

Introduction

Internetworking - Module 1

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Instructor

- Mr. Athar Mahboob
- Holds BS and MS degrees in Electrical Engineering from Florida State University, USA
- Expertise in Linux, Computer Networks and Computer Security
- Faculty Member at IBA, Karachi since December 2001
- Previously at SSUET for 5-1/2 years as Head of Computer Engineering Department
- Currently doing Ph. D. at NUST (PNEC), Karachi
- More information is available at <http://www.atharmahboob.com>

Office Hours

- Monday and Wednesday: 2:30 PM to 4:30 PM
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Topics To Be Covered

- Introduction to Internetworking
- OSI Reference Model and Networking Review
- TCP/IP Model
- Layer 2 Internetworking
- Internet Protocol Version 4
- Internet Protocol Version 6
- Layer 3 Internetworking Paradigms
- RIP
- OSPF
- IS-IS
- BGP
- Routing Policies
- Security Issues in Internetworking

Teaching Methodology

- Classroom Lectures
- Lecture Notes available in print and online at <http://www.atharmahboob.com/courses/internet>
- Hands-on Lab Work

Text Book and Reference Books

- **Text Book**

- Interconnections, 2nd Edition

 - Radia Perlman Addison-Wesley, 2000

 - Low Priced Edition, Pearson Education Asia

- **Reference Book**

- Routing TCP/IP, First Edition

 - Jeff Doyle

 - Cisco Press, 2000

- A lot of reference material will be made available on-line.

Laboratory Work

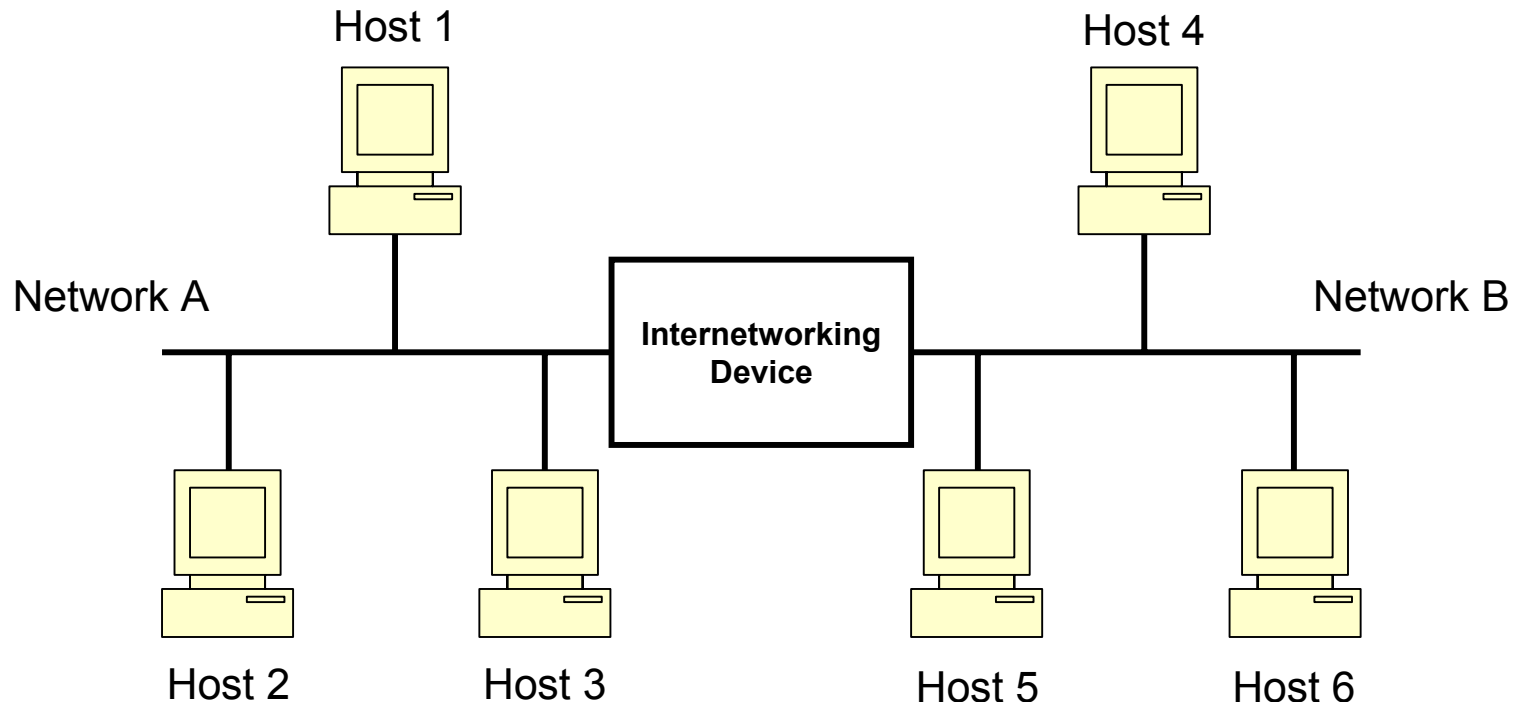
- 12 Laboratory Assignments
- Labs will be documented and well defined
- We will start from Thursday
- Different network topologies will be created
- Networking protocols and internetworking protocols will be configured
- Linux will also be used
- Zebra router package will also be used

