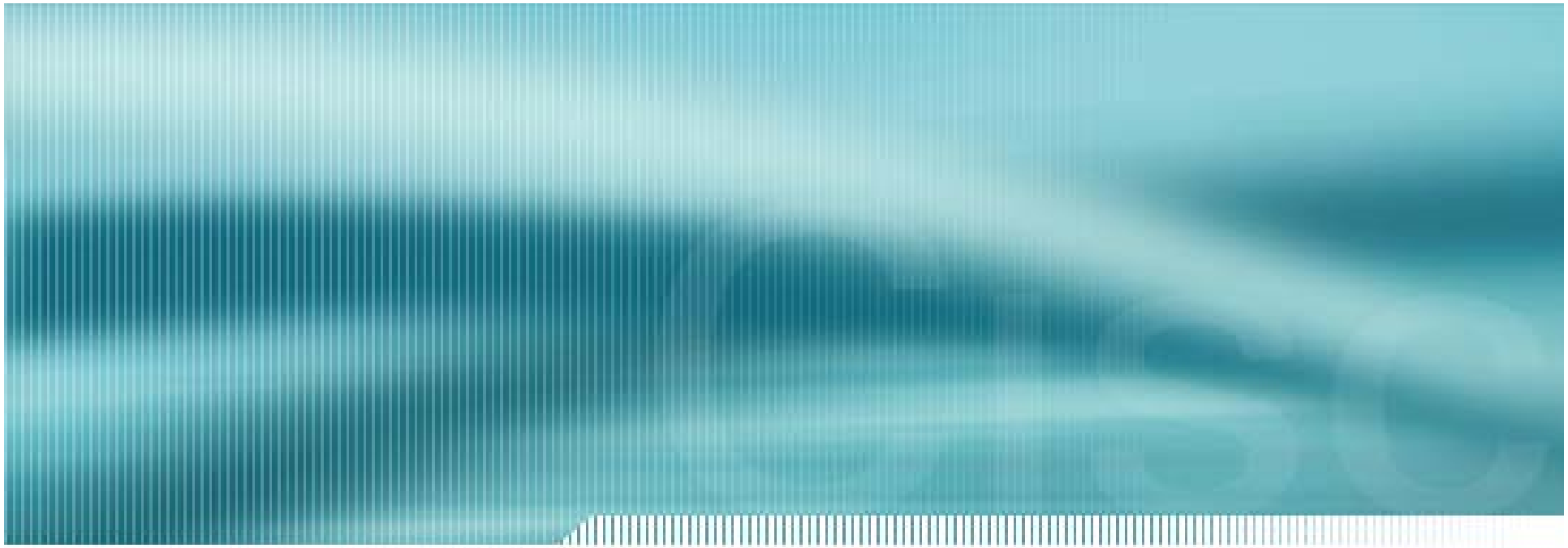


Datornätverk I
Introduktion

Malin Bornhager

Halmstad University

Session Number
Version 2002-1

Malin Bornhager

- **Instruktör: CCNA, CCNP, Wireless LANs och Fundamentals of Unix**
- **Kontor: F309**
- **E-mail: Malin.Bornhager@hh.se**
- **http://www.hh.se/staff/maol**

Datornätverk I

- **Lärare/Instruktörer**
- **Vad är Cisco Networking Academy (CNAP)?**
- **Cisco Certified Network Associate (CCNA) 1-4**
- **Academy Connection**

Instruktörer

- **Malin Bornhager (kursansvarig, examinator)**
- **Philip Heimer (föreläsningar, övningar, laborationer)**

Vad är Cisco Networking Academy

- **Cisco Networking Academy (CNAP)**
- **E-learning program**
- **Cisco Systems**
- **Cisco Academy Training Center (CATC)**
- **Regional Akademi (RA),** ***Högskolan i Halmstad***
- **Lokal Akademis (LA)**
- **Studenter**

Curriculum

- CCNA 1 till 4
- CCNP 1 till 4
- Fundamentals of UNIX
- Wireless LANs
- Network Security (I och II) / CCNA Security
- Java Programming
- IT Essentials I and II (PC Hardware and Software, Network Operating Systems)
- IP Telephony

CCNA – Cisco Certified Networking Associate

- **Discovery**
- **Exploration**
  - **Network Fundamentals (Datornätverk 1)**
  - **Routing Protocols and Concepts(Datornätverk 1)**
  - **LAN Switching and Wireless (Datornätverk 2)**
  - **Accessing the WAN (Datornätverk 2)**

CCNA 1: Network Fundamentals

- **Introduction to fundamental networking concepts and technologies**
- **OSI Model**
- **TCP/IP**
- **Network devices**
- **Addressing**
- **Cabling**

CCNA 2: Routing Protocols and Concepts

- **Understand how a router learns about remote networks**
- **Best path to networks**
- **Static routes and Routing protocols**
- **Configuration, verification and troubleshooting**
- **Routing table**

Kurslitteratur

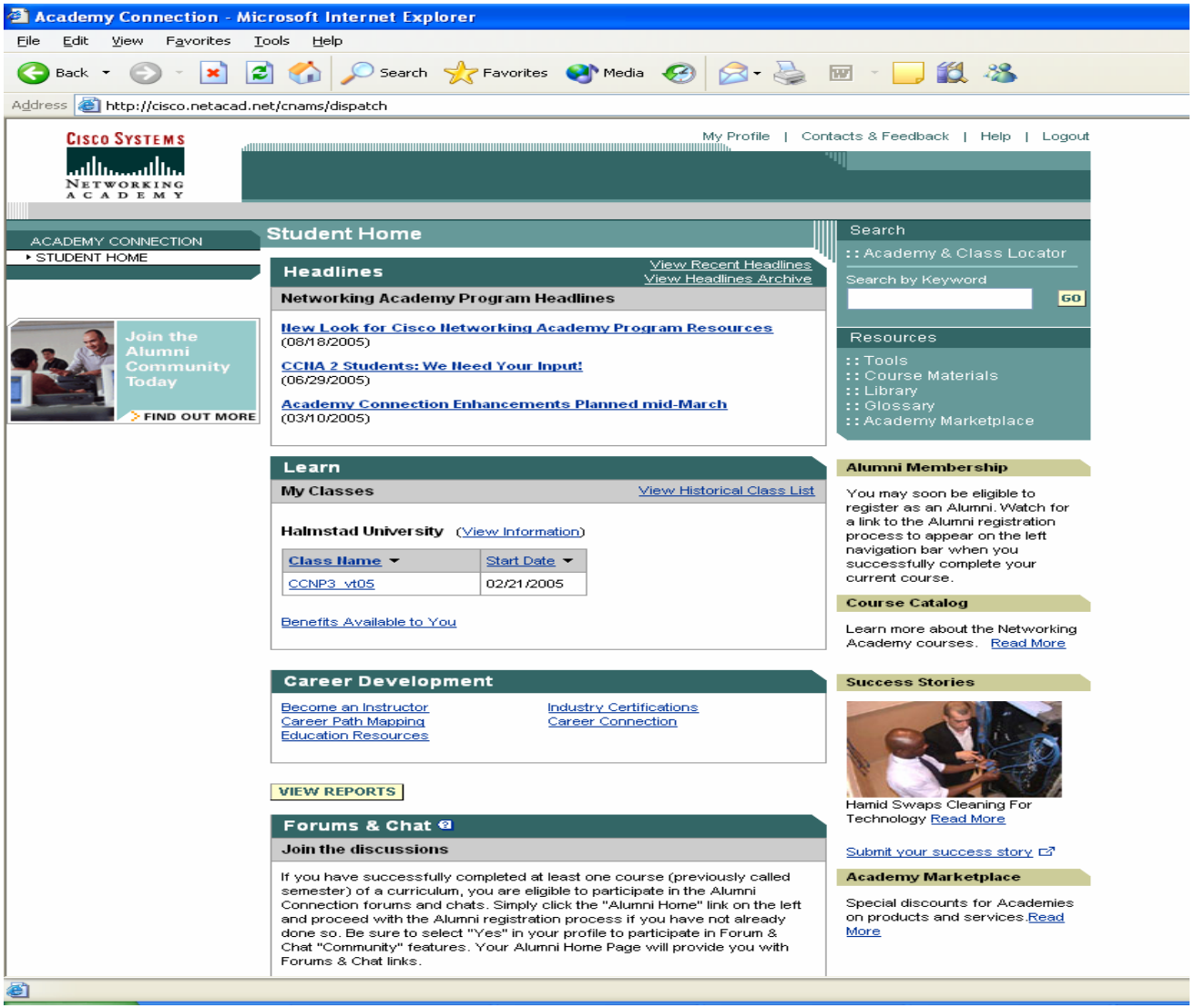
- **Online Curriculum**
  - **http://cisco.netacad.net**
- **Kursbok:**
  - **“Network Fundamentals, CCNA Exploration Companion Guide”, ISBN 1587132087**
  - **”Routing Protocols and Concepts, CCNA Exploration Companion Guide”, ISBN 1587132060**
  - **http://www.pearsoned.co.uk/bookshop/**
- **Laborationer och extra kursmaterial**
  - **Kurshemsidan: http://www.hh.se/ik2004**

