Ethernet for the layman

In order to explain basic Ethernet theory, we can use a functional comparison to a busy city with highways, buildings, and cars. To illustrate this, the table below provides correlation between the different components/pieces/links that encompass Ethernet network connectivity, and the larger scale infrastructure of a metropolitan city.

Ethernet Basics

Ethernet is a widely used communications protocol that is used to transmit data packets (datagrams) between network devices. Imagine a highway in a large metropolitan area six lanes wide at rush hour. The vehicles on the highway need rules to follow so that they get to their destination without crashing into each other. In an Ethernet network link, there could be 100 million bits of information transmitted in one second. In the Ethernet standard, there exist rules to govern packet structure, transmission requirements, error correction, communication with end equipment, etc.

Examining the differences between 100Mhz, 100 Base TX, Cat5e; what does it all mean?

When discussing connectors and Ethernet, there are a few key details to be aware of:

- 100Mhz is a measurement of Frequency for the signal
  - Comparable to the Speed Limit of a highway
- 100BaseTX (or Fast Ethernet) is an Ethernet link standard and identifies available link bandwidth. The bandwidth is measured in units of MBits/S (megabits per second)
  - Comparable to the number of cars that pass a point in one second
- Cat5e is an EIA/TIA standard for performance and physical characteristics for cables and connectors
  - Comparable to performance specifications of the car and highway

In connectors and cables, Fast Ethernet uses 2 pairs, one for transmit, one for receive. This, way data traffic can flow in both directions simultaneously.

Esterline
Connection Technologies

Ethernet for the layman

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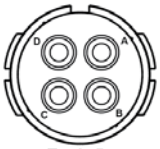
Souriau offering:

Standard solutions.

UTS Hi seal size 8, 4 contacts

1 (Pair 1) ➡ A
2 (Pair 1) ➡ C
3 (Pair 2) ➡ B
4 (Pair 2) ➡ D



8E4/8D4
4 Ø 1 (#20)

UTS size 10, 6 contacts

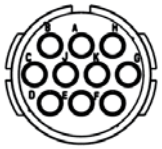
1 (Pair 1) ➡ A
2 (Pair 1) ➡ B
3 (Pair 2) ➡ E
4 (Pair 2) ➡ D

106/10E6/10D6
6 Ø 1 (#20)

Shielding continuity done in cavity C&F.
Note: Shielding can be replaced by DC power.

UTS size 12, 10 contacts

1 (Pair 1) ➡ C
2 (Pair 1) ➡ B
3 (Pair 2) ➡ G
4 (Pair 2) ➡ H



12 10/12E10/12D10
10 Ø 1 (#20)

UTO size 10, 6 contacts

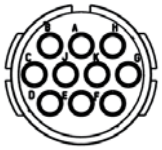
1 (Pair 1) ➡ A
2 (Pair 1) ➡ B
3 (Pair 2) ➡ E
4 (Pair 2) ➡ D

106/10E6/10D6
6 Ø 1 (#20)

Shielding continuity done in cavity C&F.
Note: Shielding can be replaced by DC power.

UTO size 12, 10 contacts

1 (Pair 1) ➡ C
2 (Pair 1) ➡ B
3 (Pair 2) ➡ G
4 (Pair 2) ➡ H



12 10/12E10/12D10
10 Ø 1 (#20)

What about using coax contacts ?

Ethernet twisted pairs carry a symmetrical (balanced) signal. Once terminated into a coax contact, the inner core will be protected by a shield - but not the outer contact. Because of EMI issues, the signal will no longer be balanced. Conclusion - it does not work and is not recommended.

What about using Quadrax contacts ?

The Quadrax contact is used in railway applications because of the use of quad cable. In this specific market, the standard Ethernet twisted pairs wires cannot be offered, they are too thin and often solid (not stranded).
In the rest of industry, UTP (Unshielded Twisted Pairs) cables are widely used. The Quadrax contact is not designed to terminate them. And thus, are not advised for industrial applications.

Conclusion

To carry 100Mb/s data signal, 100BaseTX or Fast Ethernet recommends the use of Cat5e connectors as well as Cat5e cable with the support of a 100MHz signal. Nevertheless, a 100Mb/s signal can be transmitted in certain conditions (short distance, only one connector, lower frequency but a different code) thru many other connection materials - not necessarily Cat5e rated.