NANJING UNIVERSITY · SOFTWARE INSTITUTE

南京大学 软件学院

OSI Layer 5-7: Application Layers

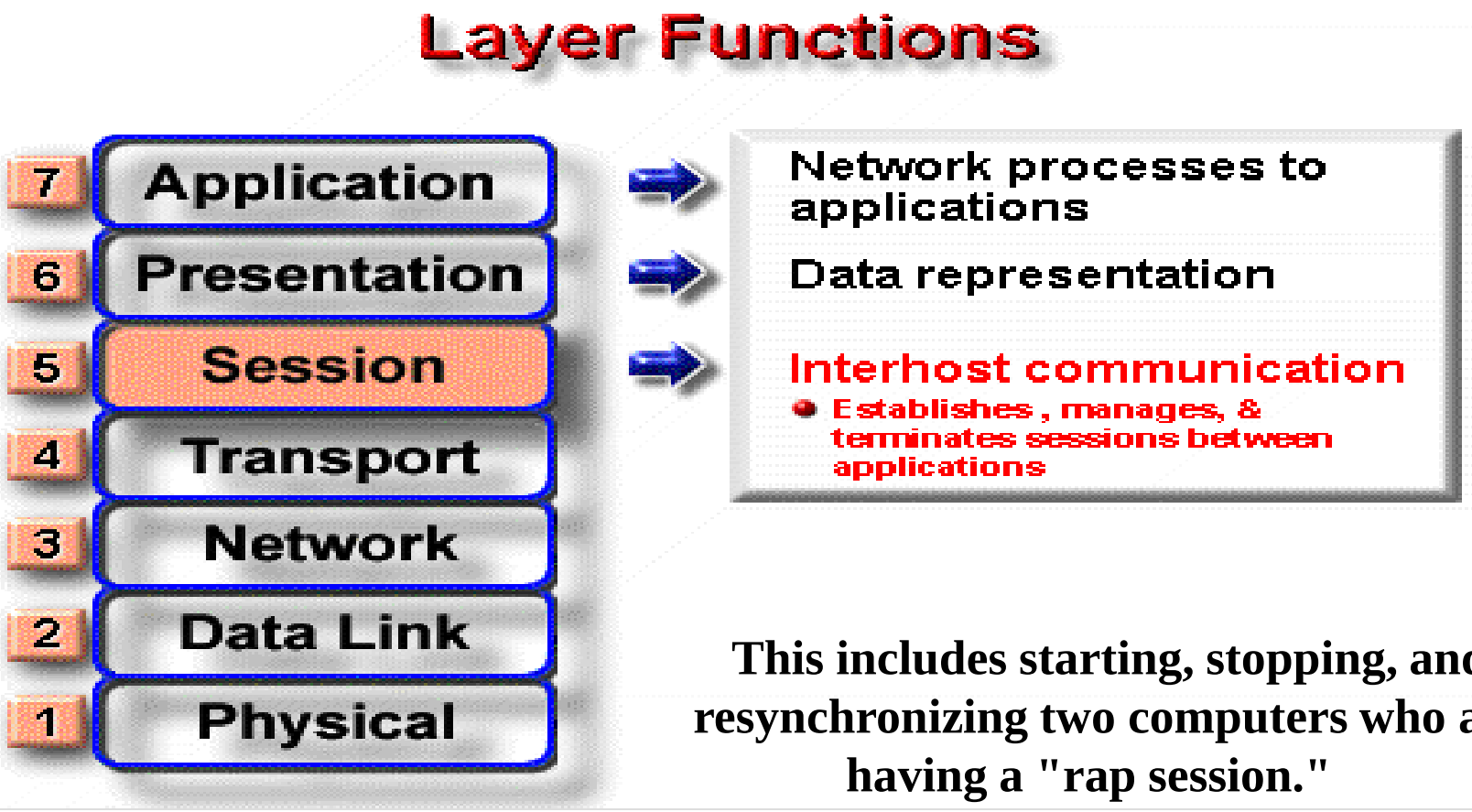
CISCO SYSTEMS

EMPOWERING THE INTERNET GENERATION℠

OSI Layer 5-7: Application Layers

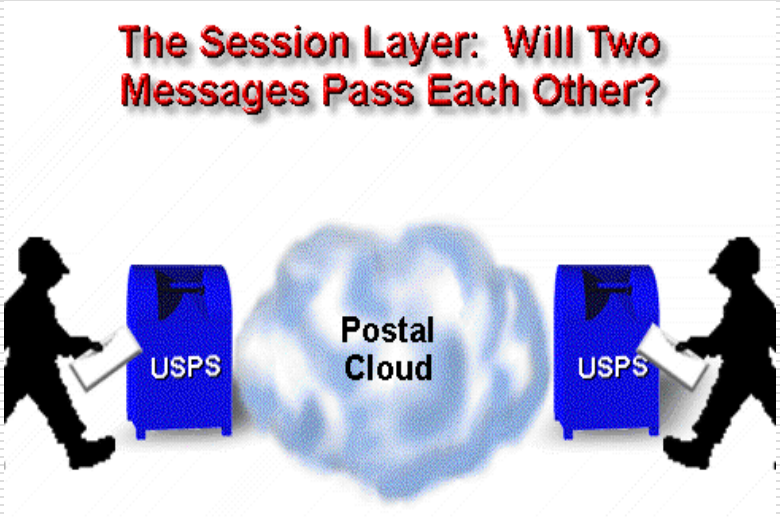
- The Session Layer
- The Presentation Layer
- The Application Layer

