European

PRI Frame

PRI = 8000 frames/s = 8000 X 193 bits/frame
= 1.544 Mbps



Primary Rate Interface



23 X 64(B1 – B23) + 64 (D) + 8 (overhead) = 1544

User Access

- Defined using two concepts
  - Functional groupings of equipment
  - Reference points to separate functional groupings

Typical User Access Layout