



CO AND CL SERVICES

SERVICE BY A LAYER TO ITS UPPER LAYER

- **CONNECTION ORIENTED**
- **CONNECTION LESS**

CO

- ESTABLISH A CONNECTION
 - USE THE CONNECTION
 - RELEASE THE CONNECTION
- e.g. TELEPHONE SYSTEM

CO

- BIT ORDER IS PRESERVED
 - RELATION BETWEEN PACKETS
 - SEQUENTIAL TRANSMISSION OF PACKETS
 - DECISION BY SWITCH CAN BE MADE ONLY ONCE
 - PARAMETER NEGOTIATION EXIST
- ONE SIDE REQUEST, OTHER SIDE
ACCEPT/REJECT/COUNTERPROPOSAL

CL

- EACH MESSAGE CARRY FULL INFORMATION (DESTINATION ADDRESS)
- ALL ARE INDEPENDENT
- ARRIVAL ORDER MAY CHANGE
e.g. POSTAL SYSTEM

CHARACTERIZATION

QoS

- ACKNOWLEDGMENT → RELIABLE → OVERHEAD → DELAY
- IF ACK. CALLED ACK DATAGRAM SERVICE ELSE DATAGRAM SERVICE

REQUEST REPLY SERVICE

MOSTLY USED IN CLIENT SERVER MODEL

DIFFERENT TYPE OF SERVICES

TYPE	SERVICE	EXAMPLE
CO	RELIABLE BYTE STREAM	REMOTE LOGIN
CL	UNRELIABLE DATAGRAM	ELECTRONIC JUNK MAIL
CL	REQUEST REPLY	DATABASE QUERY

IF RELIABLE EXIST THEN WHY NON RELIABLE

- RELIABLE MAY NOT BE AVAILABLE
- IF UNRELIABLE ,HIGHER LAYER PROCOL DEAL WITH THE PROBLEM
- DELAY OF RELIABLE MAY BE UN ACCEPTABLE LIKE IN REAL TIME SERVICES SUCH AS MULTIMEDIA
- SO BOTH COEXIST

POLLING

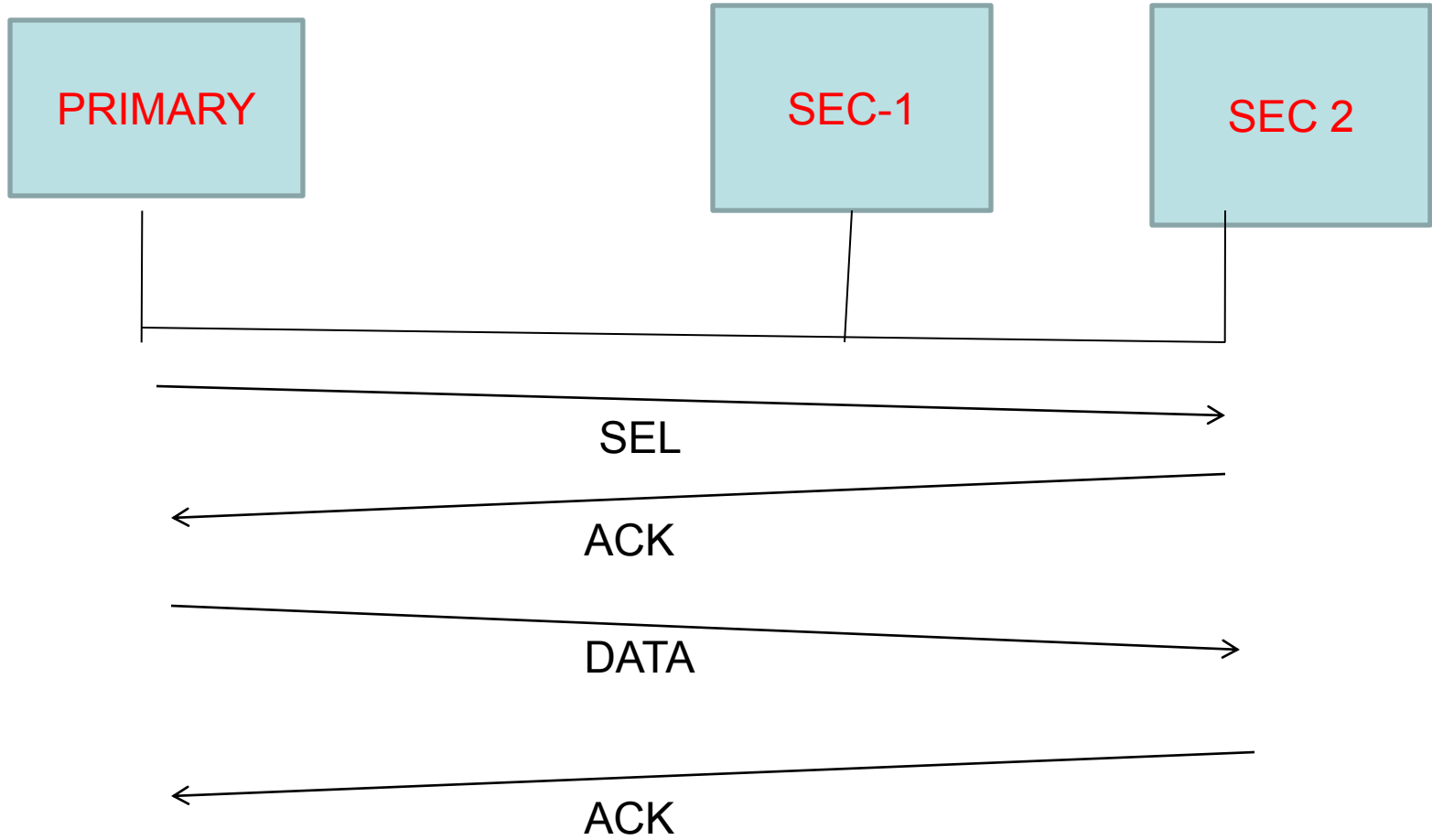
- IT WORKS WITH TOPOLOGY HAVING A PRIMARY DEVICE AND A SECONDARY DEVICE .
- ALL DATA EXCHANGE MADE THROUGH PRIMARY DEVICE.
- PRIMARY DEVICE CONTROL THE LINK AND SEC FOLLOW THE INSTRUCTIONS.
- PRIMARY DEVICE IS THE INITIATOR OF ANY SESSION.
- PRIMARY DECIDE WHICH SECTO USE LINK AT WHAT TIME.

