

Open Systems Interconnection model (OSI)

Java Network Layers

Java Networking Basics

The following paragraphs contain an overview of the seven OSI layers. A more detailed description is given on the two files posted under Java Network and Java Networking Basics. Carefully read and understand this lecture and the material covered by the posted files. This material is one of the topics of the second midterm AND the final.

A communication protocol is a set of rules for controlling communication. All communications in distributed systems is based on message passing. The OSI model is designed to allow open systems communication.

OSI is a layered protocol:

Physical layer: responsible for the handling both the mechanical and electrical details of the physical transmission of a bit stream. The layer is implemented in the hardware.

Analog-digital

Digital-analog

Data Link layer: Error detection and recovery in the transmission of bits (noise). Groups the bits into units named **frames**.

Data Link Protocol: **Ethernet**

MTU: Maximum Transmission Unit

MAC address: six colon-separated pairs of hex digits, e.g., 8:0:20:11:ac:85

Network Layer: responsible for providing connections and for routing packets in the communication network.

In a LAN the sender puts the message out on the network and the receiver takes it off.

In a WAN there are many paths from the sender to the receiver. How to choose the best path (with the smallest delay) is named **routing**.

- **Connection-oriented** network-layer protocol – a fixed route is obtained and all messages are sent using that fixed route (telephone system)
- **Connectionless** protocol – no fixed route. Each package is route separately.

Unit: datagrams

Transport layer: breaks the message into pieces small enough to fit in a single packet, assigns a sequence number and then sends them all.

TCP

UDP

Unit: packets

Session Layer – allows users to insert checkpoints in the transfer, provides synchronization facilities.

Presentation Layer: concerned with the representation of the data. Makes it easier for machines with different hardware and OS's to communicate.

Application Layer: contains many different protocols. It is responsible for interacting directly with the users. (file transfer, remote login, email...) http, ftp, telnet, email, etc.

Fig. A typical message on the network

Java Layered protocol

Java uses a four-layer protocol.

Data Link layer

Internet layer

Transport layer

Application layer

Java.net classes provide system-independent network communication.