1. Example roll: 16CS30018 The data that needs to be transmitted is 16CS18

   The hex code of this data is 0x313643533138

   Calculation: (2's complement addition (RFC 1071))

   (1,2) 0x3136
   (3,4) + 0x4353
   (5,6) + 0x3138

   (sum) 0xA5C1

   Checksum = (sum o 0xFFFF) + (sum >> 16) = 0xA5C1 *

   * *The formula takes care of overflow in the sum (i.e. if the sum is more than 16bit). o is the bitwise and operator.*

   The receiver does the same calculation and matches whether the transmitted checksum is the same as the calculated checksum.

2. The IP and the MAC address will be as follows.

   a. Source IP: 10.0.0.1
      Destination IP: 10.0.1.1
      Source MAC: 00:0a:95:9d:68:16
      Destination MAC: 00:b7:91:8d:12:0a

   b. Source IP: 10.0.0.1
      Destination IP: 10.0.1.1
      Source MAC: 00:A0:C9:14:C8:29
      Destination MAC: 00:1B:44:11:3A:B7

   c. R1 broadcast an ARP Query message through R1-eth2. H2 receives that ARP Query and replies back with its MAC address through an ARP Reply.

3. Let N = 20, then the cable speed is 1Gbps.

   In CSMA/CD, for a station to get some surety of successful transmission, the contention interval (time during which the station is transmitting) should have at least 2 x propagation time slot width, i.e. there must be enough time for the front of the frame to reach the end of the cable and then for an error message to be sent back to the start before the entire frame is transmitted.

   As a result for a 1 km cable the one-way propagation time = 1/200000 = 5 μsec. So, for both ways it would be = 2 x 5 μsec = 10 μsec

   At 1 Gbps, all frames shorter than 10,000 bits can be completely transmitted in under 10 μsec, so the minimum frame is 10,000 bits or 1250 bytes.