POLLING

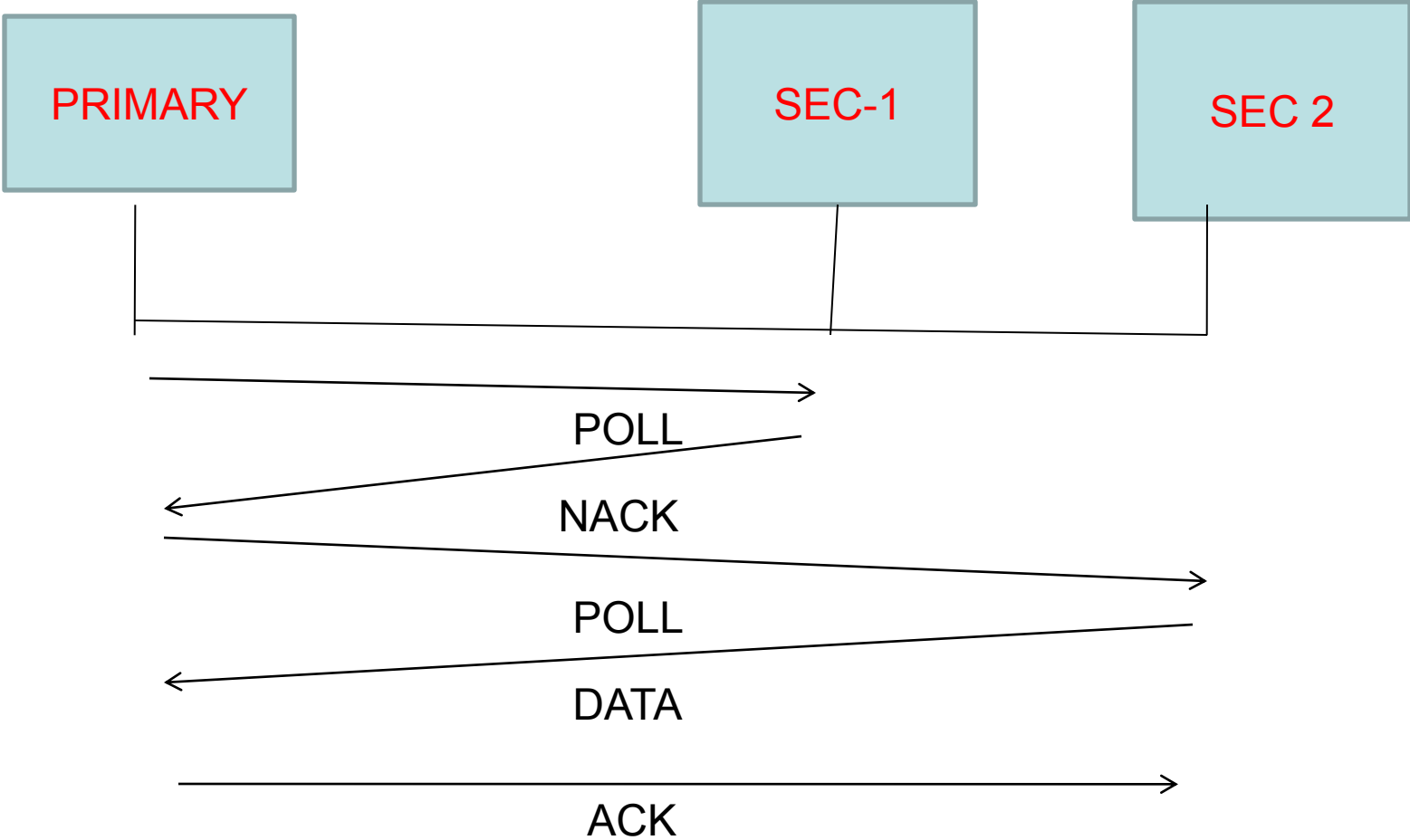


- SELECT FUNCTION (P TO S)
- POLL FUNCTION (S TO P)

POLLING : SELECT



POLLING : POLL



POLLING



- CENTRALIZED (hub polling)
polling order is maintained by a single central station or *hub*.
- DECENTRALIZED (distributed)
each station knows its successor in the polling