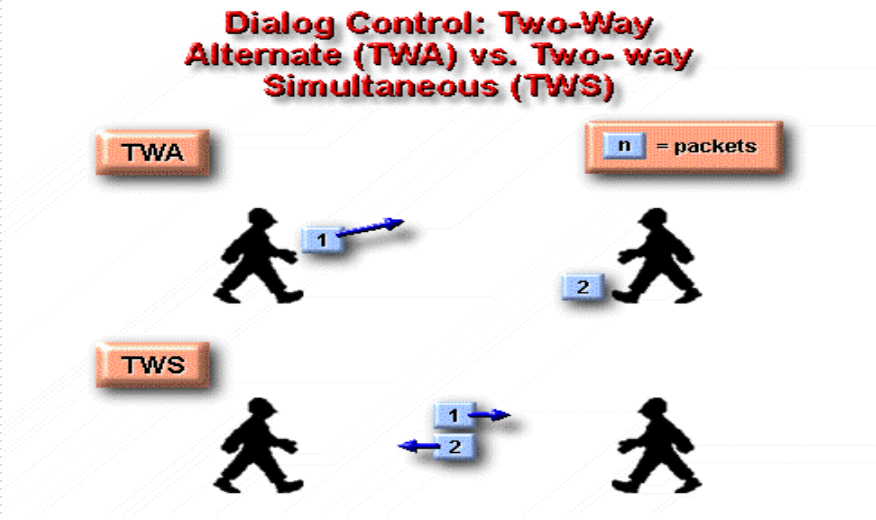
Layer 5: The Session Layer



This includes starting, stopping, and resynchronizing two computers who are having a "rap session."

The Session Layer

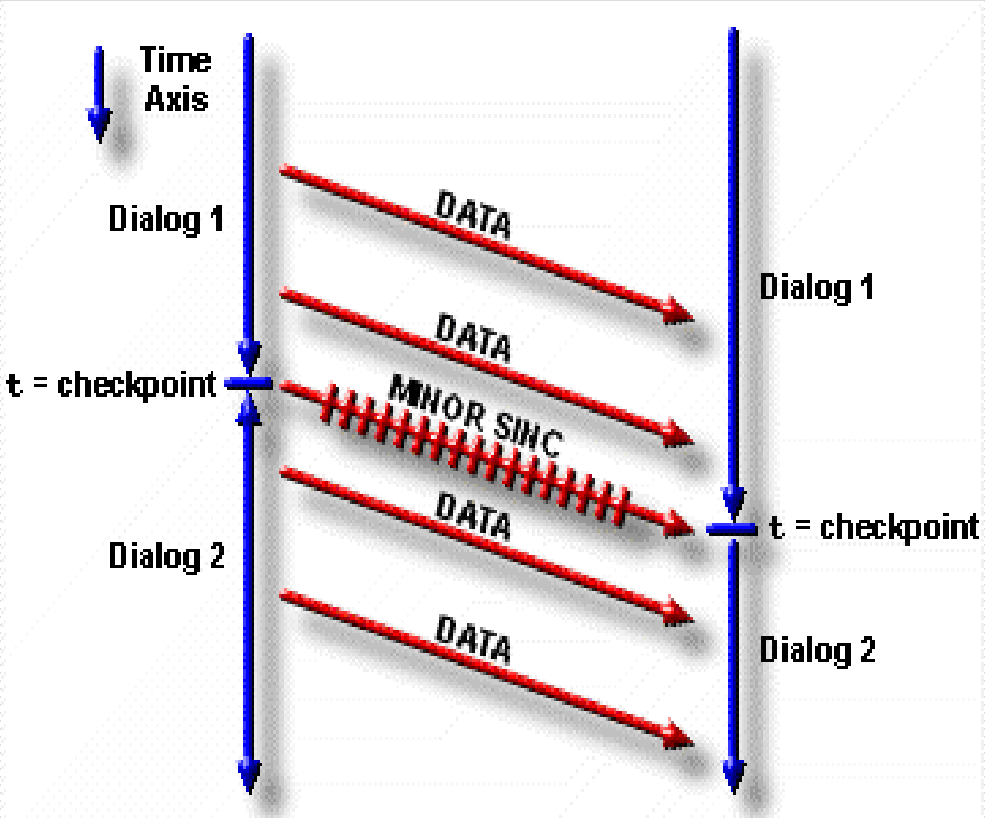




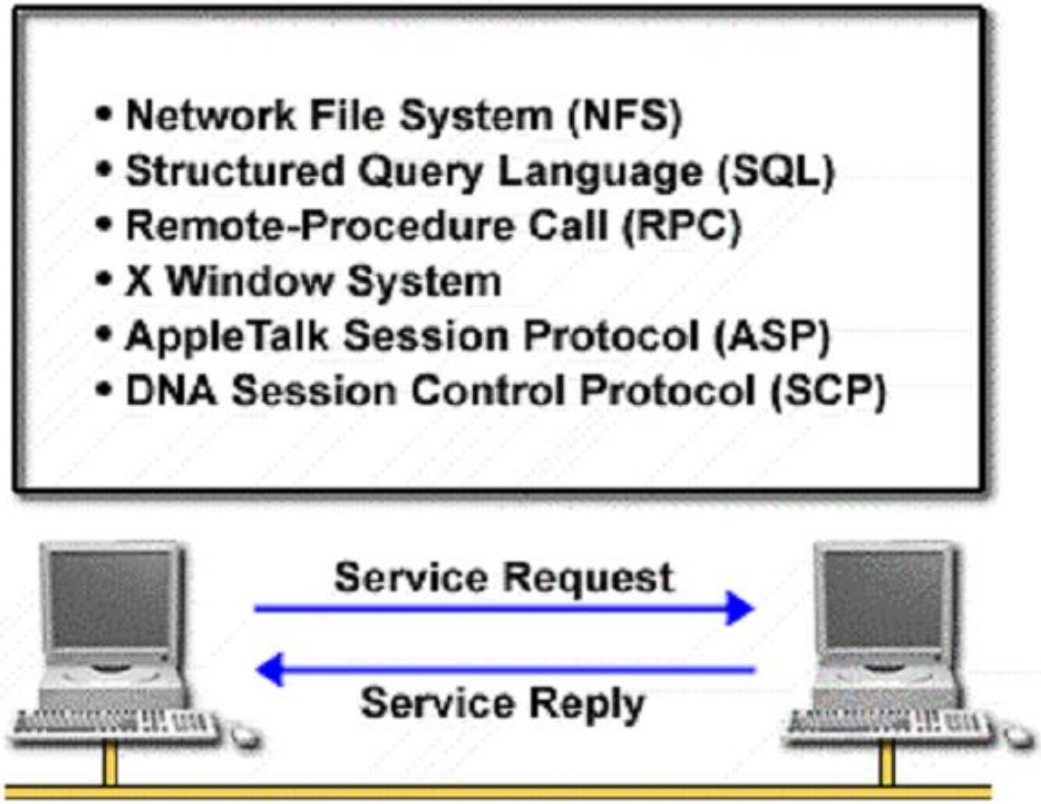
- *two-way simultaneous communication*?
- *two-way alternate control?*
- **have synchronized the subjects of your conversations**?

