

# ECSE-6600: Internet Protocols

## Informal Quiz #03 **SOLUTIONS**

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# **Internetworking: Informal Quiz SOLUTIONS**

# Internetworking

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- √  The application-level gateway is a translation-based approach to internetworking
- √ Translation-based approaches to internetworking are highly scalable; and control resides with end-systems
- √  Application-level gateways (ALG) are usually highly stateful
- √  Replacing the ALG approach with common sublayer (IP) gateways leads to global addressability
- √ The IPv4 address is 16 bytes long
- √ The subnet mask is specified in every data packet header
- √ IP only allows fixed packet sizes
- √  The error detection method used by IP is a simple 16-bit checksum, and is therefore fairly weak.
- √ IP can multiplex and demultiplex packets directly from any application, without an intervening transport layer
- √  If the network address encoded in the destination address matches the network address encoded in the source address, the destination is directly connected (usually via a LAN) to the source.

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- √  The network address is usually encoded as a prefix of the IP address
- √ The destination (or next-hop) LAN address is usually found through a procedure called fragmentation/re-assembly
- √ The routing table maps destination prefixes to destination LAN addresses
- √  The subnet mask is a fancy way of specifying the boundary between the network part and the host part in the IP address.
- √ ARP is a protocol that resolves names to IP addresses
- √  Address resolution is an example of an “indirection” mechanism (part of the puzzle of creating the virtualization of “connectivity”)
- √ The IP protocol provides routing and error reporting functions in addition to forwarding, fragmentation/re-assembly and address resolution
- √  In the IP addressing scheme, hosts in the same subnet are constrained to have the same address prefix and subnet mask
- √  The class A through class D method of encoding network addresses is called the “classful” addressing model. Though it has no relevance today, operators may refer to an address as being from the original classful allocations

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- ✓ 192.10.20.11 is a class B address
- ✓  In the address 128.13.40.50, the “128.13” part refers to the network address (in the classful addressing model)
- ✓  The classful IP addressing restricts the flexibility of address allocation and may waste IP address space
- ✓ In the address, 15.10.9.8/20, the first 21 bits refer to the network address.
- ✓  15.10.9.8/20 is an example of a supernetted (or CIDR) address.
- ✓  The subnet masking procedure lead to a change in the forwarding algorithm and routing table structure (I.e. changes in the critical data path of IP)
- ✓  VLSMs imply that different subnets in an organization could be sized differently and have different length subnet masks.
- ✓  Hierarchical addressing leads to smaller routing table sizes
- ✓ Maximum transmission unit is a transport layer (I.e. layer 4) parameter.
- ✓  When an IP datagram has to traverse a series of networks with different MTUs, the largest possible fragment size is the minimum MTU of the path.

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- ✓ Reassembly of IP datagram fragments is performed at every hop (I.e. hop-by-hop)
  - ✓  The DF bit is set to indicate the the packet should be dropped if fragmentation is necessary
  - ✓  The purpose of path MTU discovery is to size datagrams so as to largely avoid the need for fragmentation (a performance concern)
  - ✓ IP (I.e. layer 3) provides the path-MTU discovery function
  - ✓ ARP is the only method of performing address resolution
  - ✓  The table-lookup method of address resolution is static, I.e., it will fail when the mappings change dynamically
  - ✓  ARP is essentially a dynamic binding strategy for the address resolution (I.e indirection) problem
  - ✓ The ARP request is unicast to the receiver
  - ✓  The hourglass model refers to the fact that a variety of applications & transports are mapped to a single, simple protocol (IP) that is in turn mapped to a variety of underlying networks.
  - ✓ In IP, the routers implement a lot of functions (esp. forwarding functions) compared to end-hosts.