sequence and send the poll directly to that station

POLLING



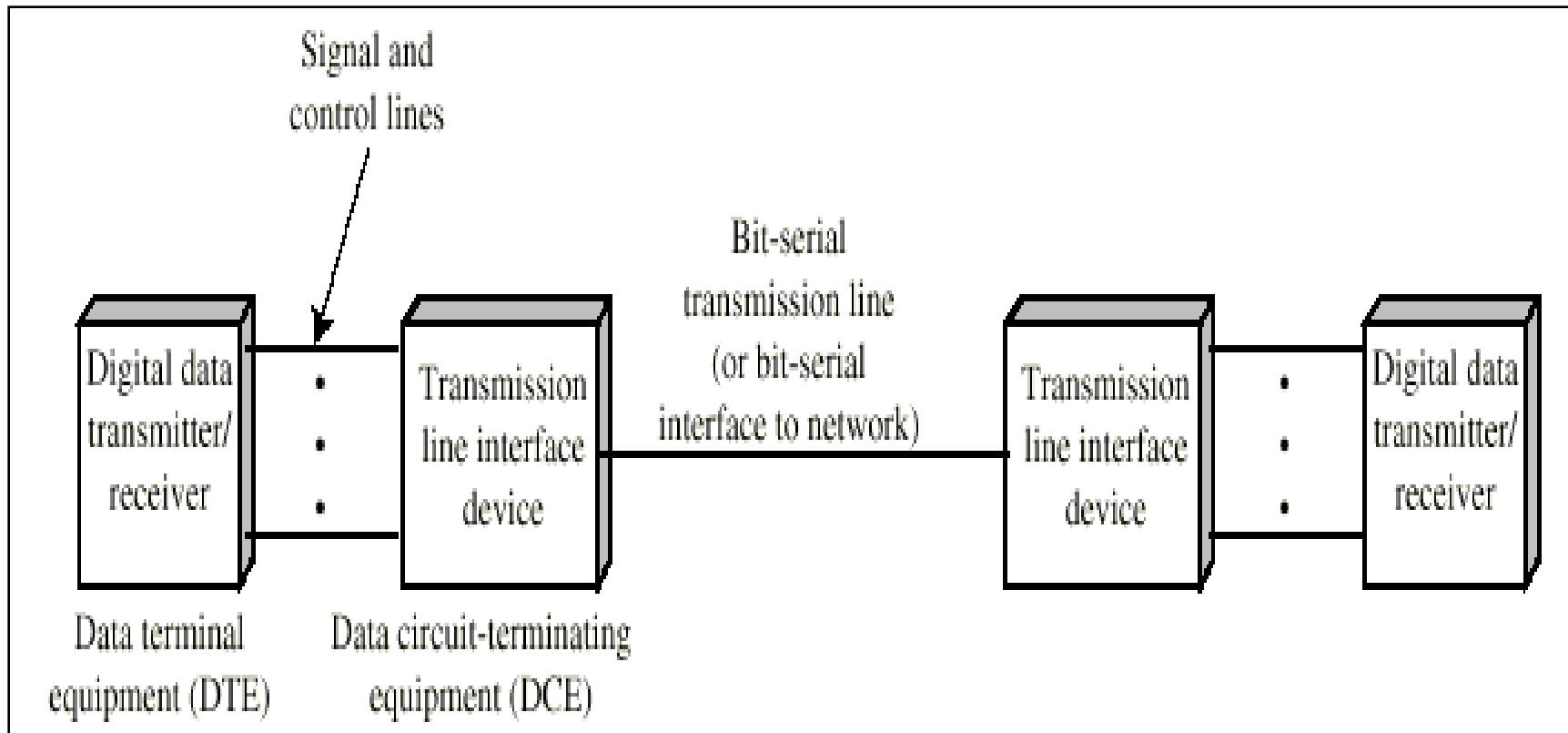
- CENTRALIZED (hub polling)
polling order is maintained by a single central station or *hub*.
- DECENTRALIZED (distributed)
each station knows its successor in the polling sequence and send the poll directly to that station

