The Internet, Protocols & Standards

THE INTERNET

The Internet has revolutionized many aspects of our daily lives. It has affected the way we do business as well as the way we spend our leisure time. The Internet is a communication system that has brought a wealth of information to our fingertips and organized it for our use.

Topics discussed in this section:

A Brief History The Internet Today (ISPs)

Hierarchical organization of the Internet



a. Structure of a national ISP



b. Interconnection of national ISPs

In this section, we define two widely used terms: protocols and standards. First, we define protocol, which is synonymous with rule. Then we discuss standards, which are agreed-upon rules.

Topics discussed in this section:

Protocols Standards Standards Organizations Internet Standards

Protocols

Cooperative action is necessary

- computer networking is not only to exchange bytes
- huge system with several utilities and functions. For examples
 - error detection
 - Encryption
 - Routing
 - etc.
- For proper communication, entities in different systems must speak the same language
 - there must be mutually acceptable conventions and rules about the content, timing and underlying mechanisms
- Those conventions and associated rules are referred as "PROTOCOLS"



1. Organizations For Communication Standards

Standards are developed by cooperation among standards creation committees, forums, and government regulatory agencies.

Standards Creation Committees

- a) International Standards Organization (ISO)
- b) International Telecommunications Union (ITU)
- American National Standards Institute (ANSI)
- d) Institute of Electrical and Electronics Engineers (IEEE)
- Electronic Industries Association (EIA)
 Internet Engineering Task Force (IETF)

a) International Standards Organization (ISO)

- A multinational body whose membership is drawn mainly from the standards creation committees of various governments throughout the world
- Dedicated to worldwide agreement on international standards in a variety field.
- Currently includes 82 memberships industrialized nations.
- Aims to facilitate the international exchange of goods and services by providing models for compatibility, improved quality, increased quality, increased productivity and decreased prices.

b) International Telecommunications Union (ITU)

- Telecommunication Standards Sector (ITU– T)
- An international standards organization related to the United Nations that develops standards for telecommunications.
- Two popular standards developed by ITU-T are:
 - i) V series transmission over phone lines ii) X series – transmission over public digital networks, email and directory services and ISDN.

c) American National Standards Institute (ANSI)

- A non-profit corporation not affiliated with US government.
- ANSI members include professional societies, industry associations, governmental and regulatory bodies, and consumer groups.
- Discussing the internetwork planning and engineering, ISDN services, signaling, and architecture and optical hierarchy.

d) Institute of Electrical and Electronics Engineers (IEEE)

- The largest national professional group involved in developing standards for computing, communication, electrical engineering, and electronics.
- Aims to advance theory, creativity and product quality in the fields of electrical engineering, electronics and radio.
- It sponsored an important standard for local area networks called Project 802 (eg. 802.3, 802.4 and 802.5 standards.)

e) Electronic Industries Association (EIA)

- An association of electronics manufacturers in the US.
- Provide activities include public awareness education and lobbying efforts in addition to standards development.
- Responsible for developing the EIA-232-D and EIA-530 standards.

f) Internet Engineering Task Force (IETF)

- Concerned with speeding the growth and evolution of Internet communications.
- The standards body for the Internet itself
- Reviews internet software and hardware.

2. Communication Protocols

Definition

- Protocol is a set of rules that govern all aspect of data communication between computers on a network.
- These rules include guidelines that regulate the following characteristics of a network: access method, allowed physical topologies, types of cabling, and speed of data transfer.
- A protocol defines what, how, when it communicated.
- The key elements of a protocol are syntax, semantics and timing.
- Protocols are to computers what language is to humans.
 Since this article is in English, to understand it you must be able to read English. Similarly, for two devices on a network to successfully communicate, they must both understand the same protocols.

Elements of protocol

i) Syntax

The structure or format of the data. Eg. A simple protocol;



ii) Semantics

- Refers to the meaning of each section of bits.
- how is a particular pattern to be interpreted, and what action is to be taken based on that interpretation.
- Eg. Does an address identify the route to be taken or the final of the message?

iii) Timing

Refers to two characteristics:

- a. When data to be sent
- b. How fast it can be sent
- Eg. If a sender produces data at 100 Mbps but the receiver can process data at only 1 Mbps, the transmission will overload the receiver and data will be largely lost.

Characteristics of protocol

- a) Direct / indirect
- communication between two entities maybe direct or indirect.
 - i) point-to-point link
 - connection provides a dedicated link between two devices
 - the entities in these systems may communicate directly that is data and control information pass directly between entities with no intervening active agent.



ii) multipoint link

- connection more than two devices can share a single link
- The entities must be concerned with the issue of access control and making the protocol more complex.

thanks