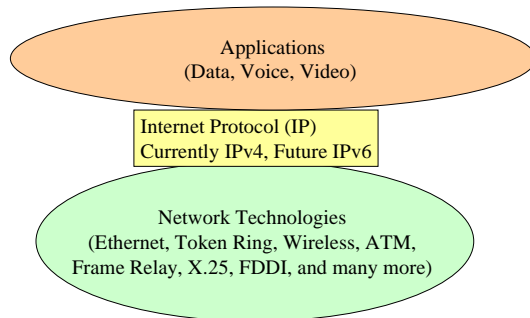


IP-Networks and the Internet

- Internet and IP
- TCP/IP Stack
- IPv6 - the Next Generation IP
- Carrying Voice Over IP
- Next Generation Internet

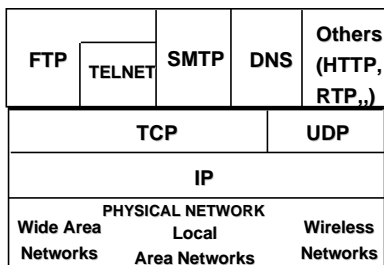
Amjad Umar

Network Convergence to IP

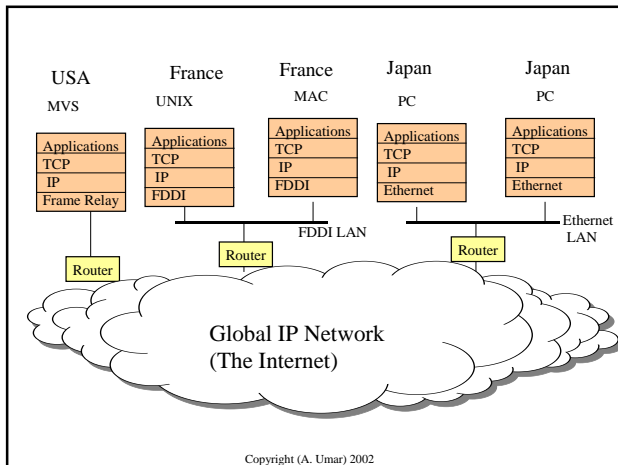


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Service Delivery in Internet

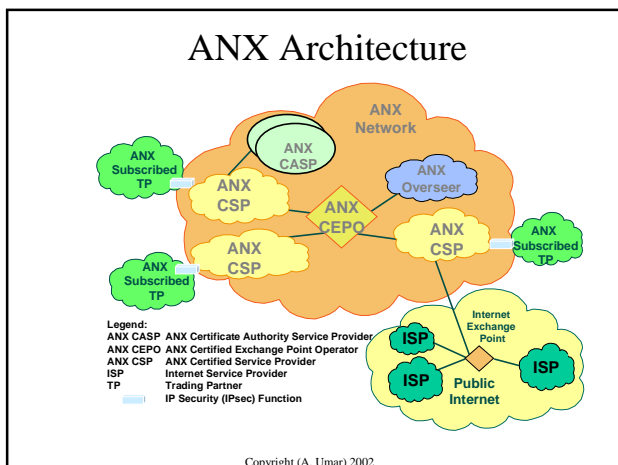


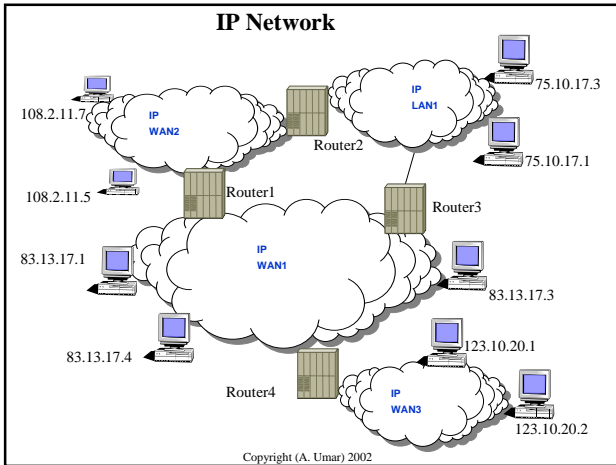
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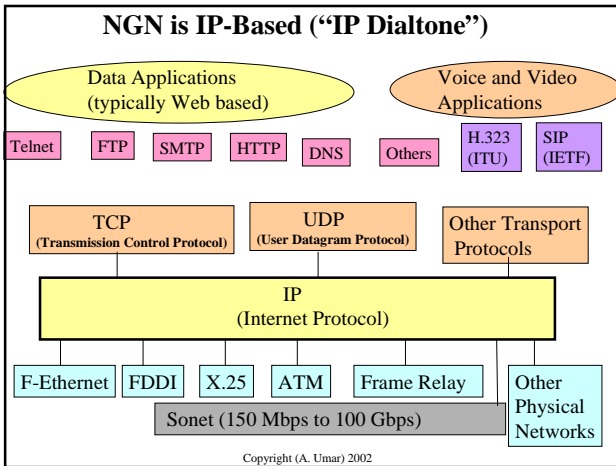