POLLING

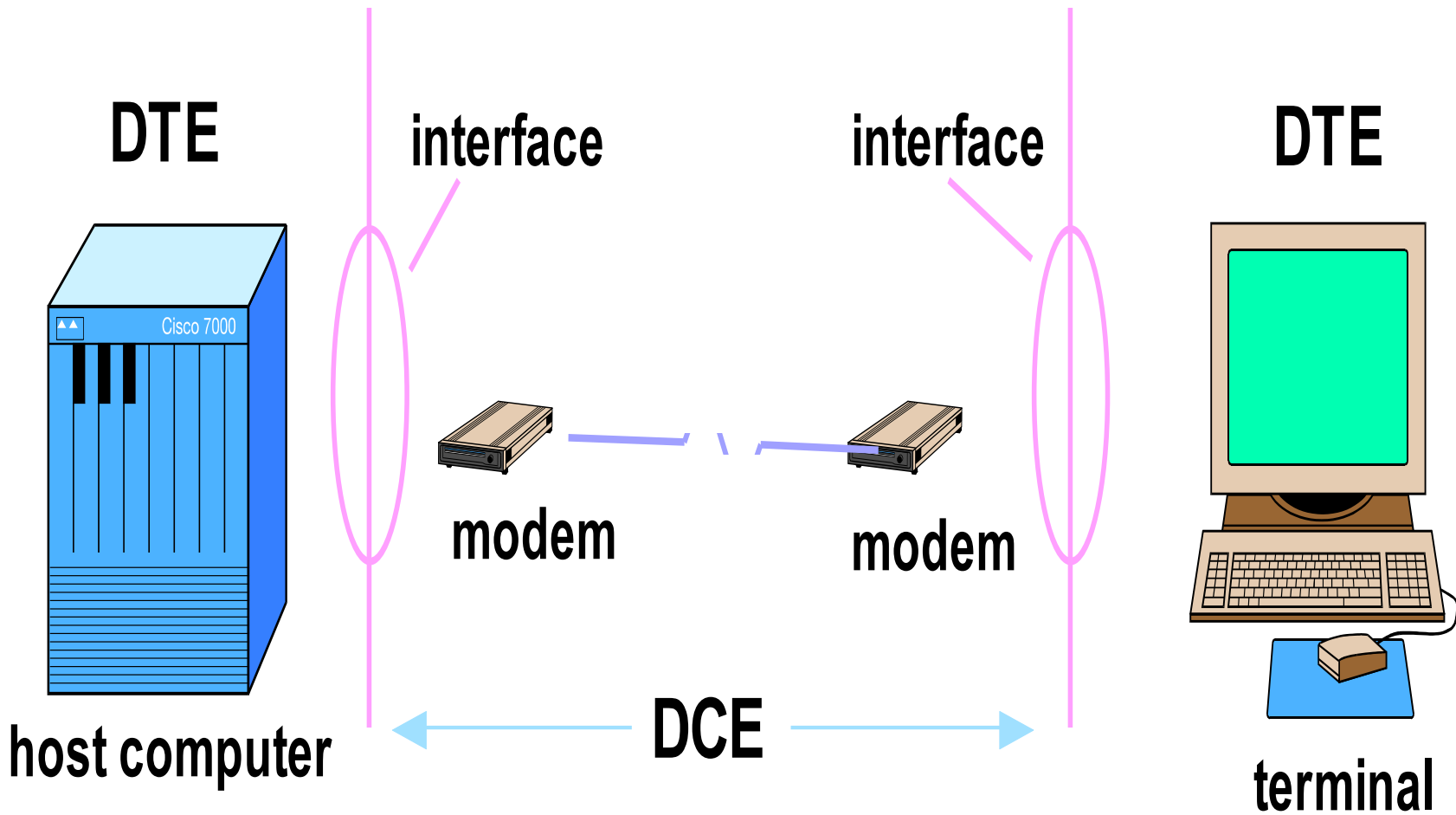


- CENTRALIZED (hub polling)
polling order is maintained by a single central station or *hub*.
- DECENTRALIZED (distributed)
each station knows its successor in the polling sequence and send the poll directly to that station

Communications Interface Illustration



DTE and DCE



RS-232C (EIA 232C)

- EIA's "Recommended Standard" (RS)
- Specifies mechanical, electrical, functional, and procedural aspects of the interface
- Used for connections between DTEs and voice-grade modems, and many other applications

EIA-232-D

- new version of RS-232-C adopted in 1987
- improvements in grounding shield, test and loop-back signals
- the prevalence of RS-232-C in use made it difficult for EIA-232-D to enter into the marketplace

RS-449

- RS449 is a high speed digital interface - unlike RS232 which uses signals with reference to ground, RS449 V.11 receivers look for the difference between two wires