The Session Layer

- *Checkpoint* is used to separate parts of a session, previously referred to as dialogues
- Dialogue separation is the orderly initiation, termination, and managing of communication.



Some Applications of Layer 5



- Coordinates applications as they interact on different hosts

The Application Layers

- The Session Layer
- The Presentation Layer
- The Application Layer

Layer 6 - The Presentation Layer

- The presentation layer is responsible for presenting data in a form that the receiving device can understand.
- The presentation layer has 3 main functions:
  - Data formatting
  - Data compression
  - Data encryption

Data Formatting

- Imagine two dissimilar systems.
  - One uses Extended Binary Coded Decimal Interchange Code (EBCDIC) to format text
  - The other uses American Standard Code for Information Interchange (ASCII) to format text
- Layer 6 provides the translation between these two different types of codes

Graphic File Formats

- The Internet often uses two binary file formats to display images:
  - Graphic Interchange Format (GIF)
  - Joint Photographic Experts Group (JPEG).
- Any computer with a reader for the GIF and JPEG file formats can read these file types, regardless of the type of computer.

Multimedia File Format

- The multimedia file format is another type of binary file, which stores sounds, music, and video.
  - These files may be completely downloaded, first, and then played, or they may download while they are playing.
  - The latter method is referred to as streaming audio.