Academy Connection

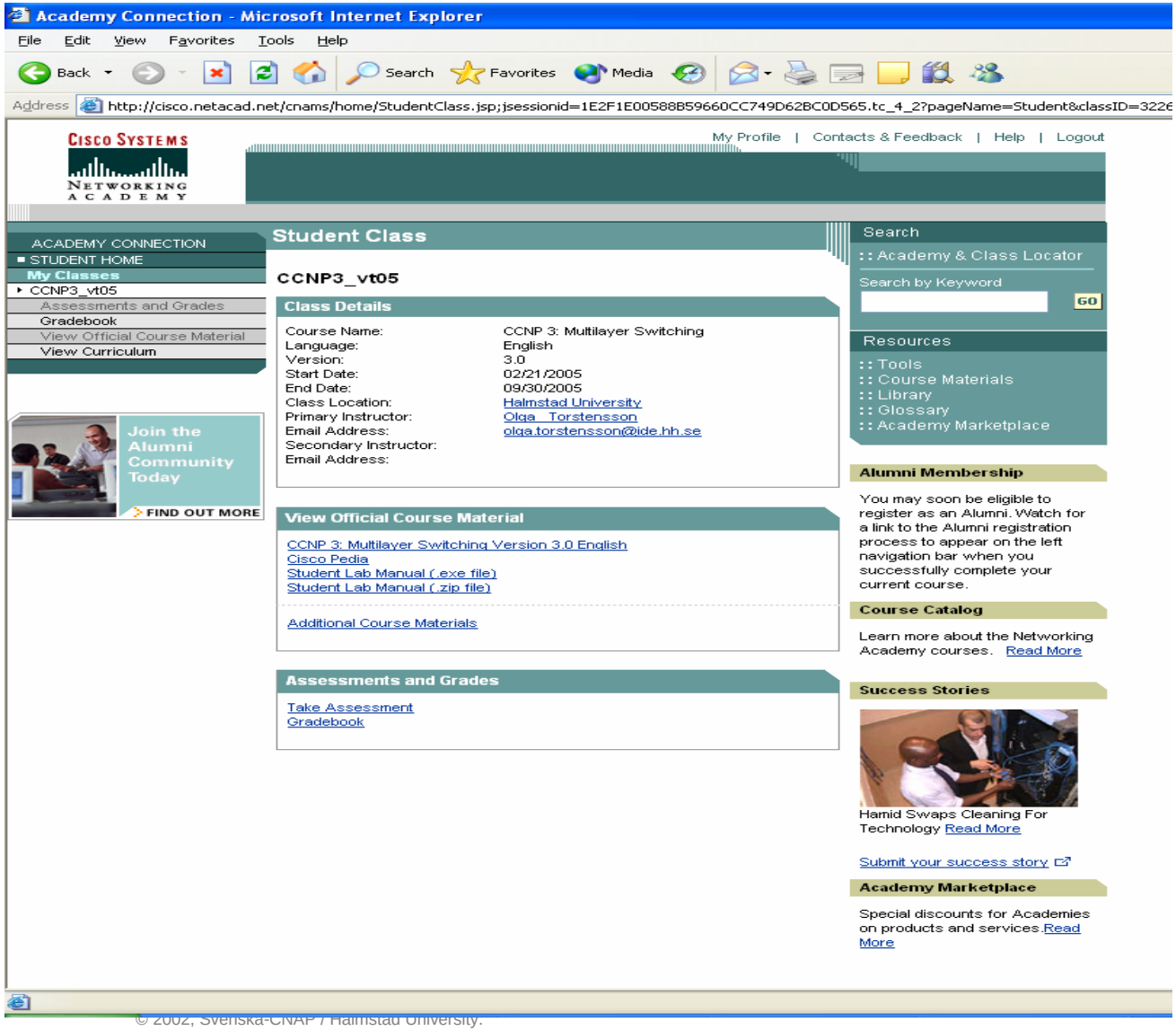
- **http://cisco.netacad.net**
- **Användarkonto**
  - **Användarnamn och lösenord (via e-mail efter registrering)**
- **Använd din student e-mail**

