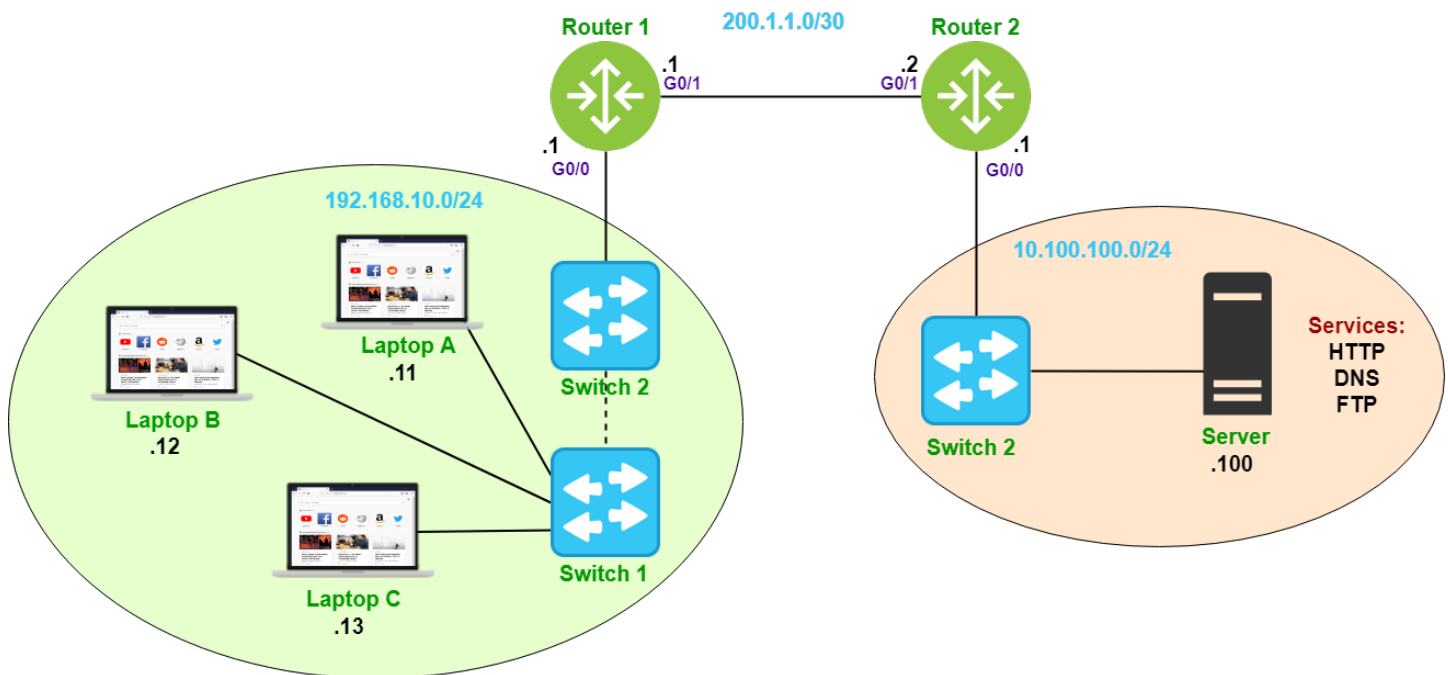


Lab 3 – OSI Model – Layers 4 - 7



Lab Topology and Learning Goals



The transport layer plays a vital role in network communications. Segmentation occurs at the transport layer, as well as the decision whether a protocol or application provides slower, more reliable transport, or favors the faster transit with no assurances of delivery. This is a decision that is often left to the application designer. In this lab we observe the behavior of both TCP and UDP, as well as some application layer protocols.

Lab Instructions and Required Resources

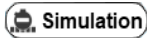
- Complete this lab in the Packer Tracer file: **INFO-6078 – Lab 3 – OSI Model – L4-7.pkz**
- Take Lab Quiz: **Lab 3 - Requires Respondus LockDown Browser**

Lab 3 – OSI Model – Layers 4 - 7



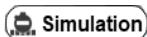
Transmission Control Protocol (TCP) Operation

TCP provides connection-oriented, stateful delivery of information. The mechanisms used by TCP create additional overhead on network resources. Before TCP transfers data, a communication session is established and hosts share information about how quickly information can be transferred.



Simulation Observe the TCP Three-Way Handshake

- Switch Packet tracer to simulation mode
- Edit the Event List Filters and include **TCP** and **HTTP**
- Click on **Laptop A** and switch to the **Desktop** tab
- Open the **Web Browser** and retrieve the page at www.fanshawe.ca
- Use the play controls to move the simulation forward until you see a TCP segment
- Select the first segment in the **Event List** pane and observe the **OSI Model** details
- Click the Layer 4 section and review the information related to the connection state and TCP flags
- Switch to the **Outbound PDU Details** and observe the layer 4 header
- Observe the source and destination port numbers, as well as the sequence and acknowledgement numbers
- Advance the simulation until the response to the first segment is received at **Laptop A**
- Examine the PDU observing the incoming information
- What does the PDU tell you about the connection state?
- What TCP flags are set on the segment?
- Switch to the **Inbound PDU Details** and observe the acknowledgement number
- Advance the simulation until the PDU has arrived at the **Server**
- Open the PDU and observe the In Layers of the **OSI Model** tab
- Switch to the **Inbound PDU Details** and notice the sequence and acknowledgement numbers



Simulation Observe Data Transfer

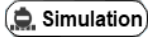
- Advance the current simulation until **Laptop A** sends an **HTTP** PDU
- View the **Outbound PDU Details**, take note of the TCP sequence number
- Find the layer 3 Total Length field, remember this value
- Advance the simulation until a response is received by **Laptop A**
- Notice the TCP flags set in the In Layers of the **OSI Model** tab
- Switch to the Inbound PDU Details tab and observe the acknowledgement number
- Can you calculate why the acknowledgement number is this value?
- Advance the simulation and observe the connection teardown

Lab 3 – OSI Model – Layers 4 - 7



User Datagram Protocol (UDP) Operation

UDP is a connectionless protocol that transmits data at a rapid pace, but does not provide reliable delivery or ordered data reconstruction. UDP is well suited for real-time applications and protocols that can tolerate some loss.



Simulation Observe UDP Data Transfer

- Press the **Reset Simulation** button to clear the previous simulation
- Edit the Event List Filters, remove **TCP** and **HTTP**, then include **UDP** and **DNS**
- Open the Command Prompt on **Laptop B** and do a DNS query for with the command:
nslookup www.fanshawe.ca
- Minimize the **Command Prompt**, open the PDU and observe the layer 4 **OSI Model** information
- Switch to the **Outbound PDU Details** tab and observe the UDP header
- Advance the simulation and observe the UDP exchange

Lab Challenge: Observe Network data transfers

- Generate and observe traffic that originates from **Laptop-A** and is destined for **TCP** port **80** on the **Server**
- Start an **FTP** transfer on a laptop and retrieve the file **c2960-lanbasek9-mz.150-2.SE4.bin** from the **Server**; using simulation mode, observe the conversation flowing back and forth