1 1	0			- 1	1	0 1	0	1	1	1	0	1	1 1	1	0	0	1	1	1	1 (D 1	1	1	1	1	0 0) ()	1	1	0 1	1	0	1 1	1	1	0 0) 0	0	1	1	0 0	οс	0 (10
1 1				1	1	0 1	1	1		1	0	0	0 1	1	0	1		0	0	1	1 0	1	0	0	0	1 0) 1	0	0	0 1	1	0	0 0	0	0	0	1	0	1	0	1.0	O T	1	1	01
0.0	1	X A 7	T. J	0	0	1 0	1		1	0	1		1 1		1	1			0	0 '	1 1	0	0	0	0		0	0	1	1 1	1	0	0 0	1	0	0 0	0 0	1	0	0	0 (0 1	0	0	10
0.0			5	0		1 0	1	1				0	0 1					0	0	1 1	1 1	1	0	1	0	0 1	0	1	0	1 0	1	1	0 0	0 (1	0 0	0 0	0	1	1	1	1 C) 1	0	10
0 1	1	V V	-	0		1 0	0	0		0	0	0	1 0	0	1	0	1	1	1	1 1	1 1	1	1	0	1	1 0	0 0	0	0	0 1	0	0	1 0	1	1	0 .	0	1	1	0	0	1.7	0	0	0 0
0 1				0		0 0	1	1			0	1	0 1	0	0	1			1	0 0	0 0	0	0	0	0	0 1	1 1	1		0 0	0	0	1 0	1	1	1	1 1	0	0	1	0	0 C	0 0	1	10
0 1		0 1 1	0 1	1 0			0					1	1 0	0		1		0	1	1	1 0	1	0	1	0	0 0	0 0			1 1	1	0	1 0	0 0	0	1	1	1	1	1	1 (0 C	0 (0	1 1
1 1	0	1 1 0	1 1		1	0 1	1	0		0		1	1 1	0	1		1	1	0	0 '	1 0	1	1	0	1	0	0	1	0	0 1	0	0	0 1	1	0	1 .	1 1	0	1	1	1	1 0) 1	1	0 0
1 1		1 1 1	1 1		1		1	1		1	1	1	0 1	1	1	0		0		0	1 1	1	1	0	1	1 1	0	1	0	1 1	1	1	0 1	0	0	1 0	0 0	1	0	1	1	1 7	1	1	0 0
1 0		1 0 1	1 0	1 1			0	1			1	1				1	0	1	1	0 0	0 0	1	0	0	0	0 1	0	1	1	0 1	0	1	0 0	0	1	1 1	0	1	0	1	0	0 1	0	0	10
0.0								1		0	0	1	0 0		0	0		1	1	1 0	0			0	1	0 0	1	1	1	1 1	0	1	1 1	1	0	1	0	1	1		0	0 0	0 0	1	1 1
0.0								1		0	0	1	0 0		0	0		1	1	1 (0 0			0	1	0 1	0	1	1	0 1	1	0	1 0	0 0	1	0 0	0 1	0	1	0	1	1 0	0	1	1 1
1.1		CC		2		7.		E i	- h		~ ~	5	1		~	-L		-	~							1 0	0	1	0	1 0	0	1	1 0	0	0	1 0) 1	1	0	1	0	1 7	0	0	1.1
3 1		CS		23	3		1			н							11	11)	H.							0 1	1 1		1	1 0	1		0 0	1	1	0 0	0 0	0	0	1	1	1.7	1.1	0	10
0 1								0	0		1	0	0 0	0		1	1	0	1	1	1 1	1	0		0	1 0	0	1	0	0 0	1	0	1 1	1	1	0	1 1	1	1	0	0	1.7	1.1	1	0 1
1 0	0	Netwo	م بار		-		_						0 1				0	0	0	1 0	5 O			1	0	1 1	1	0	1	1 1	0		0 1	1	1	0 '	1 0	1	1		1	1 C) I	0	10
0 1	0	Netwo	ork r	-ro	to	COI	S		1	0			o c	1		0	0				0 0	0	1	0	0	1 1	0	1	1	1 1		0	0	0	0	1 0	0	0	0	0	0	o c	ר (1	0 0
α α	0	0 0 0				0 5		0	1				o c		1		1	0	1	0 0	5 1	1	1		1	1 1	0	1	0	1 0	1		0 1	0	1	1.0	0	1	0	1	0	1 0	1	1	1 0
