

## Interview Questions: IPv4 Protocols

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### Easy Questions (Direct Recall)

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#	Question	Marking Criteria (Scale of 1-10)
E1	According to the article, what are the two main characteristics of the IP protocol regarding connection and reliability?	<ul style="list-style-type: none"><li>• 1-4: Incorrect characteristics or mentions only one.</li><li>• 5-7: Correctly identifies one characteristic (connectionless or unreliable) but not both.</li><li>• 8-10: Accurately states IP is connectionless and unreliable, as mentioned in the text.</li></ul>
E2	What is the function of the Time to Live (TTL) field in the IP header, as described in the article?	<ul style="list-style-type: none"><li>• 1-4: Incorrect function or vague description.</li><li>• 5-7: Mentions it relates to network segments or routers but misses the core purpose of preventing endless circulation.</li><li>• 8-10: Correctly explains TTL designates the max network segments a datagram can traverse and is used to prevent packets from endlessly circulating, being decreased by routers.</li></ul>
E3	The article lists several core TCP/IP protocols. Name four of them (excluding IP itself).	<ul style="list-style-type: none"><li>• 1-4: Names fewer than three correct protocols.</li><li>• 5-7: Names three of the correct protocols listed (ARP, ICMP, IGMP, TCP, UDP).</li><li>• 8-10: Correctly names four of the protocols listed: ARP, ICMP, IGMP, TCP, UDP.</li></ul>
E4	What is the purpose of ARP (Address Resolution Protocol) according to the article?	<ul style="list-style-type: none"><li>• 1-4: Incorrect purpose (e.g., routing, error reporting).</li><li>• 5-7: Mentions resolving addresses but is unclear between IP and MAC or the context (shared media).</li><li>• 8-10: Accurately states ARP resolves a known IP address to its corresponding MAC address on shared access, broadcast-based media (like Ethernet).</li></ul>

#	Question	Marking Criteria (Scale of 1-10)
E5	List two well-known TCP ports and their associated services mentioned in the article's table.	<ul style="list-style-type: none"> <li>1-4: Names fewer than two correct ports/services or names UDP ports.</li> <li>5-7: Names two correct ports but incorrect services, or vice versa.</li> <li>8-10: Correctly lists two pairs from the table (e.g., 21/FTP Control, 80/HTTP, 23/Telnet, 139/NetBIOS session, 20/FTP Data).</li> </ul>
E6	What are the two types of sockets provided by the Windows Sockets API, according to the text?	<ul style="list-style-type: none"> <li>1-4: Incorrect types or names only one.</li> <li>5-7: Names one correctly (stream or datagram) but not the other.</li> <li>8-10: Correctly identifies both stream sockets (using TCP) and datagram sockets (using UDP).</li> </ul>

## Medium Questions (Interpretation & Connection)

#	Question	Marking Criteria (Scale of 1-10)
M1	The article describes IP as "unreliable." Which higher-layer protocol mentioned is responsible for providing reliability, and how does it achieve this according to the text?	<ul style="list-style-type: none"> <li>1-4: Incorrect protocol or fails to explain the reliability mechanism.</li> <li>5-7: Correctly identifies TCP but provides a vague explanation (e.g., "it checks data") without mentioning sequence numbers or acknowledgments.</li> <li>8-10: Accurately identifies TCP and explains its reliability comes from using sequence numbers for segments and requiring acknowledgments (ACKs) for received data, retransmitting if ACKs are not received.</li> </ul>
M2	Explain the process of IP fragmentation and reassembly as described in the article. What key IP header fields are involved?	<ul style="list-style-type: none"> <li>1-4: Incorrect explanation or misses key fields. Confuses fragmentation with routing.</li> <li>5-7: Explains fragmentation occurs when MTU is smaller, mentions division into smaller packets, but is unclear on reassembly or misses one/two key fields.</li> <li>8-10: Accurately describes: Router fragments packet if MTU is too small; uses original Identification field on all fragments; sets More Fragments Flag (except on last); uses Fragment Offset for position. Destination uses Identification and Fragment Offset to reassemble.</li> </ul>

#	Question	Marking Criteria (Scale of 1-10)
M3	What is the main purpose of ICMP according to the article? Provide an example of a situation where an ICMP message would be sent.	<ul style="list-style-type: none"> <li>• 1-4: Incorrect purpose (e.g., data transfer, address resolution). Example is wrong or missing.</li> <li>• 5-7: Correctly identifies the purpose (troubleshooting/error reporting) but provides an incorrect or vague example, or an example not mentioned (like ping without naming the messages).</li> <li>• 8-10: Accurately states ICMP provides troubleshooting and error reporting for undeliverable packets. Gives a correct example from the text (e.g., ICMP Destination Unreachable sent if IP cannot deliver a packet, Echo Request/Reply for connectivity check).</li> </ul>
M4	Describe the function of the TCP three-way handshake based on the article's explanation. What is its purpose?	<ul style="list-style-type: none"> <li>• 1-4: Incorrect description of steps or purpose. Confuses with data transfer.</li> <li>• 5-7: Describes the basic SYN, SYN-ACK, ACK flow but is unclear on the purpose (synchronizing numbers, exchanging window sizes).</li> <li>• 8-10: Accurately outlines the three steps (client SYN, server SYN-ACK, client ACK) and states the purpose: to synchronize sequence and acknowledgment numbers and exchange TCP window sizes.</li> </ul>
M5	What is the role of IGMP in the context of IP multicasting, as explained in the text? List one type of IGMP message mentioned.	<ul style="list-style-type: none"> <li>• 1-4: Incorrect role (e.g., sending multicast data, routing) or incorrect message type.</li> <li>• 5-7: Correctly identifies the role (managing host membership in multicast groups) but names an incorrect message type or cannot name one.</li> <li>• 8-10: Accurately states IGMP manages host membership in IP multicast groups on a segment and allows hosts to register membership. Correctly names one message type (Host Membership Report, Host Membership Query, Group Leave).</li> </ul>
M6	Compare the key characteristics of TCP and UDP as described in the article regarding reliability and connection setup.	<ul style="list-style-type: none"> <li>• 1-4: Incorrect comparison, mixes features between the two.</li> <li>• 5-7: Correctly identifies TCP as reliable/connection-oriented and UDP as unreliable/connectionless but doesn't elaborate based on article details (e.g., ACKs for TCP, no ACKs for UDP).</li> <li>• 8-10: Accurately contrasts TCP (reliable, connection-oriented, uses handshake, guarantees delivery via ACKs/retransmission) with UDP (unreliable, connectionless, no handshake, best-effort delivery, no guaranteed arrival/sequencing).</li> </ul>

