1. If number of bits is N, then N-1 Zero bits are added in the payload then the resulting bit stream will be 10011101000. Now by performing division by 4-bit generator 1001 the CRC bits associated with the data payload are 100.

   So, the resultant bit stream will be 10011101**100**.

   Validation:

   D*(2^r) = (Quotient * G) XOR R
   10011101000 = (10001100 *1001) XOR (100)
   10011101000 = (10011101100) XOR (100)
   10011101000 = 10011101000

2. For Slotter ALOHA Efficiency with N nodes: N*p*(1-p) ^ N-1
   For Pure ALOHA Efficiency with N nodes: N*p*(1-p) ^ (2*(N-1))

   **A.**

   **Slotted ALOHA:**
   Here N = 3 and p = 0.37
   Efficiency = 3 * 0.37 * (0.63) ^ 2
   Efficiency = 0.44

   **Pure ALOHA:**
   Here N = 3 and p = 0.37
   Efficiency = 3 * 0.37 * (0.63) ^ (2*2)
   Efficiency = 0.17

   B.

   **Slotted ALOHA:**
   Here N = 3 and p = 0.37
   Efficiency = 3 * 0.59 * (0.41) ^ 2
   Efficiency = 0.29

   **Pure ALOHA:**
   Here N = 3 and p = 0.37
   Efficiency = 3 * 0.59 * (0.41) ^ (2*2)
   Efficiency = 0.05

3. It is not possible to guarantee end-to-end communication between hosts even if all individual links are reliable. Depending on the router or switch, packets might get lost in forwarding between different links. This is because the network interface card of the sending host might drop a packet, or the network interface card of the receiving host might lose the packet. On the Internet, link-layer reliability only applies between point-to-point nodes. There is a need for higher layer services to provide end-to-end reliability between two arbitrary hosts.

4. When transmitting a frame that has already experienced n collisions, a node chooses the value of k at random from Set {0, 1, 2, 3, …., (2^n)-1}. The probability to choose a value from that Set is 1/(2^n).

   For the question n = 5; So, the probability that a node chooses k=4 is 1 / (2^5) that is 1/32.

5. SDN's network-control application layer because it acts as SDN’s brain. Utilizing the North Bound API, the network control application layer communicates with the SDN controller, which has access to the network's current state, to carry out the network control operation.

6. Initially, the packets are routed according to the policies. Inter-AS routing depends heavily on policies. Scalability, or the capacity to manage many nodes in the network, performance is the delivery of packets with a less latency and a higher throughput. Inter-AS protocol helps in the controlled distribution of routing information. Intra-AS protocol comprises of the policy issues which play a less important role in choosing routes. Inter-AS routing is policy-oriented, so the performance of the routes used is given secondary importance whereas in intra-AS routing, performance is crucial. Inter-AS Uses BGP (Border Gateway Protocol) whereas intra-AS uses RIP (Router Information Protocol) or OSPF (Open shortest path first protocol).

7.
   A. Destination Mac Address: 07-C2-46-49-FE-4B
   B. Destination IP Address: 128.119.19.29
   C. Source MAC Address: 94-12-46-A5-94-35, Destination MAC Address: 31-AB-BC-61-25-6C.
      Yes. Due of the Link layer's ability to transport data between points rather than end to end directly. Therefore, when data is shifting in the link while sending between the source and destination, MAC addresses will change.

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It being passed by router which cause in subnet chanç