

# LOG AND DIGITAL PHYSICAL INTERFACES

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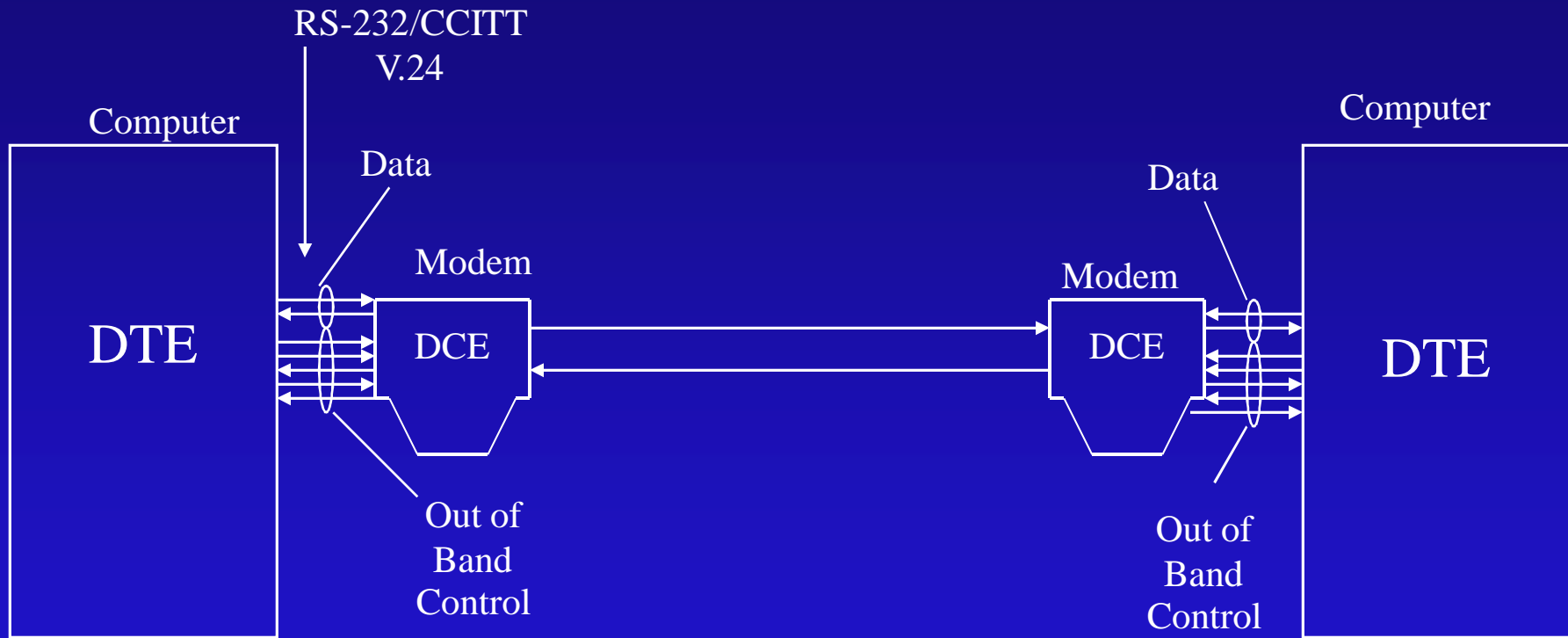
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**COMPUTER NETWORK**

# RS-232/CCITT V.24 and V.28 Interface



DTE : Data Terminal Equipment

DCE : Data Circuit Termination Equipment

# V.232/CCITT V.24 and V.28 Interface (Cont.)

- Data processing (DTE) to modem (DCE) interface
- The CCITT V.24 Recommendation defines the interchange circuits
  - » V.28 defines the electrical characteristics

