



Introduction to Information Technology

CSC109

2020

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The Internet & Internet Services

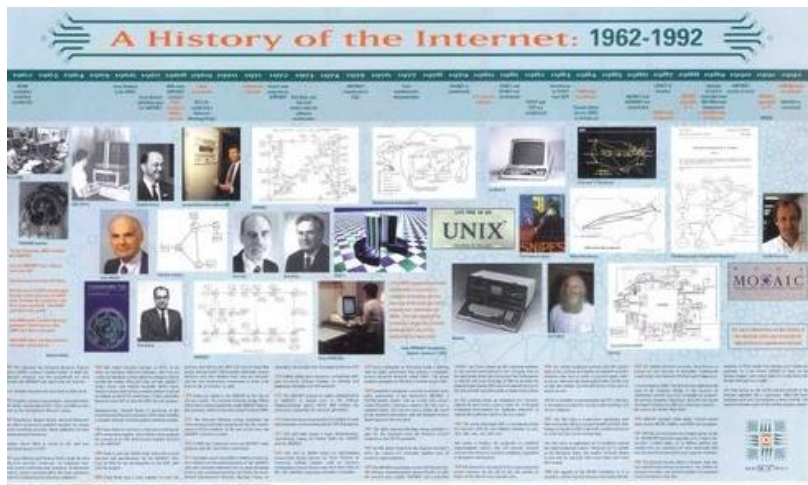
1. Introduction;
2. History of Internet;
3. Internetworking Protocol;
4. The Internet Architecture;
5. Managing the Internet;
6. Connecting to Internet;
7. Internet Connections;
8. Internet Address;
9. Internet Services;
10. Uses of Internet;
11. Introduction to Internet of Things (IoT),
12. Wearable Computing and Cloud Computing,
13. Introduction to E-commerce,
14. E-governance, and
15. Smart City and GIS

Introduction

- The Internet is a global networks that enables **computers of all kinds** to directly and transparently communicate and share services
- Any two computers, having different software/hardware, can exchange information over the Internet, as long as they obey the technical rules of Internet communication.
- The exchange of information occur among connected computers regardless of geographical located.

Internet Timeline/History

- Internet started from a prototype research project.
- Networking of computers origin at the US Department of Defense Advanced Research Projects Agency (DARPA)



- ✓ *In the Beginning, ARPA created the ARPANET.*
- ✓ *And the ARPANET was without form and void.*
- ✓ *And darkness was upon the deep.*
- ✓ *And the spirit of ARPA moved upon the face of the network and ARPA said, 'Let there be a protocol,' and there was a protocol. And ARPA saw that it was good.*
- ✓ *And ARPA said, 'Let there be more protocols,' and it was so. And ARPA saw that it was good.*
- ✓ *And ARPA said, 'Let there be more networks,' and it was so."*

---Danny Cohen

➤ **1969s**

- ARPA (Advanced Research Project Agency) Sponsored by US Department of Defence develop ARPAnet; Internet predecessor.
 - Designed to connect Military research centers
 - Supports Internetworking
-
- Overcoming the faults; TCP/IP was developed (set of rules used by a network for communication)

➤ **1970s**

- US National Science Foundation (NSF) designed a successor to ARPANET, called NSFNET. open for use to all university research groups, libraries and museums.

➤ **1980s**

- many Internet applications like electronic mail, newsgroups, file transfer facility and remote login were developed.
- telnet

➤ **1990s**

- New application World Wide Web (WWW) it changed everything about internet
- British scientist Tim Berners Lee

➤ **1993;** Mosaic browser; Netscape navigator(Market Dominant)