Grade Distribution

Homework Assignments and Class Quizzes	20%
Hourly Tests (best 2 out of 3)	30%
Laboratory Assignments	20%
Final Exam	30%

What is Internetworking?

- Internetworking is the study of internetworks
- internetwork – a collection of interconnected networks



Some Networking Symbols

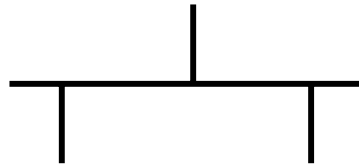
■ Serial Link



■ Host



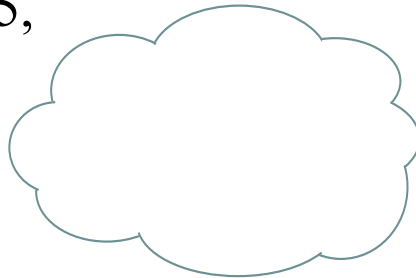
■ Ethernet



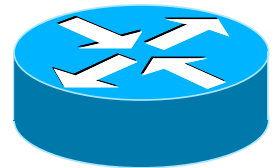
■ Internetworking Device



■ Network Cloud (X.25,



■ Router

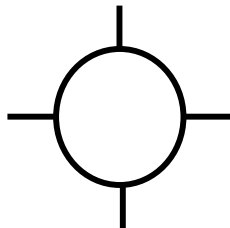


Frame Relay, ATM)