# RS-232/CCITT V.24 and V.28 Interface (Cont.)

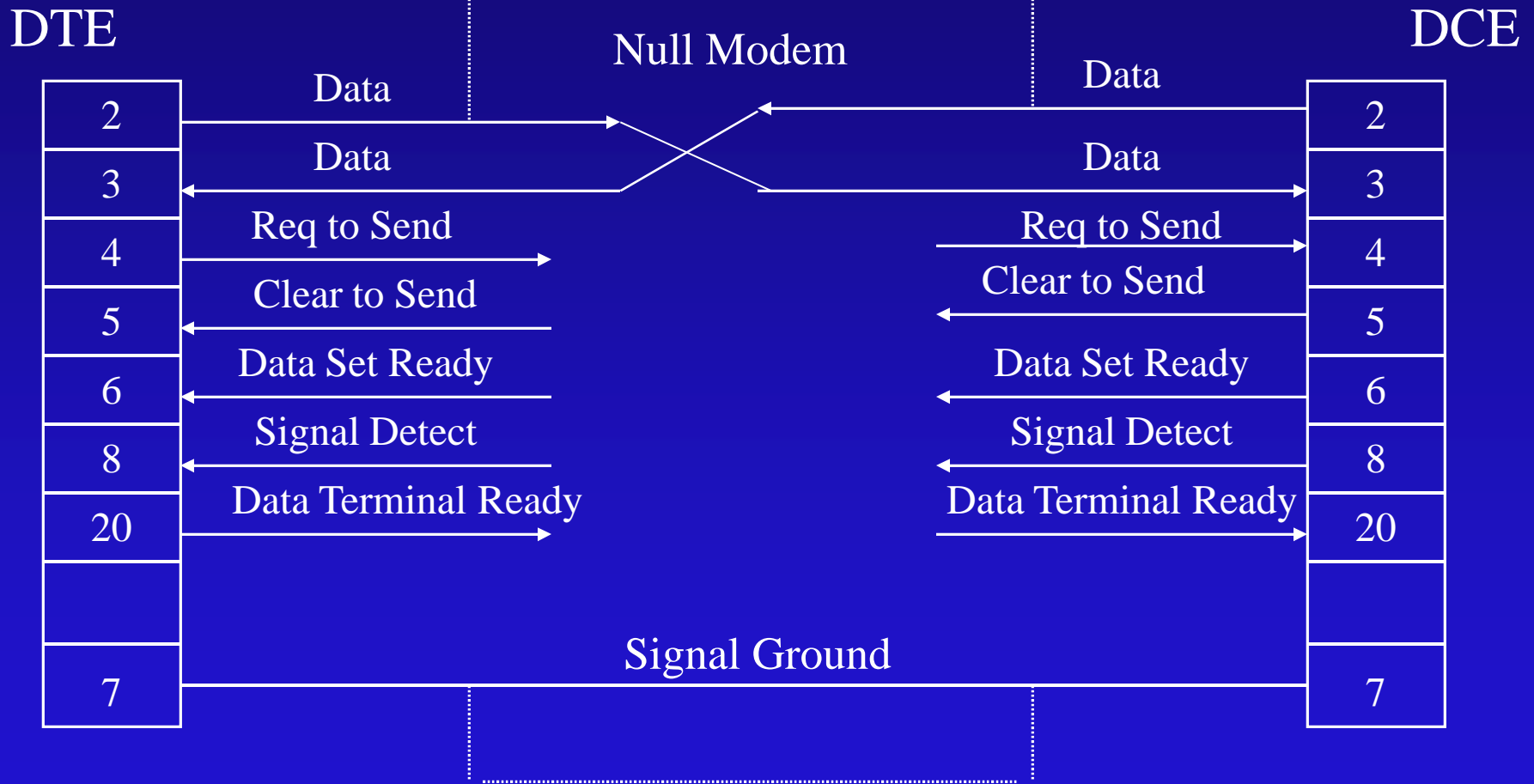
- In EIA, known as RS-232-C (the third [-C] version of RS-232)
  - » More recent version of RS-232-D (now EIA-232-D)
  - » Sometimes TIA-232-D  
(Telecommunications Industry Association)

# RS-232/CCITT V.24 and V.28 Interface (Cont.)

- A 25-pin connector/interface
  - » ISO 2110 is used
  - » Is not part of the RS-232-C standard
- Bit serial data (full duplex)
- Out of band control lines