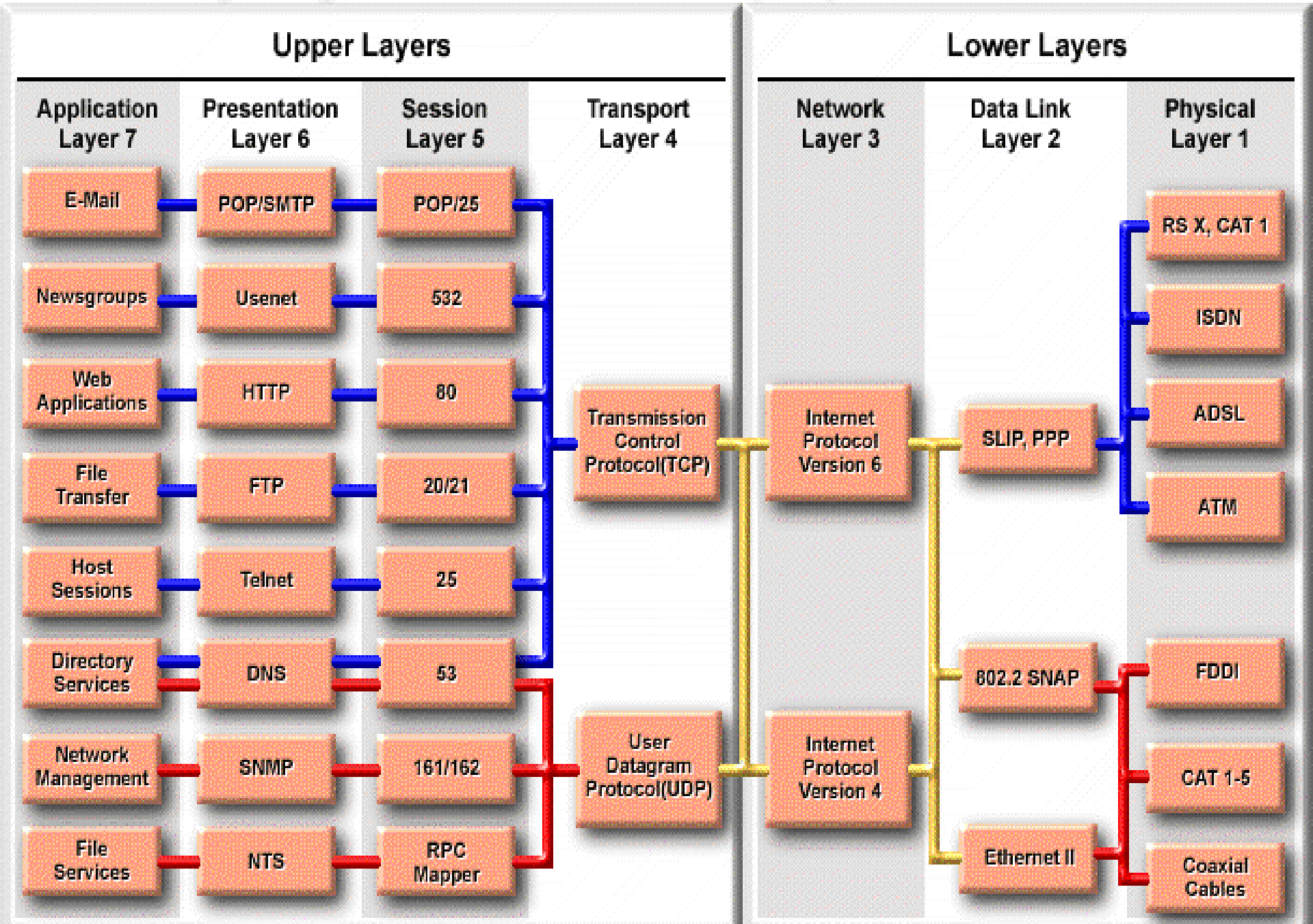
Encryption & Compression

- Layer 6 is responsible for data encryption.
  - Data encryption protects information during its transmission.
- The presentation layer is also responsible for the compression of files.

The Application Layers

- The Session Layer
- The Presentation Layer
- The Application Layer

Open Systems Interconnection (OSI) Reference Model



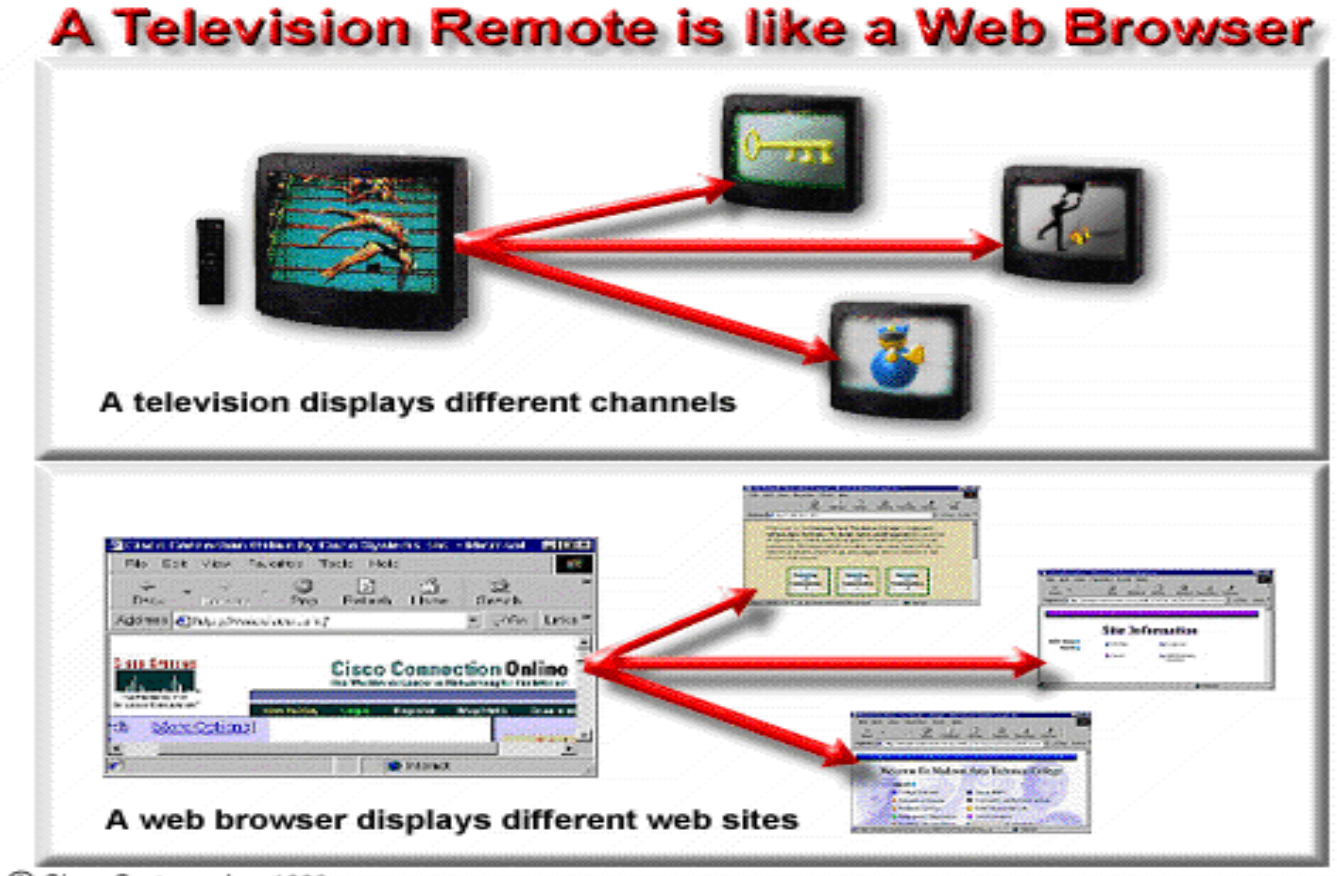
Layer 7: Application Layer

- The application layer (closest to the user) supports the *communicating component* of an application.
- The application layer:
  - Identifies and establishes the availability of intended communication partners
  - Synchronizes cooperating applications
  - Establishes agreement on procedures for error recovery
  - Control of data integrity

Layer 7: Application Layer

- Provide a direct interface for the rest of the OSI model by using NETWORK APPLICATIONS (e.g. www, e-mail, ftp, telnet)
- Or provide an indirect interface by using standalone applications (e.g. word processors, spreadsheets, presentation managers, network redirector).

