

Research Document: COMMUNICATION PROTOCOLS

ARJUN POGIRI

April 10, 2023

1 Introduction

In the field of computer networking, understanding the OSI model, Ethernet frames, and network protocol analyzers such as Wireshark is essential. In this research document, we will explore these topics in-depth, providing a comprehensive overview of the OSI model, IEEE 802.3 Ethernet, and Wireshark.

2 OSI Model

The OSI model is a conceptual framework that describes how data is transmitted and received over a network. It consists of seven layers, each of which serves a specific function in the process of data communication. In this section, we will discuss each layer of the OSI model in detail, along with examples.

graphicx

[width=0.8]total osi.png

Figure 1: OSI MODEL

2.1 Physical Layer

The physical layer deals with the transmission of raw data over a physical medium such as copper cables, fiber optics, or radio waves. It provides a physical interface between the device and the network. Examples of the physical layer include Ethernet, RS-232, and USB.

2.2 Data Link Layer

The data link layer is responsible for ensuring that data is transmitted reliably and efficiently between two devices on the same physical network. It breaks data into frames, adds error checking information, and manages access to the

physical network. Examples of the data link layer include MAC addresses and Ethernet switches.

2.3 Network Layer

The network layer is responsible for addressing, routing, and delivering data between different networks. It adds logical addresses to data packets and uses routing protocols to determine the most efficient path for data to travel. Examples of the network layer include IP addresses and routers.

2.4 Transport Layer

The transport layer is responsible for ensuring that data is transmitted reliably and efficiently between applications on different devices. It breaks data into segments, adds error checking information, and manages flow control. Examples of the transport layer include TCP and UDP.

2.5 Session Layer

The session layer is responsible for managing the communication between different applications on different devices. It establishes, maintains, and terminates sessions between applications, and manages checkpoints and recovery. Examples of the session layer include remote procedure calls and network file systems.

2.6 Presentation Layer

The presentation layer is responsible for transforming data into a format that can be understood by the application. It handles data encryption, compression, and translation between different data formats. Examples of the presentation layer include encryption algorithms such as AES and compression algorithms such as JPEG.

2.7 Application Layer

The application layer is responsible for providing services to end-users. It includes protocols and services such as email, file transfer, and web browsing. Examples of the application layer include HTTP, SMTP, and FTP.

3 Ethernet frames

Ethernet frames are used to transmit data on Ethernet networks, which are the most widely used local area network (LAN) technology in the world. In this section, we will discuss the components of an Ethernet frame, including the preamble, destination and source MAC addresses, type, data, pad, and FCS.

4 Wireshark

Wireshark is a popular open-source network protocol analyzer that allows you to inspect network traffic in real-time. In this section, we will discuss the features and capabilities of Wireshark, including its support for a wide range of protocols and its user-friendly interface.

5 Conclusion

In conclusion, understanding the OSI model, IEEE 802.3 Ethernet, and Wireshark is essential for anyone working in the field of computer networking. By exploring these topics in-depth, we have