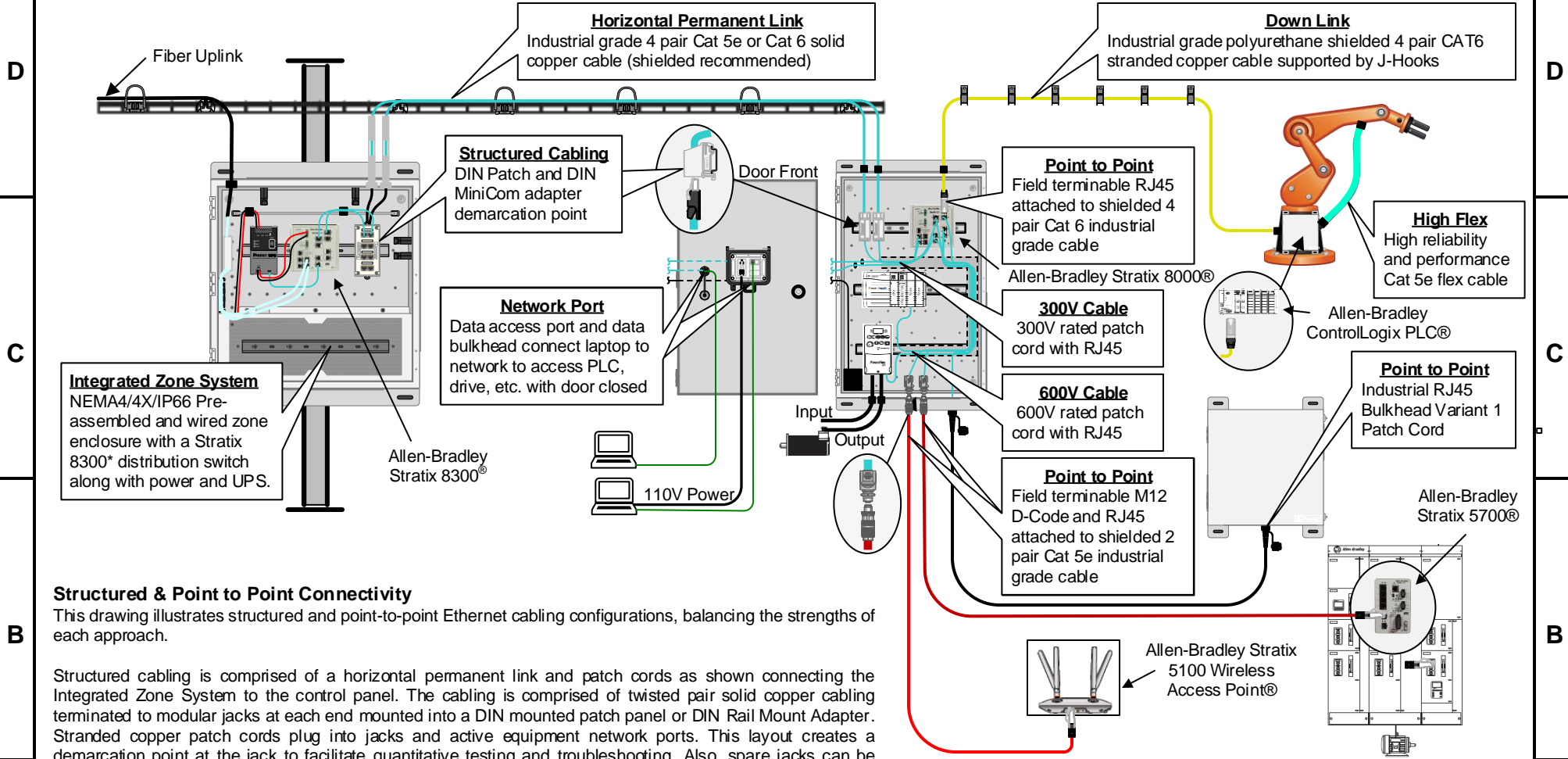


Copper Structured and Point-to-Point Cabling Techniques in an Industrial Environment



Structured & Point to Point Connectivity

This drawing illustrates structured and point-to-point Ethernet cabling configurations, balancing the strengths of each approach.

Structured cabling is comprised of a horizontal permanent link and patch cords as shown connecting the Integrated Zone System to the control panel. The cabling is comprised of twisted pair solid copper cabling terminated to modular jacks at each end mounted into a DIN mounted patch panel or DIN Rail Mount Adapter. Stranded copper patch cords plug into jacks and active equipment network ports. This layout creates a demarcation point at the jack to facilitate quantitative testing and troubleshooting. Also, spare jacks can be installed for future connections ideal for star network topologies. Adding connections is fast, easy, and low cost with just a patch cord. The drawback with structured cabling is that more cable is needed

Point-to-point is a direct connect cabling where a plug is directly connected to the device ports on each end. Typically, stranded twisted pair cabling is installed for flex. A 4-pair cable in yellow is shown connected to a field terminable RJ45 plug and a 2-pair in red is shown connected to an M12 D-code connector. A 4-pair RJ45 bulkhead patch cord is shown in black. This point-to-point connection is simpler than found in structured cabling. It is a good approach when chaining devices in a linear or ring topology. However, the stranded cable does not have the same reach due to attenuation as solid copper cable, and spare channels are more difficult.