HTTP

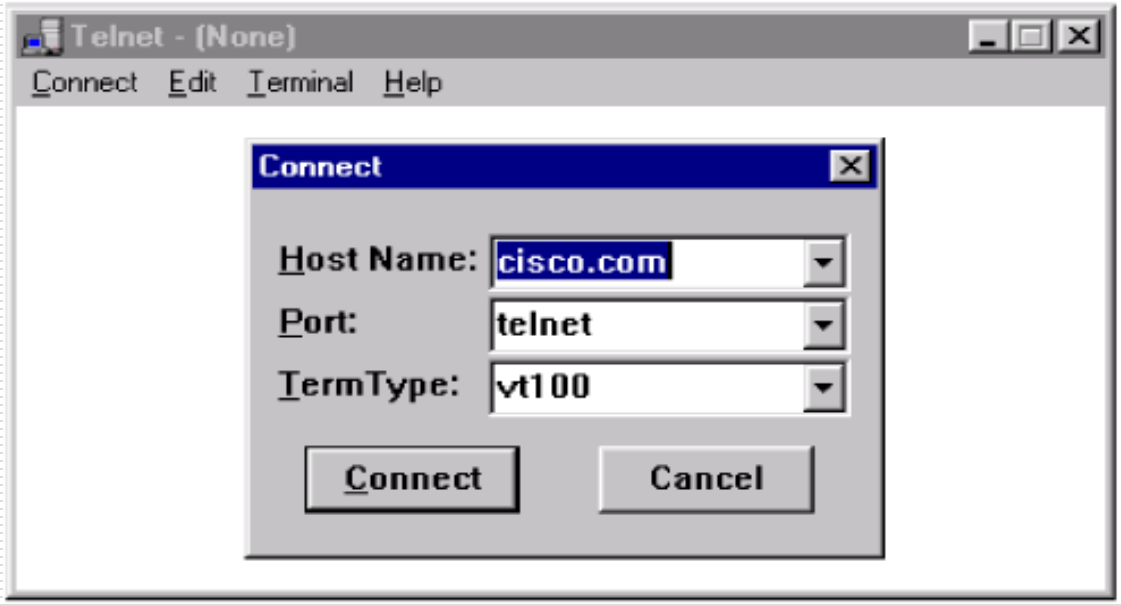

A Television Remote is like a Web Browser
A television displays different channels
Cisco Connection Online
A web browser displays different web sites
© Cisco Systems, Inc. 1999

FTP and TFTP

- FTP is a reliable, connection-oriented service that uses TCP to transfer files.
  - FTP first establishes a control connection between the client and the server(port 21)
  - Then a second connection is established, which is a link between the computers through which the data is transferred. (port 20)
- TFTP is a connectionless service that uses UDP
  - Small and easy to implement.
  - E.g. TFTP is used on routers to transfer configuration files and Cisco IOS images.

Telnet

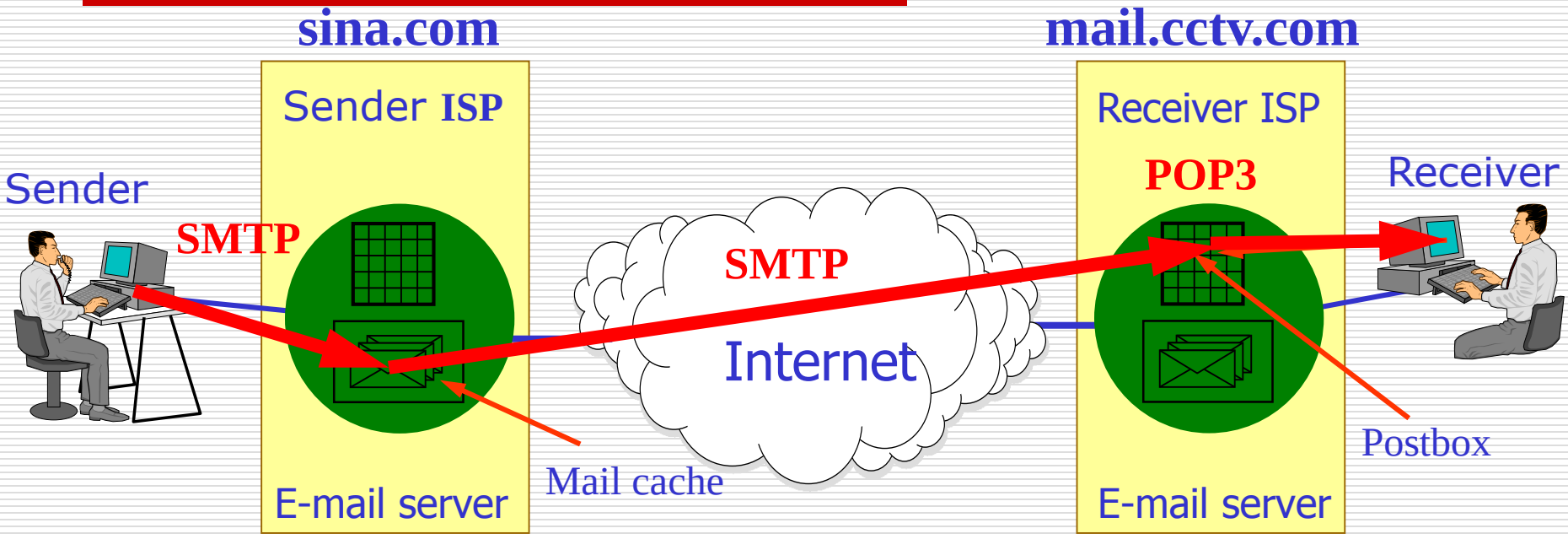
- Telnet client software provides the ability to log in to a remote Internet host that is running a Telnet server application and then to execute commands from the command line.



