Internet Technologies

Internet

Mahesh Kumar
[maheshkumar@andc.du.ac.in]

Course Web Page
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Outline
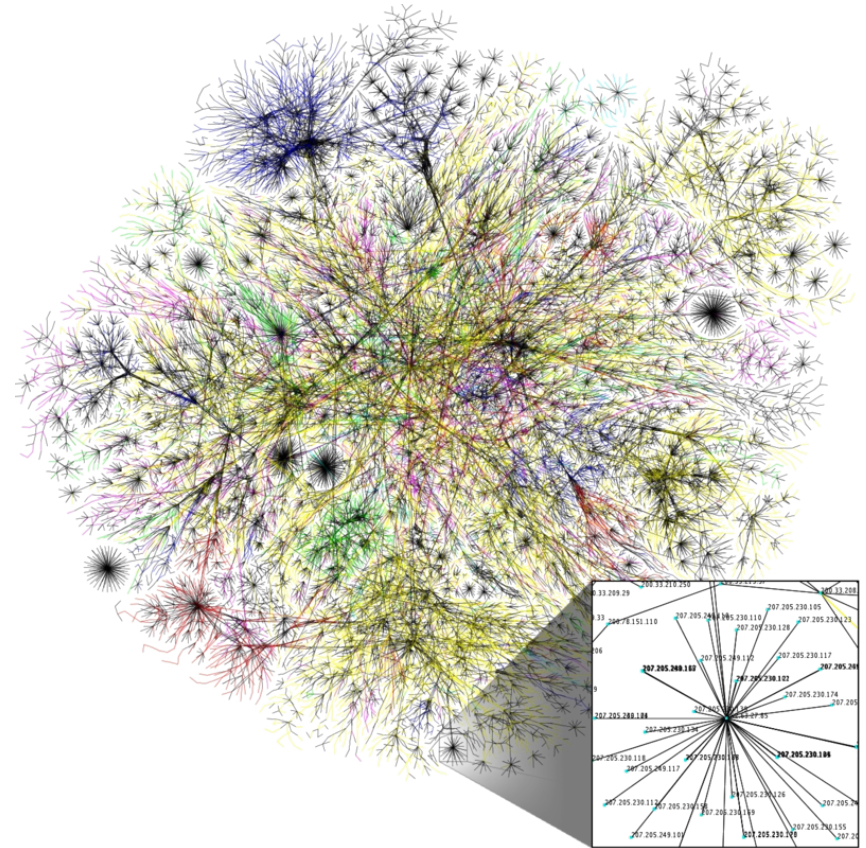
Visualization of Internet routing paths [1]

What is Internet?

- The network formed by the <u>co-operative interconnection</u> of a large number of computer networks:

  - *Network of networks*

  - *No* one owns the internet
    - → *Every person who makes a connection owns a slice of the internet*

  - *There is no central administration to the internet.*

- The way internet has evolved, it has incorporated different technologies, techniques, and application under a single umbrella making it most popularly used infrastructure in terms of <u>information exchange and communication</u>.

What is Internet?

- <u>History of Computer networks</u>, initially started in the late 1960s.

    - *Cluster of some computers in different laboratories and organization*

    - *Main purpose was to connect several computers together, so as to achieve a number of goals like:*

        → *exchanging messages (communication)*
        → *sharing some information (sharing)*

    - *Networks of that time shared some <u>characteristics</u>:*

        → *They were all proprietary in nature (same type/vendor). For example network of only IBM computers or HP computers*
        → *They were totally unknown entity to each other*

What is Internet?

→ *With the passage of time these kind of small networks have emerged in the different laboratories and organization like small islands.*

- *As the requirement or the need of the people grew with time, they felt the necessity to connect these networks together, so that:*

  → *A user of network X can communicate with the user of network Y*

  → *There should be some way of communication*

  → *In order to do that one big problem needed to be solved, that problem was the problem of compatibility.*

  → *There has to be be a common binding force or a common standard that would allow all the computers across these networks to communicate among themselves.*

What is it (Internet) actually?

- A community of people
  - *who use and develop the networks*

- A collection of resources
  - *that can be reached from those networks*

- A setup to facilitate collaboration
  - *among the member of research and education communities, world-wide.*

- The connected networks use the TCP/IP protocol

  - *the common standard*
  - *all the message exchanges that goes on the internet they use the syntax and format of the TCP/IP message protocol*

Important Internet Applications

1. Telnet

2. File Transfer Protocol (FTP)

3. Electronic Mail (Email)

4. Gopher

5. Internet Relay Chat

6. Usenet News

7. World Wide Web (**Web**)

How does the Internet work?

