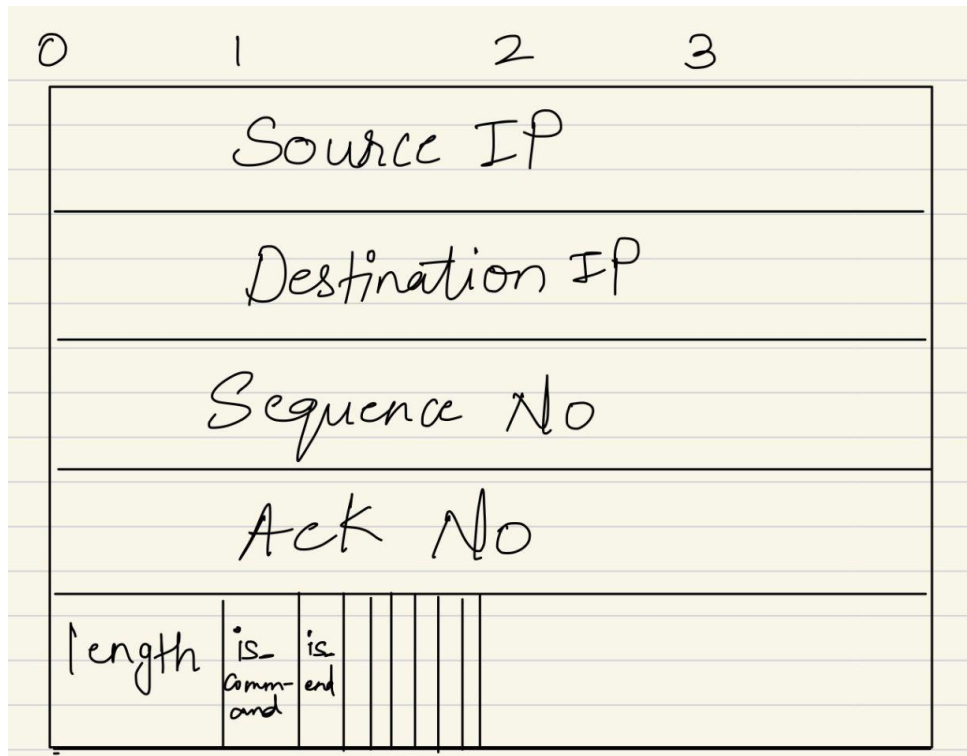


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Protocol Documentation

Header Format :



Header Description :

1. Source IP : Source IP address of 4 bytes
2. Destination IP : Destination IP address of 4 bytes
3. Sequence No : Sequence No of 4 bytes
4. Acknowledgement : Ack no of 4 bytes
5. Length : length of payload in packet - 1 byte
6. Is\_command : Single bit to identify if its command packet or not
7. Is\_end : Single bit to identify if it's the end packet of the stream.

In the protocol designed Sequence no and ack no is used to reliably transfer data from end to end so that any dropped packet can be received again.

Sequence No and Ack no have same meaning as in TCP.

**Seq no** : Number which identifies from what position sender is sending from buffer.

**Ack no** : Number which ask other end to send data from this position.

**Communication 1 (From Rover to NASA):**

- Rover will get the image , convert to byte and then convert bytes to packets by including header and send **all** the packets over the network.

- On the Receiver side NASA will get the packet and store the payload of the packet and compute to see first missing packet using sequence number and ask rover to send it again using ack no. It will check for missing packet every **5sec** and ask rover to send first missing packet.
- Once it has all the packet it will form the image from byte array and write it to disk. (This is confirm using seqno & is\_end flag in header)
- Rover won't send unless it receives packet from NASA asking for data.

### **Communication 2 (From NASA to Rover):**

- Nasa will send to rover for any command in payload of packet as integer in range 1-255
- Rover will send ACK that command has been successfully received
- If NASA do not receive ack say ack packet got dropped for the command nasa will resend the command packet again every **5sec** unless it receives ack for the send command

Type of communication is identified using **is\_command** field in header.

Maximum Size of packet here will be **1300 bytes (payload) + 18 bytes (header) = 1318 bytes**

### **Compare to TCP :**

1. In this protocol I have reduced the size of header so that less data needs to be transfer over network meaning lesser packet.
2. Only missing packet needs to be transfer again as for all received packets data is stored so no need to transfer it again
3. Only one side will resend the packet again based on timer or dropped packet other end just needs to acknowledge to send ack or data.
4. Compare to TCP here one end sends all data at once after that other end will ask missing packets one by one.
5. Congestion control is not needed in this scenario as the link will only be dedicated to NASA rover communication.
6. Error checking is not needed if there are any errors in packet that will be identified by lower layer and packet will be resend again.