- The RS449 interface is a generic connector specification. It's not an actual interface. The connector pinning was originally designed to support RS422 for balanced signals, and RS423 for the unbalanced signals. And should have been the successor of RS232.
- EIA standard improving on capabilities of RS-232-C
- provides for 37-pin connection, cable lengths up to 200 feet, and data rates up to 2 million bps
- covers functional/procedural portions of R-232-C
 - electrical/mechanical specs covered by RS-422 & RS-423

Functional Specifications

- Specifies the role of the individual circuits
- Data circuits in both directions allow full-duplex communication
- Timing signals allow for synchronous transmission (although asynchronous transmission is more common)

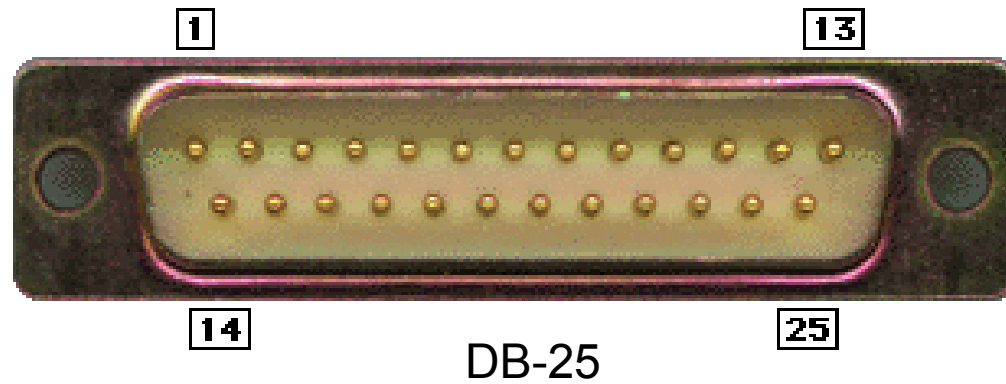
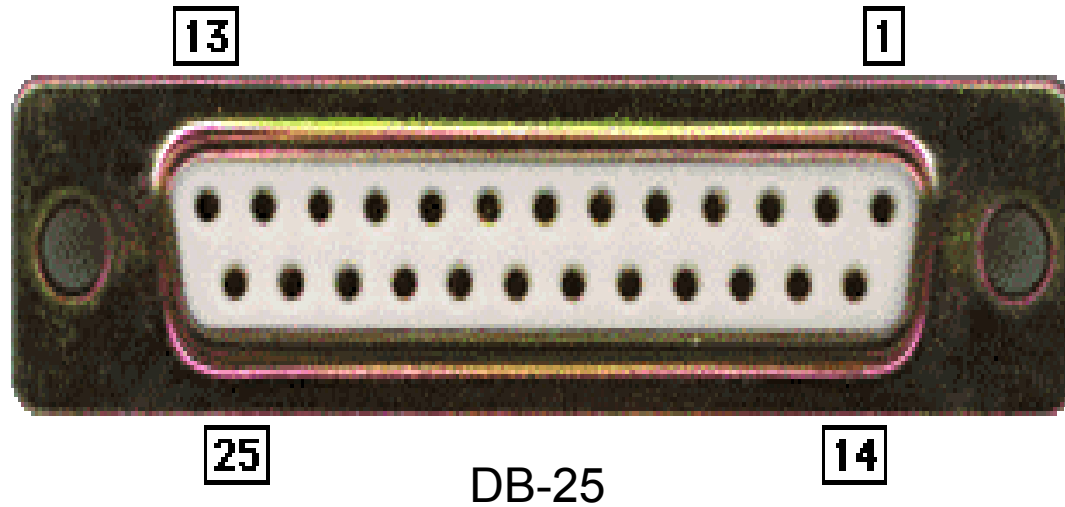
Procedural Specifications