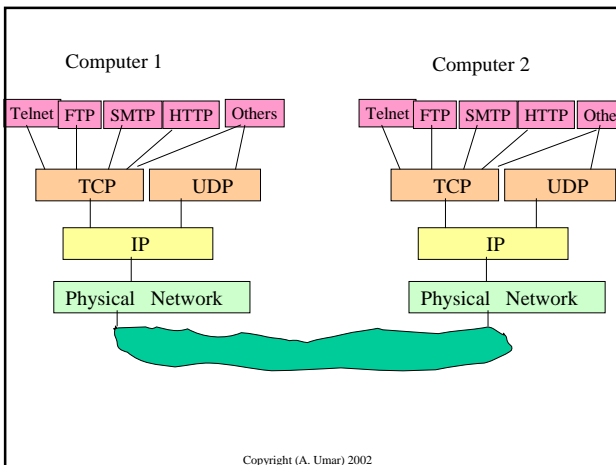
Forms of Internet

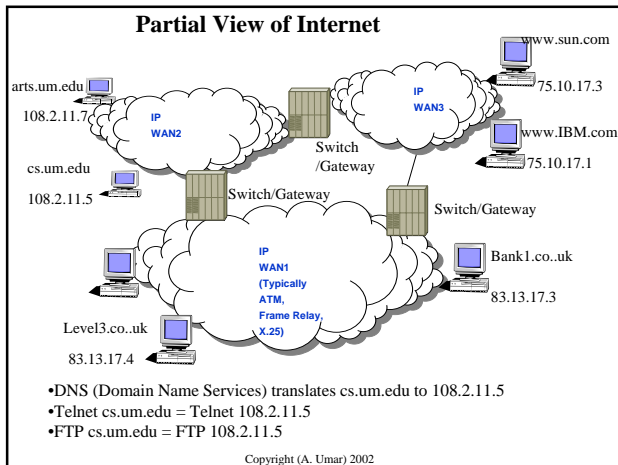
- Public Internet - no central owner
- Intranet - Privately owned by corporations
- Extranet - Collectively owned by corporations/agencies