Academy Connection – Log In

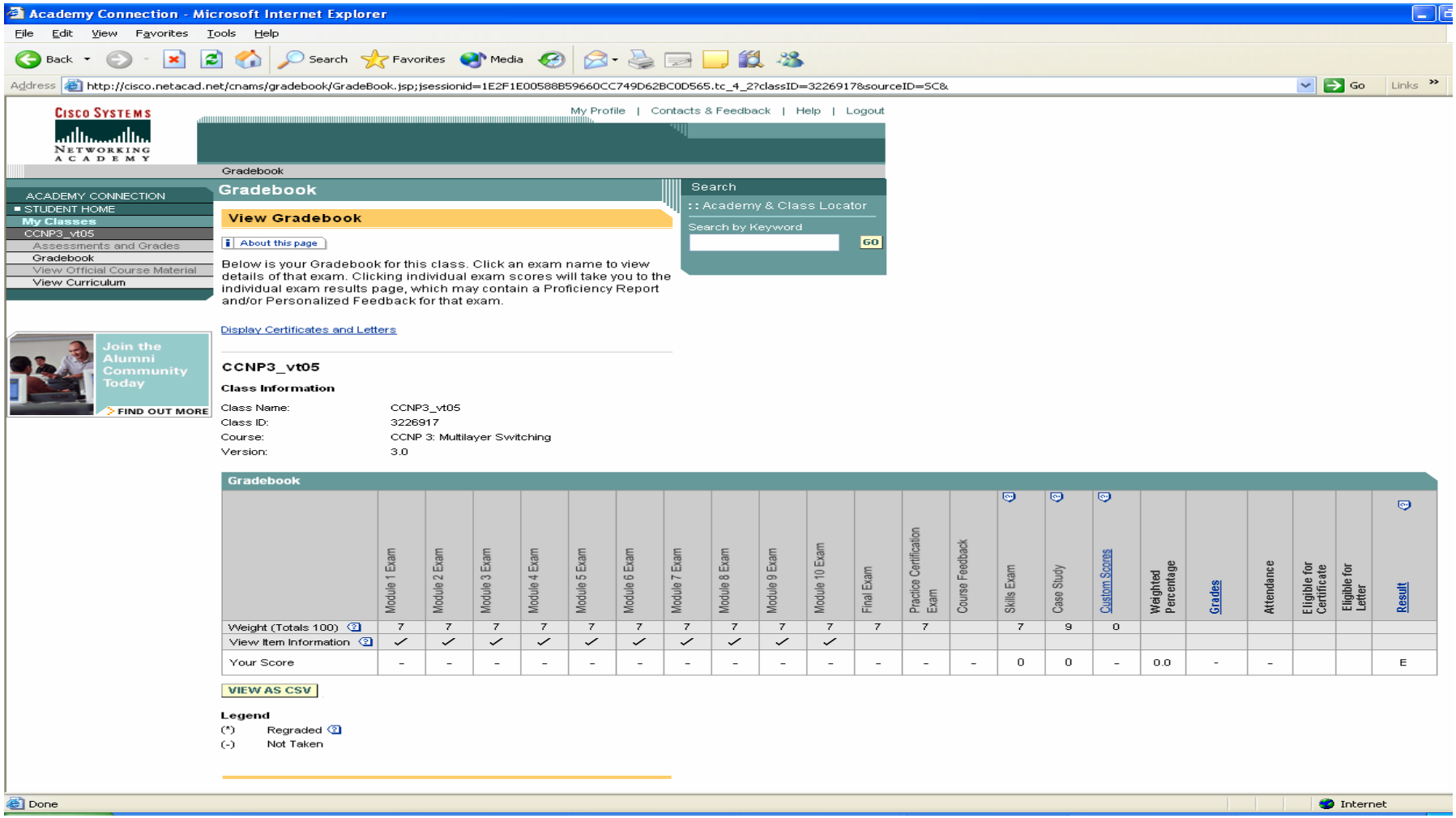
Academy Connection – Student Home



Academy Connection – Student Class



Academy Connection - Gradebook



Undervisning

- Föreläsningar
- Övningar (2 timmar vecka 15)
- Laborationer (3 h/vecka)
  - Obligatorisk närvaro
- Extra laborationer
  - D513 och D514

Examination - betygsättning

- **Final Exam (2+2 hp)**
  - **CCNA 1, Fredag 23 april**
  - **CCNA 2, Torsdag 20 maj**
- **Skills Exam (3.5 hp)**
  - **Vecka 21 (torsdag 27 maj)**
  - **Registrering på senare labtillfälle**
- **Laborationer**
  - **Närvaro för att var behörig för Skills Exam**
- **50% på VARJE del av kursen**

Certificate - CNAP

Academy Connection:

- **Module Exams (self-study)**
  - **Obligatoriskt för att få närvara på Final Exam**
- **Final Exam (CCNA 1 + 2) > 70%**
- **Skills Exam > 70%**

Schema

- http://www.hh.se
- **Kurshemsida:**
  - **Länk från www.hh.se/staff/maol**
  - **www.hh.se/ik2004**

Schema – föreläsningar

v.12 **Tisdag 10.15-12.00: Kursintroduktion**
Onsdag 10.15-12.00: OSI Model, TCP/IP

v.13 **Tisdag 10.15-12.00: IP Addressing, Subnetting, VLSM**

v.17 **Måndag 10.15-12.00: Routing, Routing Table**

v.18 **Måndag 10.15-12.00: Routing Protocols**

Schema - laborationer

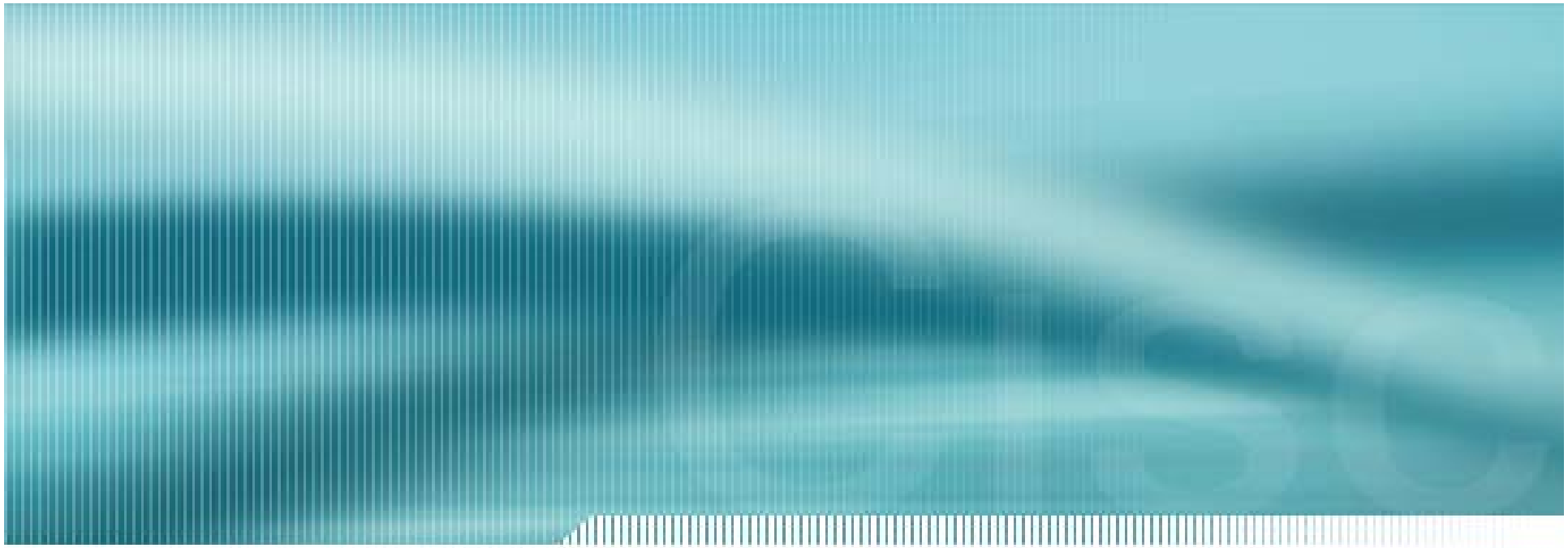
v.13 Lab 1, Packet Tracer 4.0
v.15 Lab 2
v.16 Lab 3
v.17 Lab 4, Worksheet: Routing Table
v.18 Lab 5, Worksheet: VLSM
v.19 Lab 6
v.20 Repetition, Case Study

Schema - övningar

v.15 Fredag 16 april kl. 10.15-12.00

Frågor

?