- Multiple procedures are specified
- Simple example: exchange of asynchronous data on private line
 - Provides means of attachment between computer and modem
 - Specifies method of transmitting asynchronous data between devices
 - Specifies method of cooperation for exchange of data between devices

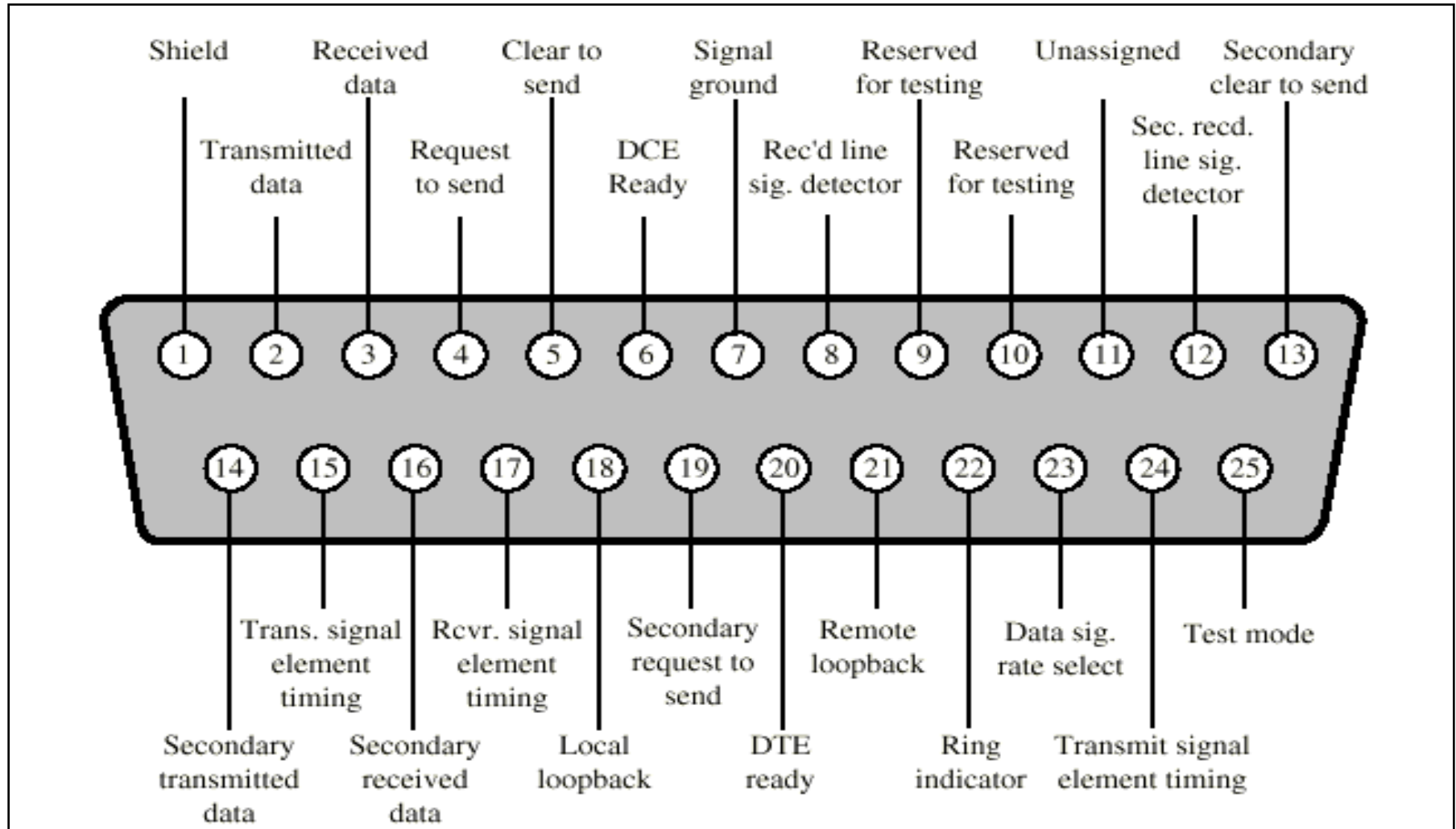
Mechanical Specifications

- 25-pin connector with a specific arrangement of leads
- DTE devices usually have male DB25 connectors while DCE devices have female
- In practice, fewer than 25 wires are generally used in applications

