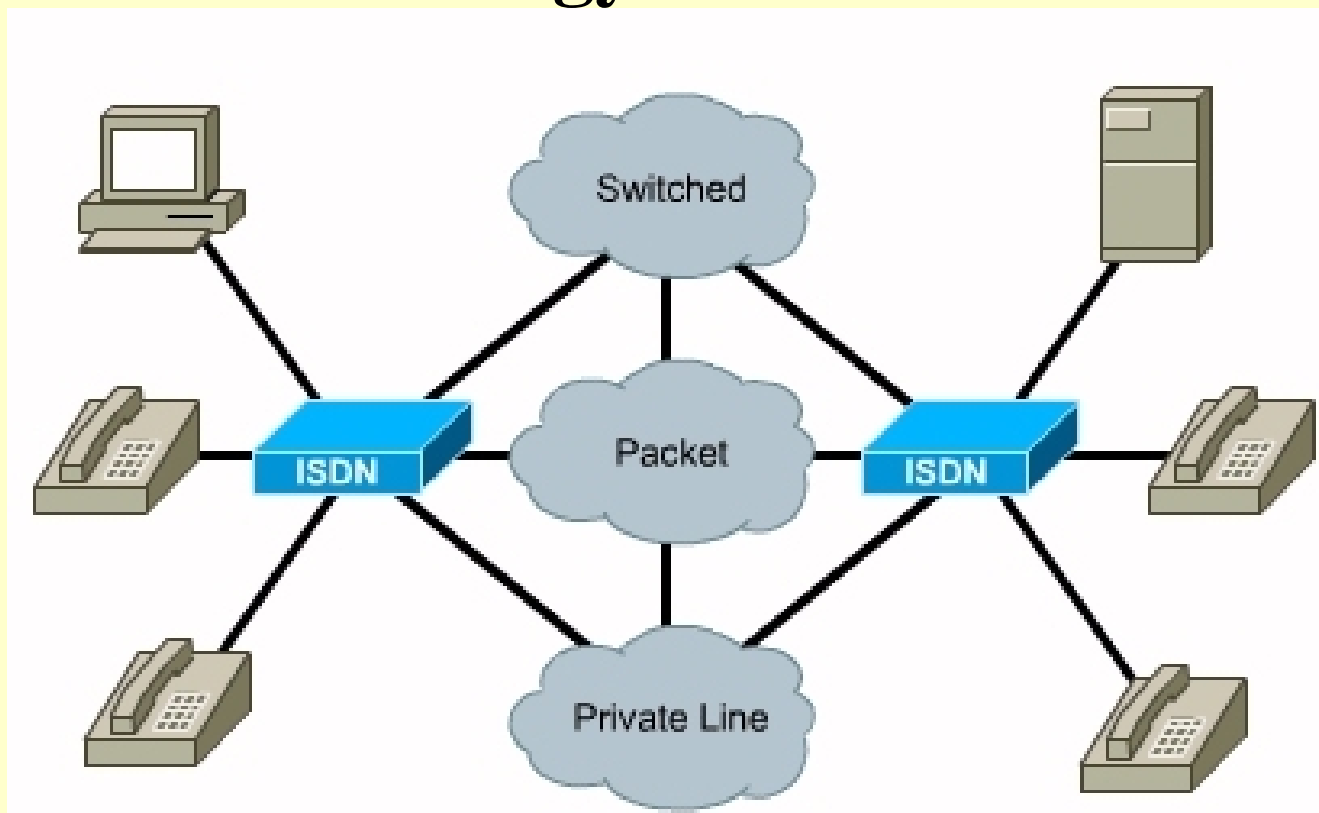


What is ISDN?

INTEGRATED SERVICES DIGITAL NETWORK

- **ISDN is a set of standards which define an end to end Digital Network**
- **WAN Technology**



Features of ISDN

- **Uses Digital Signal**
- **Uses Existing telephone wiring**
- **Charges are generally based on the duration of call (How long the WAN link was used)**
- **Alternate to using leased lines**
- **Can transport many types of Network traffic (Voice, Data, Video, Text, Graphics etc)**
- **Faster Data transfer rate than modems**
- **Faster Call setup than Modems**

ISDN Components

- **Terminal Equipment type 1 (TE1)**
 - * ISDN compatible device (Router with ISDN Interface)
 - * TE1s connect to the ISDN network through a four-wire, twisted-pair digital link
- **Terminal Equipment type 2 (TE2)**
 - * ISDN Non-compatible devices.
 - * Will require a terminal adapter.
- **Terminal Adapter (TA)**
 - * Converts standard electrical signals into the form used by ISDN
 - * Needed for connection with TE2 devices
 - * The ISDN TA can be either a standalone device or a board inside the TE2