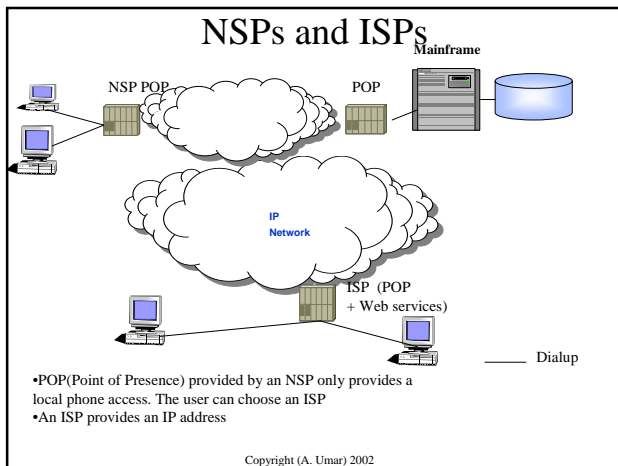


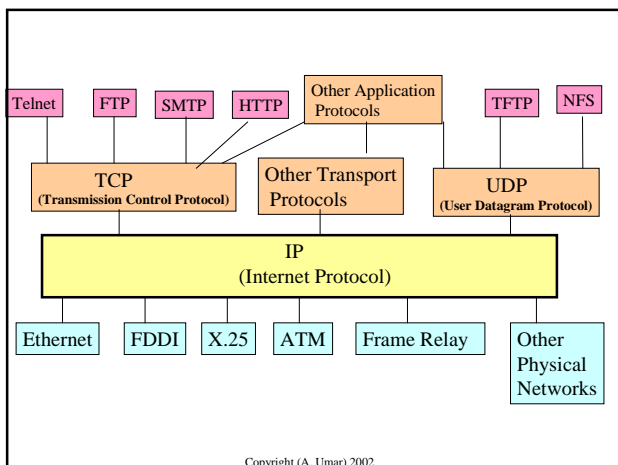




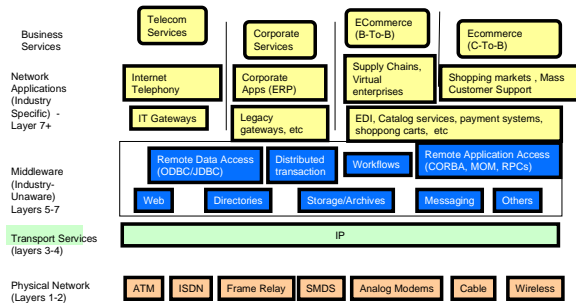








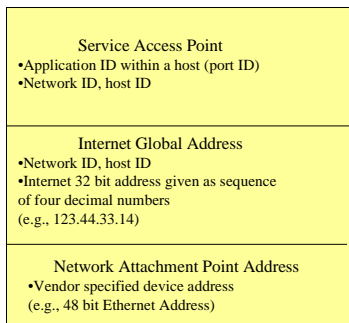
Layered Systems



Note: Layer 7+ indicates industry specific application services

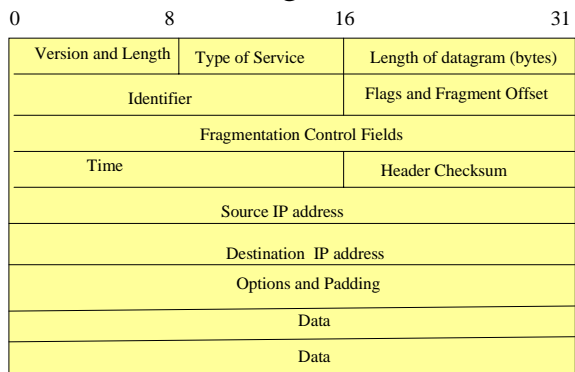
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Address Levels in IP



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IP (v4) Datagram Format



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Example of a Routing Table



a) A Simple IP Network

Destination Network	Route Information
10.0.0.0	Direct
30.0.0.0	Direct
70.0.0.0	Indirect (route to gateway B, address 30.0.0.0)

b) Routing Table for Router A

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IPv4 Address Classes

32 Bits

	0	8	16	31
Class A	0	Network	Host	
Class B	10	Network	Host	
Class C	110	Network	Host	
Class D	1110	Multicast Address		
Class E	11110	Reserved for future use		

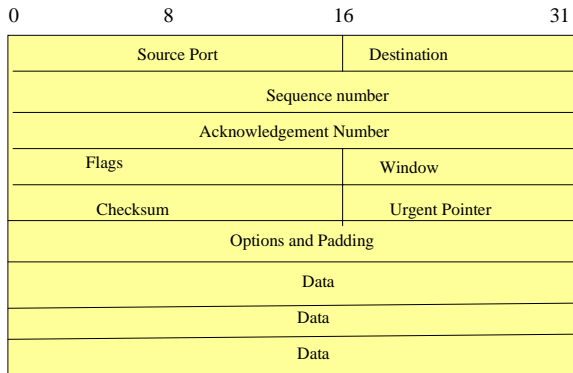
TCP Port Number Examples

Table Example for TCP port number examples. Examples are assigned port numbers

Port No	Keyword	Description
0		Reserved
1-4		Not assigned
5	RJE	Remote job entry
7	Echo	Echo port
11	Users	No. of active users
13	Daytime	Daytime
15	Netstat	Network Status
20	FTP Data	FTP data send/receive
21	FTP	FTP session management
23	Telnet	Terminal login/logout
25	SMTP	Simple Mail Transport Protocol
53	Domain	Domain name server
80	HTTP	HTTP default port for Web