SMTP and POP

- E-mail servers communicate with each other using the SMTP to send and POP to receive mail.
  - **SMTP (Simple Mail Transfer Protocol)**
  - **POP3 (Post Office Protocol version 3)**

SMTP and POP



Sender：**xyz5678@sina.com**

Receiver ： **ab30@mail.cctv.com**

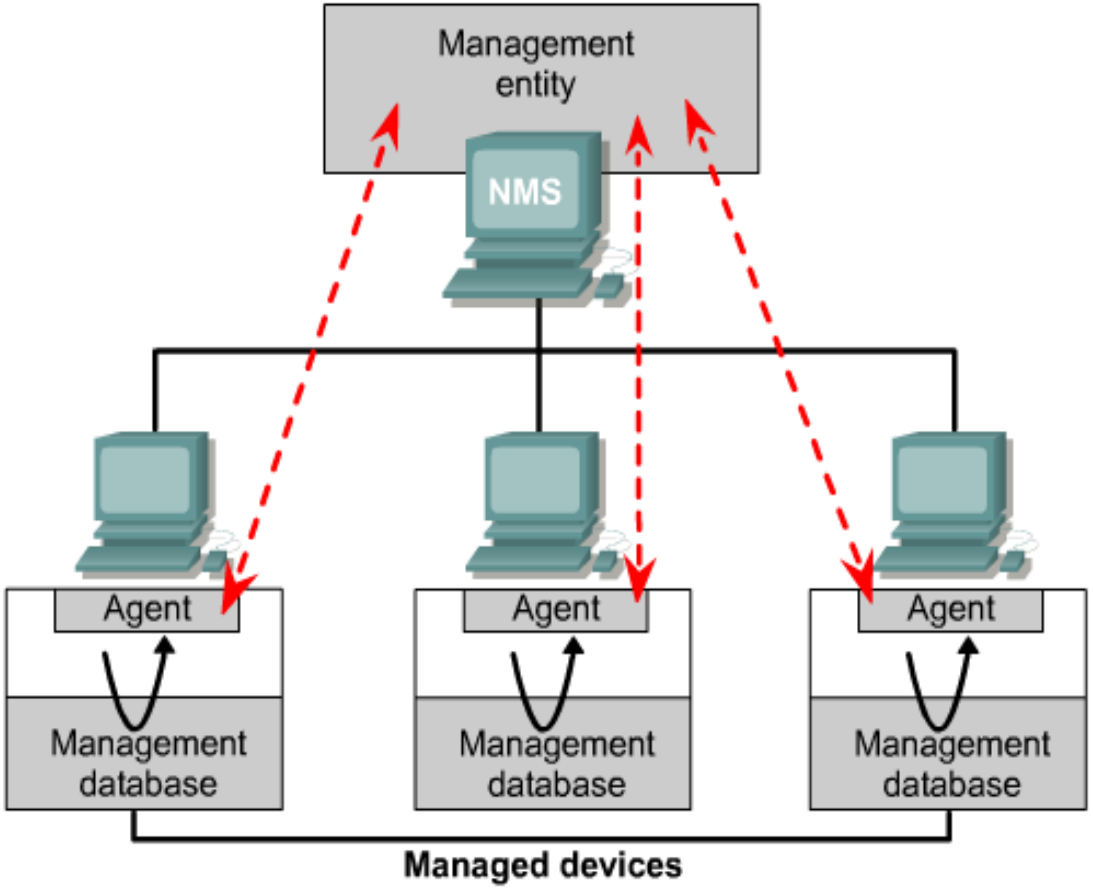
User name

Domain name of e-mail server

IP and TCP are transferring protocols of e-mail

SNMP

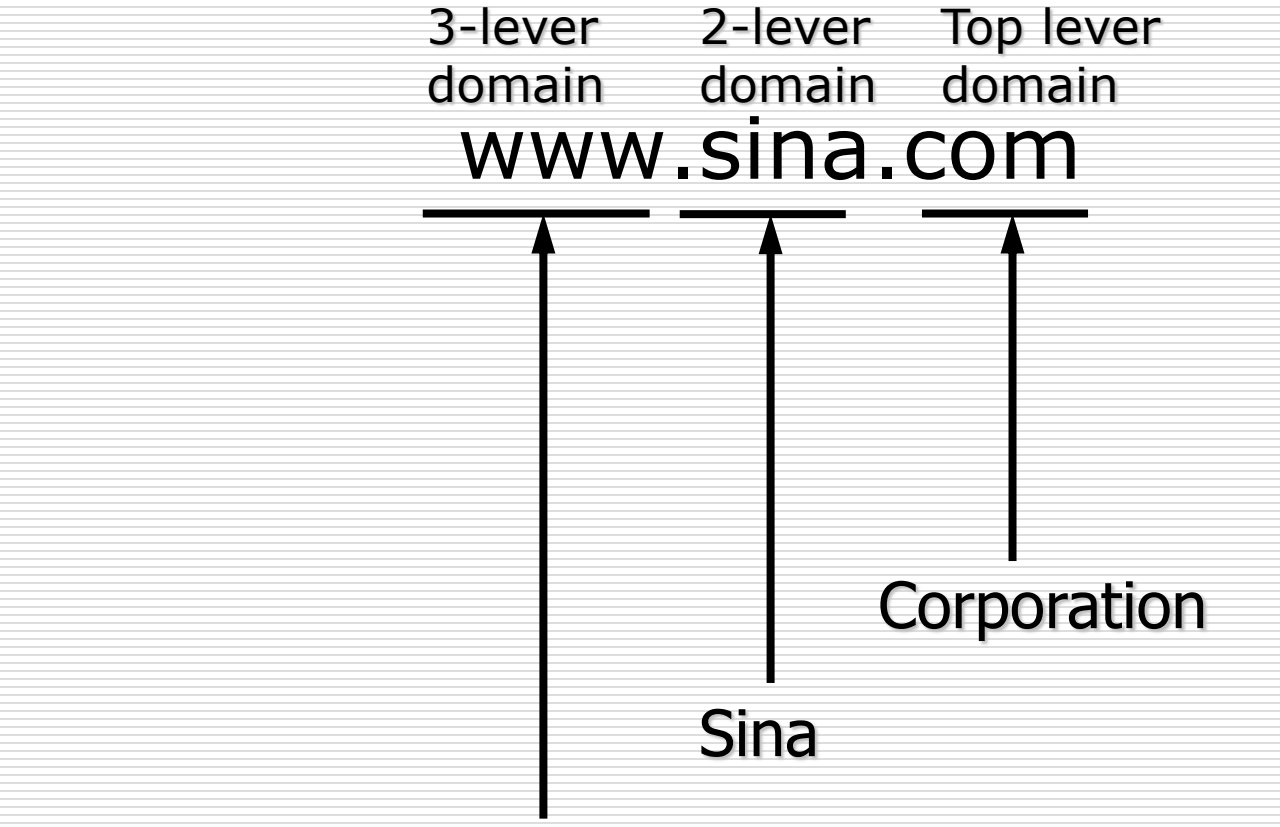
- The Simple Network Management Protocol (SNMP) is an application layer protocol that facilitates the exchange of management information between network devices.