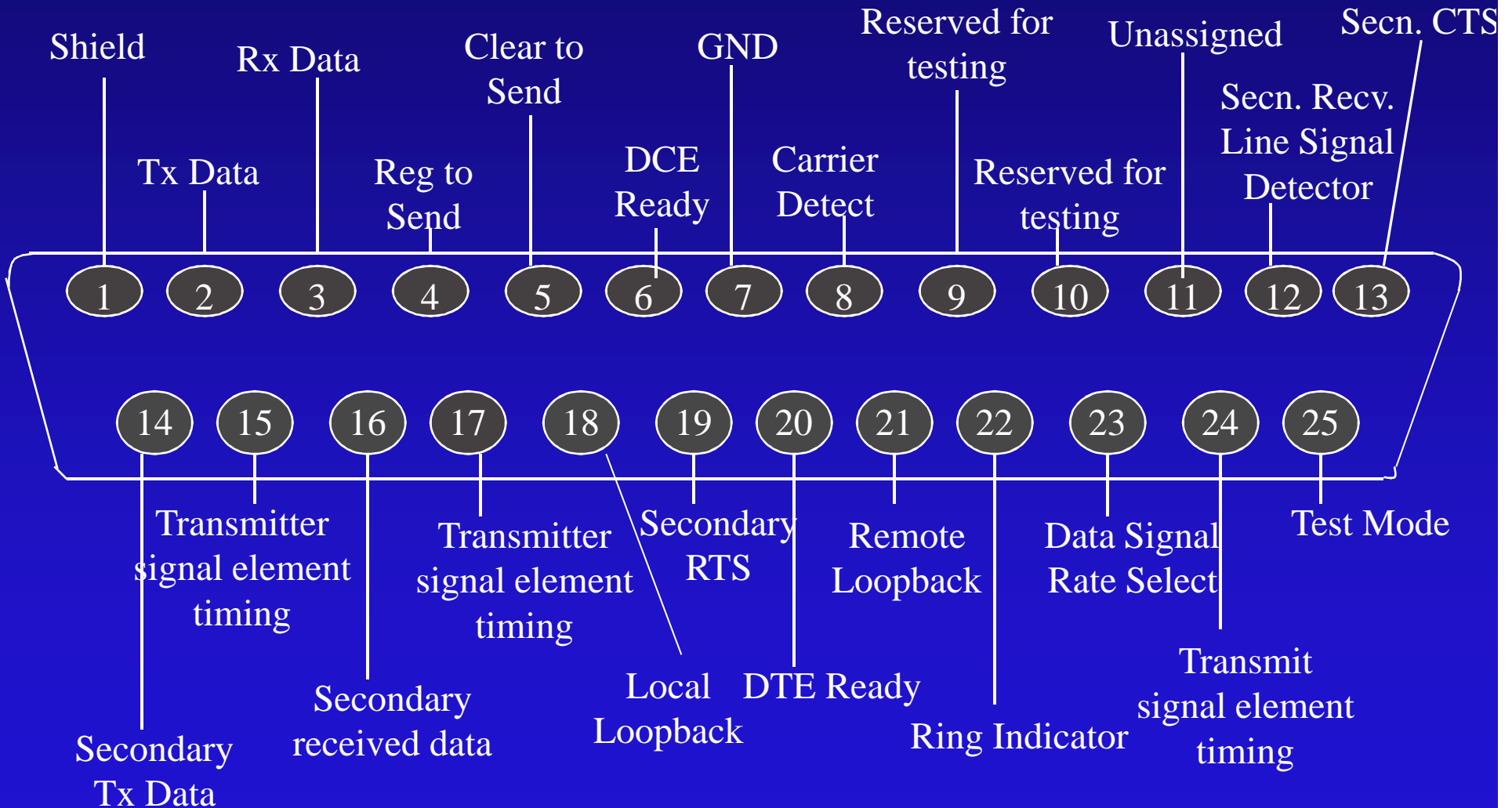
# V.232/CCITT V.24 and

# V.28 Wi



Note : There are many variations to Null Modem Cross Connection

# Pin Assignments for V.24/EIA-232



# /CCITT V.24 & V.28 Related Products

- It is often convenient to switch RS-232/V.24 signals from a computer to one of several devices
  - » For example, to different types of printers
- Simple multiple switches are available for this purpose



