News

Editorial: Cabling and connectors used in Ethernet

By Iain Deuchars, General Manager at ComNet International.

How often have you looked to borrow a friend's mobile phone charging cable just to find it has a different connection to the one on the phone, or arrived in another country and realize they have some weird looking wall socket that your power plug doesn't fit in to? It's annoying, but something that global or open standards look to remove from the world of Ethernet.

The cabling and connectors used in Ethernet are defined in a telecommunications standard set by the TIA/EIA/-568 group. EIS stands for Electronic Industries Association and TIA for Telecommunications Industry Association. This group made up of contributing organizations has defined the standard from 1995 to-date for what we call structured

cabling - the rules that say how data wiring in a building is installed and tested. Ethernet within a building operates over structured cabling, and as such, the connectors on ComNet equipment must be compliant to the TIA/EIA/-568 standard.

Gender neutrality is a hot topic these days and not one that this editorial intends to cover, but from a connector point of view, gender definition is essential. For connector harmony, a male (plug) must connect to a female (socket) and vice-versa. Any other gender combination will not work.

For the sake of this editorial, we will look at the copper (electrical) connectors only, and in the future, we will pick up on the fiber (optical) connectors.

> Our copper Ethernet medium is a cable made up of eight individual copper wires. The eight individual wires are twisted together in pairs to form four twisted pair cables, and those four twisted pair cables are grouped in a larger cable to form our TIA/EIA industry defined copper medium. Each of the copper wires is given a colored jacket to wear, so it's easily identified. And within a pair, the jackets have the same color, but one is stripped to differentiate it from its twisted-pair buddy.

So, we have our medium all defined, but what about the connector? Well, just like the medium, it is given very clear standards that need to be adhered to for compliance. The connector itself is known as an RJ45. RJ stands for Registered Jack and is a term created in the USA back in the 1970s to define connectors for the telecommunications industry. For our copper medium, the combined male/female connection must allow the physical copper to connect or touch together. Think of the power socket at your desk where you have physical copper pins on the plug that connect to copper housings in the socket. By the copper medium coming together, we create the transmission path, and our signals pass through. The RJ45 connector has eight copper conductors that create the eight individual transmission paths.

Just to confuse things a little more, the connector is generically termed an 8P8C (8 Position 8 Contact), but for our Ethernet world, we use the RJ45 terminology. The conductors in the connector are numbered, so the correct colored copper wire is attached when the connector is attached to the cable. This wiring standard dictates that all compliant connections are the same regardless of where they come from.

> The Ethernet connections with ComNet and Vanderbilt equipment are TIA/EIA -568 compliant RJ45 female (socket) - they reside within the active equipment, so are female. The male (plug) is at the end of the cabling. In the early days of

Ethernet, the cabling had to crossover - transmit on one end had to go to receive on the other, so this created problems. Today inside the active equipment, the port features MDI-X (Medium Dependent Interface – Crossover), a fancy term that says the connection tests the link and adjusts itself according to the cabling. The bottom line is you don't care these days - straight through or crossover cables connected will be ok for MDI-X compliant Ethernet ports on equipment.

Now, if we can have this level of open standards with our power connections, we would all be happier.

Download ComNet's Product Portfolio Brochure