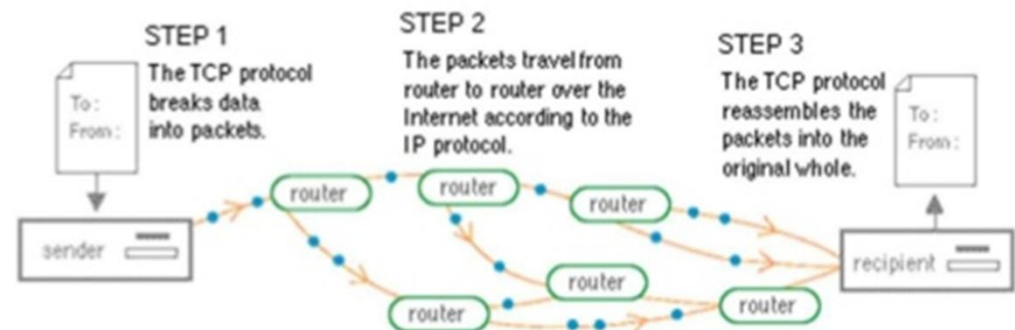
Internetworking Protocol

TCP/IP is the communication protocol for the Internet

It specifies how data is exchanged over the internet by providing end-to-end communications that identify how it should be broken into packets, addressed, transmitted, routed and received at the destination.

TCP/IP requires little central management, and it is designed to make networks reliable, with the ability to recover automatically from the failure of any device on the network.

The TCP/IP protocol has two parts: TCP and IP.



Step 1:

- Each packet contains address, sequencing information, and error control information.
The address is used to route the packet to its destination.
- The error control information is used to check that the packet arrived at the destination is the same as that sent from the source

Step 2:

- Internet Protocol (IP) allows different computers to communicate by creating a network of networks.
- IP handles the dispatch of packets over the network.
- It handles the addressing of packets, and ensures that a packet reaches its destination traveling through multiple networks with multiple standards.

Step 3:

- TCP sequencing information in the packet is used to reassemble the packets in order, at their destination.


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Microsoft Windows [Version 10.0.19041.21]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\rajiv>tracert google.com

Tracing route to google.com [172.217.161.14]
over a maximum of 30 hops:

  1  <1 ms    <1 ms    <1 ms    192.168.1.1
  2  42 ms     41 ms     42 ms     1-adsl.ntc.net.np [49.244.128.1]
  3  43 ms     42 ms     41 ms     10.26.200.34
  4  41 ms     41 ms     42 ms     202.70.72.180
  5  43 ms     41 ms     44 ms     202.70.93.97
  6  70 ms     47 ms     46 ms     202.70.93.190
  7  46 ms     44 ms     46 ms     202.70.93.158
  8  84 ms     83 ms     83 ms     ix-xe-5-1-3-0.tcore1.mlv-mumbai.as6453.net [180.87.38.174]
  9  85 ms     83 ms     83 ms     74.125.48.190
 10  91 ms     92 ms    247 ms     108.170.248.203
 11  91 ms     90 ms     89 ms     216.239.48.65
 12  89 ms     91 ms     90 ms     209.85.242.105
 13  91 ms     91 ms     90 ms     108.170.251.113
 14  91 ms     97 ms     89 ms     64.233.175.101
 15  90 ms     89 ms     89 ms     del03s10-in-f14.1e100.net [172.217.161.14]

Trace complete.

