Quick Reference
TCP/IP Fundamentals

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IPv4 vs. IPv6: Much of the information within this tool is intended for use with IP version 4 (IPv4), the current IP standard. IP version 6 (IPv6) is on the horizon, however, and you should understand the differences between it and IPv4. To help you do so, we've included a section comparing IPv6 and IPv4 on page 4.

TCP/IP DEFINED

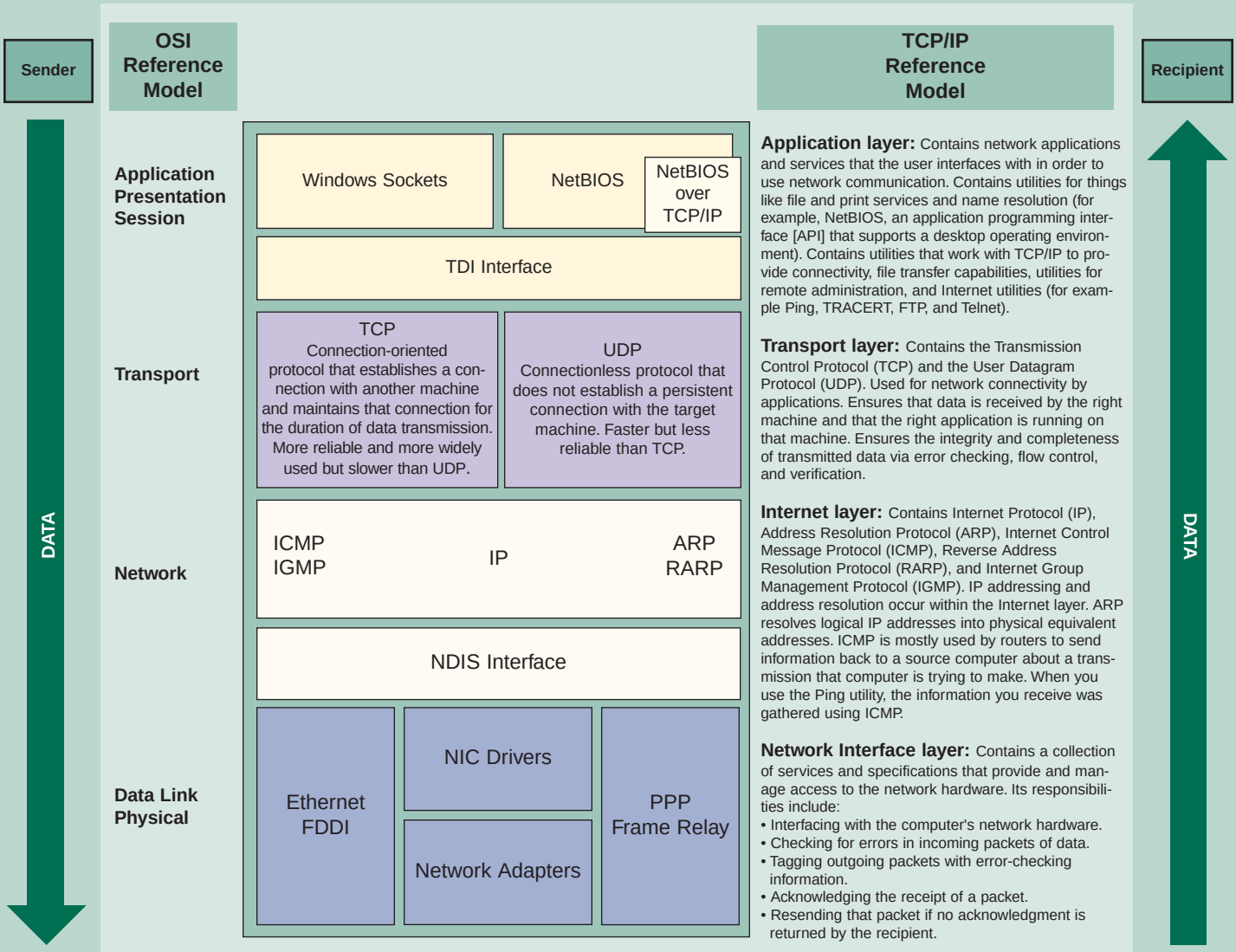
Transmission Control Protocol/Internet Protocol (TCP/IP) is an industry standard suite of protocols that computers use to find, access, and communicate with each other over a transmission medium. A protocol is a set of standards and rules that need to be followed. In the case of networking computers, a protocol is the set of standards and rules that a machine's hardware and software must follow in order to be recognized and understood by other computers. The protocol suite is implemented via a software package most commonly known as the TCP/IP stack. There are four general layers of the TCP/IP stack:

- Application layer
- Internet layer
- Transport layer
- Physical or Network Interface layer

The TCP/IP reference model and OSI reference model

The Open Systems Interconnected reference model (OSI/RM) is the standard that all other protocols follow. The OSI/RM provides a framework that connects heterogeneous systems using a common protocol. It also gives developers universal concepts so they can develop and perfect protocols.

Each layer of the TCP/IP reference model corresponds to a part of the OSI model.



Application layer: Contains network applications and services that the user interfaces with in order to use network communication. Contains utilities for things like file and print services and name resolution (for example, NetBIOS, an application programming interface [API] that supports a desktop operating environment). Contains utilities that work with TCP/IP to provide connectivity, file transfer capabilities, utilities for remote administration, and Internet utilities (for example Ping, TRACERT, FTP, and Telnet).

Transport layer: Contains the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP). Used for network connectivity by applications. Ensures that data is received by the right machine and that the right application is running on that machine. Ensures the integrity and completeness of transmitted data via error checking, flow control, and verification.

Internet layer: Contains Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Reverse Address Resolution Protocol (RARP), and Internet Group Management Protocol (IGMP). IP addressing and address resolution occur within the Internet layer. ARP resolves logical IP addresses into physical equivalent addresses. ICMP is mostly used by routers to send information back to a source computer about a transmission that computer is trying to make. When you use the Ping utility, the information you receive was gathered using ICMP.

Network Interface layer: Contains a collection of services and specifications that provide and manage access to the network hardware. Its responsibilities include:

- Interfacing with the computer's network hardware.
- Checking for errors in incoming packets of data.
- Tagging outgoing packets with error-checking information.
- Acknowledging the receipt of a packet.
- Resending that packet if no acknowledgment is returned by the recipient.

The layers of the OSI Model and how they map to different areas of Microsoft's TCP/IP, and the four layers of the TCP/IP Reference Model and how they map to Microsoft's TCP/IP