Computer Networks I
Introduction to Networking

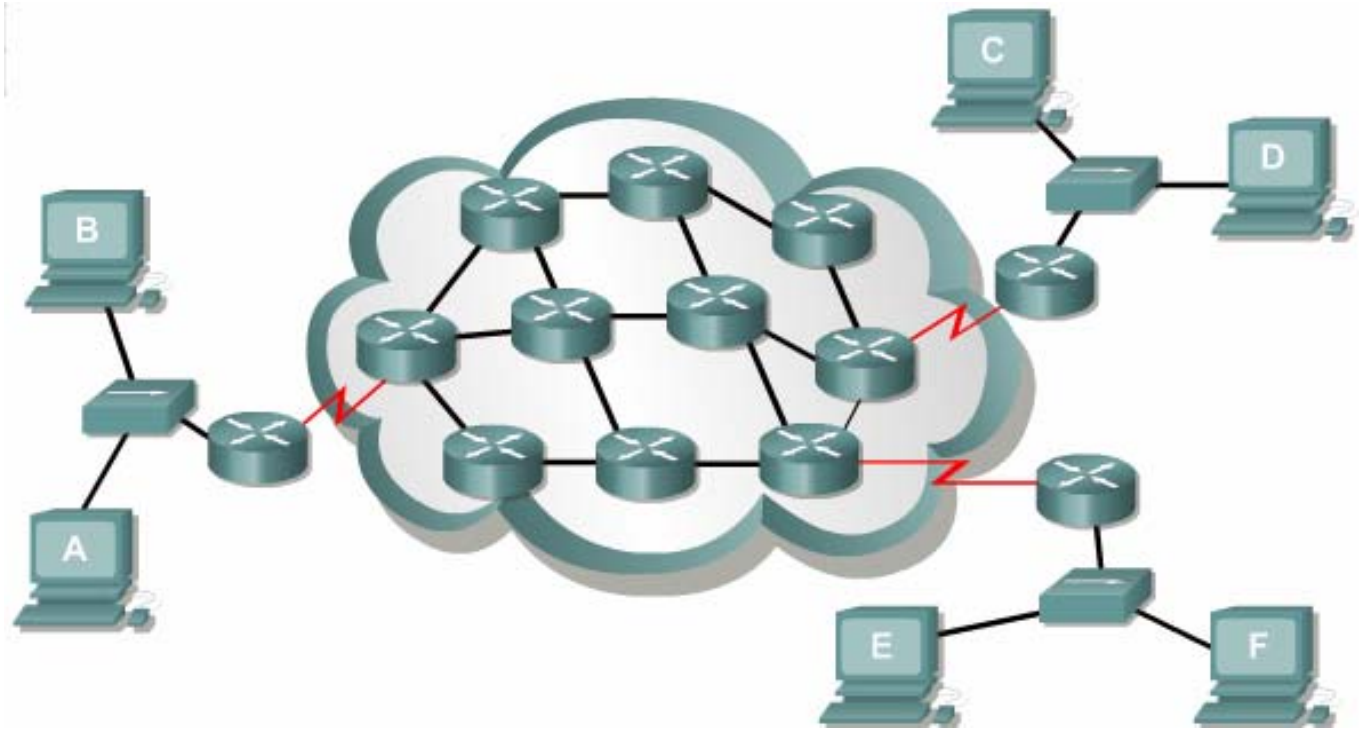
Malin Bornhager

Halmstad University

What is a network?

- Group of computers and connecting circuitry
- Two or more points
- Connection between the points (path)
- Source
- Destination

Example of a network

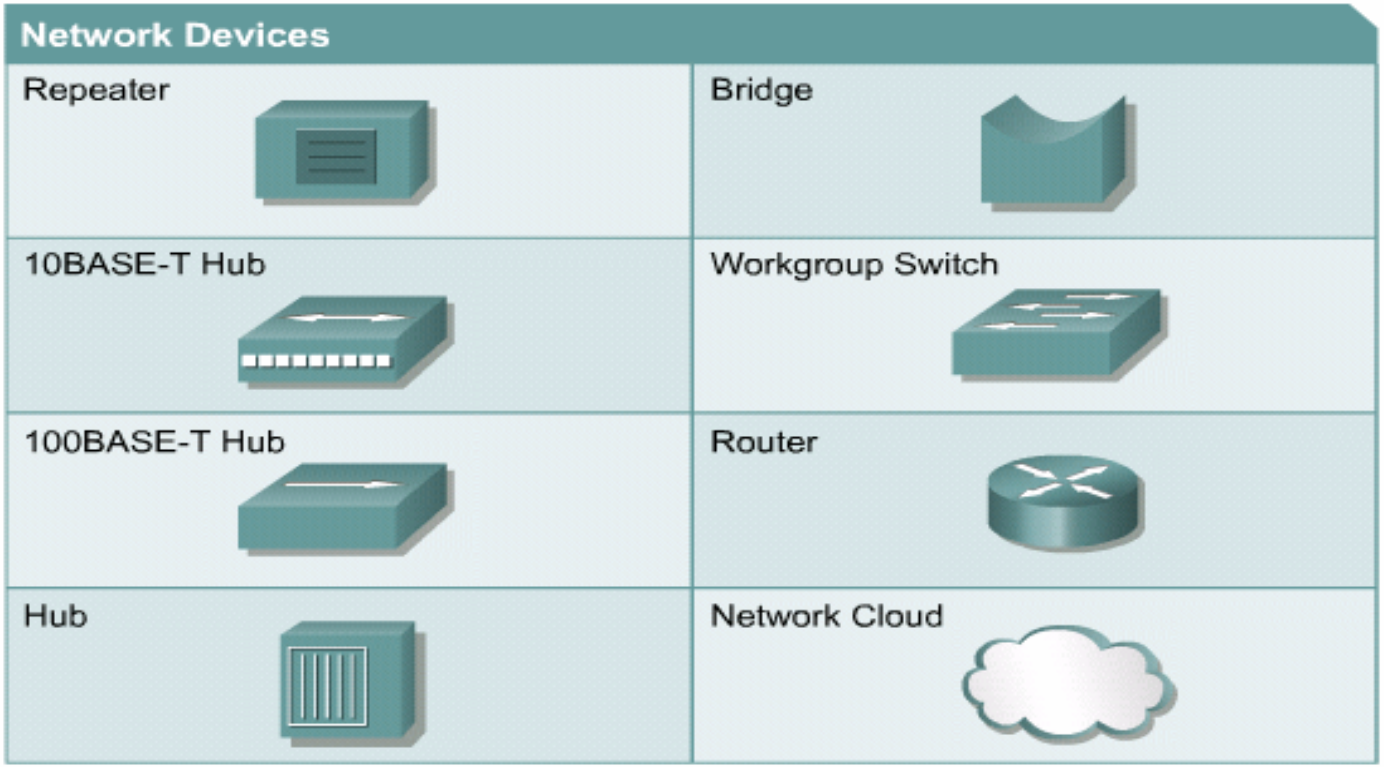


Network Components

- **Physical**
  - **Network hardware devices**
  - **Complete physical network**
- **Logical**
  - **User data**
  - **Frame**

Physical components

Networking device icons:



Media

- **Different types of media**
  - **Twisted-pair (STP/UTP)**
  - **Coaxial cable**
  - **Fibre optic cable**
  - **Air (wireless)**