# 2/CCITT V.24 & V.28

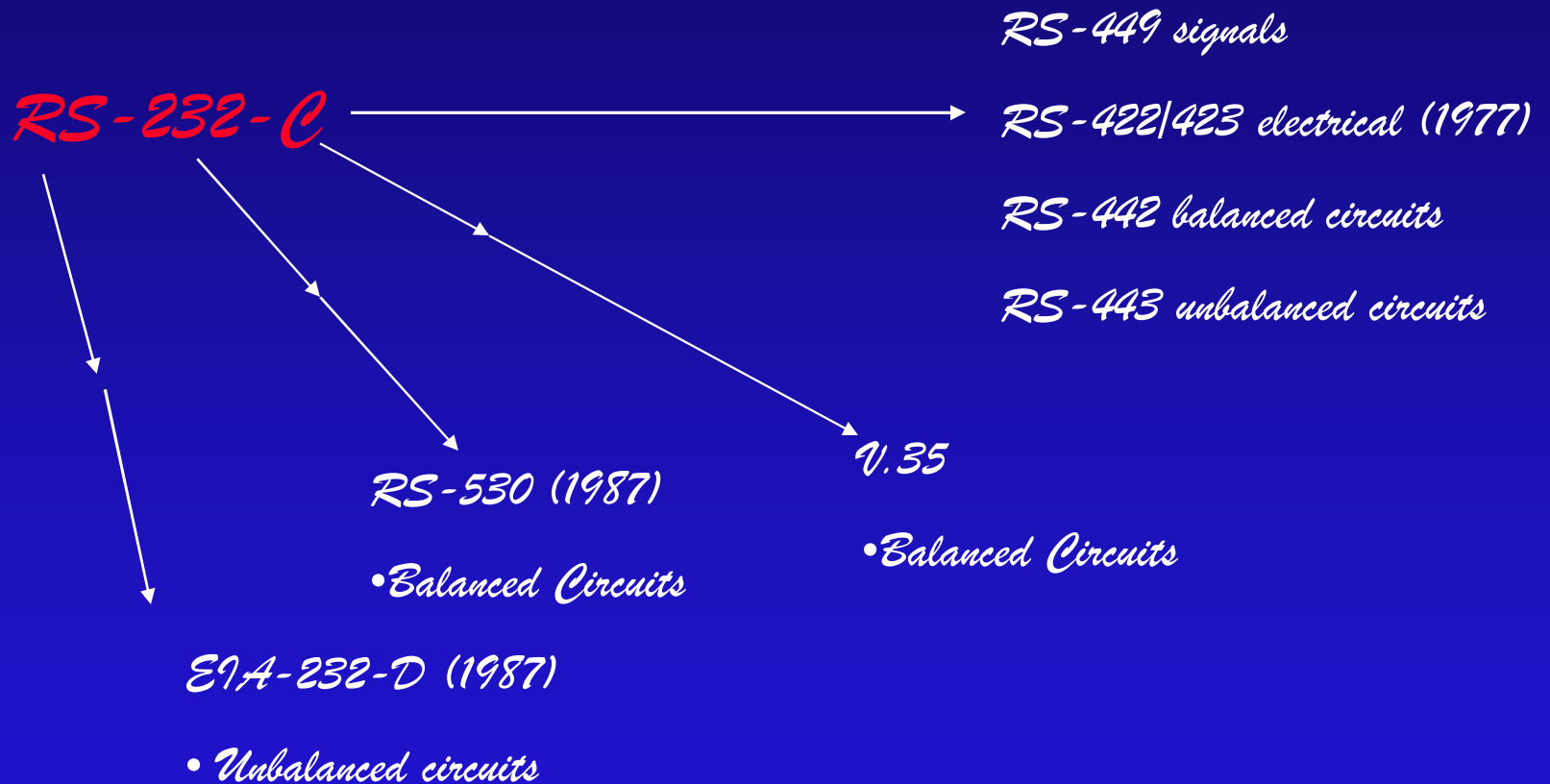
## Related Products (Cont.)