■ Switch



■ Token Ring Network



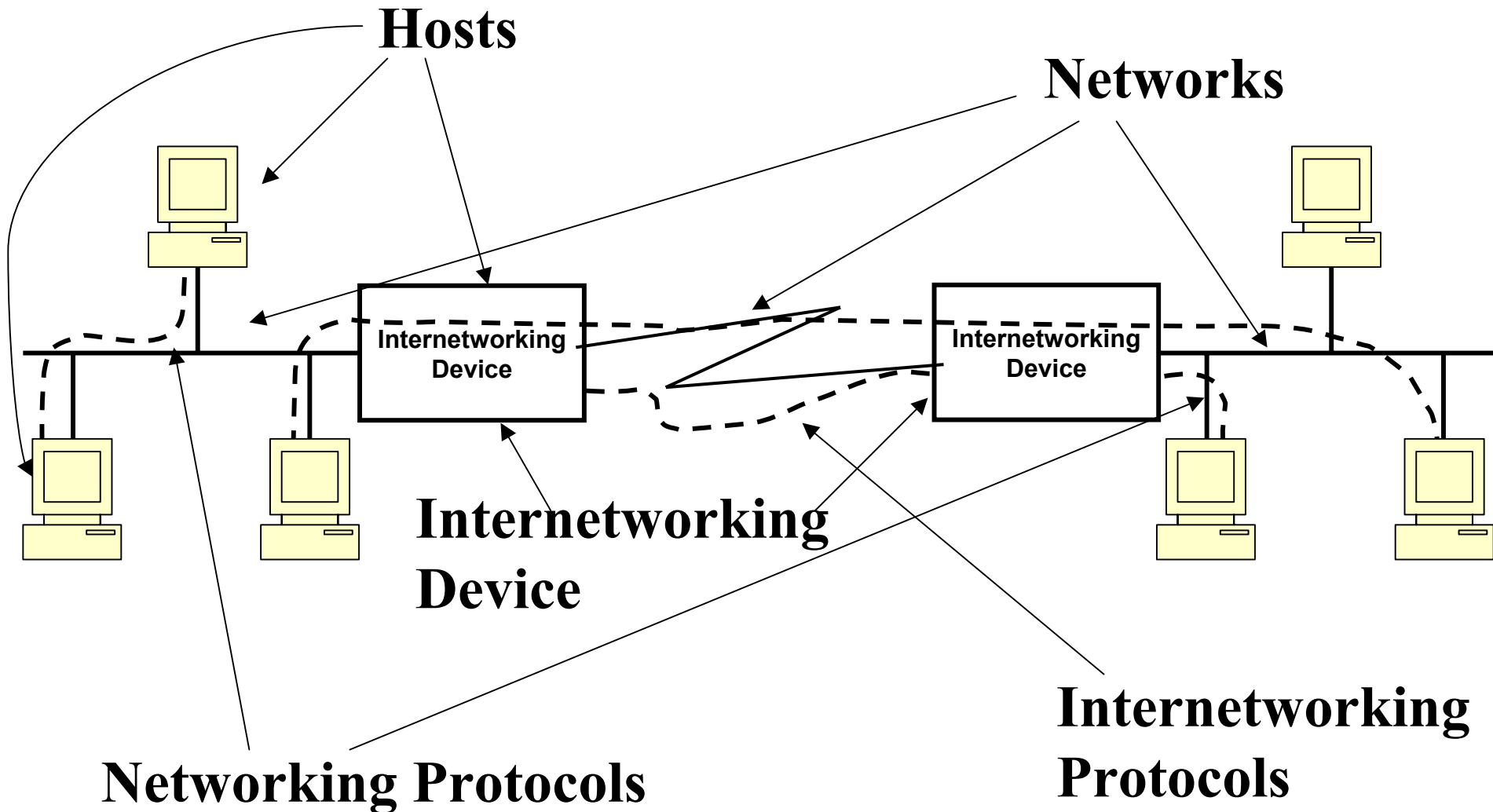
■ Bridge



Important Elements of an internet

- **Hosts** – devices which attach to networks. Generally computers but may be embedded computers e.g. printers, printer servers, routers, etc.
- **Networks** – entities which provide communication capabilities to hosts
- **Internetworking Device** – a special entity allowing information to travel from one network to another
- **Networking Protocols** – rules of communication between hosts
- **Internetworking Protocols** – special protocols allowing internetworking capabilities