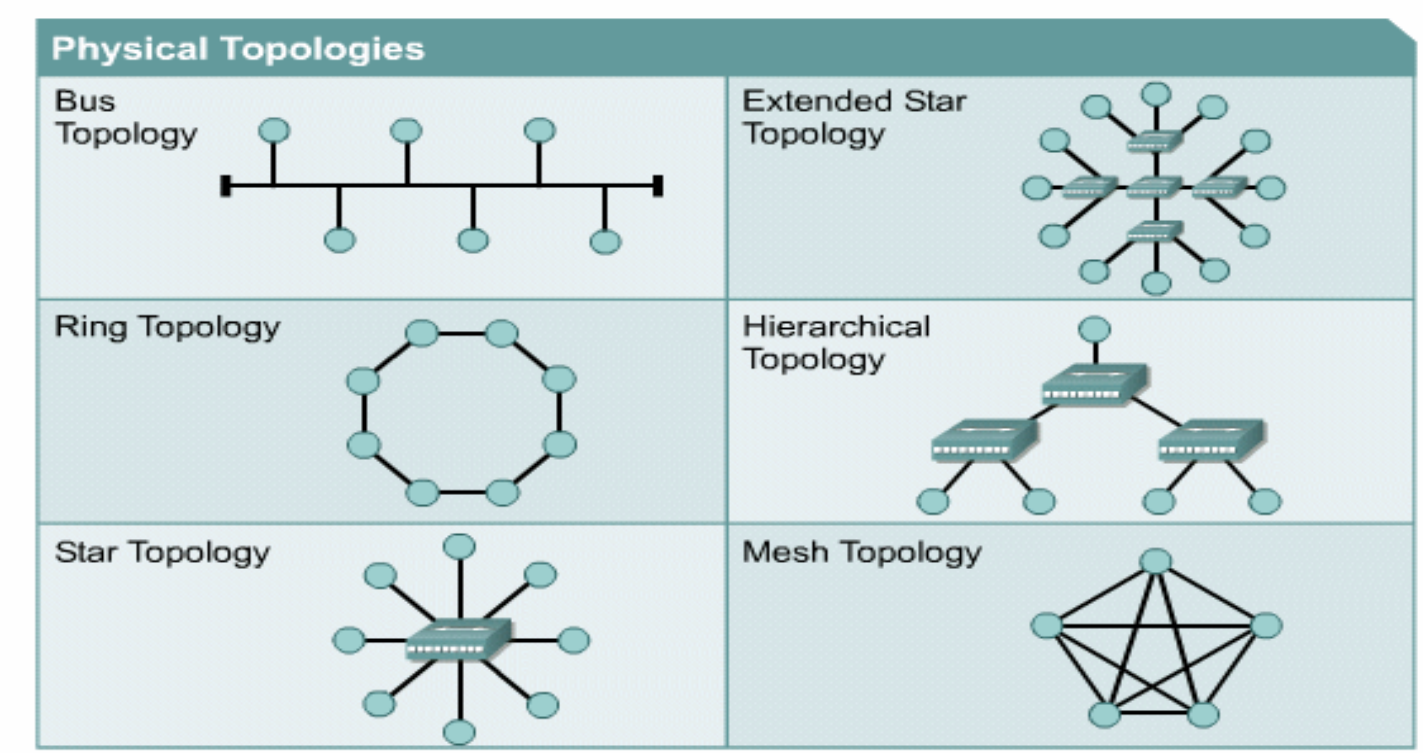
Logical components

- **Frame**

Frame header	Frame data	Frame trailer
Source and destination address	User data	End of frame

Network Terminology

Networking Topologies:



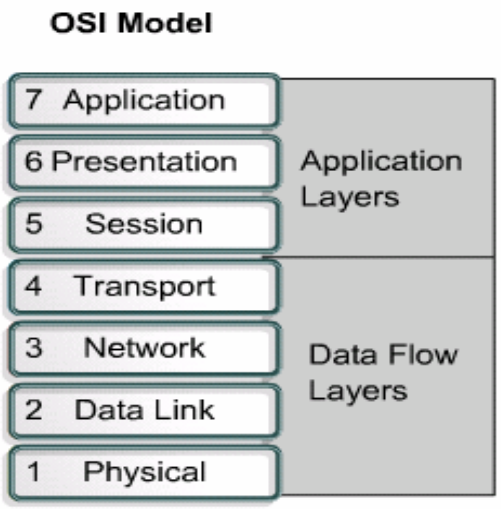
Network protocols

Protocol = rules/specification

Protocols control all aspects of data communication, which includes the following:

- **How the physical network is built**
- **How computers connect to the network**
- **How the data is formatted for transmission**
- **How that data is sent**
- **How to deal with errors**