- Specialized companies have been developed to handle the interface market with products such as
  - » Multiple switches
  - » RS-232/V.24 cables
  - » Null modems
  - » RS-232/V.24 gender changers+
- Breakout boxes to monitor control signals

# Limitations of RS-232/V.28

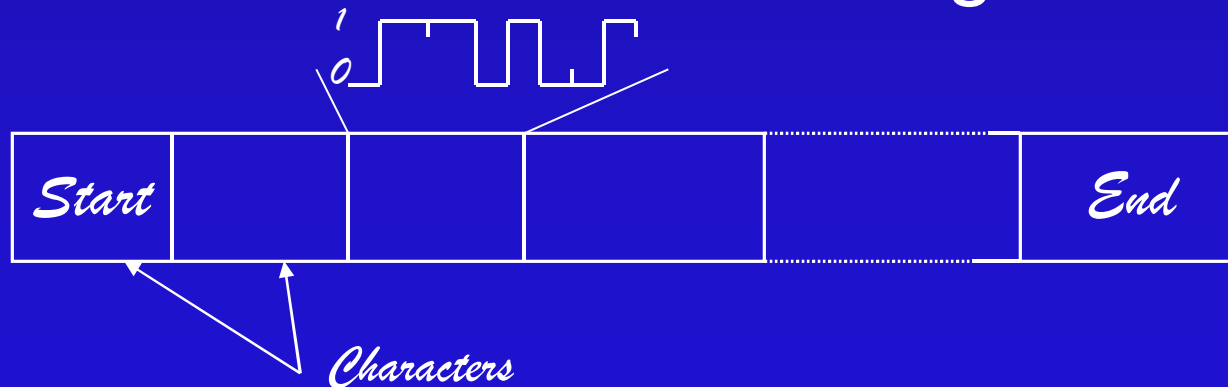
- An upper data rate of about 20 kbit/s
- An upper cable length of about 50 to 100 feet (about 20 to 40 m)
- Some products are available to extend these, but a new approach is needed

# The Evolution of RS-232-C



# Synchronous Transmission

- Has a known timing relationship between bits and characters
- Characters are sent one after the other
- The receiver recovers this timing from transitions in the arriving data