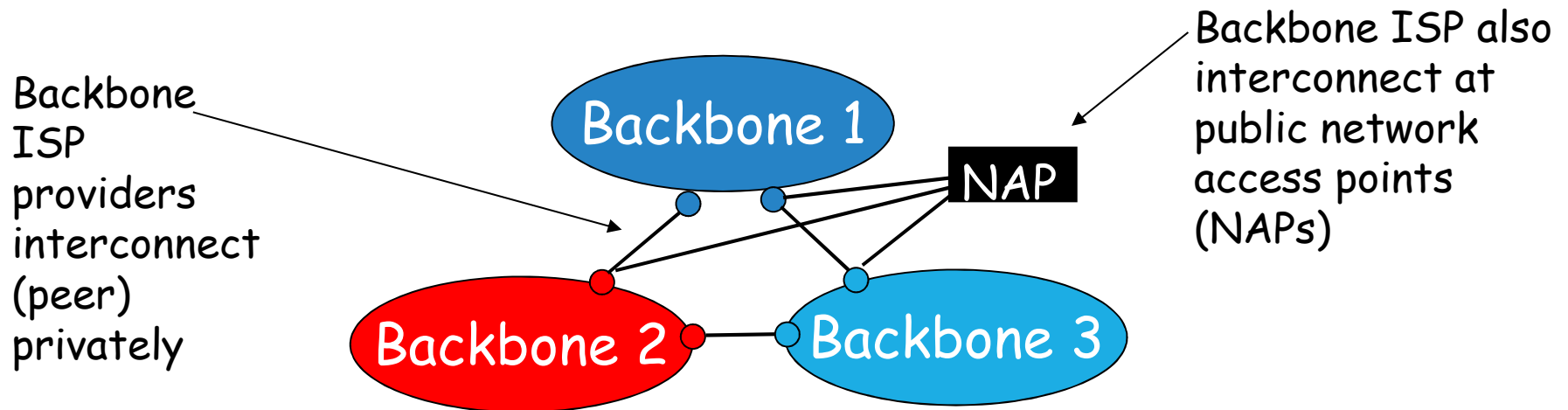
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The Internet Architecture/ Internet hierarchical

Architecture of Internet is hierarchical in nature

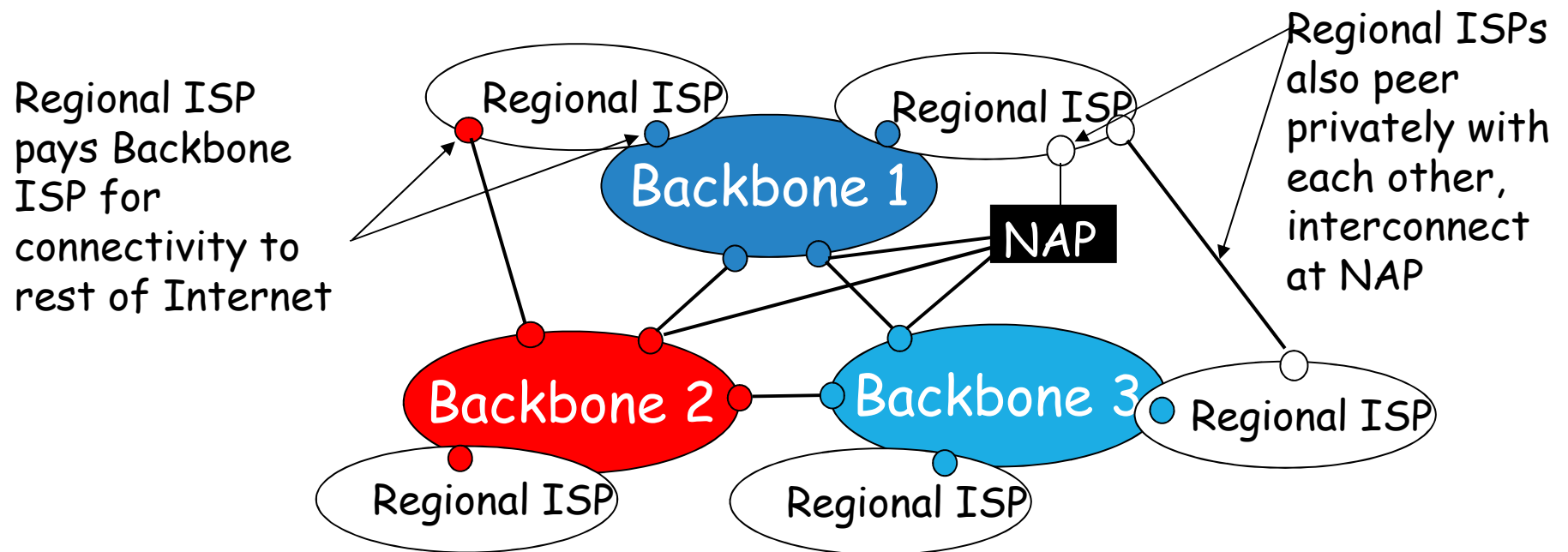
at center: “Backbone” ISPs (e.g., MCI, Sprint, AT&T, Cable and Wireless),
national/international coverage