α τ										0	1	0			0	1	1	0	1	0 0	5 1	1	1	0	1	1 0	0 1	0	1	0 1	0	1	1 0	1	0	0 0	0	1	1	0	0 (οс	1	1	1 1
T 0														1	1				1	0 0	5 1	1	0	0	0			0	0	0	1	0	1 1	1	0	1.1	1 1	0	1	0	1.0	0 1	0	0	0 0
- T - T										0					1		1	0		1	1 1		0	0	0	0		0	1	0 1	0		1 0	1	1	0 0	0	1	1	1	0 0	0 1	1	0	0 1
T 0													1 1						1		1 1	0		0	0	0 0	1	0	1	1 1	1	1	0 0	1	0	1 0	0		0	0	0	1.7	0	1	0 0
0 0													o c				0		0	1	1 1		1	0	0	1 1	1 1	0		0 1	0		1 0	1	0		1 1	1	1	1	0	1 C	0 (0	10
1 0			1 0		U.								o c				0	0		1	1 0	1	1	0	0	1 1	0	0	1	1 1	0	1	1 1	0	1	0 '	1 1	1	1	0	0	1.7	1	1	0 0
0 0		0 0 1	U Ü								0		0 0	1	0					0	1 0	1	0	0	0		0	1	1	1 0	0	1	1 0) 1	0	1 0	0	1	1	0	0	O T	1	0	10
1 U										0			1 1							0 0	5 1	0		1	1	0 1	1 1		1	0 0	1	0		0	0	1 1	1 1	0	0	0		1 C) 0	0	1 1
1 1																				0 0	0 0	0			1	1 0	0	0	1	1 1	1		1 1	1	1	1 1	0		1	0	1	1 C	ר (1	1 1
i 0									0				о с					1	0	1 0	0 0		0	0	1	0 1	1 1			0 1		1	1 1	0		1 0	1	0	0	1	1.7	0 0	ר (1	01
1.1													0 1				0	1		0	1 1		0		1	0 1	(I	1	1	1 0	1		0 1	0	1	1 1	1 0	1	1	1	1	1 C) 0	1	0 1
0 0															0		1	1		1	1 0	1	0		0	0 1			0	0 0	0	1	1 1	0	1	1 0	0	0		1	1.7	o c	0 (0	0 1
1 0															0						1 0		1		1				0	0 0	0	0	1 1	0	1	1	1 1	1		1	0	1 C	0 (1	10
													0 0	0					1		1 0		1		1	1 0	1	0		1 1		0		0	0	0 0	0	1	0	0	0	1 1	0		0 1
1 U																	0	0		0 0	5 1	1	1	0	0		1			0 1	0	0		1	1	1 1	1 0	0	0	0	1.7	0 1	1	0	1 0
		1 1 1	1.1	с I.	1												0	Ū.	1	0	1 0	0	1		0	1 1	0			0 0		1	1 1		1	1 0	1	0	1	0	1.0	о с	0 0	1	1 0
0 U		Willia	mJ.	То	lley	/												0		0 0	0 1	0	0		0		1	1		0 1	1		1 1	1	1	1 1	0	0	0	1	0 /	0 1	1	1	10
1.1																0						1			0	0 0	1	0		0 1	0	0	0 0	0	1		1 1	0	1		0	0 C) 1	0	0 1
1 U		(U U	1 0																0	1 0	а т				0	1 1	0		1	1 0	1	0	0 0	1	1	1 0	1		1		1 (0 1	0	1	1 0
1 0		May 2,	2024																		1 0			0	1	1 1	0	1	0	1 0	1	0	0 0	0		1 0		0	1		0	0 1	0	0	1 0
0 I																				0		0		1	0	1 1	1			1 1		0	1 1	0	0	1	1 1		1	0	0	0 C) ()	0	0 0
																							0				0		0	0 0		0	1 0	0	0	1 1	1 0	1	1	1	0	1 1	1	0	1 0

