A document describing the following:

(1) format of header and packet that goes from Rasp Pi to Arduino Uno via LED and Photodiode;

The packets contains header, payload and checksum. The header has the bit ‘1’. The payload has the data of 8 bits. The checksum is of 8 bits and is calculated using a key known to the sender and the receiver.

(2) format of ACK that goes from laptop # 2 to Rasp Pi via TCP connection over WiFi,

The ACK packet consists of the string “1”.

(3) how you modulate the LED to transmit a 0 or a 1,

The LED is set to +5 (LED glows) when a 1 is transmitted, 0 otherwise ( LED does not glow).

(4) how do you synchronize the Rasp Pi and arduino,

If the Host 2 gets 2 errors in the bits, it sends a SYN – 2 status to the Rasp Pi. The rasp pi transmits the Synchronization stream (111111111111111100000000) to Arduino till a SYNACK (stat = 4) is received from Host 2. If a SYNNAK (stat = 5) is received from Host2, continue sending Synchronization stream. This helps to regain synchronization and prevents any drift in reading of bytes.

(5) how long do you take to transmit a bit,

The time taken to transmit a bit is 25ms.

(6) explanation of the scheme you use to build reliability.

We use ACKs and NAKs to ensure reliability. Whenever the Host 2 receives a packet, it checks for the checksum, if the checksum is as desired, an ACK is sent in response, else, a NAK is sent. Synchronisation between the Rasp pi and the Arduino is another way of ensuring reliability. If the Host 2 gets 2 errors in the bits, it sends a SYN – 2 status to the Rasp Pi. The rasp pi transmits the Synchronization stream (111111111111111100000000) to Arduino till a SYNACK (stat = 4) is received from Host 2. If a SYNNAK (stat = 5) is received from Host2, continue sending Synchronization stream. This helps to regain synchronization and prevents any drift in reading of bytes.