- treat each other as equals



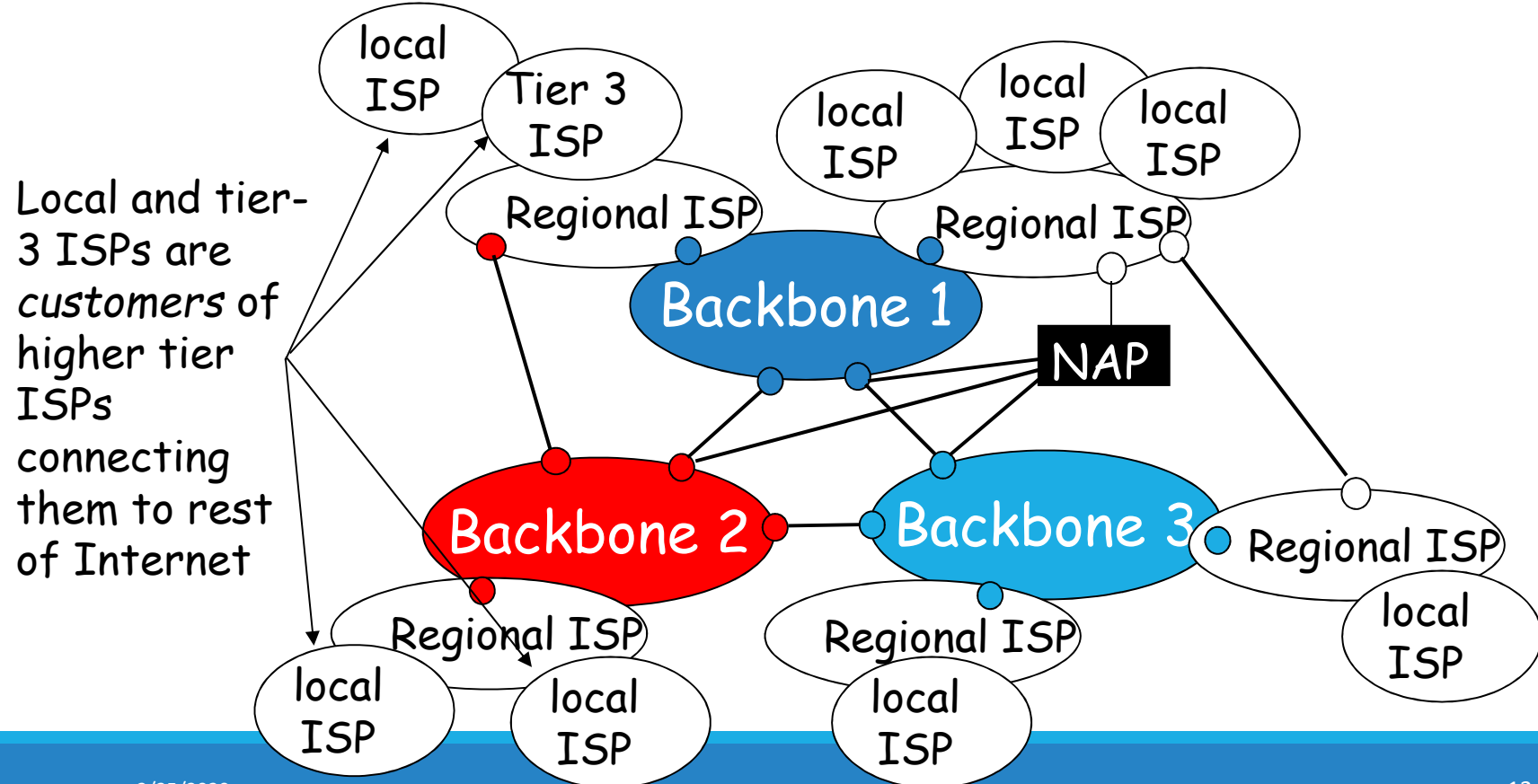
“Regional” ISPs: smaller ISPs

- Connect to one or more Backbone ISPs, possibly other Regional ISPs