Domain Name System (DNS)

- The Domain Name System (DNS) is a service on a network that manages domain names and responds to requests from clients to translate a domain name into the associated IP address.

Domain Name


3-lever domain
2-lever domain
Top lever domain
www.sina.com
Corporation
Sina
Computer name to provide the www services

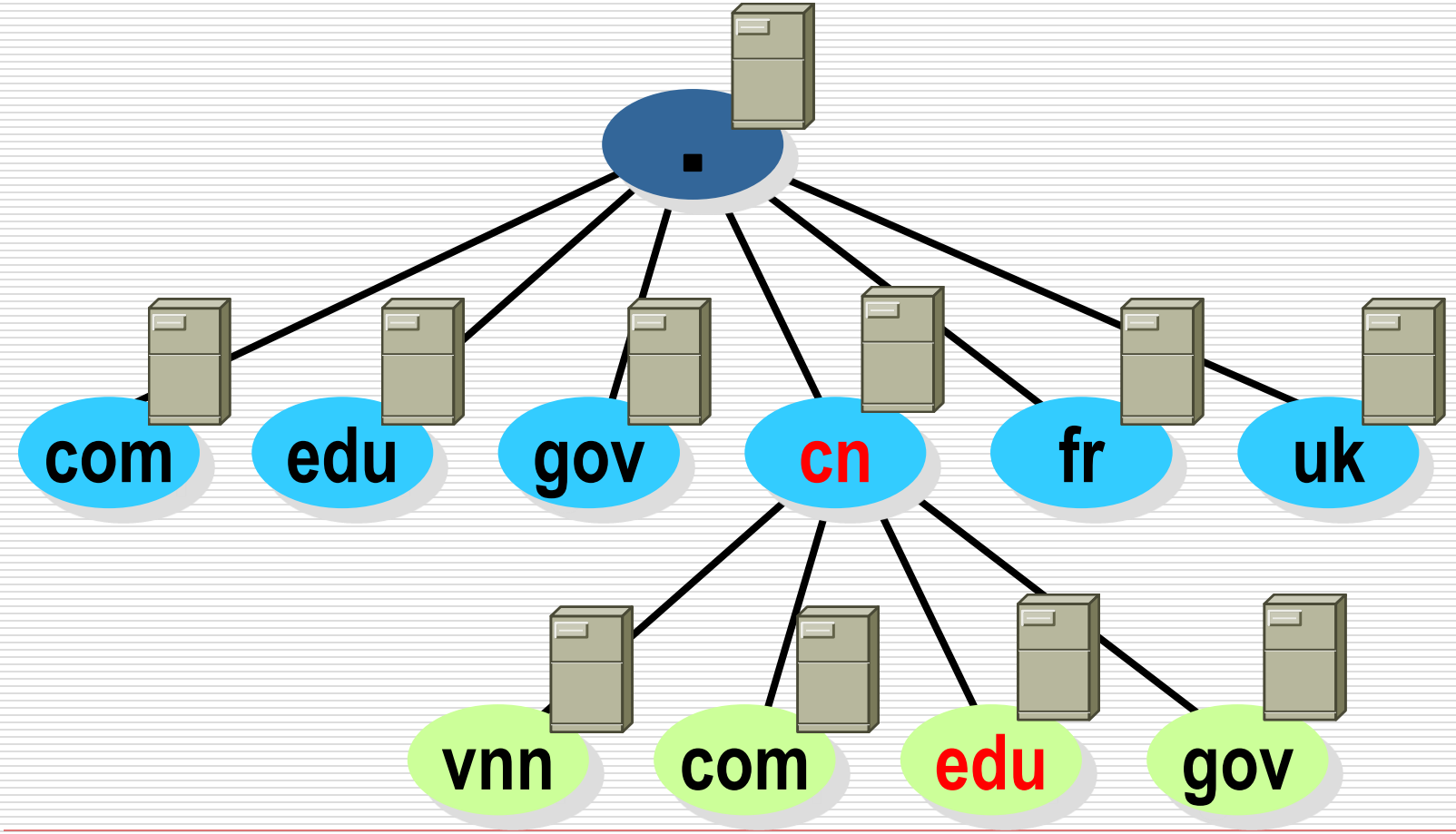
TLD (Top Level Domain)

