

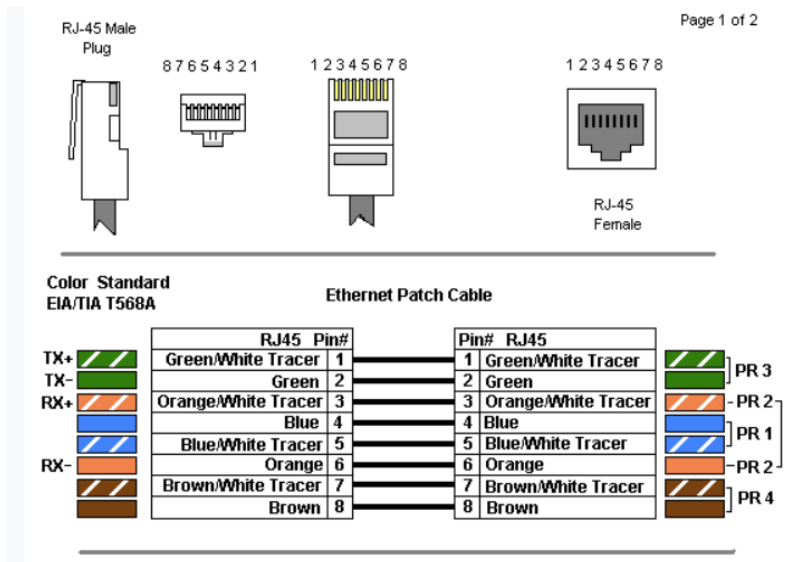
Wiring and testing of 100Mbps ethernet link

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Objectives

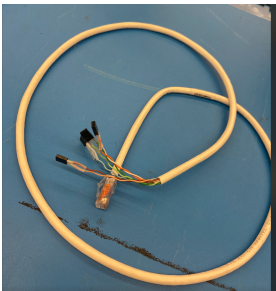
To test the ethernet link for DORA with a laptop and CM4 breakout board to see the link speed with unmatched cable length between twisted pairs, within twisted pairs, flipping Tx+/-, flipping Tx, Rx.

Ethernet wiring diagram

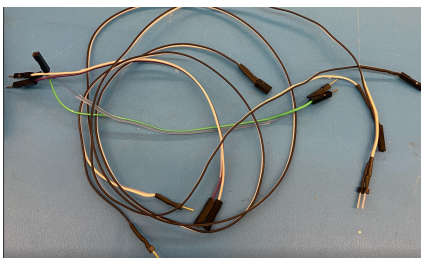


Equipments used

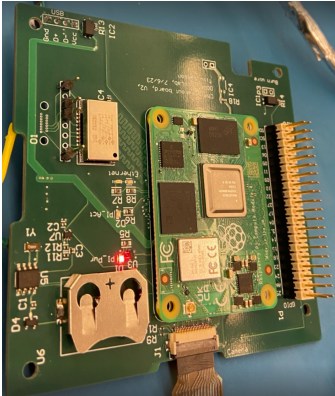
- 1) Ethernet cable terminated with female jumper pins



- 2) Male to female jumper cables with different length(not twisted pairs but stuck together)



3) CM4 breakout board

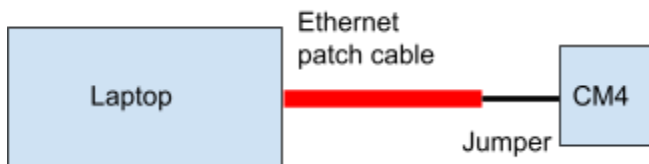


4) A USB-c adapter with ethernet port



5) A dummy file with size 100 MB

6) Test setup



Case1) Ethernet cable connected with same length jumper cable

a)

RJ 45 side	Jumper	CM4 side
Tx+	~20cm	Tx+
Tx-	~20cm	Tx-
Rx+	~20cm	Rx+
Rx-	~20cm	Rx-

Link established in	12-13 sec
Up load time for 100MB file	9 sec
Down load time for 100MB file	9 sec

b) Flipped the jumper cable within the pairs(Tx+,Tx- and Rx+,Rx-)

RJ 45 side	Jumper	CM4 side
Tx+	~20cm	Tx-
Tx-	~20cm	Tx+
Rx+	~20cm	Rx-
Rx-	~20cm	Rx+

Link established in	12-13 sec
Up load time for 100MB file	9 sec
Down load time for 100MB file	9 sec

Case2) Ethernet cable connected with different length jumper cable

RJ 45 side	Jumper	CM4 side
Tx+	0cm	Tx-
Tx-	cm	Tx+
Rx+	~80cm	Rx-
Rx-	~80cm	Rx+

Link established in	12-13 sec
Up load time for 100MB file	9 sec
Down load time for 100MB file	9 sec

Case3) Ethernet cable connected with different length jumper cable within Tx pair(Tx+ with short cable and Tx- with long cable)

RJ 45 side	Jumper	CM4 side
Tx+	~20cm	Tx-
Tx-	~80cm	Tx+
Rx+	~20cm	Rx-
Rx-	~20cm	Rx+

Link established in	12-13 sec
Up load time for 100MB file	9 sec
Down load time for 100MB file	9 sec

Case4) Ethernet cable connected with seperated (jumper cable pair is not separated by ~ 5 to 10cm) 80 cm jumper cable within Tx pair.

RJ 45 side	Jumper	CM4 side
Tx+	~80cm	Tx-
Tx-	~80cm	Tx+
Rx+	~20cm	Rx-
Rx-	~20cm	Rx+

Link established in	12-13 sec
Up load time for 100MB file	9 sec
Down load time for 100MB file	9 sec

Case 5) Cross connection Tx pair and Rx pair swapped.

RJ 45 side	Jumper	CM4 side
Tx+	~20cm	Rx-
Tx-	~20cm	Rx+
Rx+	~20cm	Tx-
Rx-	~20cm	Tx+

Link established in	12-13 sec
Up load time for 100MB file	9 sec
Down load time for 100MB file	9 sec

Case 6) Cross connection

RJ 45 side	Jumper	CM4 side
Tx+	~20cm	Tx-
Tx-	~80cm	Rx+
Rx+	~20cm	Tx+
Rx-	~20cm	Rx-

Not connected

Conclusion

The lesson learned is for a 100 Mbps link speed patch cable requires two pairs, length matching is not required within pairs or between pairs, and twisted pairs are not essential.