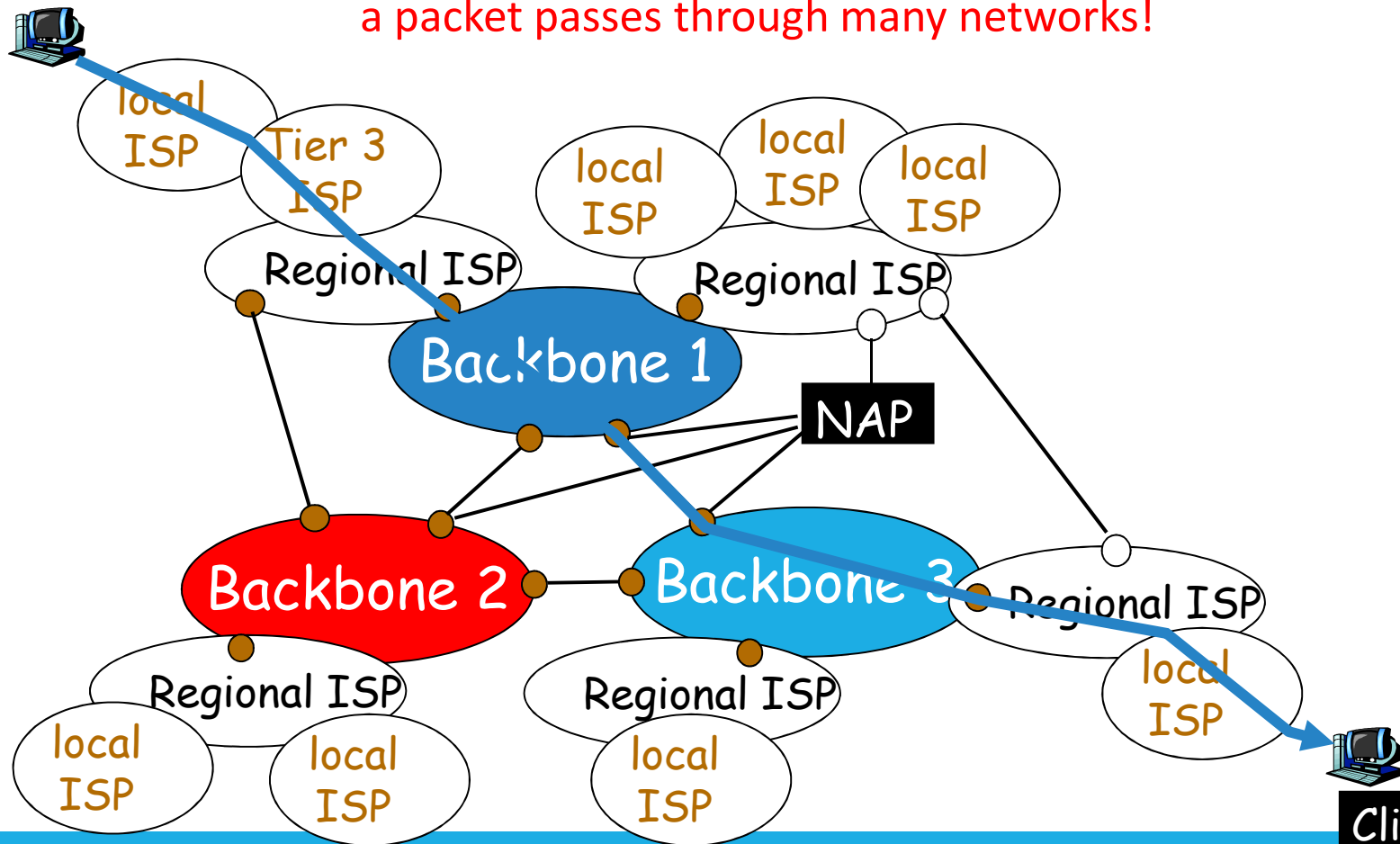
“Tier-3” ISPs and local ISPs

- last hop (“access”) network (closest to end systems)



Client

a packet passes through many networks!



