

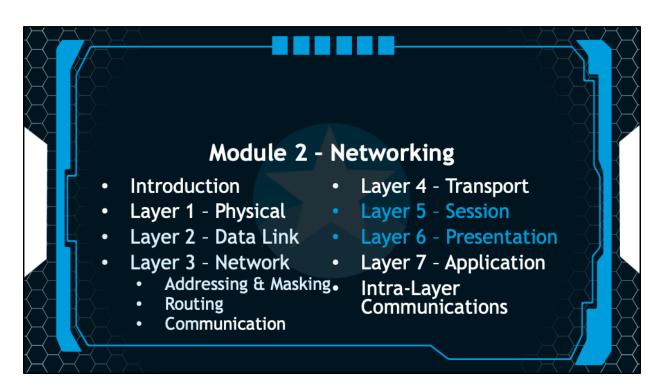
Welcome to Cyber Aces, Module 2! A firm understanding of network fundamentals is essential to being able to secure a network or attack one. This section provides a broad overview of networking, covering the fundamental concepts needed to understand computer attacks and defenses from a network perspective.

I. Introduction to	01. Linux
Operating Systems	02. Windows
2. Networking	
3. System Administration	01. Bash 02. PowerShell

This training material was originally developed to help students, teachers, and mentors prepare for the Cyber Aces Online Competition. This module focuses on the basics of networking. This session is part of Module 2, Networking.

The three modules of Cyber Aces Online are Operating Systems, Networking, and System Administration.

For more information about the Cyber Aces program, please visit the Cyber Aces website at https://CyberAces.org/.



In this short section, we'll provide a brief introduction to the Session Layer and the Presentation Layer.



Session Layer



The Session Layer creates and terminates unique connections between applications

TCP implements some Session Layer functionality itself

- TCP maintains state using sequence numbers
 Session Layer functionality is often implemented at the Application Layer
 - Web applications use HTTP cookies to maintain sessions (though HTTP itself doesn't support sessions)

Sessions are important. The session layer provides flow control to unique connections between applications. The session layer creates and terminates application connections. TCP implements some session layer functionality itself (since it maintains connection states using sequence numbers). Many common TCP/IP protocols implement session layer services as part of the Application layer rather than creating a separate layer. For example, HTTP is often referred to as a "stateless" protocol because it has no concept of a session. HTTP by itself is incapable of identifying a series of requests as part of a single session; it is left to the application developer to use a web application such as PHP or .NET to add session tracking through the use of session cookies. The lack of session layer functionality in the HTTP protocol has led to many compromised web accounts.



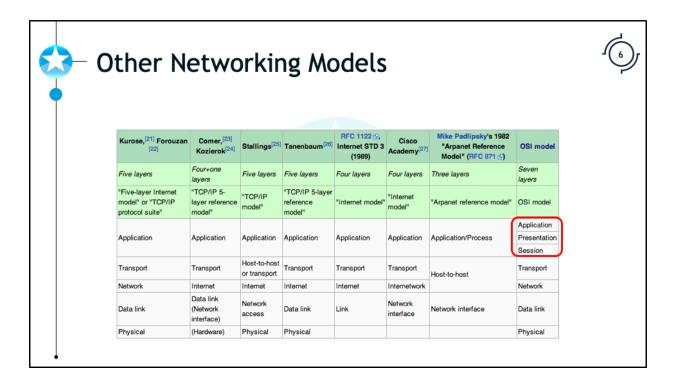
Presentation Layer



The Presentation Layer establishes a standard way to encode data between layers
It provides format independence for data
Character encoding (i.e., UTF-8) and encryption are Presentation Layer functions

•MIME is an important protocol at this layer Like the Session Layer, most Presentation Layer functionality is implemented in the Application Layer

The Presentation Layer is used by applications to establish a standard way of encoding data. More generally, the Presentation Layer is responsible for providing independence from data formats for Application Layer protocols. For example, encryption of data will often occur as part of the Presentation Layer, as would handling of character encoding (such as UTF-8). MIME (Multipurpose Internet Mail Extensions) is a Presentation Layer protocol that defines the formatting of e-mail messages, particularly multi-format messages and attachments. However, like the Session Layer, most common TCP/IP protocols implement Presentation Layer functions as part of the Application Layer protocol. For example, HTTP can handle character encoding.



The OSI model is not the only networking model; however, it is the one most commonly referred to. Most of the other models lump the Presentation and Session layers into the Application layer. Most often, the OSI layers 5 and 6 are implemented and included in the Application Layer.

Above image taken from: https://en.wikipedia.org/wiki/Internet protocol suite



Tutorial Complete!

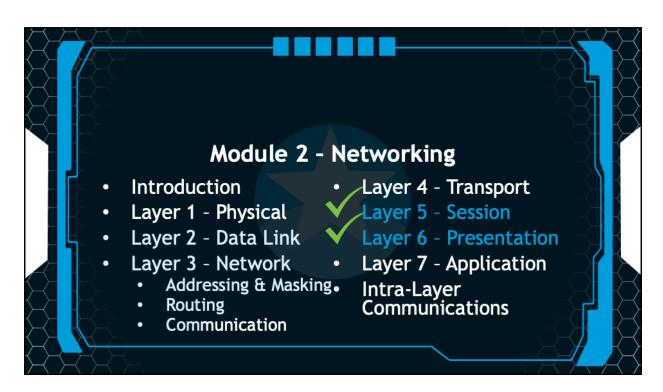


This concludes Module 2 - Layers 5 & 6

We've learned about the Session and Presentation layers

In the next module, we'll learn about Layer 7, the Application Layer

This concludes the discussion about Layer 5 and 6, the Session and Presentation layers. In the next tutorial we'll discuss Layer 7, the Application Layer.



In the next session we will discuss Layer 7, the Application Layer.