## Hard Questions (Synthesis & Application within Article Context)

#	Question	Marking Criteria (Scale of 1-10)
H1	The article mentions several ICMP Destination Unreachable messages. Explain the difference between a "Host Unreachable" and a "Protocol Unreachable" message based on the descriptions provided.	<ul style="list-style-type: none"><li>• 1-4: Incorrect explanations or confuses the two messages.</li><li>• 5-7: Correctly explains one but not the other, or provides vague descriptions distinguishing source (router vs host) but not the underlying reason.</li><li>• 8-10: Accurately differentiates: Host Unreachable is sent by a router when it cannot find a route to the destination IP. Protocol Unreachable is sent by the destination host when the protocol specified in the IP header (e.g., TCP, UDP) isn't active/matched.</li></ul>
H2	How do the IP header's "Protocol" field and the TCP/UDP header's "Destination Port" field work together to deliver data to a specific application, based on the information in the article?	<ul style="list-style-type: none"><li>• 1-4: Incorrect explanation, confuses fields, or describes only one field's function.</li><li>• 5-7: Explains the function of each field separately (Protocol field directs to TCP/UDP, Port field directs to app) but doesn't clearly synthesize how they combine for delivery.</li><li>• 8-10: Accurately synthesizes: The IP header's Protocol field tells the destination IP layer whether to pass the payload up to TCP or UDP (or ICMP, etc.). The Destination Port field within the subsequent TCP or UDP header then allows that protocol layer to deliver the data to the specific application/process listening on that port number.</li></ul>
H3	The article describes NetBIOS over TCP/IP (NetBT) providing three distinct services: Name Management, Datagrams, and Sessions. Based on the descriptions, explain which core TCP/IP protocol (TCP or UDP) is used for each service and why that choice is appropriate according to the service description.	<ul style="list-style-type: none"><li>• 1-4: Incorrect protocol mapping or justification for fewer than two services.</li><li>• 5-7: Correctly maps protocols (UDP 137, UDP 138, TCP 139) but provides weak or missing justifications based on the service characteristics (e.g., query/response vs connectionless vs connection-oriented).</li><li>• 8-10: Accurately maps: Name Management (UDP 137 - suitable for quick query/response), Datagrams (UDP 138 - matches connectionless, unreliable nature), Sessions (TCP 139 - required for connection-oriented, sequenced, reliable delivery). Justifies each choice based on the service descriptions (e.g., unreliable datagrams use UDP, reliable sessions use TCP).</li></ul>

#	Question	Marking Criteria (Scale of 1-10)
H4	Explain the relationship described between IP addresses, MAC addresses, and the ARP protocol specifically in the context of sending an IP packet on a shared medium like Ethernet.	<ul style="list-style-type: none"> <li>• 1-4: Confuses IP and MAC roles, or incorrectly describes ARP's function in this context.</li> <li>• 5-7: Explains that IP is for end-to-end routing and MAC is for the local hop, and ARP finds the MAC, but struggles to clearly link them in the packet sending process on Ethernet.</li> <li>• 8-10: Accurately explains: To send an IP packet to a host (or next-hop router) on the same Ethernet segment, the sending host needs the destination *MAC address* for the Ethernet frame header. If the MAC isn't cached, ARP is used: it broadcasts a request with the target IP address, and the owner of that IP replies with its MAC address, allowing the frame to be addressed and sent.</li> </ul>
H5	Considering the descriptions of Windows Sockets and NetBIOS Interface, how do these components act as intermediaries between user applications and the core TCP/IP protocols (TCP, UDP, IP)?	<ul style="list-style-type: none"> <li>• 1-4: Cannot explain the intermediary role or describes them as core protocols themselves.</li> <li>• 5-7: Explains they are APIs used by applications, but is vague on how they interact with TCP/UDP/IP (e.g., "they let apps use the network").</li> <li>• 8-10: Accurately explains that Windows Sockets and NetBIOS Interface are Application Programming Interfaces (APIs) that provide a standardized set of functions/commands. Applications call these API functions (e.g., connect, send, receive, resolve name) which, in turn, interact with the underlying TCP, UDP, and IP protocol implementations to perform the actual network communication tasks. They abstract the complexity of the core protocols.</li> </ul>