Client

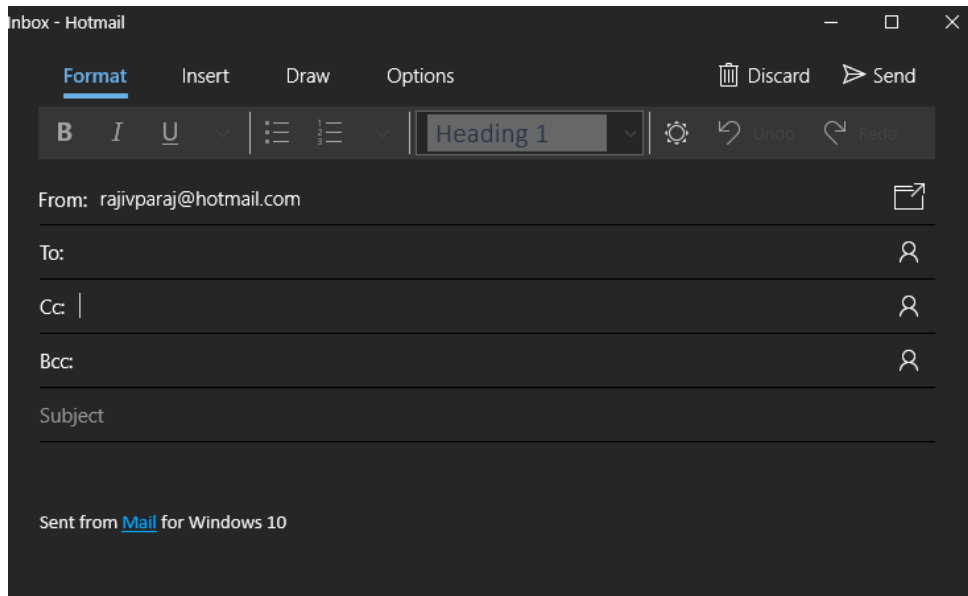
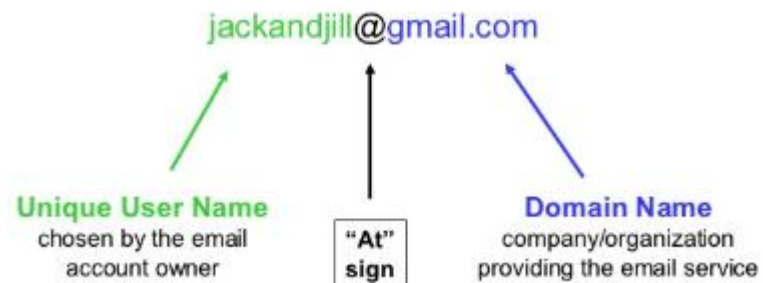
Internet Services

❖ Electronic Mail

- ✓ Electronic mail (E-mail) is an electronic message transmitted over a network.
- ✓ E-mail is a text-based mail consisting of lines of text, and can include attachments (audio messages, pictures and documents).
- ✓ **Features:**
 - ☐ Single/Multiple Reception
 - ☐ Convenience
 - ☐ Faster
 - ☐ Record/Reference
 - ☐ Attachments of files and documents
 - ☐ Unique email-id enables feature of postal service.(send, reply, forward, store, delete etc)
 - ☐ Saves Money & Time

✓ E-mail Address

☐ Consist Three part



✓ E-mail Message Format

☐ consists of two parts-header and body.