- **<u>A simple network</u>**

  - *When two computers need to communicate, you have to link them, either*
    - → *physically (usually with an Ethernet cable) or*
    - → *wirelessly (with Wi-Fi or Blutooth systems)*

  - *All modern computers can sustain any of those connections.*
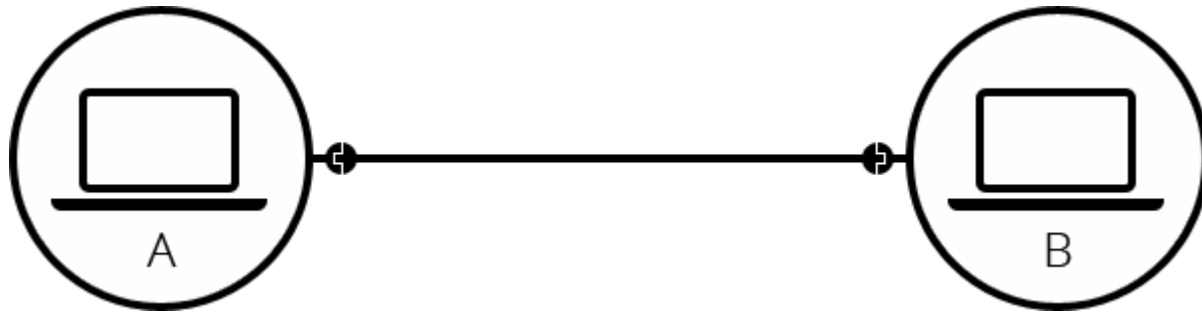
Figure 1: A simple network [2]

How does the Internet work?

- *Such a network is not limited to two computers*
  - → *can connect as many computers as you wish.*
  - → *it gets complicated quickly*

- *For a network of 10 computers :*
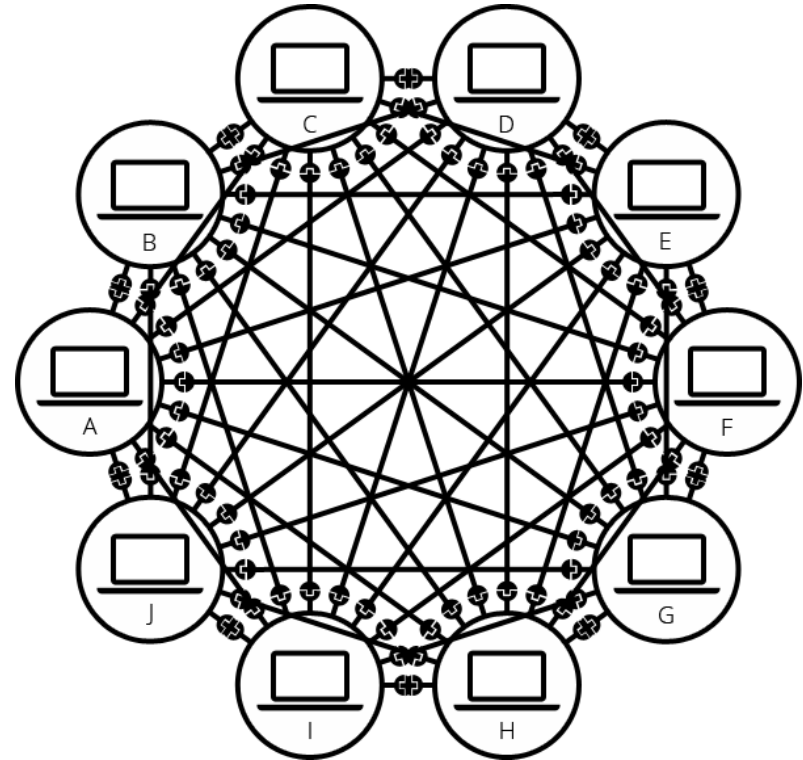 - → *You need 45 cables, with nine plugs per computer*
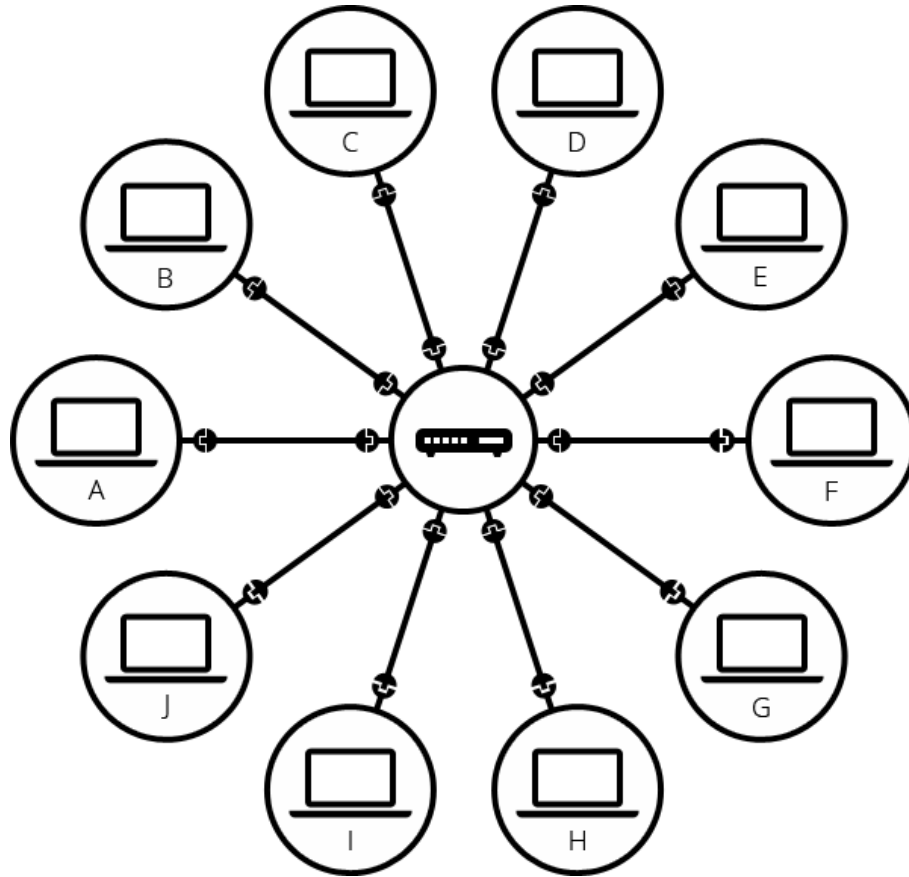

