Networking Models

Contents

Overview

Models are used to represent what processes are taking place, in networking there are two main modules you need to know about: the **OSI model**, and the **TCP/IP** model.
This module will give you an overview of both models and how they compare.

OSI

The **O**pen **S**ystem **I**nterconnection (OSI) model is a **7 layer model**, which is was developed by the **I**nternational **O**rganization for **S**tandardization (ISO).
It was designed to show how the software and hardware elements of a network work.

7 - **Application Layer**

This is where **network services** are operating to supply services to the end-user.
The application layer protocol in a Web browser application will send and receive web page content, using HTTP.
Data is provided to and obtained from the presentation layer.

6 - **Presentation Layer**

The presentation layer's role is to make sure that the data is formatted correctly for the application layer.
This includes the encryption or decryption of data to support the application layer.

5 - **Session Layer**

The session layer is where connections are maintained and recovered in the case of lost data or connection interruptions.
Session orientated communications is continued until a device disconnects, or there is a connection time out.
If there is a short interruption, not long enough for the session to time out, it can be recovered.
We can think of this as being similar to a phone call.

4 - **Transport Layer**

The two most well-known protocols that are used on this layer are **TCP** and **UDP**.
Both are protocols used when sending an ordered stream of data packets.

- **T**ransmission **C**ontrol **P**rotocol (TCP) - checks the data has been received by the destination device and has no errors.
- **U**ser **D**atagram **P**rotocol (UDP) - does not do any checks, making the stream of data fast but not necessarily as accurate.

3 - **Network Layer**

When data arrives here, the source and destination addresses will be examined to see if the data has reached its final, intended, destination.
If the data has reached the correct destination, it will be moved on to the transport layer. If it hasn't, the destination address will be updated and sent back to the lower layers.

Routing is supported on this layer, by maintaining the logical (IP) addresses on a network and mapping them to physical (MAC) addresses.
This is accomplished through using the **Address Resolution Protocol (ARP)**.

2 - **Data Link Layer**

The Data Link Layer checks the data obtained from the physical layer, to ensure that there are no transmission errors, and packages the bits in **data Frames**.
Physical addressing schemes are also managed on this layer, such as **MAC addressing, switches and bridges**.

Because this layer is so complex, it is often divided into two sublayers for more clarification; these are known as the **Media Access Control** and the **Logical Link Control** sublayers.

1 - **Physical Layer**

This layer describes what hardware is being used, such as **Ethernet cables, hubs and repeaters**.
As the lowest layer of the model, it is ultimately responsible for the transmission of data bits from the source/sending device to the destination/receiving device.

A mnemonic for remembering the order of the **OSI** layers is **A**ll **P**eople **S**eem **T**o **N**eed **D**ata **P**rocessing.

TCP/IP

TCP/IP is a set of protocols used to communicate via networks, these protocols can be split into 4 layers.

4 - **Application Layer**

The Application layer is equivalent to the Presentation and Application layers in the OSI model.
The higher level protocols are included on this layer, such as **HTTP**, **Telnet**, **SSH**, **FTP** and **RDP**.

3 - **Transport Layer**

The Transport layer is equivalent to the Transport layer in the OSI model.
The main purpose of this layer is to allow devices to carry on a conversation.
Two of the main protocols that are used on this layer are **TCP** and **UDP**.

2 - **Internet Layer**

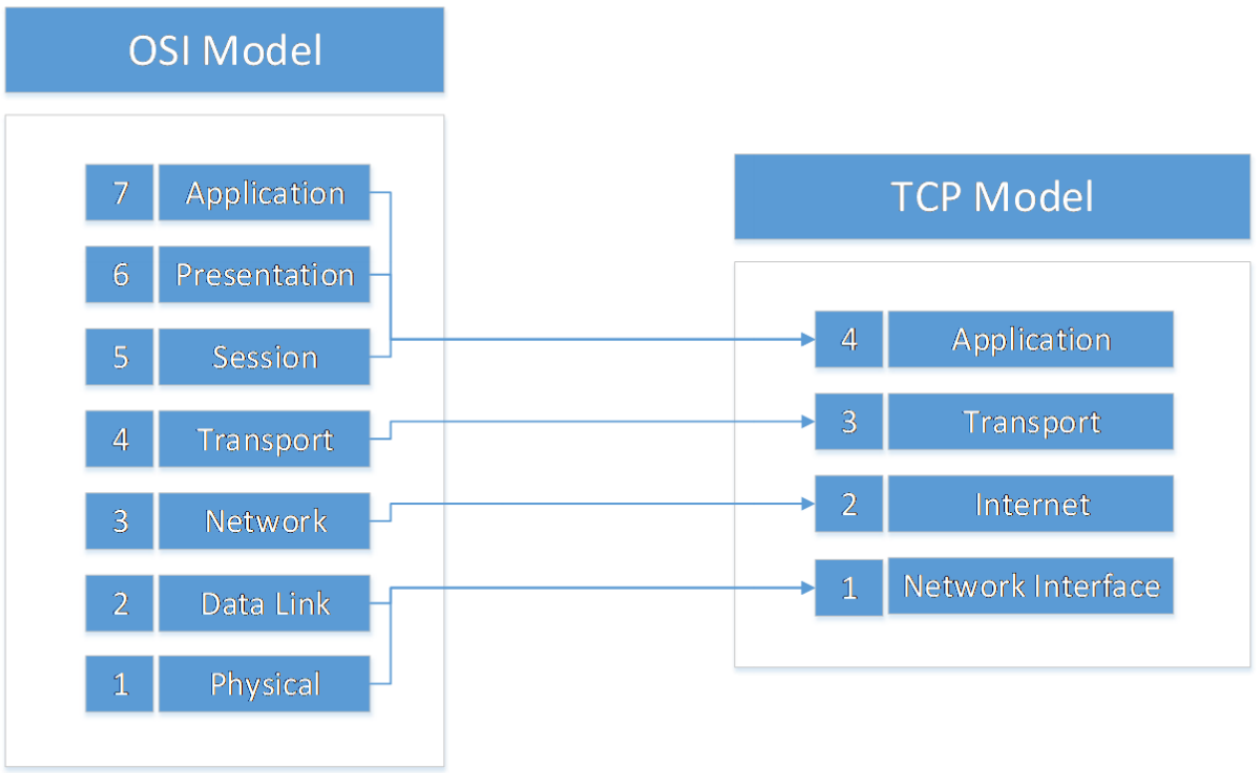
The Internet Layer is equivalent to the Network layer in the OSI model.
This is where data is put into data packets, known as **IP Datagrams**, which contain the logical addresses of the source and destination devices.
This layer is also responsible for the routing of these datagrams.

1 - **Network Access Layer**

The Network Access Layer is the lowest of all the TCP/IP layers and is equivalent to the Physical and Data Link layers in the OSI model.
This layer is where details of how data is physically transmitted throughout a network are defined.

TCP/IP and OSI Visual Comparison

Here is a diagram showing how the layers between the OSI and TCP/IP models relate:



Tutorial

There is no tutorial for this module.

Exercises

There are no exercises for this module.