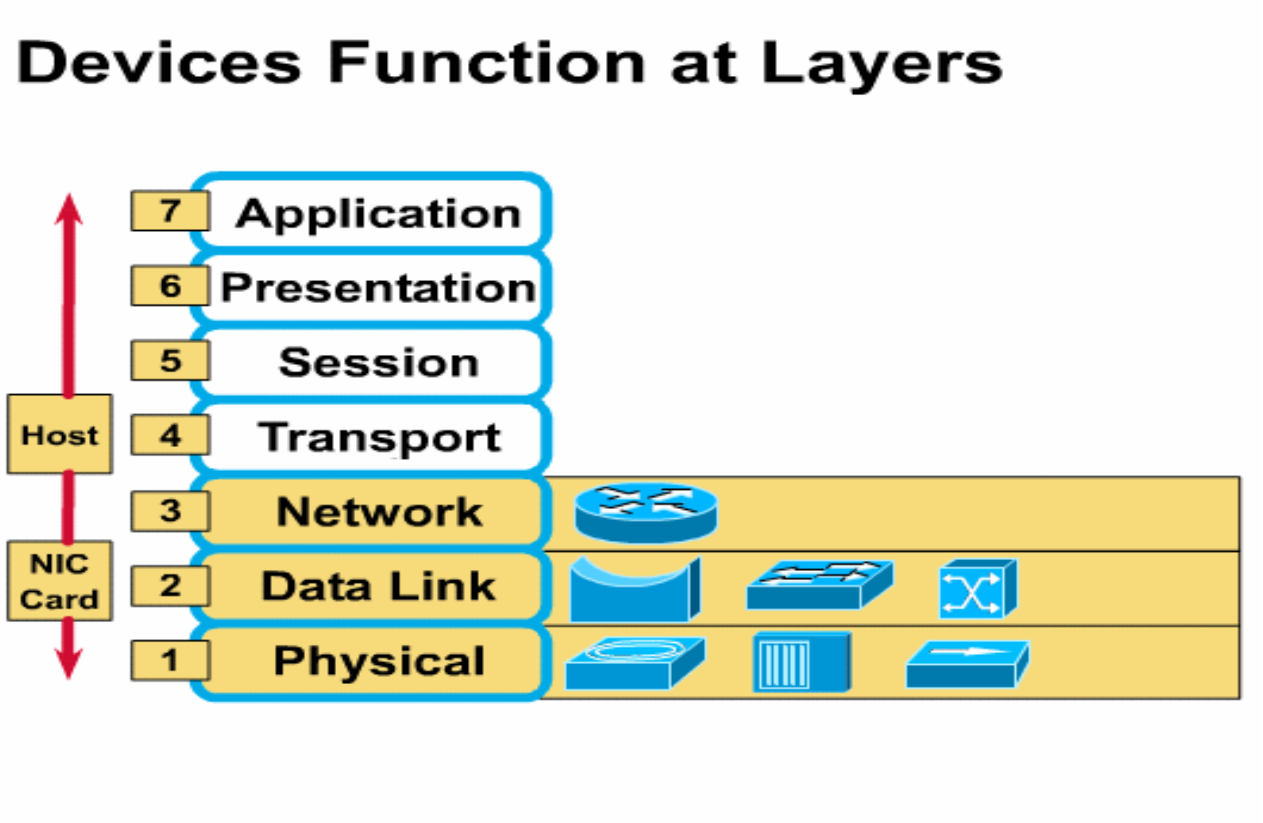
Network Architecture Models



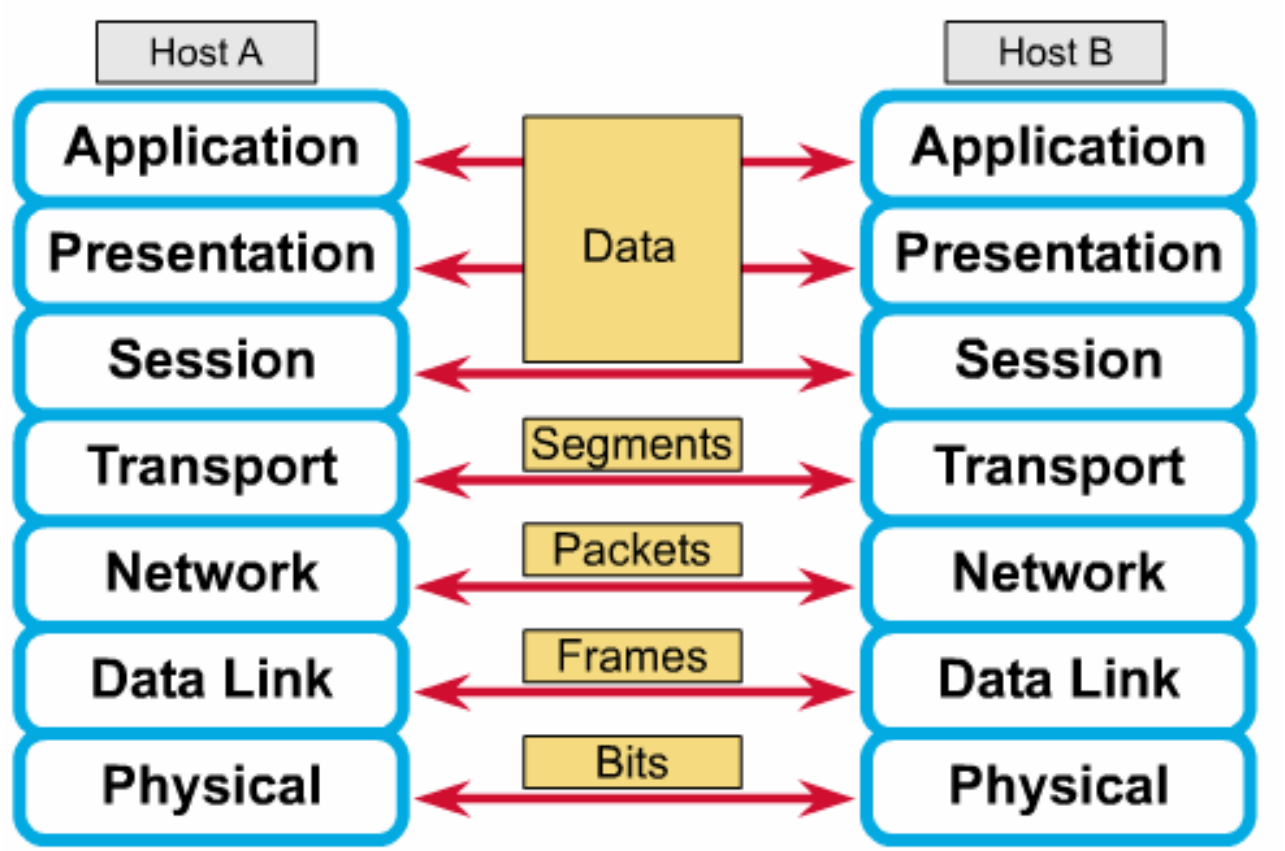
Why use models to describe the operation of network devices?

- Reduces complexity
- Standardizes interfaces
- Facilitates modular engineering
- Ensures interoperable technology
- Accelerates evolution
- Simplifies teaching and learning