Figure 2: A network of 10 computers [2]

How does the Internet work?

- *To solve this problem, each computer on a network is connected to a special tiny computer called a* router*.*

- *This router has only one job:*
  → *it makes sure that a message sent from a given computer arrives at the right destination computer.*

  → *To send a message to computer B, computer A must send the message to the router, which in turn forwards the message to computer B and makes sure the message is not delivered to computer C.*

  → *It works like a <u>signaler at a railway station</u>*

How does the Internet work?

Figure 3: A network of 10 computers with a router [2]

- *When a router is added to the system*
  - → *our network of 10 computers only requires 10 cables: a single plug for each computer and a router with 10 plugs.*

How does the Internet work?

- **<u>A network of networks</u>**

  - *What about connecting hundreds, thousands, billions of computers?*
    - → *a single router can't scale that far*

  - *But we know that a router is a computer like any other, so can we connect two routers together?*

  - *By connecting <u>computers to routers, then routers to routers</u>, we are able to scale infinitely.*
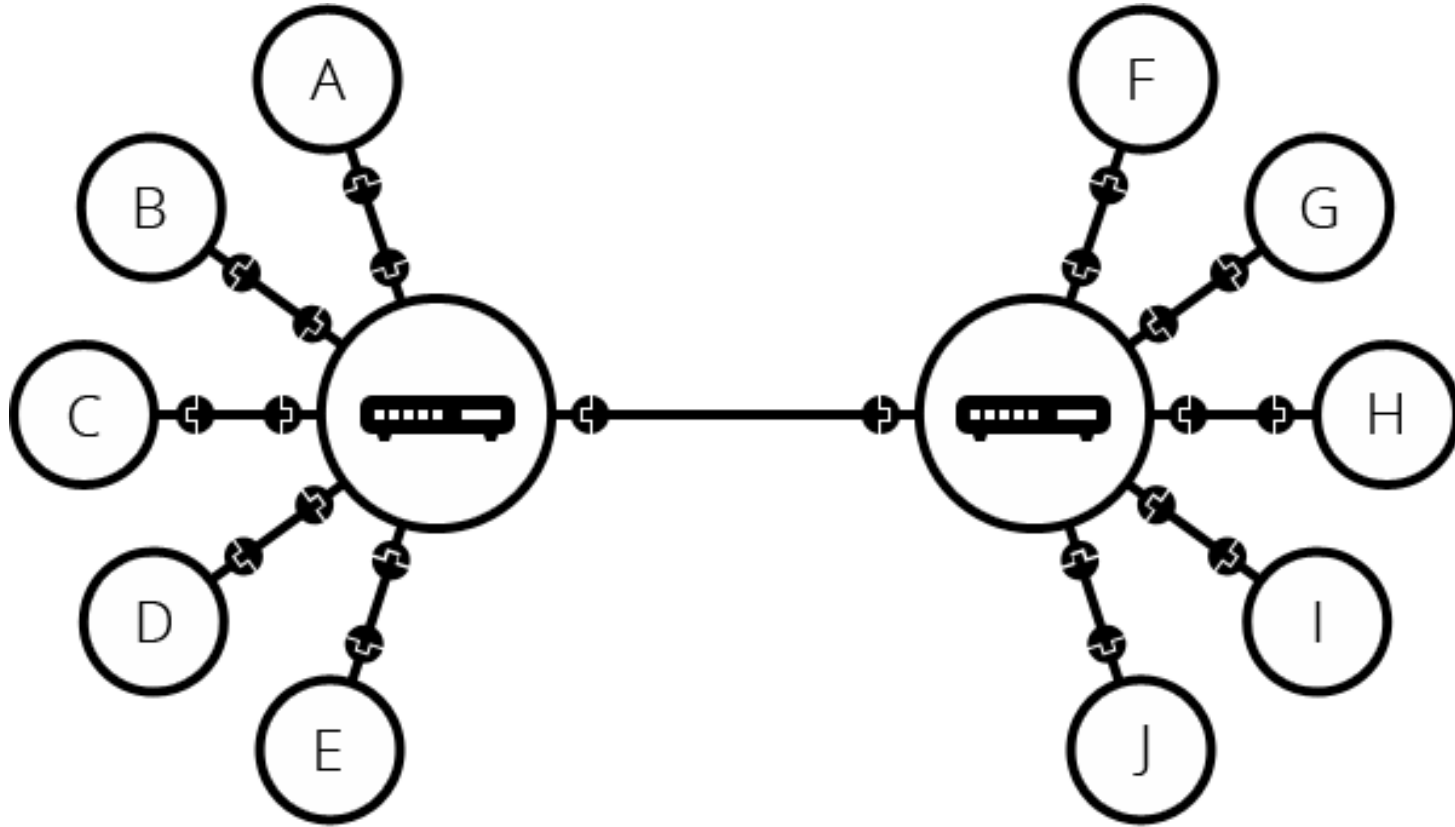
How does the Internet work?