# V.24/EIA-232 dial-up operation

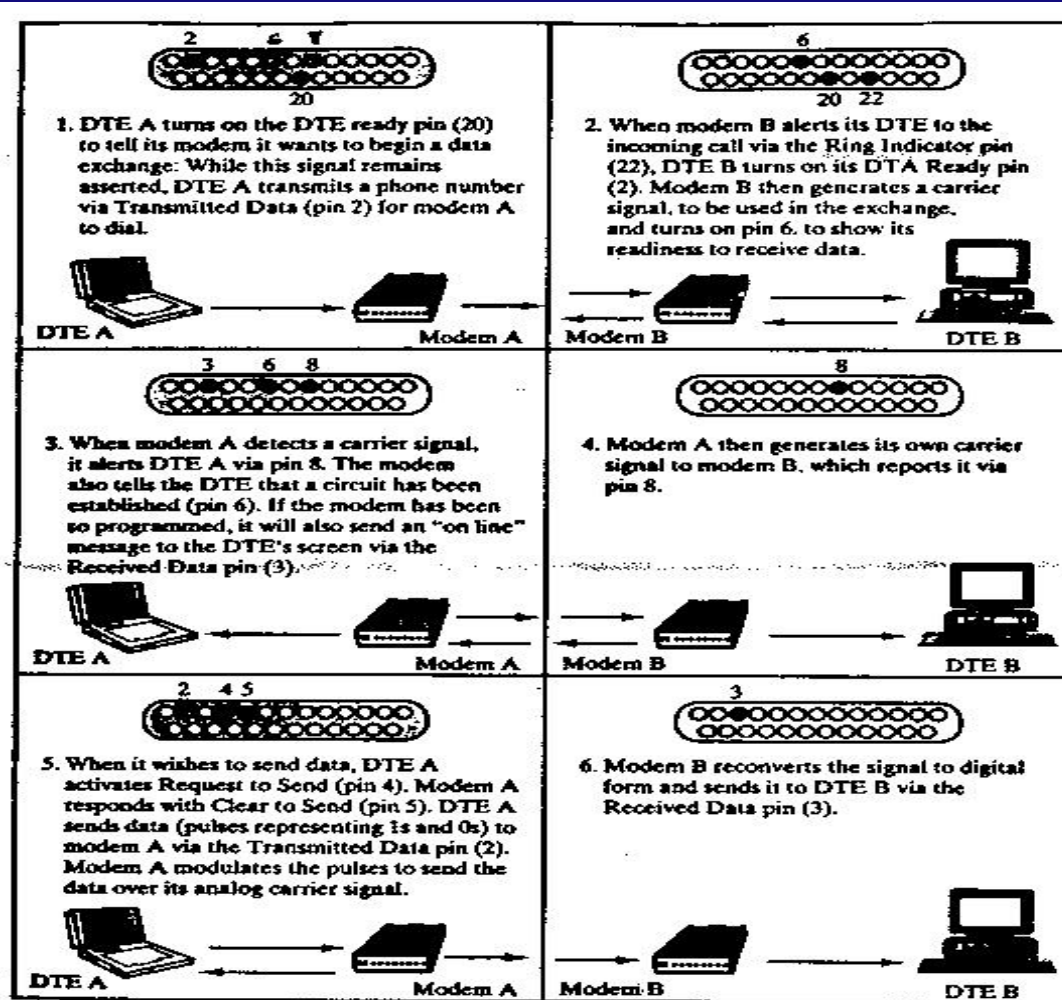
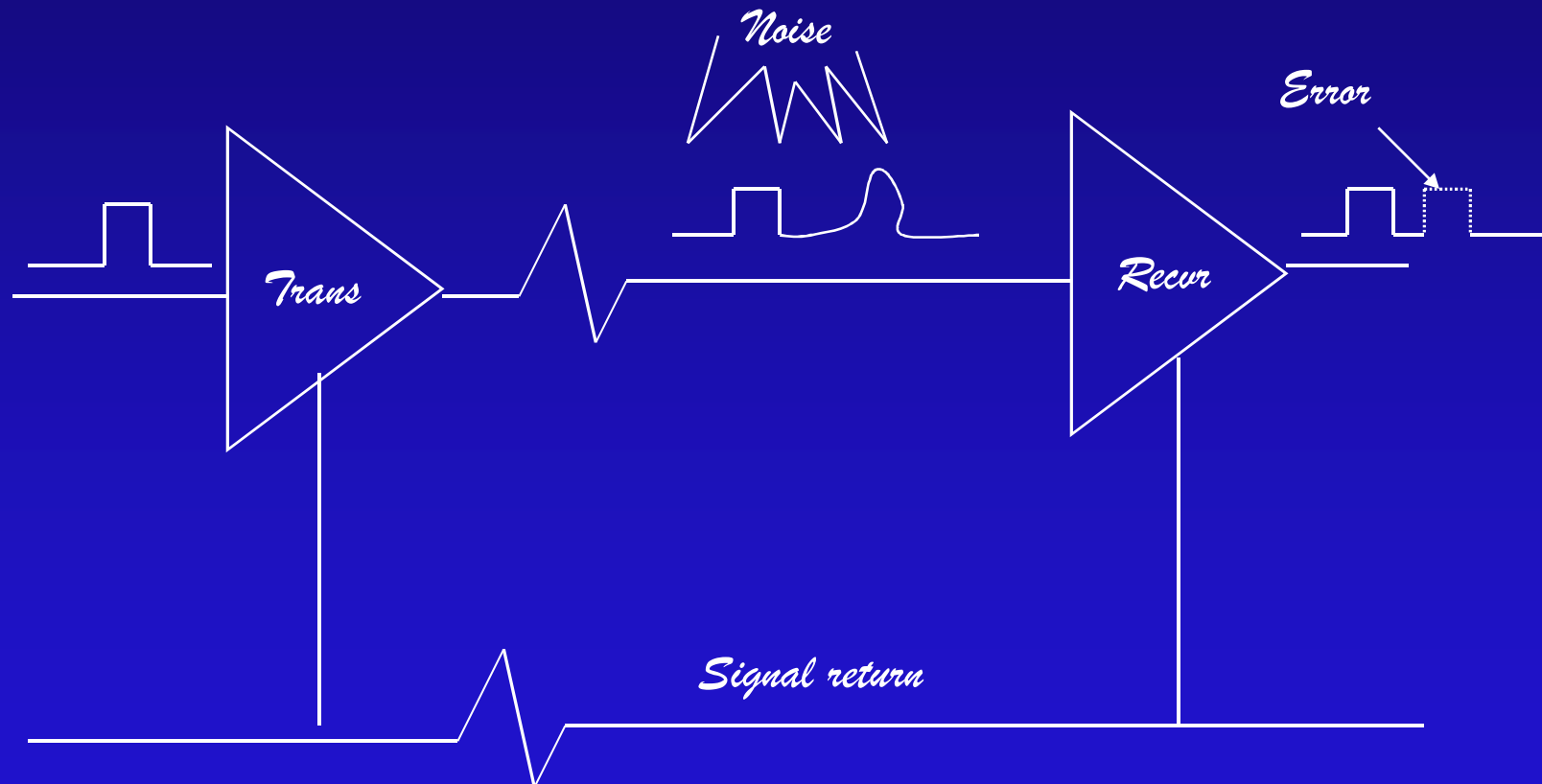