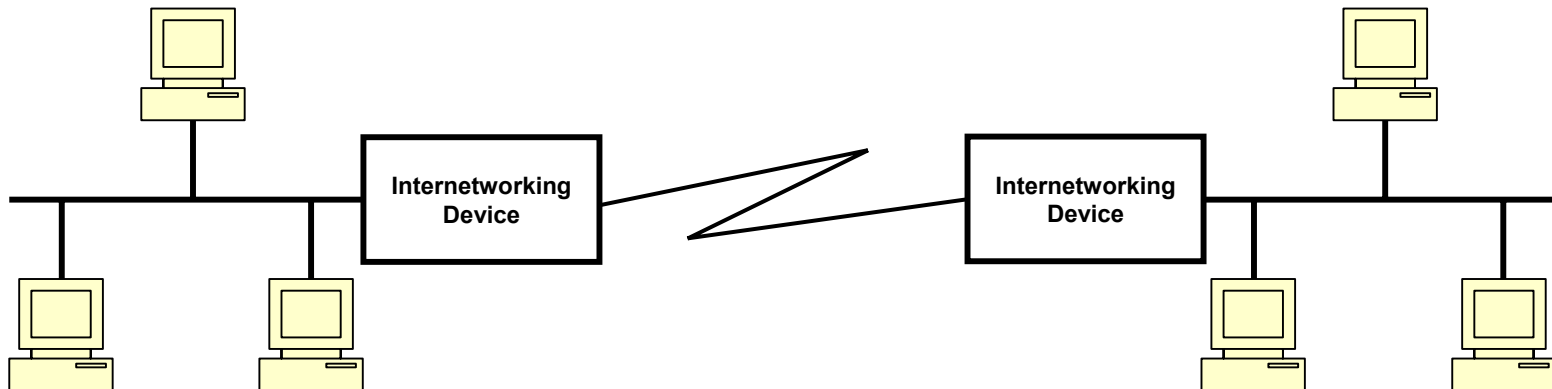
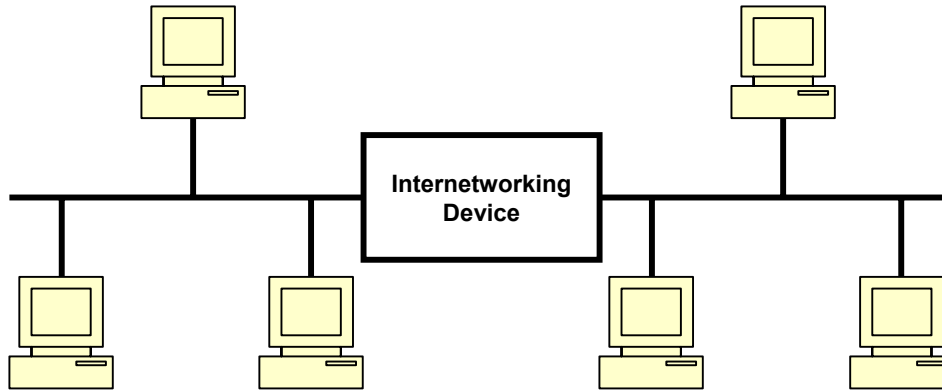
Important Elements of an internet



