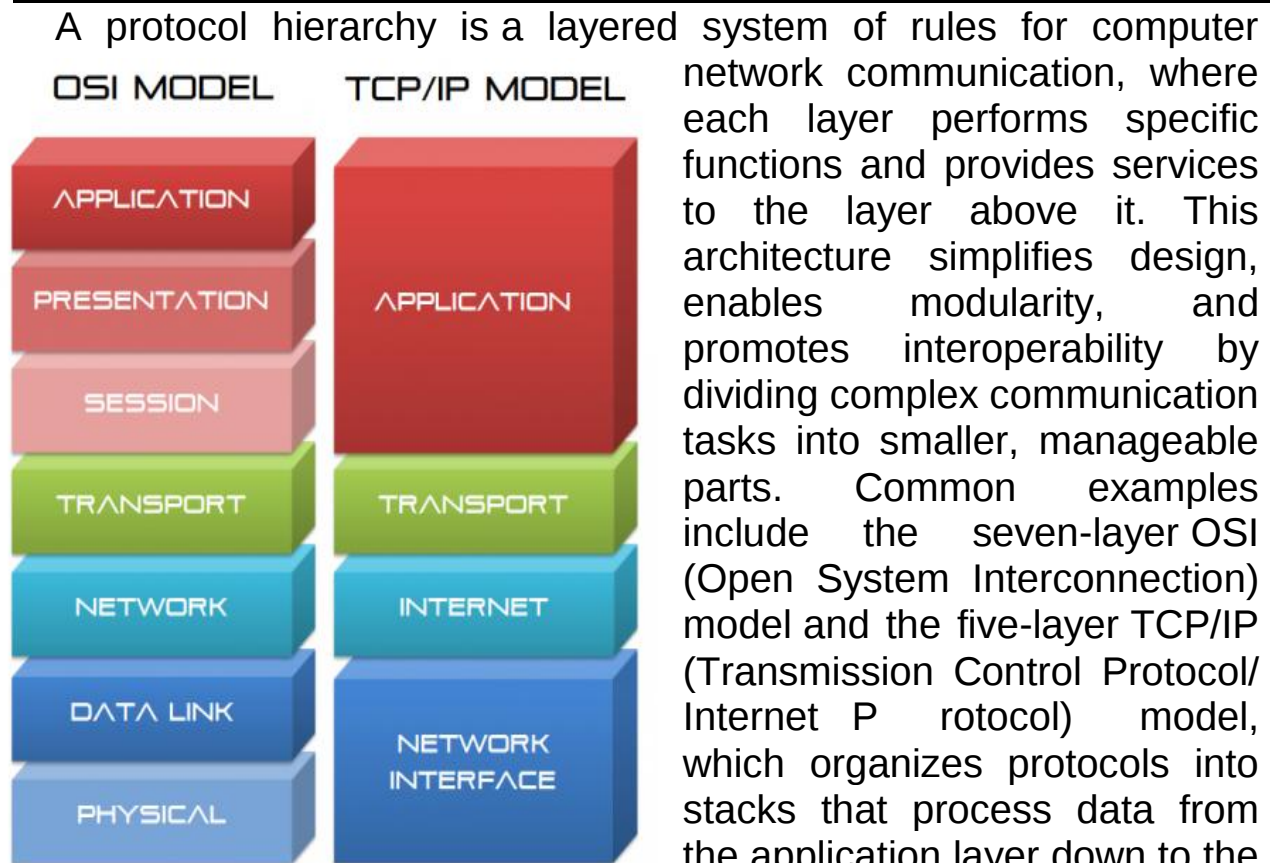




How Protocol Hierarchies Work:

- **Layered architecture:** Protocols are organized into layers, with each layer performing a specific set of functions.
- **Service to higher layers:** Each layer provides services to the layer immediately above it, abstracting away the details of its own implementation.
- **Interfaces:** Layers interact with each other through well-defined interfaces.
- **Data flow:** When a device sends data, it moves down the stack, from the application layer to the physical layer, where it is transmitted over a medium like wires or radio waves.

- **Peer-to-peer communication:** At the receiving end, the data moves up the stack, with each layer interacting with its corresponding peer layer on the destination computer.
- **Encapsulation:** As data moves down the stack, each layer adds its own header (and sometimes a trailer), a process called encapsulation, to the data before passing it to the layer below.

Characteristics of Protocol

- **Syntax:** The format of the data being transferred.
- **Semantics:** The meaning of each bit and section of the data.
- **Timings:** The speed of data transfer and the timing of events during communication.

Benefits of protocol hierarchy

- **Modularity:** Network software is built as a stack of layers, making it easier to develop, manage, and update.
- **Interoperability:** Different vendors can develop hardware and software for different layers that can work together, as long as they adhere to the standards for their respective layers.
- **Simplicity:** Each layer is responsible for a specific task, simplifying the overall design and allowing developers to focus on one layer at a time.

Examples of models

- **OSI model:** A conceptual, seven-layer model that provides a detailed framework for network communication.
- **TCP/IP model:** A four or five-layer model that is the basis for the internet and most modern networks.