Figure 4: connecting two routers together [2]
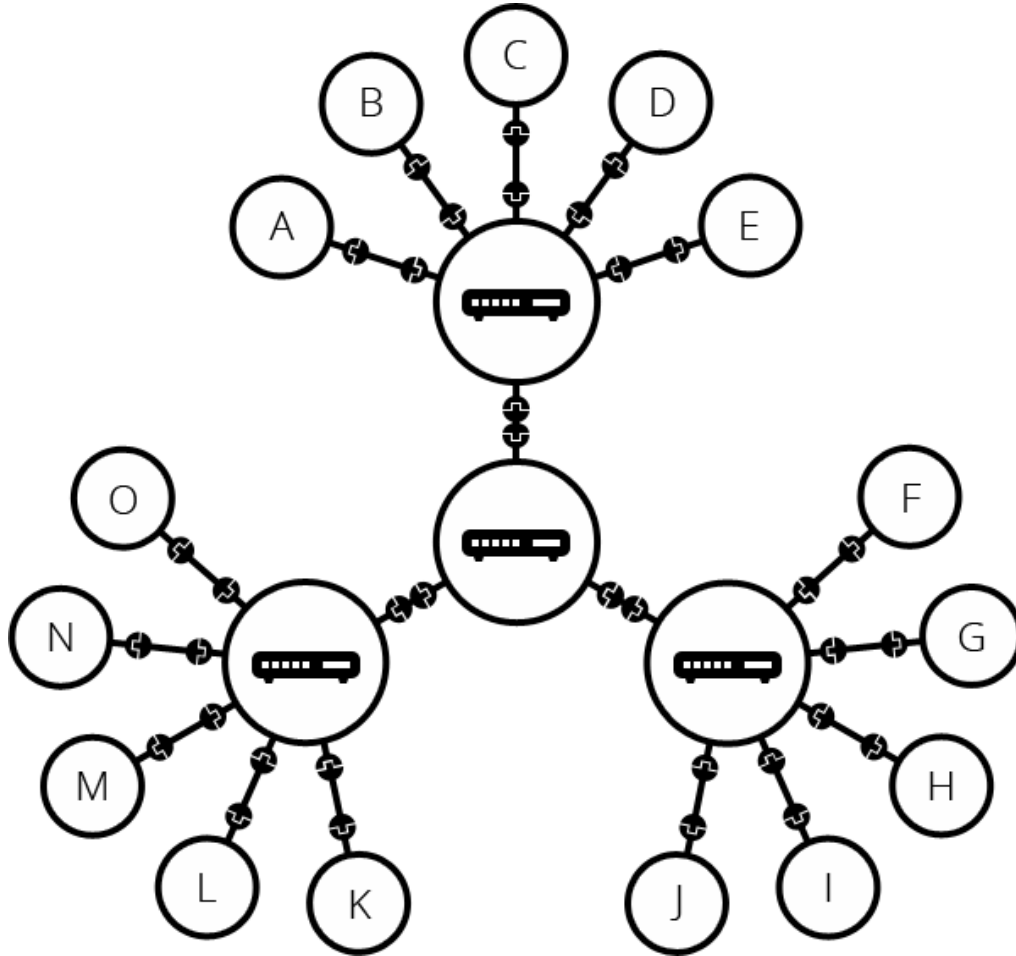
How does the Internet work?