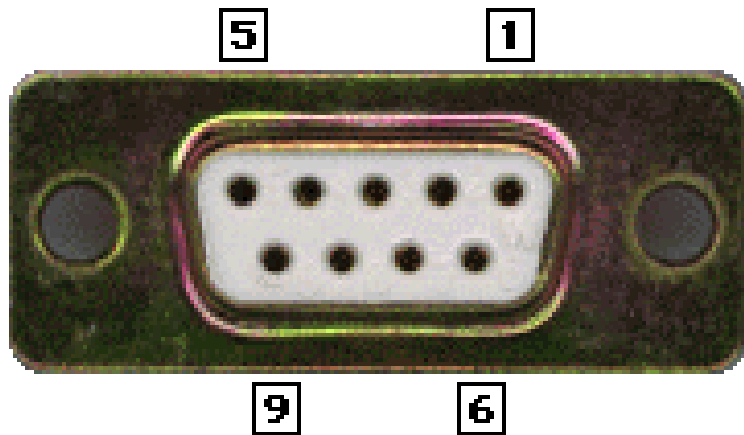
RS-232 DB-25 Connectors



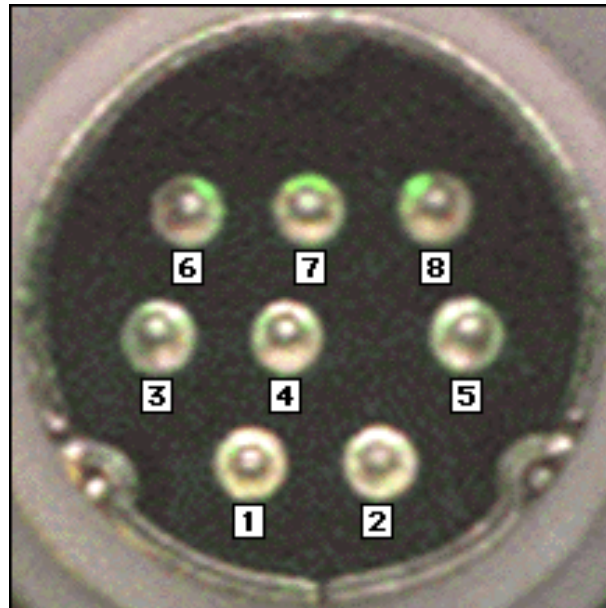
RS-232 DB-25 Pinouts



RS-232 DB-9 Connectors



RS-422 DIN-8



CCITT X.21 Interface

- | Physical-level interface between DTE and DCE
- | For synchronous operations on public data networks
- | X.21 uses control transitions and ASCII characters rather than using separate signal lines

CCITT X.21 Interface(contd)

- | The X.21 electrical characteristics are
 - » CCITT X.27 (balanced; same as V.11 and RS-422)
 - » CCITT X.26 (unbalanced; V.10 and RS-423)