- Use this drawing when:**
- Laying out Structured and Point-to-Point Best Practices
 - Addressing industrial cabling
 - Upgrading control network to Ethernet/IP
 - Designing control panels to meet UL 508A

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Bill of Materials

Part Number	Description
Zone Enclosure	
Z23*****	24" x 36" integrated system with 16 downlinks expandable up to 48, Stratix 8300, and UPS
FSPD912-050M	12-fiber OM2 dielectric multimode armored distribution 50 meters length
FLCDMCXAQY	LC Opticam OM3/OM4 fiber optic connector
Control Panel	
IFC6C04BBL-CEG	Shielded Cat 6 stranded cable, PVC jacket, CM
CADIN1IG	DIN rail mount adapter, international gray
CDPP8RG	8 Port DIN rail mount panel
ISTPHCH1MTL	600V rated, Cat 5e patch cord, 1 meter length
ICAM12DRJS	Bulkhead mounted RJ45 to M12 adaptor
ISPS688FA	Field attached shielded RJ45 plug
IAEBH6	Bulkhead jack Cat 6 UTP RJ45 with cap
IAPNG5EWH	IndustrialNet data access port, Cat 5e, white
CJ688TGBL	Mini-Com Module, Cat 6, UTP, 8 pos 8 wire, Universal, Black, TG Style
CJS5E88TGY	Mini-Com Module, Cat 5e, Shielded, 8 pos 8 wire, Universal, TG Style
Machine & Robot	
ISFCH5C04ATL-XG	Industrial copper cable, Cat 5e, 4-pair, 24/7 AWG stranded, SF/UTP, CM, 600V, Teal, 1000ft/305m reel, high flex, sun and oil resistant
ISFCH5C02ATL-XG	Industrial copper cable, Cat 5e, 2-pair, 24/7 AWG stranded, SF/UTP, CM, 600V, Teal, 1000ft/305m reel, high flex, sun and oil resistant
ISPS5E44MFA	Field attached shielded M12 plug
IUTPSP10BL	Industrial patch cord Cat 6 UTP RJ45 with caps, 10 ft
ISX6004AYL-LED	Industrial copper cable, Cat 6, 4-pair, 24/7 AWG stranded, S/FTP, PUR, yellow, 1640ft/500m reel
PSM7004BL-KED	Harsh environment copper cable, Cat 7, low smoke zero halogen (LSZH), 4-pair, S/FTP shielded, oil resistant
JP2SBC50-L20	J Hook with screw-on beam clamp for use with flanges up to ½"

For More Information

For more information, contact your local distributor, Panduit Sales Representative, or Rockwell Automation Sales Representative.

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About this Configuration

There are different ways to deploy copper network cabling in an industrial environment. This drawing shows best practices for various connectivity options considering the environment.

Zone Enclosure Subsystem

Redundant optical fiber uplink cables are routed into the zone enclosure to the fiber surface mount box. The surface mount box protects terminations and manages slack. On the downlink side, copper patch cords are connected to RJ45 jacks in the DIN Rail mounted patch panel connected to horizontal cables. The horizontal cables are routed to control panels that connect machine control devices to the manufacturing network. The uplinks and downlinks follow a structured cabling approach.

Control Panel Subsystem

Redundant horizontal copper cables enter the top of the panel and are terminated to jacks mounted into DIN rail mounted adapters following a structured cabling approach. Two 300V rated patch cords are then used to connect to the switch uplink ports. The switch downlinks are point-to-point connections using 600V rated patch cords from the switch to the Variable Frequency Drive (VFD) and to RJ45 to M12 D-code bulkhead adapters (IP20 and IP67 rated) mounted on the lower wall of the control panel. The 600V rated patch cords are used when cabling is in proximity of high voltages in accordance with UL 508A.

Machine Area

Four network cables exit the control panel to the machine area. At the top of control panel, a shielded 4-pair CAT6 polyurethane cable connected to the switch leaves the control panel and is connected to the robot enclosure using field terminable plugs. A bulkhead RJ45 CAT 6 UTP patch cord is used to connect an enclosure. A shielded 2-pair UTP CAT 5e cable with an M12 on one end and a field terminable plug on the other is connected to a switch in a Motor Control Center (MCC). The last cable is a shielded 2-pair UTP CAT 5e cable with an M12 on one end and a field terminable plug on the other connected to a wireless access Point (WAP). Shielded cable is typically used, and Panduit offers a CM / CMX Outdoor durable TPE jacket for North America, Latin America, and Asia Pacific. A zero halogen polyurethane jacket is available for EMEA. The cable on the robot is a high flex 4-pair shielded CAT 5e 600V rated SF/UTP cable.