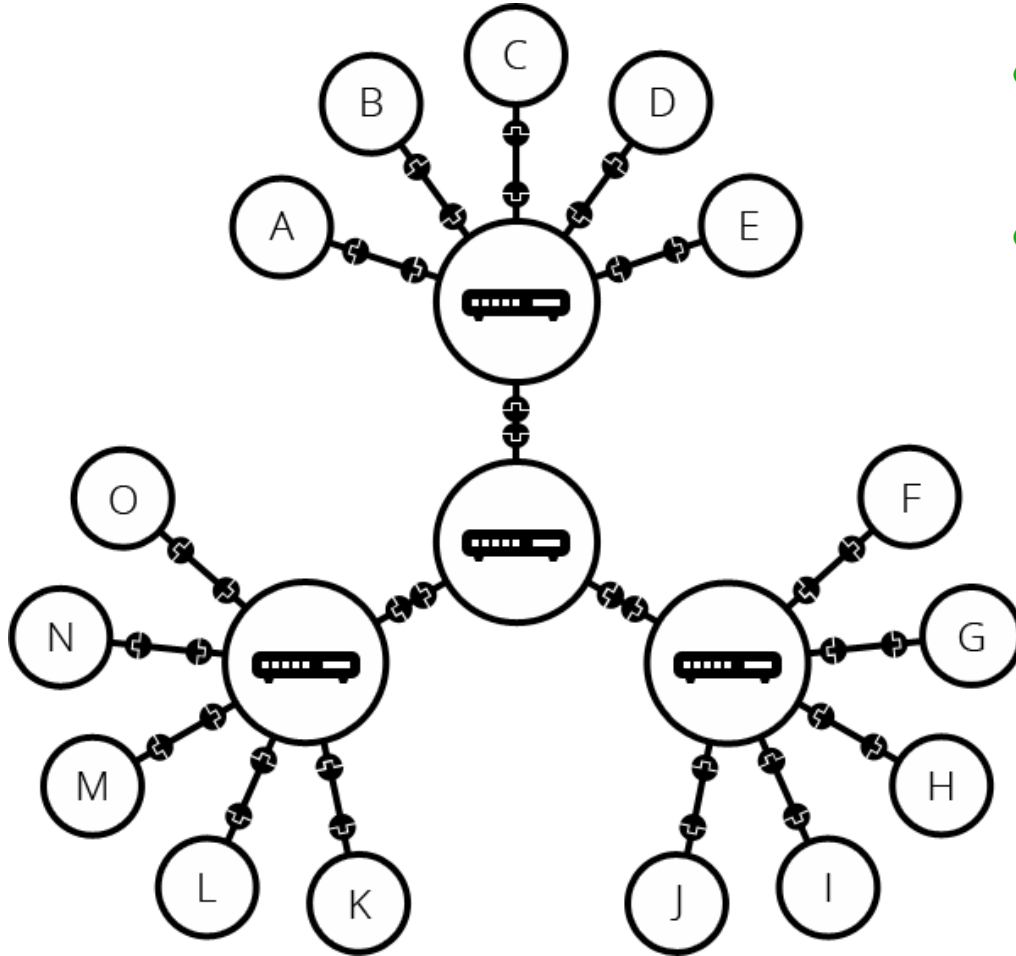Figure 5: connecting routers to routers [2]

How does the Internet work?

Figure 5: connecting routers to routers [2]

- *Such a network comes very close to what we call the Internet.*

- *There are other networks out there: your friends, your neighbors, anyone can have their own network of computers.*

  → *How to connect with them?*

  → *But it's not really possible to set cables up between your house and the rest of the world.*