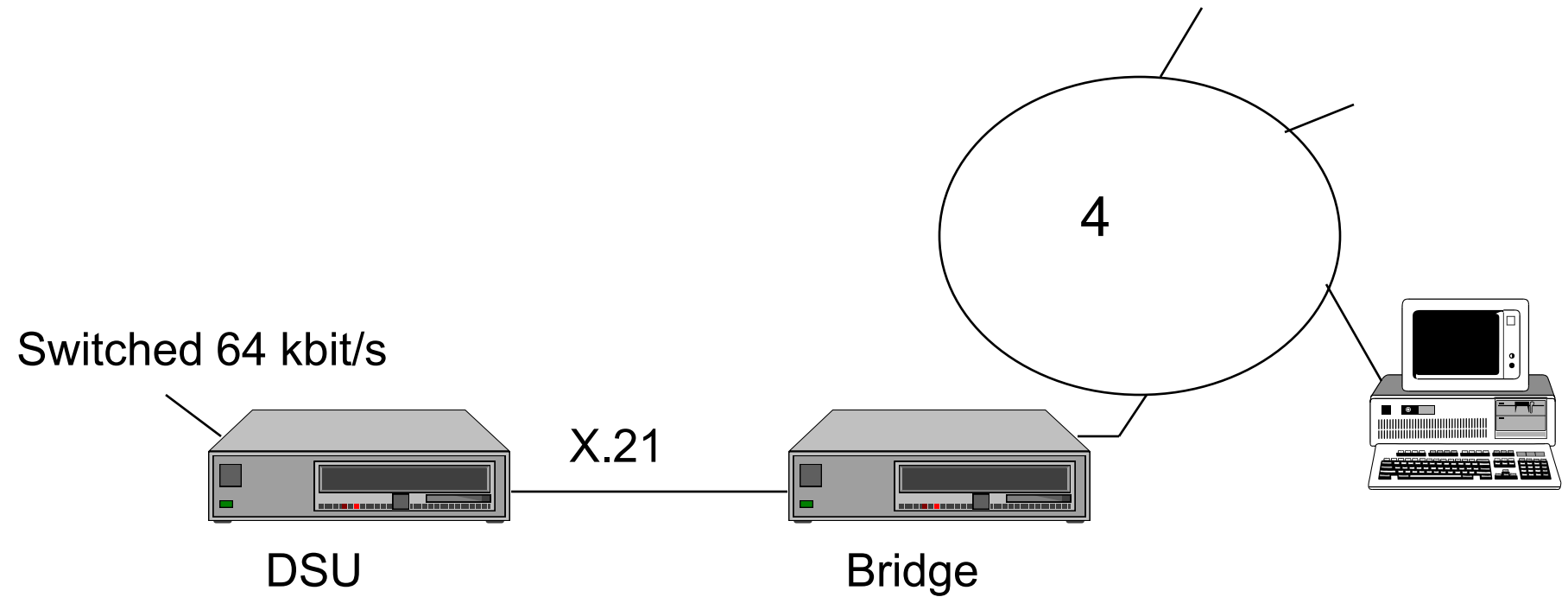
(Note: For operation above 9600 bit/s, X.27 is required)
- | X.21 mechanical characteristics are
 - » 15-pin connector per ISO Standard 4903

CCITT X.21 Interface(contd)

- | The X.21 electrical characteristics are
 - » CCITT X.27 (balanced; same as V.11 and RS-422)
 - » CCITT X.26 (unbalanced; V.10 and RS-423)

(Note: For operation above 9600 bit/s, X.27 is required)
- | X.21 mechanical characteristics are
 - » 15-pin connector per ISO Standard 4903

CCITT X.21 Interface (Cont.)



CCITT X.21 Interface(contd)

Circuit	Name
G	Ground, Common Return
Ga	DTE Common Return
Gb	DCE Common Return
T	Transmit
R	Receive
C	Control
I	Indication
S	Signal Timing
B	Byte Timing (Optional)

CCITT X.21 bis

- | As an interim (perhaps longer term) provision, we have X.21 bis
- | X.21 bis utilizes RS-232 for use with X.25
- | Particularly used in countries where X.21 has not yet become available

CCITT X.21 bis (contd)

- RS-232 signals are used to represent X.21 events
 - To initiate the call
- Some X.21 features are not supported
 - Call progress signals