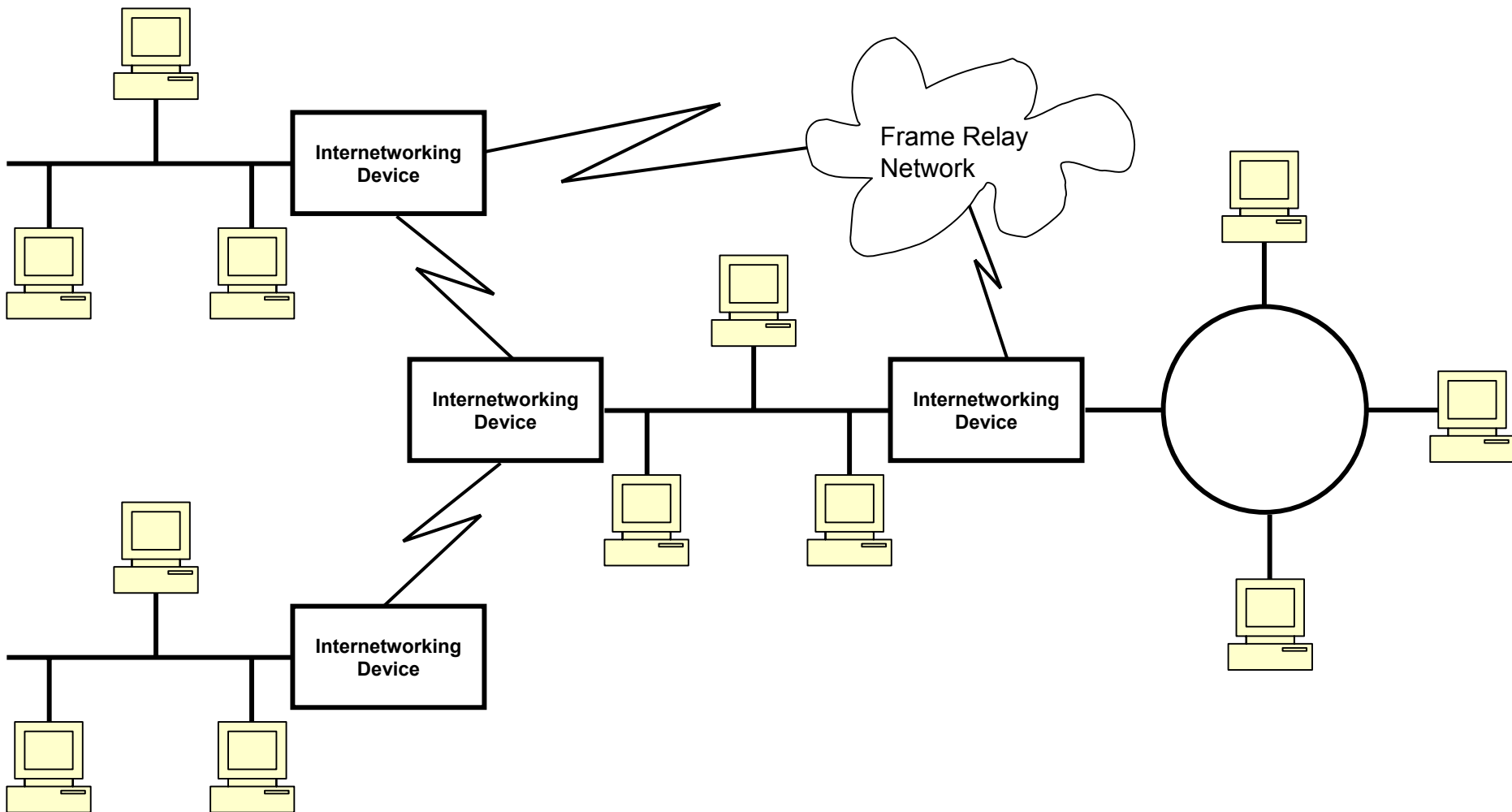
internet vs. Internet

- internetwork – a collection of interconnected networks
- internetwork = internet (a short form)
- internetwork (common noun): any collection/connection of networks
- Internet (proper noun): a particular worldwide collection/connection of networks

Simple vs. Complex Internetworks



Simple vs. Complex Internetworks



Why Internetworks?

- Ideally we should have only one network so there is no need for the complexity associated with internetworking
- Similarly, ideally there should be only one country and we should all be citizens of the same country
- Both ideals are not practical

Why Internetworks?

- Networking technologies have geographical constraints – LANs vs. WANs
- Networking technologies have capacity limitations – one network means one communication medium and fixed communication bandwidth – cannot accommodate every one
- Networking technologies are so many – some costly some cheap, some low speed some high speed, some switched some shared, some packet switched some circuit switched
- Networks belong to different organizations – organizations are choosy in connecting with others
- Conclusion – CANNOT have one network MUST have internetwork

Internetwork

Features/Characteristics

- Internetworking is transparent to end users
- Internetworking can become complex
- Internetworking can raise policy issues
- Internetworking can raise security issues
- Internetworking is a field in its own right

What You Should Already Know

- Basic Networking
- OSI Reference Model
- Local Area Networks
- Wide Area Networks
- We will quickly review these concepts