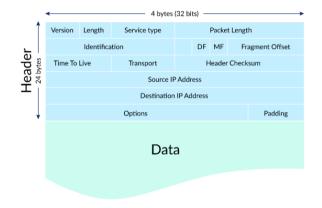


► Network Protocols



- Network models provide a conceptual framework for understanding how communication occurs in computer networks.
- Two widely used models are the OSI (Open Systems Interconnection) model and the TCP/IP (Transmission Control Protocol/Internet Protocol) model.







- The OSI model is a conceptual framework that standardizes the functions of a telecommunication or computing system into seven abstraction layers.
- Each layer serves a specific purpose and interacts with adjacent layers to facilitate data transmission.



- The Physical Layer is the lowest layer of the OSI model.
- It deals with the physical connection between devices and transmission of raw data.
- Examples include cables, hubs, and network interface cards (NICs).



- The Data Link Layer is responsible for node-to-node communication.
- It handles errors in the physical layer and ensures reliable transmission of data.
- Examples include switches, Ethernet frames, and MAC addresses.



- The Network Layer provides routing and forwarding of data packets.
- It determines the best path for data to travel from source to destination.
- Examples include routers, IP addresses, and ICMP (Internet Control Message Protocol).



- The Transport Layer ensures end-to-end communication between hosts.
- It manages data flow, error checking, and packet sequencing.
- Examples include TCP (Transmission Control Protocol) and UDP (User Datagram Protocol).



- The Session Layer establishes, manages, and terminates connections between applications.
- It facilitates dialogue control and synchronization between devices.
- Examples include API (Application Programming Interface) and RPC (Remote Procedure Call).



- The Presentation Layer is responsible for data translation and encryption.
- It formats data for presentation and ensures compatibility between different systems.
- Examples include encryption protocols (SSL/TLS) and data compression algorithms.



- The Application Layer provides services directly to end-users.
- It enables communication between applications and network services.
- Examples include HTTP (Hypertext Transfer Protocol), FTP (File Transfer Protocol), and SMTP (Simple Mail Transfer Protocol).



- While the OSI model has seven layers, the TCP/IP model has four layers.
- Despite the difference in the number of layers, both models serve as guidelines for designing and understanding network protocols.



- The TCP/IP model is a concise version of the OSI model and is widely used in practice, especially in the context of the Internet.
- It consists of four layers: Link Layer, Internet Layer, Transport Layer, and Application Layer.

WerL Link Layer (Equivalents to OSI Layers 1 and 2) 1 Network Protocols

- The Link Layer is responsible for the physical connection between devices and data transmission.
- It includes protocols such as Ethernet, Wi-Fi, and PPP (Point-to-Point Protocol).



- The Internet Layer handles addressing, routing, and packet forwarding.
- It includes the Internet Protocol (IP) and its variants, such as IPv4 and IPv6.
- IP addresses are used to identify devices on a network and facilitate communication between them.

Well Transport Layer (Equivalent to OSI Layer 4) 1 Network Protocols

- The Transport Layer provides end-to-end communication between devices.
- It includes protocols such as TCP (Transmission Control Protocol) and UDP (User Datagram Protocol).
- TCP ensures reliable data transmission with error checking and retransmission mechanisms, while UDP offers a connectionless, unreliable service.



Application Layer (Equivalent to OSI Layers 5, 6, and 7) 1 Network Protocols

- The Application Layer enables communication between networked applications.
- It includes various protocols and services for specific applications, such as HTTP, FTP, SMTP, and DNS (Domain Name System).
- These protocols define how data is formatted, transmitted, and received by applications running on different devices.



- Routing is the process of selecting the best path for data packets to travel from a source to a destination.
- Routers are devices that forward data packets between networks based on routing tables and algorithms.
- Routing protocols, such as RIP (Routing Information Protocol) and OSPF (Open Shortest Path First), are used to exchange routing information and update routing tables dynamically.