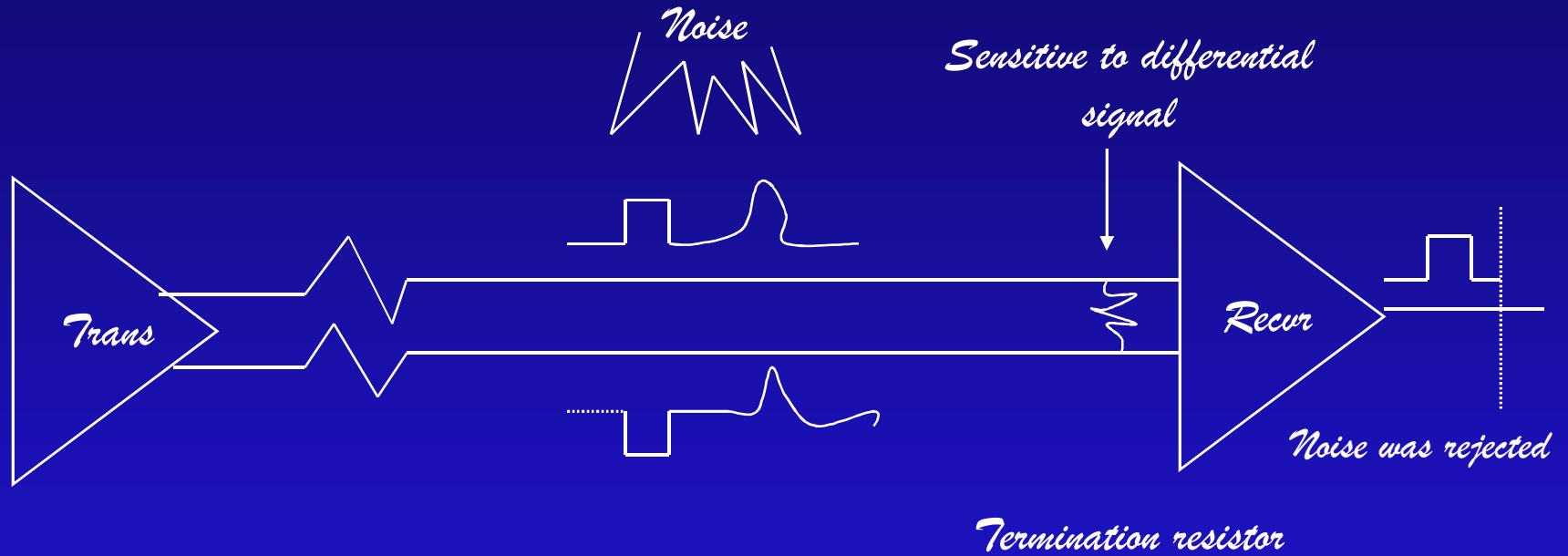
FIGURE 5.7 V.24/EIA-232 dial-up operation.

