1.2t: Lesson 2: OSI

# Network Protocol Standards

Hi it’s Nige again, last time we covered the different types of media and particularly focused on copper. We also discussed what a signal is and how important it is for sender and receiver to agree on how a packet should ‘look’, the notion of a protocol.

It is not convenient to have a single protocol with all of the things we need to agree on, so we divide the work between several different protocols.

The protocols work in ***stacks***.

Each protocol adds a header that deals with the aspects that it is responsible for.

It then passes the PDU down to the next protocol which puts its own header on……and so on.

This process is called ***encapsulation***.

Finally, the bits of the last PDU are encoded and sent down the medium.

# The OSI model

One of the models we use to show the stack is the Open Systems Interconnection, you’ll often here this just called the OSI.

It’s a 7-layer reference model, it’s widely used comparison, but never got implemented in practice. But if you read a textbook or a research paper or journal, they will probably refer to the OSI.

So, what are the 7 layers?

Starting at the bottom of the OSI stack we have the:

1. physical,
2. data,
3. network,
4. transport
5. session
6. presentation
7. and application layers.

Let’s look at each layer in turn and what it does.

# Physical layer

The lowest layer of the OSI Model is concerned with electrically or optically transmitting raw unstructured data bits across the network from the physical layer of the sending device to the physical layer of the receiving device. It can include specifications such as voltages, pin layout, cabling, and radio frequencies. At the physical layer, one might find “physical” resources such as network hubs, cabling, repeaters, network adapters or modems.

# Data link layer

At the data link layer, directly connected nodes are used to perform node-to-node data transfer where data is packaged into frames. The data link layer also corrects errors that may have occurred at the physical layer.

The data link layer encompasses two sub-layers of its own. The first, media access control (MAC), provides flow control and multiplexing for device transmissions over a network. The second, the logical link control (LLC), provides flow and error control over the physical medium as well as identifies line protocols.

# Network layer

The network layer is responsible for receiving frames from the data link layer, and delivering them to their intended destinations among based on the IP addresses contained inside the frame.

The network layer finds the destination by using logical addresses, such as IP (internet protocol). At this layer, routers are a crucial component used to quite literally route information where it needs to go between networks.

# Transport layer

The transport layer manages the delivery and error checking of data packets. It regulates the size, sequencing, and ultimately the transfer of data between systems and hosts. One of the most common examples of the transport layer is TCP or the Transmission Control Protocol.

# Session layer

The session layer controls the conversations between different computers. A session or connection between machines is set up, managed, and terminated at layer 5. Session layer services also include authentication and reconnections.

# Presentation layer

The presentation layer formats or translates data for the application layer based on the syntax or semantics that the application accepts. Because of this, it at times also called the syntax layer. This layer can also handle the encryption and decryption required by the application layer.

# Application layer

At this layer, both the end user and the application layer interact directly with the software application. This layer sees network services provided to end-user applications such as a web browser or Office 365. The application layer identifies communication partners, resource availability, and synchronizes communication.

You’ll need to remember these layers, they are important in networking, and network professionals will often assume you know what they are talking about as they casually refer to layer 3, or any of the others!

That’s all for this video in the next one we’ll discuss another model, the TCP/IP model.