ISDN Components

- **Network termination type 1 (NT1)**
 - * Network-termination devices that connect the four-wire Subscriber wiring to the conventional two-wire local loop
 - * Is a *customer premises equipment* (CPE) device (North America)
- **Network termination type 2 (NT2)**
 - * Intelligent device that performs switching & concentrating.
 - * Provides multiple ISDN interfaces on an ISDN line. The NT2 may be as simple as a bridging device connected to an NT1 unit or it may be as complicated as a PBX (Private Branch exchanges)

ISDN Reference points

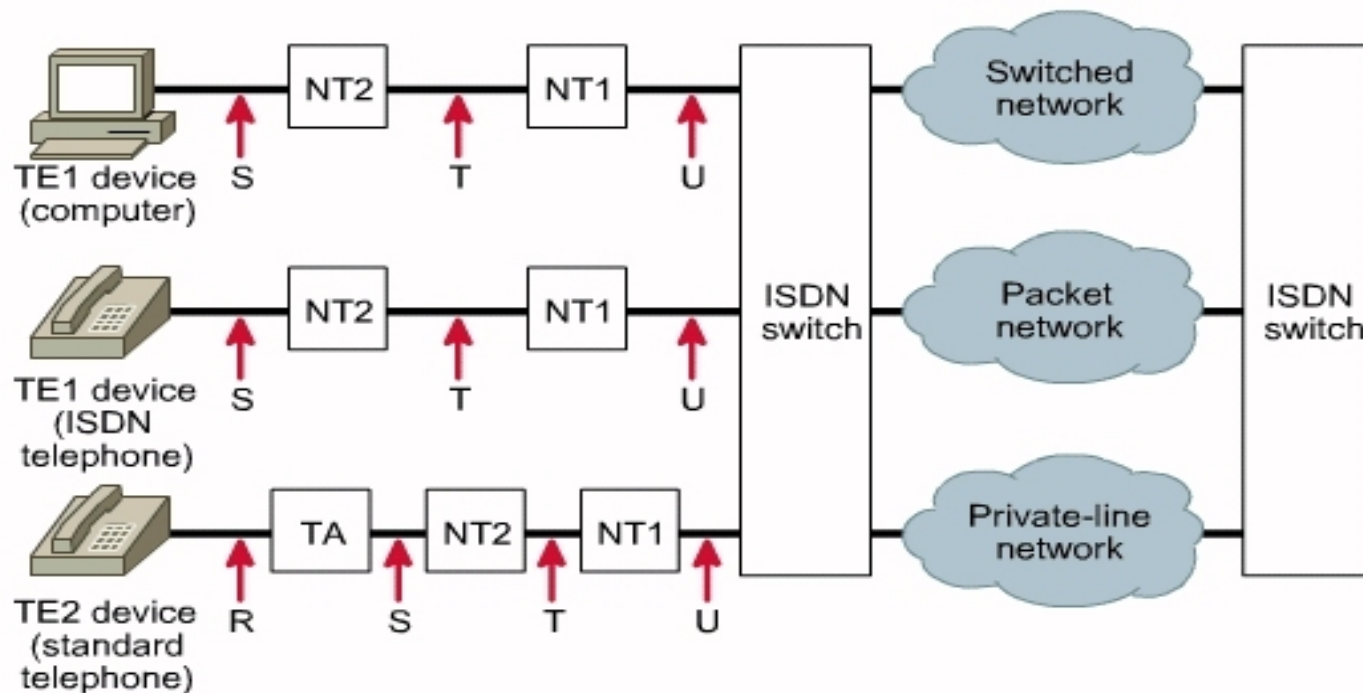
ISDN specifies a number of reference points that define logical interfaces between functional groupings, such as TAs and NT1s.