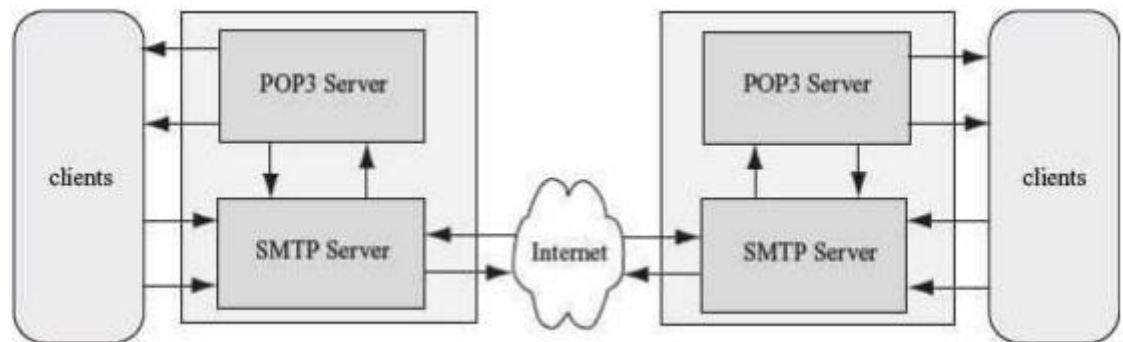
✓ E-mail Services

- ❑ Application-based e-mail
- ❑ Web-based e-mail

✓ How E-mail Works

- ❑ client-server model.
- ❑ E-mail clients
- ❑ E-mail server
- ❑ (POP3), (SMTP) & (IMAP).

Post Office Protocol 3, Simple Mail Transfer Protocol & Internet Message Access Protocol



SMTP

(Simple Mail Transfer Protocol)

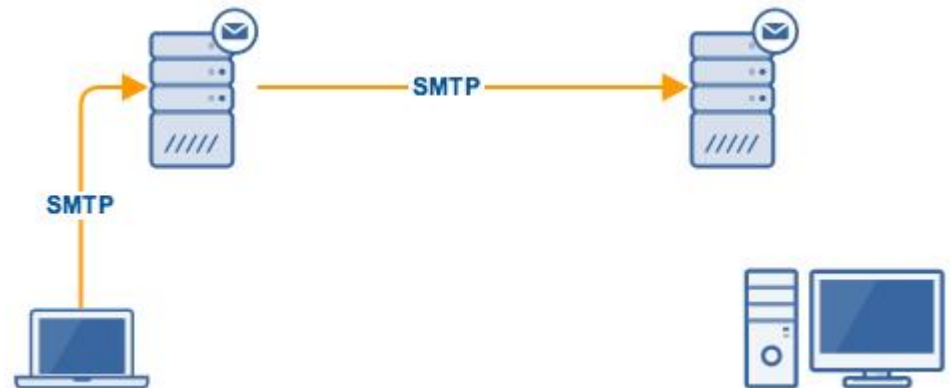
SMTP function is different from the other two.

SMTP mostly used for **sending out** email from an email client (e.g. Microsoft Outlook, Thunderbird or Apple Mail) to an email server.

It's also used for **relaying** or **forwarding** mail messages from one mail server to another.

The ability to relay messages from one server to another is necessary if the sender and recipient have different email service providers.

uses TCP/IP port 25 by default.



POP3

(Post Office Protocol 3)

POP is used to retrieve email messages from a mail server to a mail client

POP3 client retrieves email in the following manner:

1. Connects to the mail server on port 110 (or 995 for SSL/TLS connections);
2. Retrieves email messages;
3. Deletes copies of the messages stored on the server; and
4. Disconnects from the server



IMAP

(Internet Message Access Protocol)

web-based e-mail to access mail on server.

IMAP4 more sophisticated protocol (LATEST)

Retrieves email in the following manner:

1. Connects to the mail server on port 143 (or 993 for SSL/TLS connections);
2. Retrieves email messages;
3. Stays connected until the mail client app is closed and downloads messages on demand.
4. Notice that messages aren't deleted on the server.