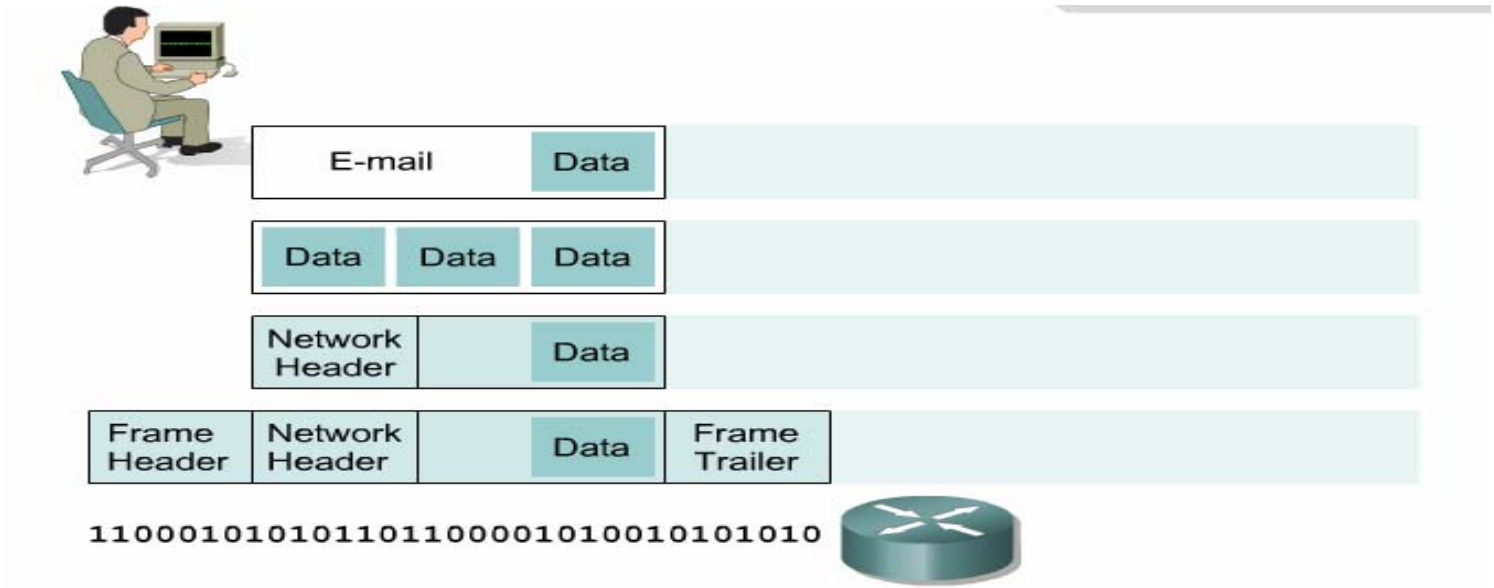
OSI Model



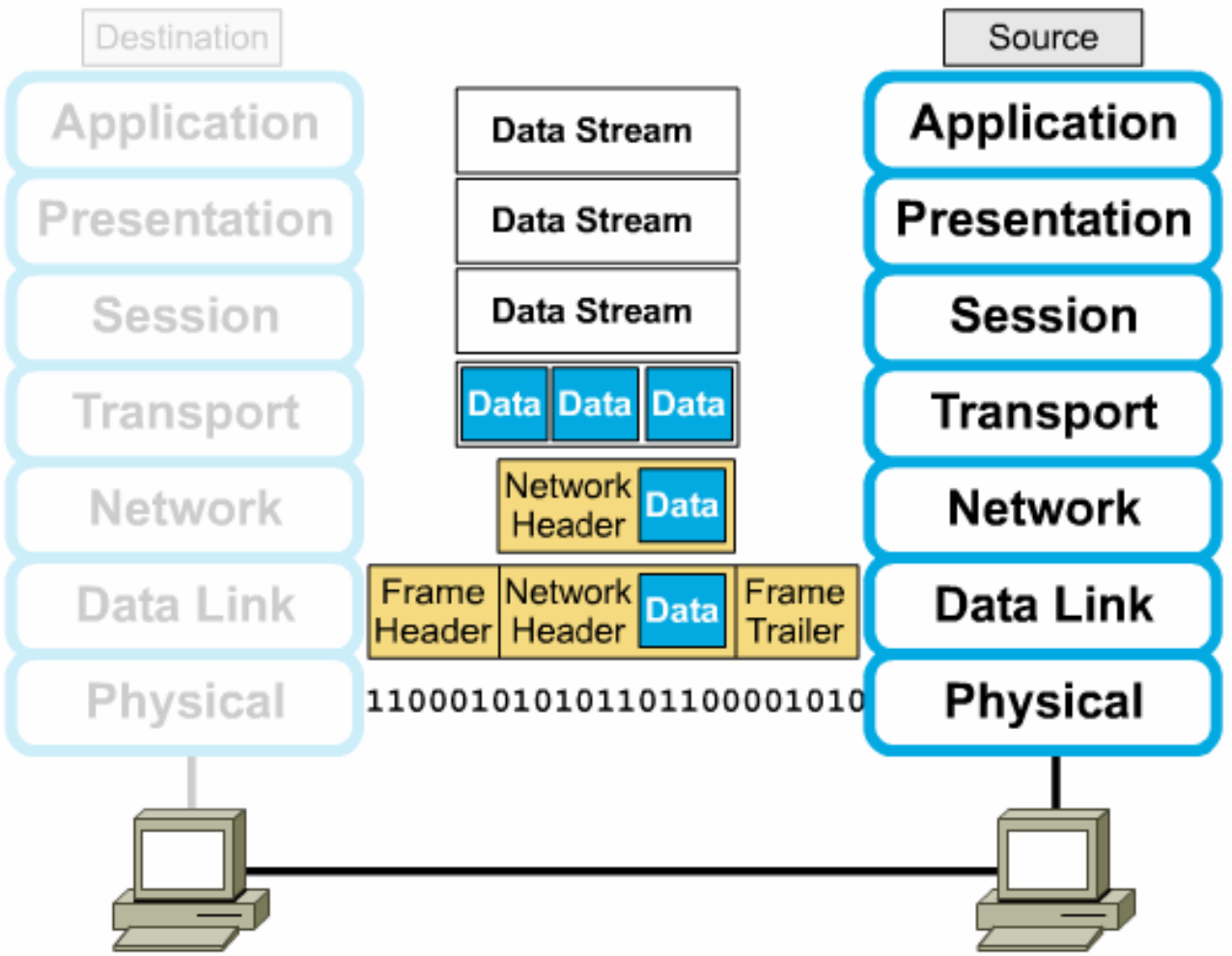
Names for Data at Each Layer



Data encapsulation



Encapsulation



Network Terminology

- **Network Interface Card (NIC)**
  - **Physical connection**
  - **MAC Address**
- **Types of networks**
  - **LAN (Local Area Network)**
  - **WAN (Wide Area Network)**

Network Terminology

- **Bandwidth**
  - **How much data that can be transported across a communication link**
  - **Limited by the physical media and technologies being used**
- **Throughput**
  - **A measure of the effective rate of data transfer**
  - **Usually less than the theoretical bandwidth**

Addressing

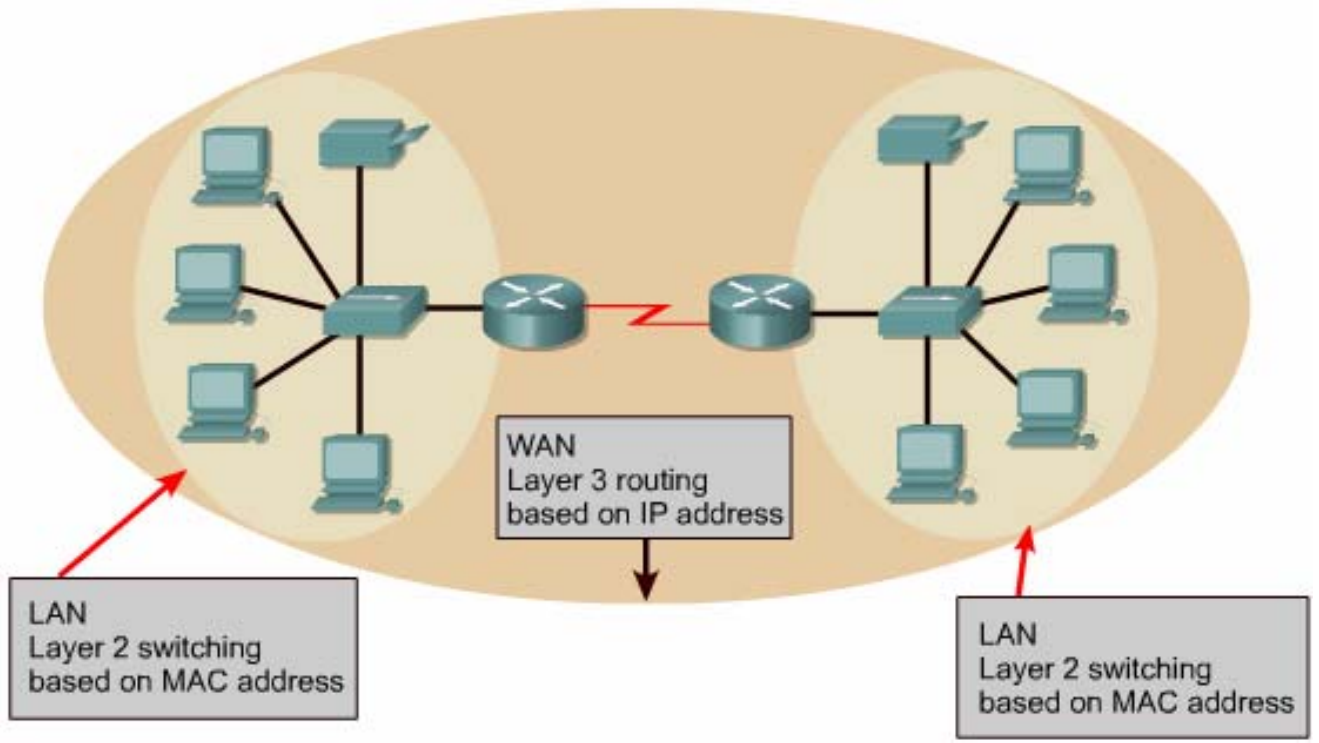
- **MAC Address**
  - **Unique physical address**
  - **48 bits**
  - **Hexadecimal, 00-0D-56-9A-15-F3**
- **IP Address**
  - **Logical address**
  - **32 bits**
  - **Dotted decimal, 192.168.1.23**

Network Maths

- **Three numbering systems are of most interest in networking**
  - **Decimal (base 10)**
    - **0,1,2,3,4,5,6,7,8,9**
  - **Binary (base 2)**
    - **0,1**
  - **Hexadecimal (base 16)**
    - **0,1,2,3,4,5,6,7,8,9,a,b,c,d,e,f**