ISDN reference points include the following:

- **R**---The reference point between non-ISDN equipment and a TA.
- **S**---The reference point between user terminals and the NT2.
- **T**---The reference point between NT1 and NT2 devices.
- **U**---The reference point between NT1 devices and line-termination equipment in the carrier network. The U reference point is relevant only in North America, where the NT1 function is not provided by the carrier network

ISDN Reference points

Reference points are a series of specifications that define the connection between specific devices, depending on their function in the end-to-end connection



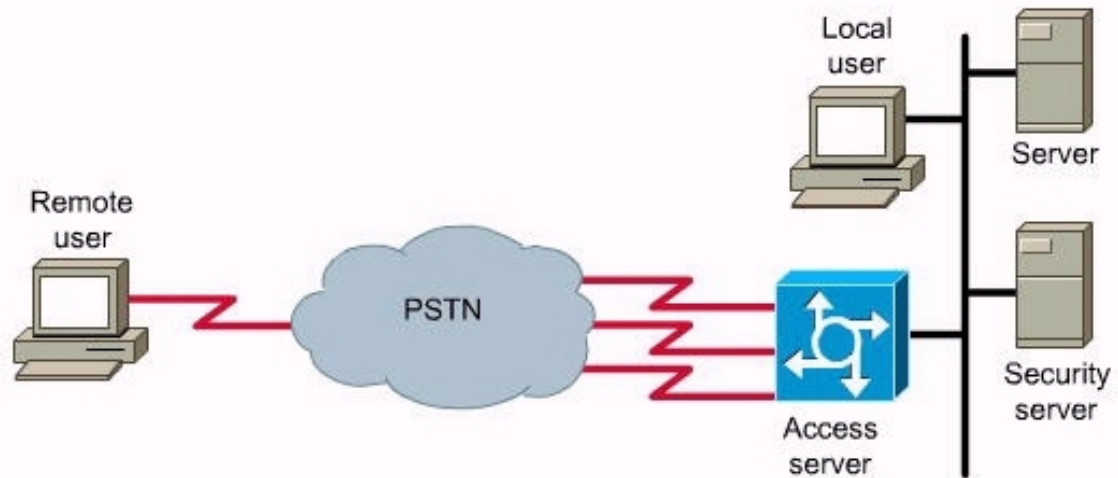
ISDN Encapsulation

- **HDLC**
(High-Level Data Link Control)
- **PPP**
(Point to Point Protocol)
- **LABP**
(Link Access Procedure Balance)

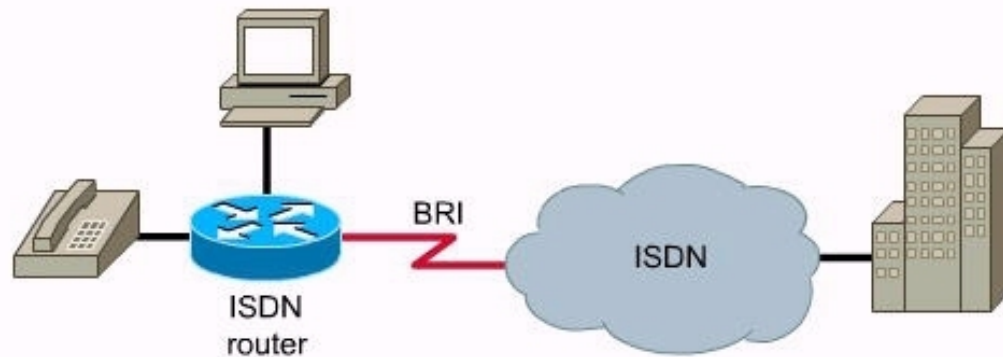
ISDN interfaces allow only a single encapsulation type

