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Slot – A11 + A12 + A13

**Lab 2 OSI Model and TCP/IP Model**

**Objective**

* Describe the four layers of the TCP/IP model.
* Name the physical devices or components that operate at each layer
* Relate the seven layers of the OSI model to the four layers of the TCP/IP model.
* Name the primary TCP/IP protocols and utilities that operate at each layer.

**Background**

This lab will help to develop a better understanding of the seven layers of the OSI model. Specifically

as they relate to the most popular functioning networking model in existence, the TCP/IP model. The

Internet is based on TCP/IP. TCP/IP has become the standard language of networking. However, the seven layers of the OSI model are the ones most commonly used to describe and compare networking software and hardware from various vendors. It is very important to know both models and be able to relate or map the layers of one to the other. An understanding of the TCP/IP model and the protocols and utilities that operate at each layer is essential when troubleshooting.

**Steps**

1. Use the table below to compare the OSI layers with the TCP/IP protocol stack. In column two, indicate the proper name for each of the seven layers of the OSI model corresponding to the layer number. List the TCP/IP layer number and its correct name in the next two columns. Also list the term used for the encapsulation units, the related TCP/IP protocols and utilities that operate at each TCP/IP layer. More than one OSI layer will be related to certain TCP/IP layers.

**OSI Comparison with TCP/IP Protocol Stack**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| OSI # | OSI Layer  Name | TCP/IP # | TCP/IP Layer name | Encapsul. Units | TCP/IP Protocols at each TCP/IP layer | TCP Utilities |
| 7 | Application | 4 | Application | Data | HTTP, FTP, SMTP, DNS | Ping, Traceroute, Telnet |
| 6 | Presentation | 4 | Application | Data | TLS, SSL |  |
| 5 | Session | 4 | Application | Data | NetBIOS, SMB |  |
| 4 | Transport | 3 | Transport | Segment | TCP, UDP | Netstat, Nmap |
| 3 | Network | 2 | Internet | Packet | IP, ICMP, ARP, RIP, OSPF | Ping, IPConfig, Traceroute |
| 2 | Data Link | 1 | Network Interface | Frame | Ethernet, PPP, ATM |  |
| 1 | Physical | 1 | Network Interface | Bits | Ethernet, DSL, ISDN |  |

**Lab 2 Model Characteristics and Devices**

**Objective**

∙ Name the seven layers of the OSI model, in order. Use a mnemonic.

∙ Describe the characteristics, functions and keywords relating to each layer.

∙ Describe the packaging units used to encapsulate each layer.

∙ Name the physical devices or components that operate at each layer.

**Background**

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as they relate to the most popular functioning networking model in existence, the TCP/IP model. The

Internet is based on TCP/IP. TCP/IP has become the standard language of networking. However, the seven layers of the OSI model are the ones most commonly used to describe and compare networking software and hardware from various vendors. It is very important to know both models and be able to relate or map the layers of one to the other. An understanding of the TCP/IP model and the protocols and utilities that operate at each layer is essential when troubleshooting.

**Steps**   
  
  
1. List the seven layers of the OSI model from the top to the bottom. Give a mnemonic word for each layer that can help you remember it. Then list the keywords and phrases that describe the characteristics and function of each.

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer #** | **Name** | **Mnemonic** | **Key Words and**  **Description of Function** |
| 7 | Application | Away | Interfaces with the user; provides network services such as HTTP, FTP, and email applications. |
| 6 | Presentation | Pizza | Responsible for data translation, encryption, and compression; ensures the data is in a usable format. |
| 5 | Session | Sausage | Manages and controls the connections between computers; establishes, maintains, and terminates sessions. |
| 4 | Transport | Throw | Ensures error-free data transmission between hosts; uses flow control and error handling (TCP/UDP). |
| 3 | Network | Not | Determines the best path for data across a network; routes packets through routers using IP addressing. |
| 2 | Data Link | Do | Handles error detection, correction, and physical addressing (MAC); ensures reliable data transfer across the physical link. |
| 1 | Physical | Please | Defines the physical hardware for transmitting raw bits over a communication medium (e.g., cables, signals). |

2. List the seven layers of the OSI model and the encapsulation unit used to describe the data grouping at each layer. Also list the networking devices that operate at each layer, if applicable.

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer #** | **Name** | **Encapsulation Unit or Logical Grouping** | **Devices or Components that Operate at this Layer** |
| 7 | Application | Data | Computer, Browser |
| 6 | Presentation | Data | Encryption devices |
| 5 | Session | Data | Gateways, Firewalls |
| 4 | Transport | Segment | Router, Switch |
| 3 | Network | Packet | Router, Switch |
| 2 | Data Link | Frame | Switch, Bridge |
| 1 | Physical | Bits | Hubs, Network cables |