  → *The telephone infrastructure already connects your house with anyone in the world*
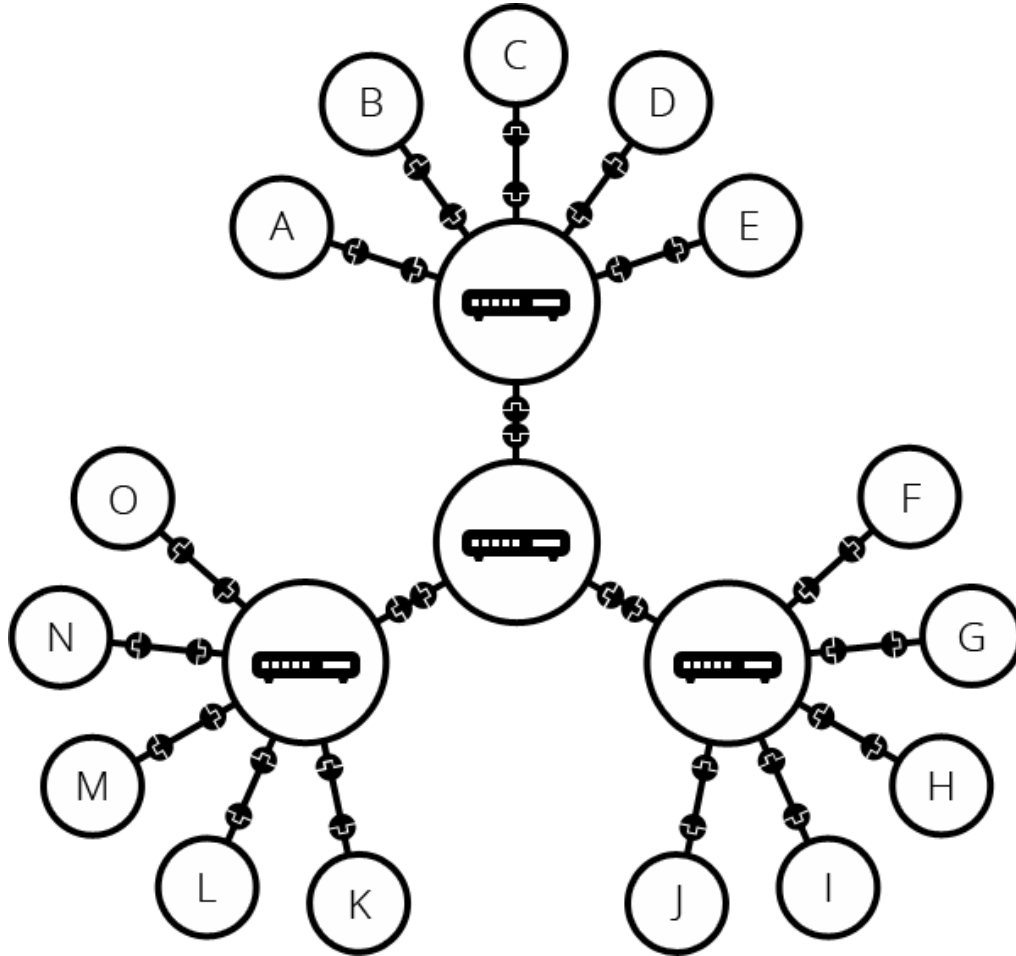
How does the Internet work?

Figure 5: connecting routers to routers [2]

→ *To connect our network to the telephone infrastructure, we need a special piece of equipment called a* *modem.*

