**R1:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mask | Destination | Next Hop | Flag | Interface |
| 255.255.255.255 | 200.200.200.20 | - | - | 200.200.200.50 |
| 255.255.255.0 | 200.200.200.0 | - | - | 200.200.200.50 |
| 255.255.255.255 | 138.15.150.119 | - | - | 138.15.150.1 |
| 255.255.255.0 | 138.15.150.0 | - | - | 138.15.150.1 |
| 255.255.255.240 | 100.100.100.96 | - | - | 100.100.100.97 |
| 255.255.255.255 | 77.77.77.77 | 100.100.100.167 | 138.15.150.20 | G | 100.100.100.97 |  138.15.150.1 |
| 255.255.0.0 | 77.77.0.0 | 100.100.100.167 | 138.15.150.20 | G | 100.100.100.97 |  138.15.150.1 |

**R2**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mask | Destination | Next Hop | Flag | Interface |
| 255.255.255.255 | 200.200.200.20 | 100.100.100.97 | G | 100.100.100.167 |
| 255.255.255.0 | 200.200.200.0 | 100.100.100.97 | G | 100.100.100.167 |
| 255.255.255.255 | 138.15.150.119 | 100.100.100.97|  77.77.124.42 | G | 100.100.100.167|  77.77.152.251 |
| 255.255.255.0 | 138.15.150.0 | 100.100.100.97|  77.77.124.42 | G | 100.100.100.167|  77.77.152.251 |
| 255.255.255.240 | 100.100.100.96 | - | - | 100.100.100.167 |
| 255.255.255.255 | 77.77.77.77 | - | - | 77.77.152.251 |
| 255.255.0.0 | 77.77.0.0 | - | - | 77.77.152.251 |

**R3:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mask | Destination | Next Hop | Flag | Interface |
| 255.255.255.255 | 200.200.200.20 | 138.15.150.1 | G | 138.15.150.20 |
| 255.255.255.0 | 200.200.200.0 | 138.15.150.1 | G | 138.15.150.20 |
| 255.255.255.255 | 138.15.150.119 | - | - | 138.15.150.20 |
| 255.255.255.0 | 138.15.150.0 | - | - | 138.15.150.20 |
| 255.255.255.240 | 100.100.100.96 | 138.15.150.1 |  77.77.152.251 | G | 138.15.150.20 |  77.77.152.251 |
| 255.255.255.255 | 77.77.77.77 | - | - | 77.77.124.42 |
| 255.255.0.0 | 77.77.0.0 | - | - | 77.77.124.42 |

**Host A:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mask | Destination | Next Hop | Flag | Interface |
| 255.255.255.0 | 200.200.200.0 | - | - | 200.200.200.20 |
| 255.255.255.255 | 138.15.150.119 | 200.200.200.50 |  | 200.200.200.20 |
| 255.255.255.0 | 138.15.150.0 | 200.200.200.50 |  | 200.200.200.20 |
| 255.255.255.240 | 100.100.100.96 | 200.200.200.50 |  | 200.200.200.20 |
| 255.255.255.255 | 77.77.77.77 | 200.200.200.50 |  | 200.200.200.20 |
| 255.255.0.0 | 77.77.0.0 | 200.200.200.50 |  | 200.200.200.20 |

**Host B:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mask | Destination | Next Hop | Flag | Interface |
| 255.255.255.255 | 200.200.200.20 | 77.77.152.251 |  | 77.77.77.77 |
| 255.255.255.0 | 200.200.200.0 | 77.77.152.251 |  | 77.77.77.77 |
| 255.255.255.255 | 138.15.150.119 | 77.77.124.42 |  | 77.77.77.77 |
| 255.255.255.0 | 138.15.150.0 | 77.77.124.42 |  | 77.77.77.77 |
| 255.255.255.240 | 100.100.100.96 | 77.77.152.251 |  | 77.77.77.77 |
| 255.255.0.0 | 77.77.0.0 | - |  | 77.77.77.77 |

**2-**

**IP Packet**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VER | HLEN : **20** | DS | Total length : **45020** | |
| ID | | | flags | Fragmentation Offset : **0** |
| TTL | | Protocol | Header checksum | |
| Source : **200.200.200.20/24** | | | | |
| Destination:**77.77.77.77/16** | | | | |
| Option | | | | |

**Routing:**

**For routing, we mask every row (in Order) in current routing table with Destination (77.77.77.77). If the destination is matched, we proceed to the next Hop.**

**In Host A’s Routing table: first Match is :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 255.255.255.255 | 77.77.77.77 | 200.200.200.50 |  | 200.200.200.20 |

**So the packet is sent to 200.200.200.50 (R1) through 200.200.200.20.**

**In R1:**

**Matched With:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 255.255.255.255 | 77.77.77.77 | 100.100.100.167 | 138.15.150.20 | G | 100.100.100.97 |  138.15.150.1 |

**We choose destination** 100.100.100.167 **(R2) through 100.100.100.97**

**In R2:**

**Matched With:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 255.255.255.255 | 77.77.77.77 | - | - | 77.77.152.251 |

**There is no next Hop so the packet will be directly sent to Host B.**

**3:**

**Based on The route, it will be fragmented in network 100.100.100.96/28 and 77.77/16**

**In R1 (100.100.100.96/28):**

**Header Size = 20 Byte**

**Total Size = 17914**

**Data Size = 17914 – 20 = 17894**

**We need 3 Fragments.**

**Frag1: Flags: M = 1 | Offset= 0**

**Frag2: Flags:M = 1 | Offset = 17894**

**Frag3: Flags:M = 0 | Offset = 35788**

**In R2:**

**Each of the above frags will be again fragmented.**

**Header Size = 20**

**Total Size = 1500**

**Data Size = 1480**

**12 Frags are Needed: ceil(17894/1480) = 12**

**Frag1 : M = 1 | Offset = 0;**

**Frag2 : M=1 | Offset = 1480**

**…**

**Frag12: M = 0 | Offset = 17760**