

ROUTER BASICS

MM Clements

Introduction

- ▣ WAN introduction and devices
- ▣ MODEM technologies
- ▣ Router Functions
- ▣ Router Hardware
- ▣ Connecting to a router for the first time

Router Function

- ▣ Linking WANs and LANs
- ▣ Interconnecting communication lines
- ▣ Path determination and packet switching
- ▣ Application of security rules (ACLs)
- ▣ Protocol conversion (encapsulation)
 - E.g. HDLC, PPP etc.

Introduction to WANs

- ▣ A wide area network (WAN) is a data communications network spanning a large geographic area such as a region, country or the entire planet
- ▣ A WAN may interconnect LANs
- ▣ May use microwave, satellite, fibre-optic, phone lines etc. to cover distances

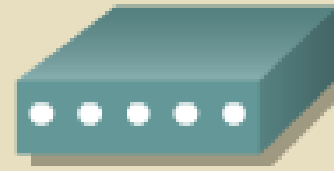
WAN Devices



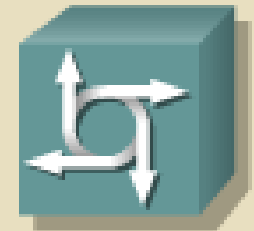
Router



Workgroup
Switch



Modem or
CSU/DSU



Communication
Server

Use of MODEM in WANs

Microsoft PowerPoint - [CCNA2_Mod1R.ppt] Cisco Networking Academy Program

CISCO SYSTEMS

CISCO NETWORKING ACADEMY PROGRAM
CCNA 2: Router and Routing Basics v3.0

6 Data Link Encapsulations

FIGURES

1
2
3
7 4
8
9

The diagram illustrates a Wide Area Network (WAN) configuration. It shows two routers (represented by blue cylinders with a white 'X') connected to two separate modem or CSU/DSU devices (represented by blue rectangular boxes). The routers are connected to their respective modems via black lines. The two modems are connected to each other via a red zigzag line, representing a long-distance communication link. A red double-headed arrow below the modems indicates the wide geographical distance between the two routers.

1.1 WANs

1.1.1 Introduction to WANs

A wide-area network (WAN) is a data communications network spanning a large geographic area such as a state, province, or country. WANs often use transmission facilities provided by common carriers, for example, telephone companies. [1](#)

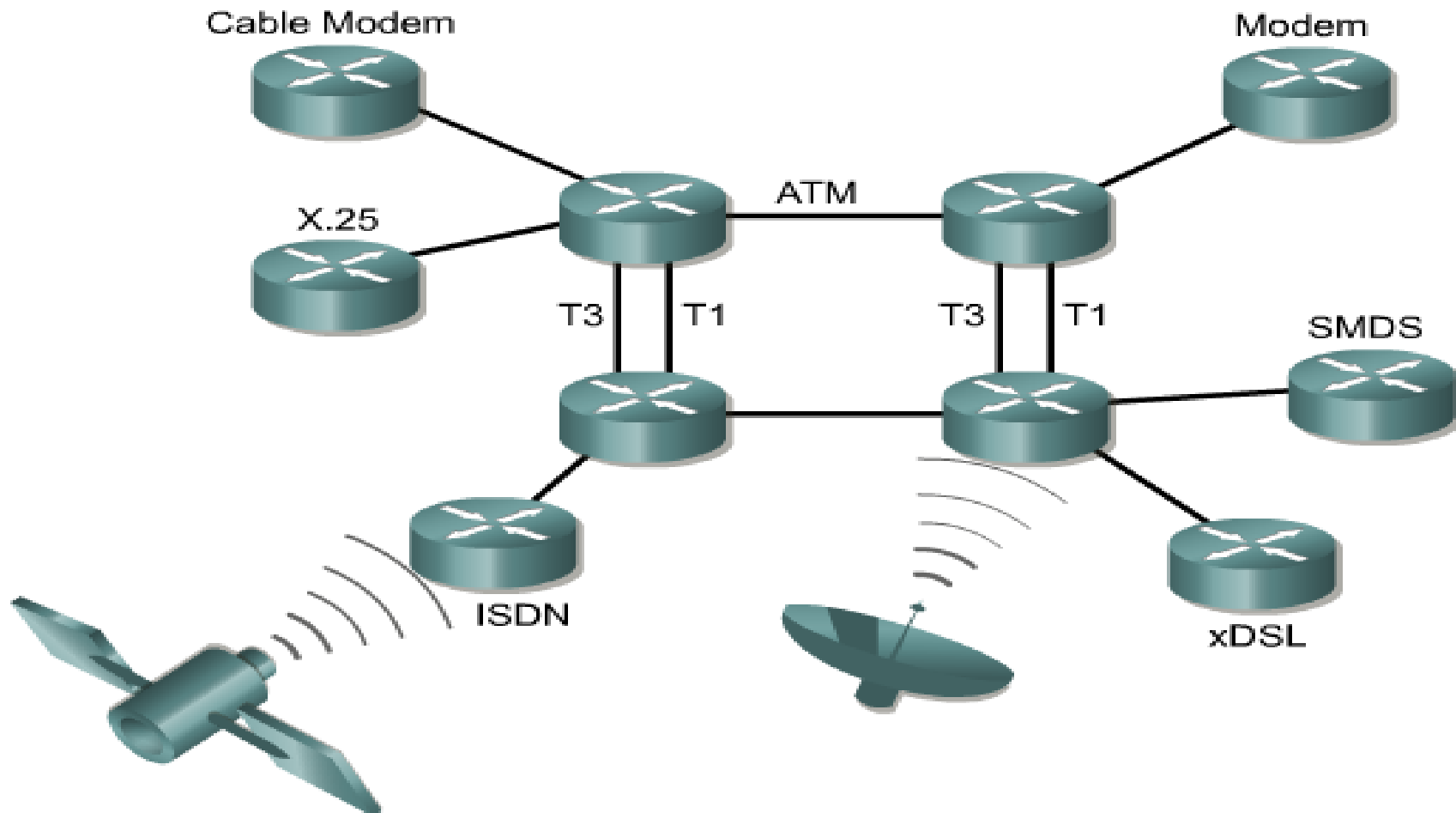
These are the major characteristics of WANs:

- They connect devices that are separated by wide geographical areas.
- They use the services of carriers such as the Regional Bell Operating Companies (RBOCs), Sprint, MCI, VPM Internet Services, Inc., and Altantes.net.
- They use serial connections of various types to access bandwidth over large geographic areas.

A WAN differs from a LAN in several ways. For example, unlike a LAN, which connects workstations, peripherals,

- MODEM = Modulator and Demodulator
- Translates between Ethernet and WAN technology and back again
- Permits long distance communications

Routers Connected by WAN Technologies



Some WAN Terminologies

- ▣ T1=1.544 Mbps, T3=44.736 Mbps , X.25, SMDS (SWITCHED MULTIMEGABIT DATA SERVICE), ATM, xDSL, Modem, Cable Modem, ISDN, OC-x
- ▣ X.25 and ISDN are used less today than in the past but can still be found in operation

Cisco Routers

- ▣ Operating system is known as Internetwork Operating System (IOS)
- ▣ Held in Flash memory (non-volatile)
- ▣ CLI not GUI
- ▣ Based on UNIX heritage

Router Operation

- ▣ Layer 3 device
- ▣ Accepts PDUs on incoming network
- ▣ Examines PDU data
- ▣ Makes decision(s) for next stage of PDU journey
- ▣ May modify PDU contents (not payload)
- ▣ Passes PDU on to outgoing network