→ *This modem turns the information from our network into information manageable by the telephone infrastructure and vice versa.*
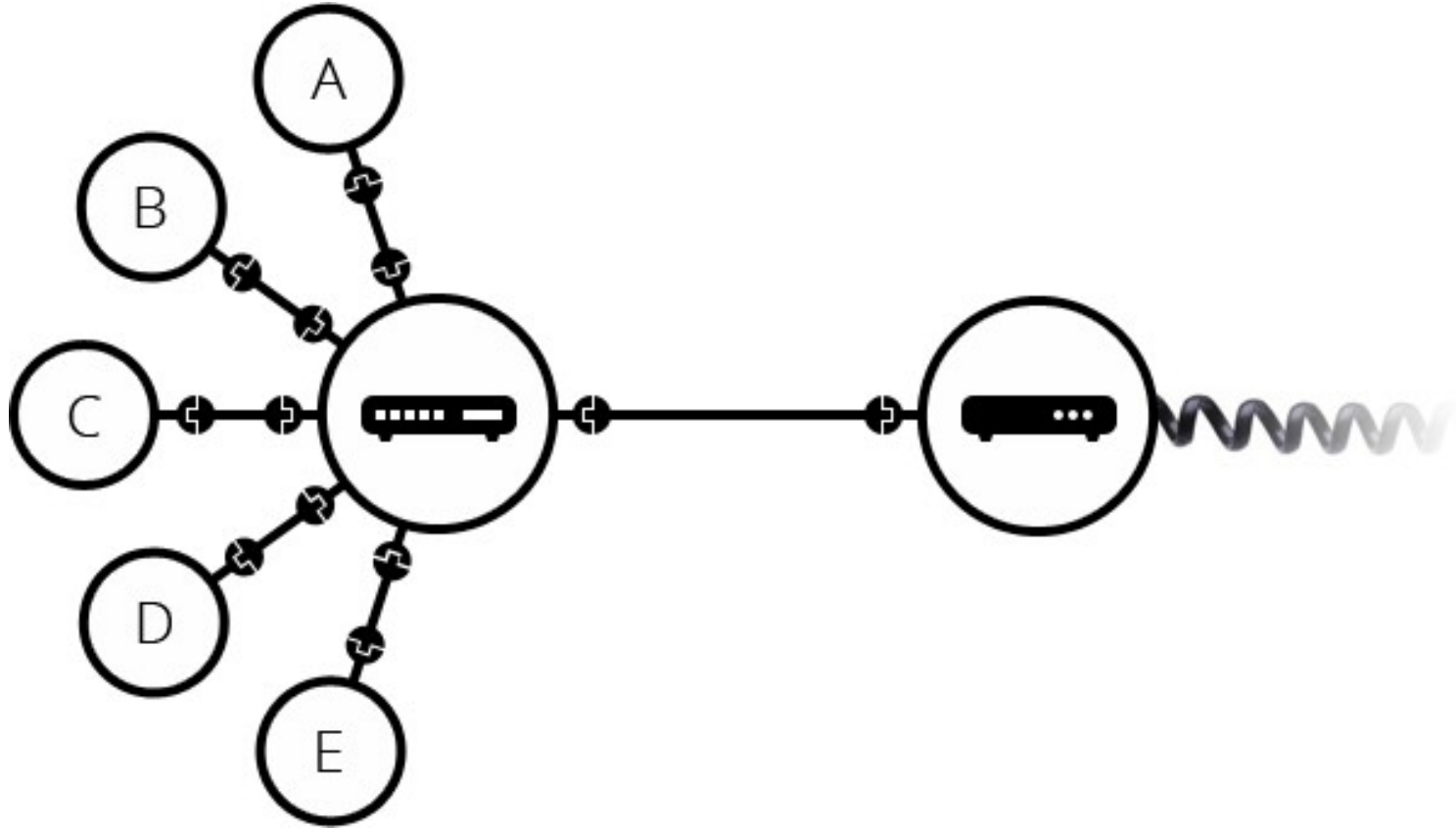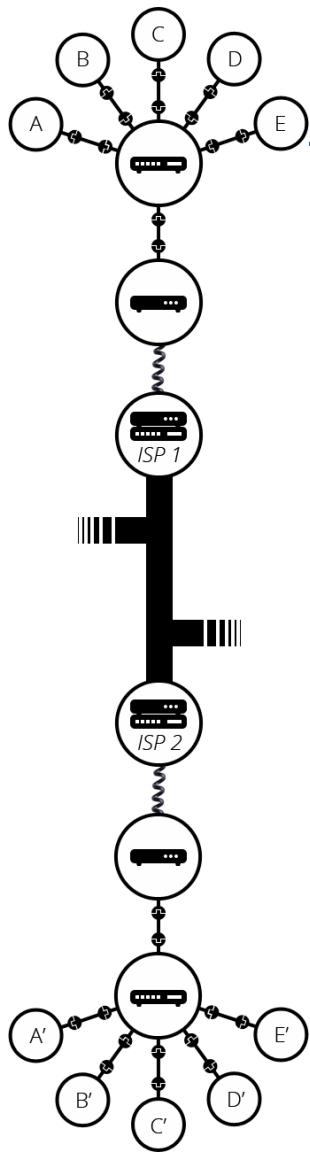
How does the Internet work?

Figure 6: connecting to telephone infrastrucure using a Modem [2]

How does the Internet work?

- *Once we are connected to the telephone infrastructure, The next step is to send the messages from our network to the network we want to reach.*

- *To do that, we will connect our network to an Internet Service Provider (ISP).*

- *An ISP is a company that manages some special routers that are all linked together and can also access other ISPs' routers.*

- *So the message from our network is carried through the network of ISP networks to the destination network*

- *The Internet consists of this whole infrastructure of networks.*

How does the Internet work?

Figure 7: connecting our network to an Internet Service Provider **[2]**

- *Find out how many ISPs are there in Delhi?*

- *Find out how many ISPs are there in India?*

- *Find out how many ISPs are there in the world?*

How does the Internet work?