- Nation TLD(nTLD)
  - .cn(CHINA), .us (United States), .uk (United kingdom), etc.
- Generic TLD(gTLD), the earliest domains include:
  - .com Enterprises and companies
  - .net Network services providers
  - .org Nonprofit organizations
  - .edu Educational facilities
  - .gov Governments (only for U.S.A)
  - .mil Military facilities (only for U.S.A)
  - .int International organizations

TLD (Top Level Domain)

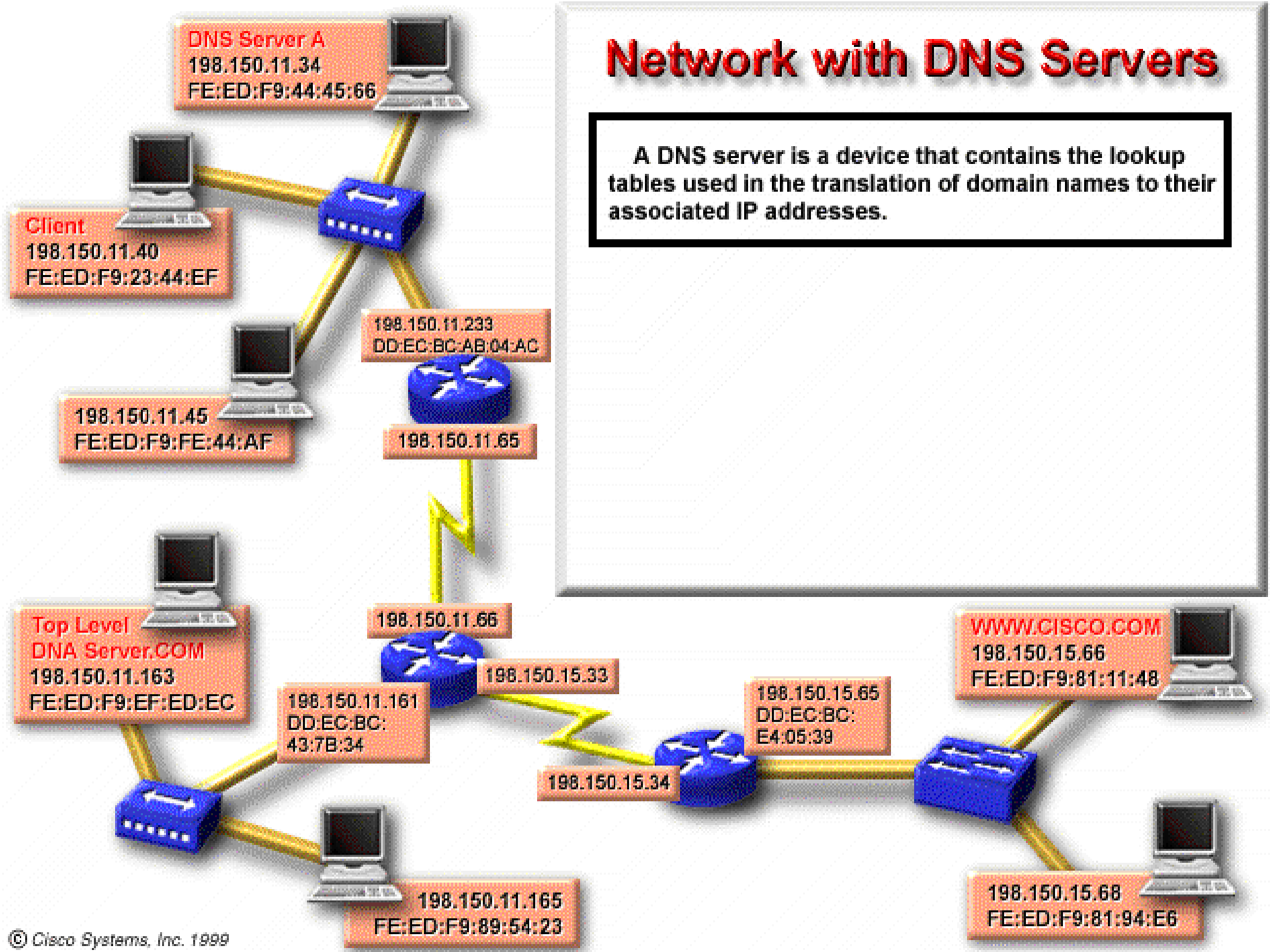
- Infrastructure domain
  - Only one: arpa, for resolving domain names reversely
- Recently, new TLD domain added:
  - .aero （航空运输企业）
  - .biz （公司和企业）
  - .cat （加泰隆人的语言和文化团体）
  - .coop （合作团体）
  - .info （各种资讯）
  - .jobs （人力资源管理者）
  - .mobi （移动产品与服务的用户和提供者）
  - .museum （博物馆）
  - .name （个人）
  - .pro （经过认证的专业人员）
  - .travel （旅游业）

Domain Name Server (DNS)



Network with DNS Servers

A DNS server is a device that contains the lookup tables used in the translation of domain names to their associated IP addresses.



Domain Name Server (DNS)

- **The *DNS* system is set up in a hierarchy that creates different levels of *DNS* servers.**
- **The *DNS* server at this level judges if itself is able to translate the domain name into an associated IP address:**
  - **If it can do that, it does so and returns the result to the client**
  - **If not, it sends the request to the higher level.**

Application Layer: Communication Ways

- One way that communication processing takes place:
  - When a browser opens, it is connected to the default page and the files of the page are transferred to the client.
  - After the processing is completed, the connection is broken
- The second way:
  - As Telnet and FTP, establish a connection to the server and maintain that connection until all processing is performed.
  - The client terminates the connection when the user determines that he/she has finished.
- All communication activity falls into one of these two categories.

谢 谢！