Info 2601

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1) 140.142.91.40/25.

$T= 2^{32-25}=128$

$G=128/4=32$

$P=25+ \log_2(128/32)=25+\log_2(4)=27$

140.142.91.40/27

2) Traceroute works by utilizing the TTL of a packet which is decreased by one at every hop. So consider that we are sending a packet, the traceroute sends a packet with a TTL of one to the destination server, at the first hop the packet TTL drops to zero and an error message is sent to the client. This will be the RTT for the first hop. The traceroute then sends a packet of TTL 2 the packet reaches to the second hop and the TTL drops to zero and the error is relayed back to the client which continues to send packets of increasing TTLs in order to get the RTT to the destination and the number of hops in between the client and the destination address.

3.) Different networks have different maximum packet sizes or MTU
(Maximum Transmission Units) and making a packet as large as possible is the best for efficiency however there is still an optimum sized since the client only knows the MTU of the immediate network link and not the MTU of links higher along the network route. The source would sent the packet at its network link MTU and when it arrives at a router that has a smaller MTU it is fragmented into multiple packets to allow it to pass through this fragmentation process continues at routers that have a smaller MTU than the size of the packets and when those packets are received at the destination it is then reassembled into original packet size.

4) 1) S:10.0.0.11

D:10.0.0.14;4430

2) S:148.67. 92 .8; 4001

D: 138.117.30.168; 80

3) S: 138.117.30.168; 80

D: 148.67. 92 .8; 4001

4) S: 10.0.0.14;4430

D: 10.0.0.11

5) h1.a.com sends a DNS REQUEST message to its local DNS

Local DNS contacts a root DNS server with a REQUEST message

Root DNS server returns name of DNS Top Level Domain server for b.com

Local DNS server contacts b.com TLD

TLD B.com server return name server for b.com

Local DNS server contacts authoritative name server for b.com

Name server for b.com returns IP address of www.b1.com.

Client sends HTTP GET message to www.b1.com which then it sends to the HTTP cache in the a.com network

The document is not found in its HTTP cache, so it sends the GET request to www.b.com.

www.b.com receives a GET request and sends the file

HTTP Cache Receives the file and forwards it to www.a.com

www.a.com send the file back to h1.a.com

6) The operating system of the laptop creates a DHCP request and puts it within a UDP segment with a destination port 67 and source port 68. The UDP segment us placed within an IP datagram with a broadcast IP address (255.255.255.255) and a source IP address of 0.0.0.0, since the laptop doesn't have an IP address. The IP datagram containing the request message is then placed in an Ethernet frame which has a destination MAC addresses of FF:FF:FF:FF:FF:FF so that the frame will be broadcast to all devices connected currently connected to the network switch which includes DHCP server, the ethernet frame's source MAC address is that of the laptop which is 00:16:D3:23:68:8A. The Ethernet frame containing the DHCP request is the first frame sent by Bob's laptop to the Ethernet switch. The router receives the Ethernet frame containing the DHCP request on its interface with MAC address 00:22:6B:45:1F:1B and the IP datagram is extracted from the Ethernet frame. The datagram's broadcast IP destination address indicates that this IP datagram should be processed by upper layer protocols at this node, so the datagram's UDP segment is now demultiplexed up to UDP, and the DHCP request message is extracted from the UDP segment. The DHCP server now has the DHCP request message. The DHCP server is running within the router and can allocate IP addresses in the block 68.85.2.0/24