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TCP SegmentFormat



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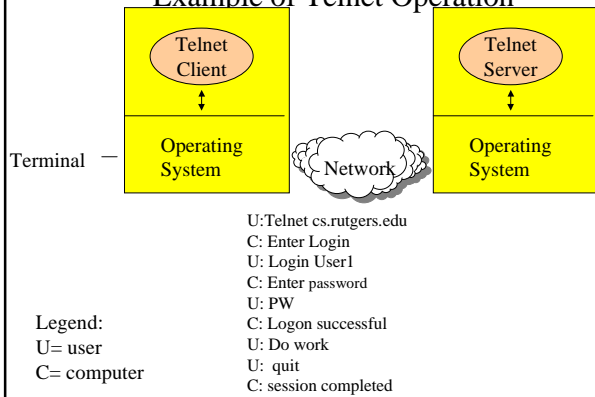
Telnet Session

U:Telnet CS.Berkeley.com
 C: Enter Login
 U: Login User1
 C: Enter password
 U: PW
 C: Logon successful
 U: Do work
 U: quit
 C: session completed

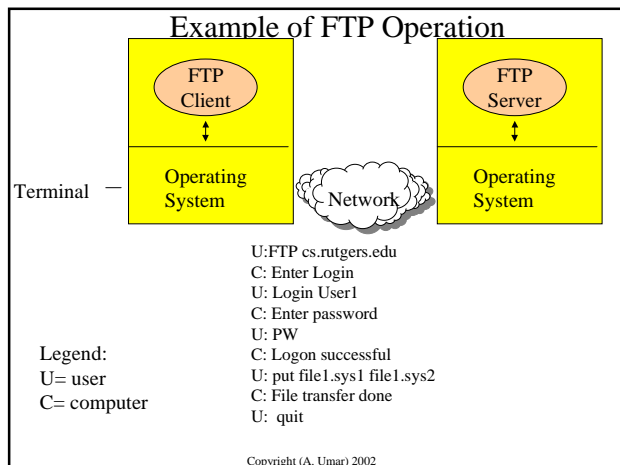
Legend: U= user, C= computer

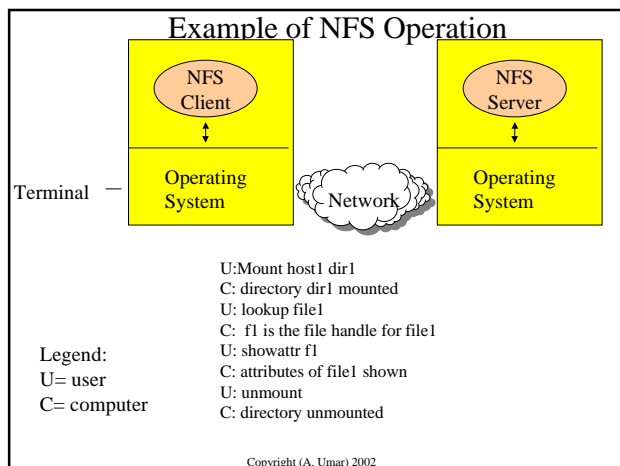
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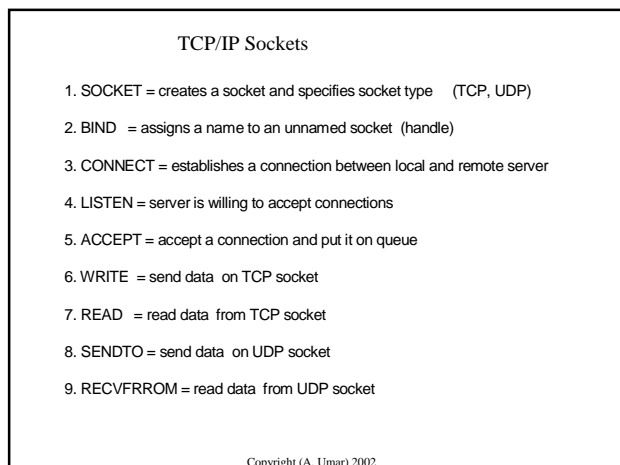
Example of Telnet Operation