Telecommuter/Remote User

➤ Using Modem



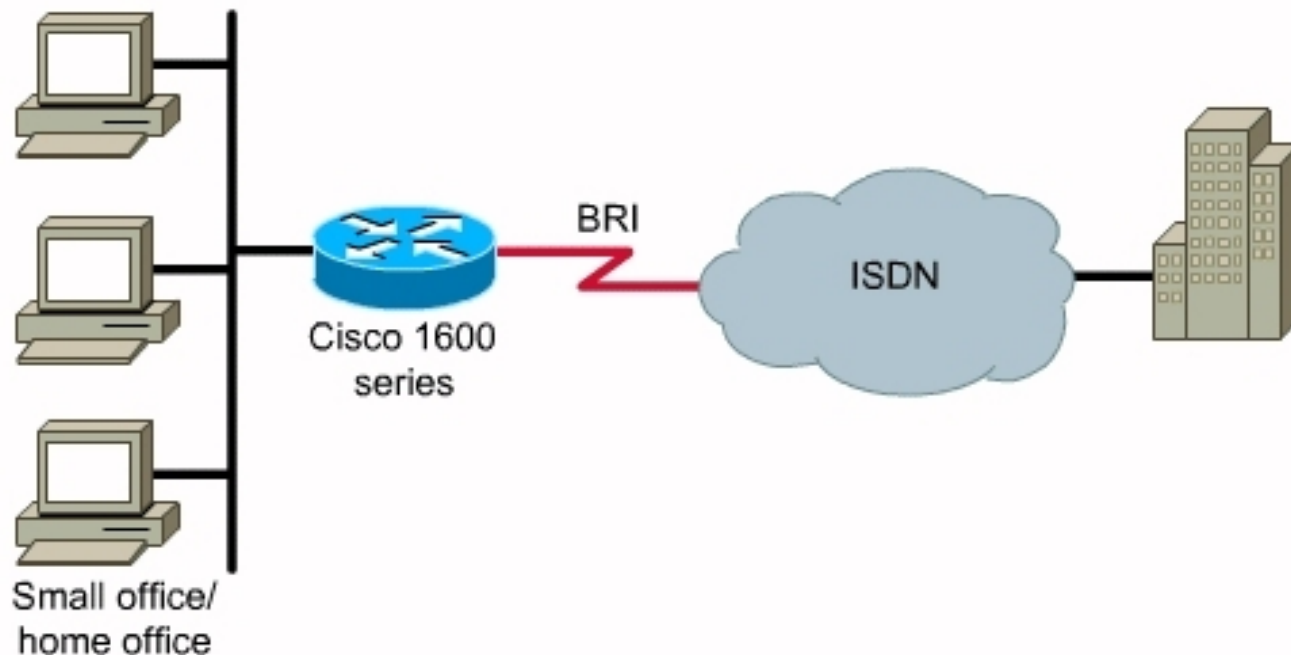
➤ Using ISDN



Telecommuter/Remote Office

Components & Considerations

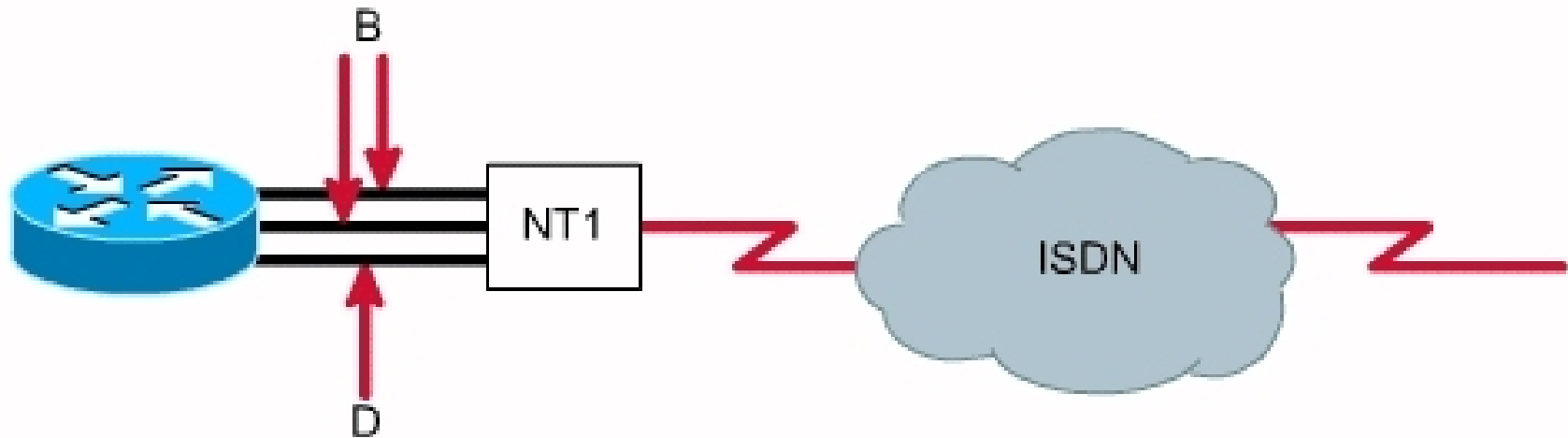
- ISDN Router
- Multiple remote users at the same location



ISDN Service

BRI (Basic Rate Interface)