- ***Finding computers***

  - *If you want to send a message to a computer, you have to specify which one.*

    → *Any computer linked to a network has a unique address that identifies it, called an "IP address"*

    → *It's a 32-bit address made of a series of four numbers separated by dots, for example: 192.168.2.10.*

    → *To make things easier, we can alias an IP address with a human readable name called a domain name.*

[2]
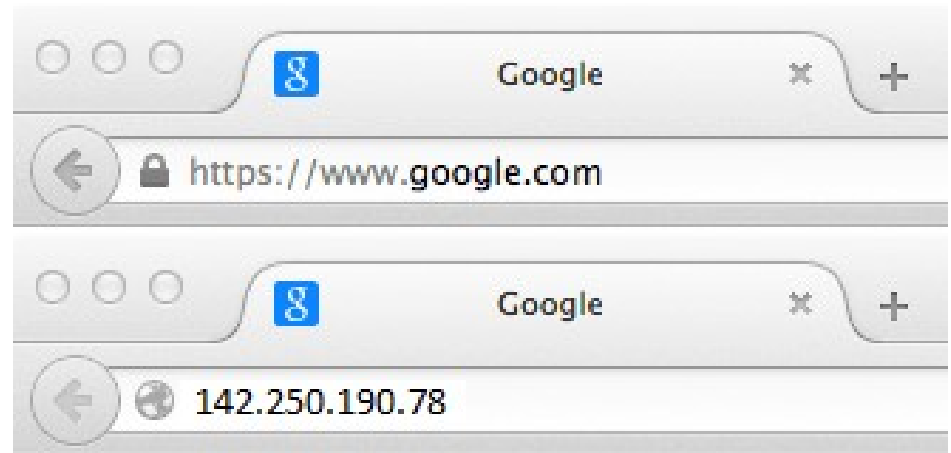
How does the Internet work?

- ***Internet and the web***

  - *When we browse the Web with a Web browser, we usually use the domain name to reach a website*

    → *Does it mean Internet and the Web are the same thing?*

  - *Internet is a* technical infrastructure *which allows billions of computers to be connected all together*

  - *Among those computers, some computers (called Web servers) can send messages easy to understand to web browsers.*

  - <u>*The Internet is an infrastructure, whereas the Web is a service built on top of the infrastructure*</u>*.*

Intranets and Extranet

- **Intranets** are private networks that are restricted to members of a particular organization.

- They are commonly used to provide a portal for members to <u>securely access shared resources, collaborate and communicate</u>.

- For example, an organization's intranet might host web pages for:
  - *sharing department or team information*
  - *shared drives for managing key documents and files*
  - *portals for performing business administration tasks*
  - *collaboration tools like wikis, discussion boards, and messaging system*

Intranets and Extranet

- Extranets are very similar to Intranets, except they open all or part of a private network to allow sharing and collaboration with other organizations

- They are typically used to safely and securely share information with clients and stakeholders who work closely with a business.

- Often their functions are similar to those provided by an intranet: information and file sharing, collaboration tools, discussion boards, etc.

Intranets and Extranet

- *Both intranets and extranets run on the same kind of infrastructure as the Internet, and use the same protocols. They can therefore be accessed by authorized members from different physical locations.*
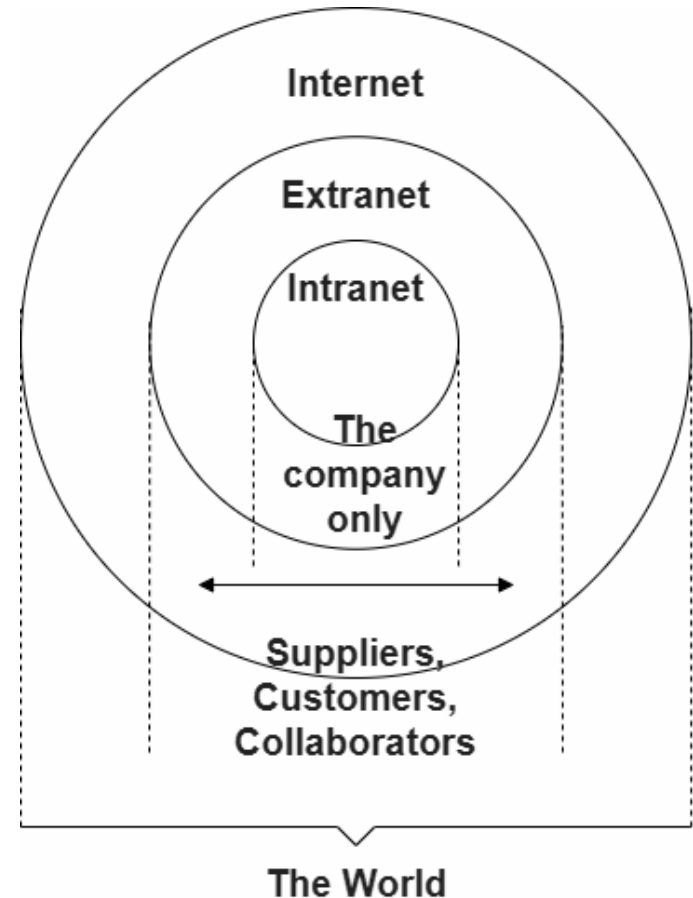

Figure 8: Intranet, Extranet and Internet [2]

References

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