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Berkeley Socket Psuedo Code (TCP/IP)

SERVER

```
1. SOCKET
2. BIND
3. LISTEN
4. ACCEPT

8. READ (from Socket)
9. WRITE (to socket)
```

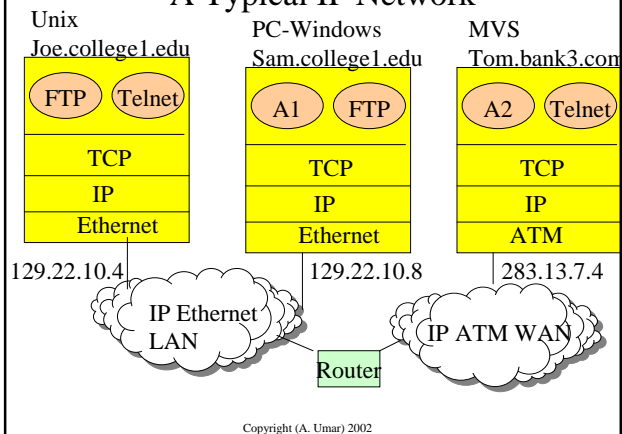
CLIENT

```
5. SOCKET
6. CONNECT
  Read local data
7. WRITE (to Socket)

10. READ (from socket)
11. CLOSE, EXIT.
```

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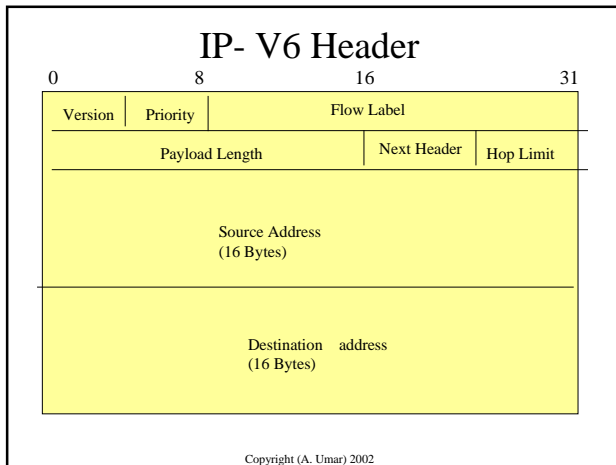
A Typical IP Network



IP v6 (Next Generation IP)

- Aims to preserve IPv4 investment as much as possible.
- IPv6 is a collection of standards that address different aspects of IPv6.
- Why IPv6:
 - ◆ **Scalability:** IPv6 uses 128bit address space as compared to IPv4 (32 bits).
 - ◆ **Autoconfiguration:** IPv6 basic specification includes address autoconfiguration. So, even a novice user can connect hi/her machine to the Internet.
 - ◆ **Security:** IPv6 basic specification includes security in the form of packet encryption and source authentication
 - ◆ **Real-time:** "Flow Label" to tell a router which packet belongs to real-time traffic.
- For current information
 - <http://playground.sun.com/pub/png/html/png-main.html>
 - <http://www.ipv6forum.com>

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Convergence of Telecom Network and Internet

Drivers

- Widespread acceptance of Internet
 - Internet Applications over PSTN Now
 - PSTN Applications over Internet in the Future
- Emerging of VoIP or Internet Telephony
 - Arbitrage
 - Low Operational Cost
 - Advanced Services
- Deregulation of Telecommunications Business
 - To Invest in the Future not the Past
 - To Position for Competition
- Product Support from Vendors

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Voice World		Next Generation Network		Data World
<ul style="list-style-type: none"> Circuit Switching TDM transport High reliability & security Limited programmability Time sensitive billing Slow service set-up Dumb phones Telephony services 		<ul style="list-style-type: none"> Single infrastructure Packet Switching Intelligence throughout (distributed / collaborative) High reliability, security & controlled QoS Innovative business to business applications High value service bundles Instant self-provisioning Broadband WAN/LAN 		<ul style="list-style-type: none"> Packet Switching Intelligence at "edge" Lower reliability & security Innovation in PC and enterprise applications Flat rate or bandwidth pricing Hard to achieve quality Smart PCs

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