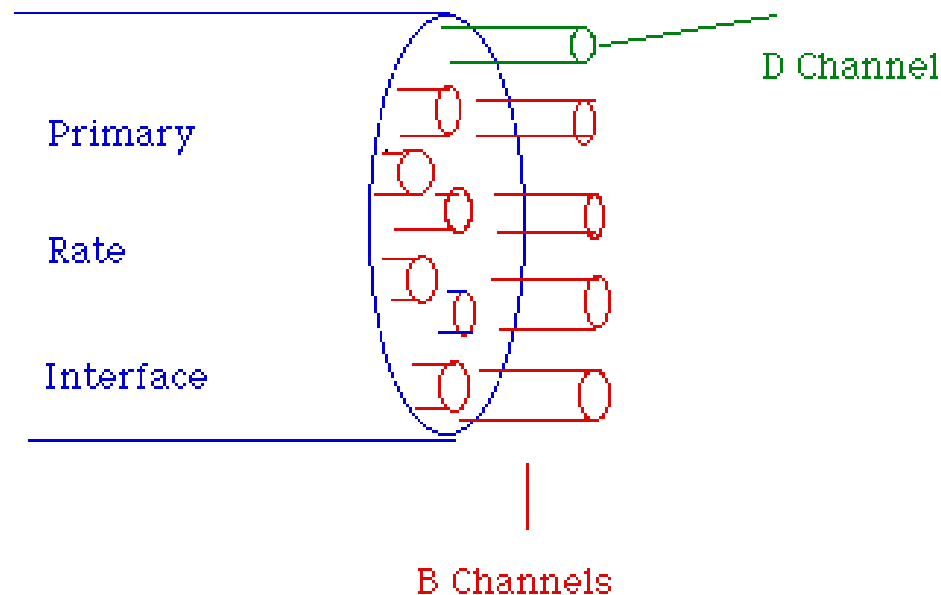
- Connection from the ISDN office to the user location provides for access to three channels. The channels are two 64Kb B-channels and one 16Kb D-channel
- The B-channels and the D-channel provide the user with access to the circuit switched network



ISDN Service

PRI (Primary Rate Interface)

- ISDN Primary Rate Interface service provides digital access via a T1 line. A T1 line provides a 1.544 bandwidth. This bandwidth is divided into 24 64Kb channels. The ISDN PRI service uses **23 B channel** access and uses the **24th (D) channel for signaling purposes**



ISDN Protocols

Protocols which start with the following letter:

- E - Protocols recommend telephone network standards for ISDN
- I - Protocols for Concepts, terminology and general methods
- Q - Protocols, how switching and signaling should operate, call setup etc.

Dial on Demand Routing

- ISDN LAN routers provide routing between ISDN BRI and the LAN by using dial-on-demand routing (DDR)
- DDR automatically establishes and releases circuit-switched calls, providing transparent connectivity to remote sites based on **networking traffic**
- DDR also controls establishment and release of secondary B channels based on load thresholds

ISDN Setup

➤ ISDN Switch

You need to be aware of the switch types used at the CO. This information is needed for the router configuration, before you can connect it to an ISDN service.

➤ Service Profile Identifiers (SPIDs)

The ISDN carrier provides a SPID to **identify the line configuration of the ISDN service**. SPIDs are a series of characters (that can look like phone numbers) that identify you to the switch at the CO. After you're identified, the switch links the services you ordered to the connection.

ISDN Setup

ISDN Switch

- Use the **isdn switch-type** command in global configuration command mode
- The full syntax of the command is: **isdn switch-type switch-type**

Supported BRI Switch Types

Output

```
kdt-3640(config)# isdn switch-type ?
  basic-1tr6      1TR6 switch type for Germany
  basic-5ess      AT&T 5ESS switch type for the U.S.
  basic-dms100    Northern DMS-100 switch type
  basic-net3      NET3 switch type for the UK and Europe
  basic-ni1       National ISDN-1 switch type
  basic-nwnet3    NET3 switch type for Norway
  basic-nznet3    NET3 switch type for New Zealand
  basic-ts013     TS013 switch type for Australia
  ntt             NTT switch type for Japan
  vn2            VN2 switch type for France
  vn3            VN3 and VN4 switch types for France
```

ISDN Setup

Service Profile Identifiers (SPIDs)

- The SPIDs are processed during each call setup operation
- The *spid-number* argument indicates the number identifying the service to which you have subscribed and assigned by the ISDN service provider for the B2 channel

Router (config-if)#

```
isdn spid1 spid-number [ ldn ]
```

- ◆ Sets a B channel Service Profile Identifier (SPID) required by many service providers

Router (config-if)#

```
isdn spid2 spid-number [ ldn ]
```

- ◆ Sets a SPID for the second B channel