# Ended Interchange Circuit



Note: V.10 is the same as X.26 or RS-423-A (unbalanced)

# Differential Interchange Circuit



Note : V.11 is the same as X.27 or RS-422-A (balanced)

# 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



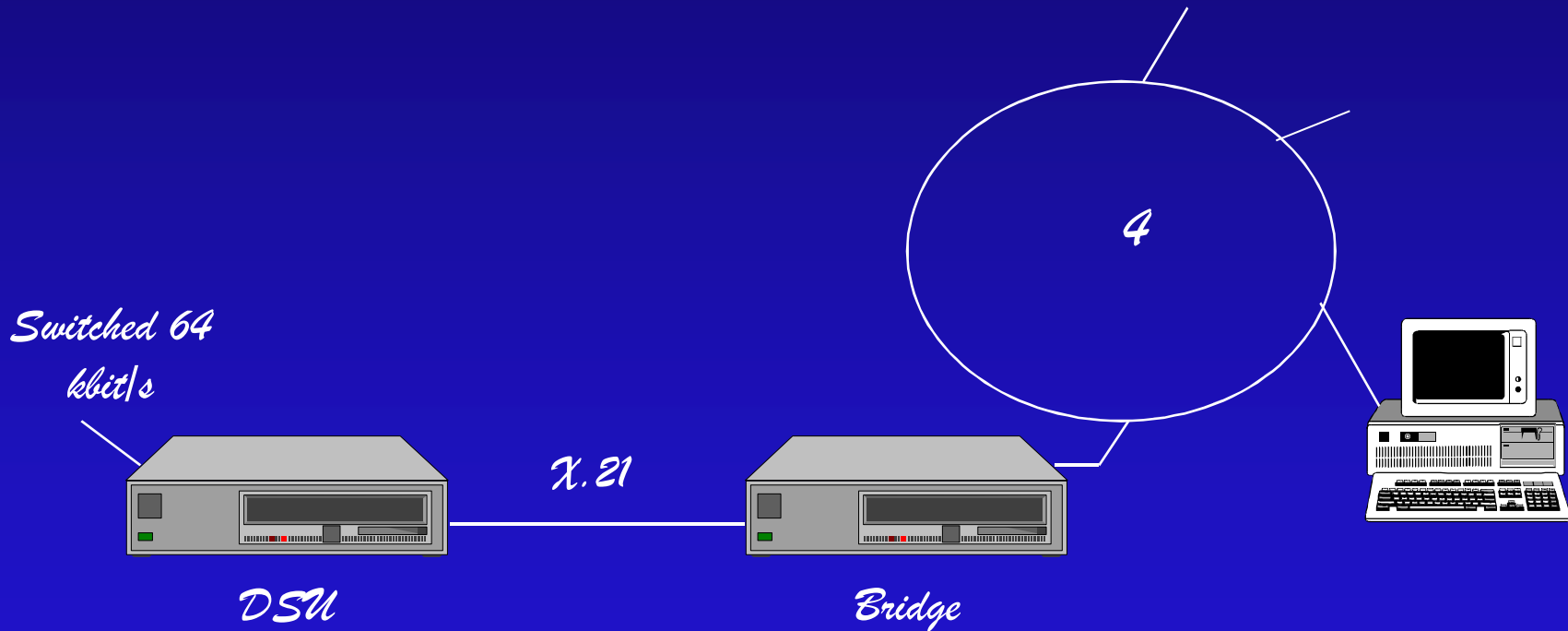
# CCITT X.21 Interface (Cont.)

- 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 (Cont.)

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

# 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 (Cont.)

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

# ISDN Interface

## Terminal Equipment (TE)

## Network Equipment (NE)