Routing Versus Switching

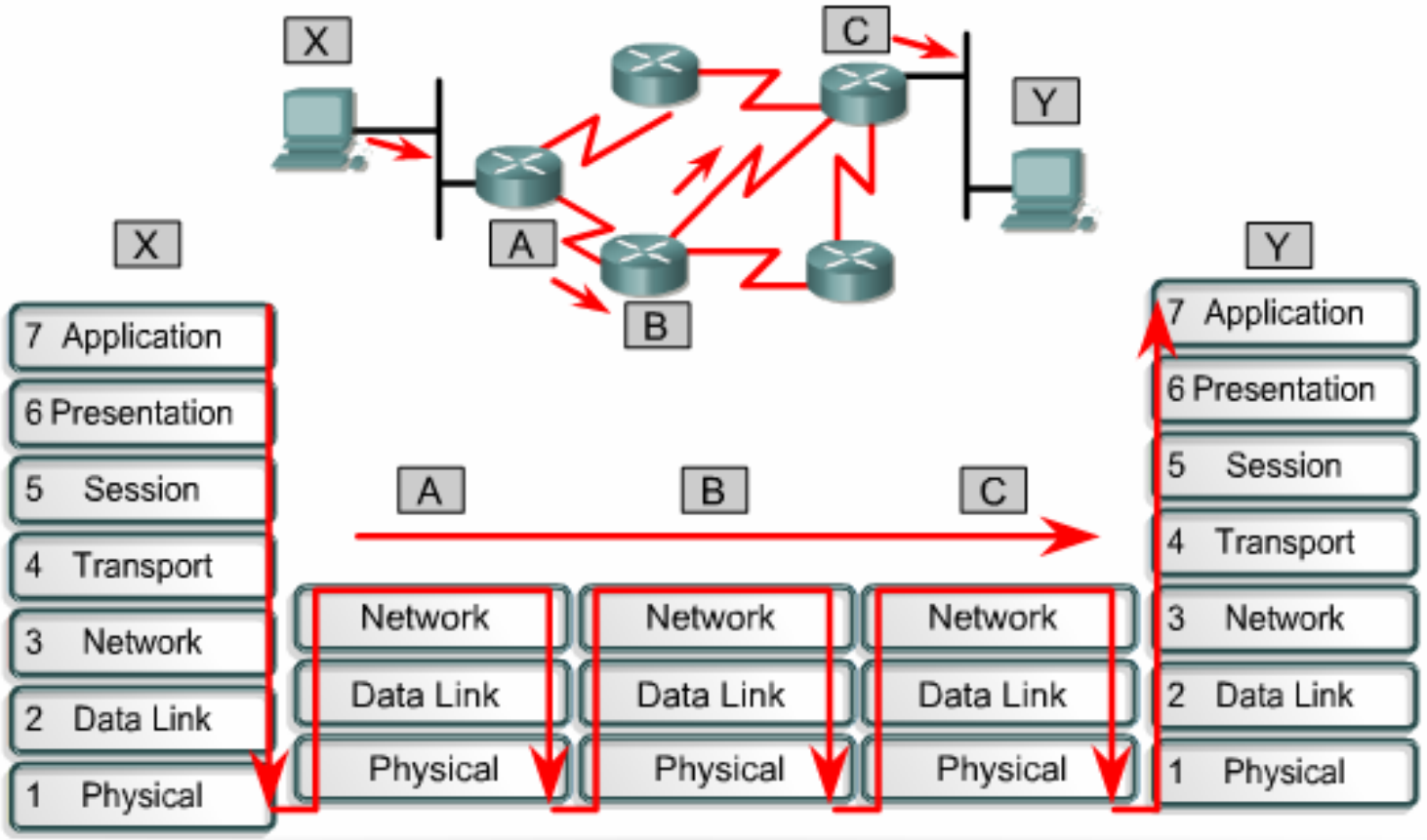
- **Routing and switching use different information in the process of moving data from source to destination.**



Routing Overview

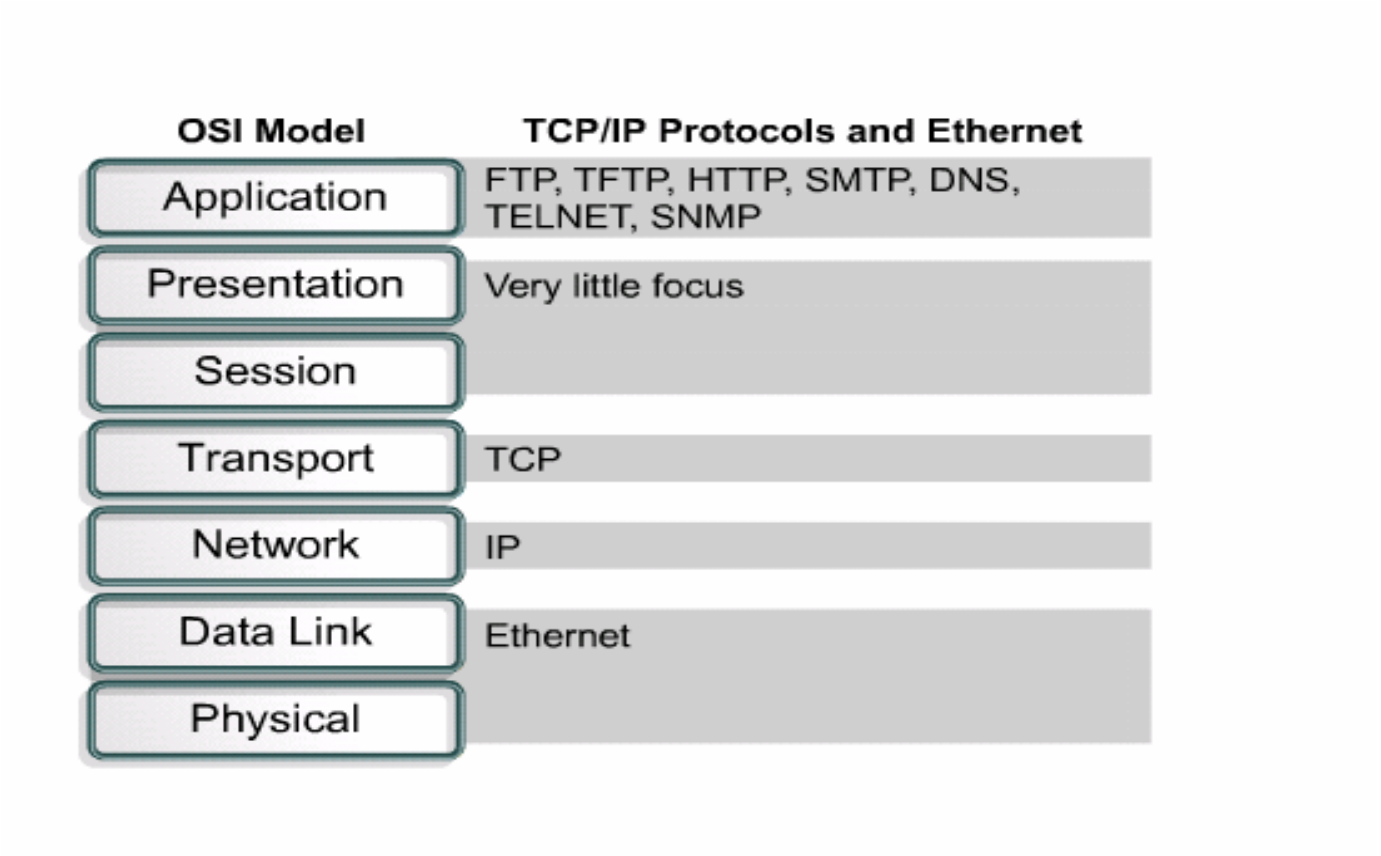
- **Static routing – An administrator manually defines routes to one or more destination networks.**
- **Dynamic routing – Routers follow rules defined by routing protocols to exchange routing information and independently select the best path.**

Data Flow Through a Network



Data flow in a network focuses on layers one, two and three of the OSI model. This is after being transmitted by the sending host and before arriving at the receiving host.

Focus of the CCNA



CCNA 1 and CCNA 2