

## LONWORKS® Bus Wiring Guidelines

applies to

DEMAN part number: **CAT5-1**  
 Description: **CAT 5e 24 AWG unshielded twisted pair**

### INTRODUCTION

The Free Topology Transceiver (FTT) supports polarity insensitive, free topology wiring. This frees the system installer from wiring using a specific bus topology. FTT supports T-tap, star, loop, and mixed wiring topologies. Free topology wiring allows fast and efficient installation. It simplifies network expansion by eliminating restrictions on wire routing, splicing, and device placement.

A FTT network may comprise multiple segments (up to sixty-four devices per section) separated by physical repeaters or routers.

FTT networks are very flexible and convenient to install and maintain, but it is important to carefully plan the network layout. This will minimize:

- unknown or inaccurate wire run lengths
- device-to-device distances
- device (node) counts
- total wire length
- inaccurate repeater/router locations
- misplaced or missing terminations.

Users are encouraged to familiarize themselves with the specifications and instructions as described in the document:

**LONWORKS FTT-10A Free Topology Transceiver User's Guide**

prepared by  
**ECHELON Corporation**

The document can be read at:

<http://www.echelon.com/support/documentation/manuals/transceivers/078-0156-01G.pdf>

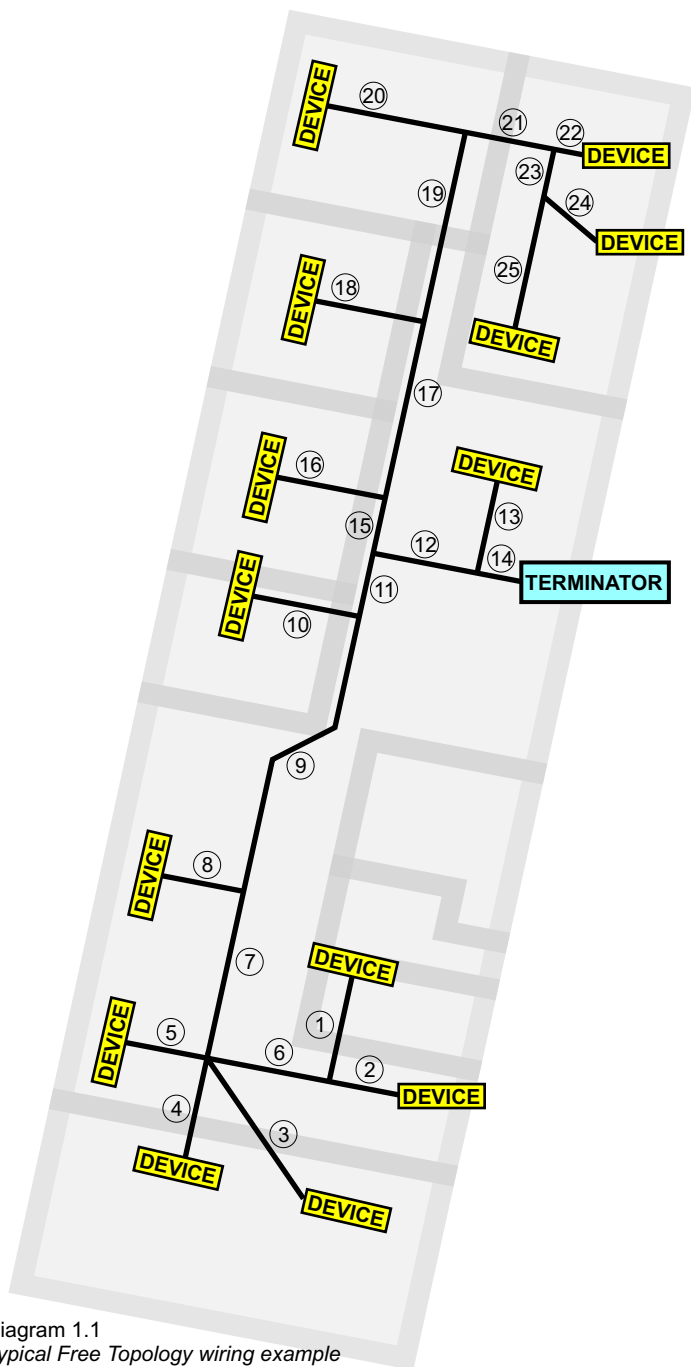


Diagram 1.1  
 Typical Free Topology wiring example

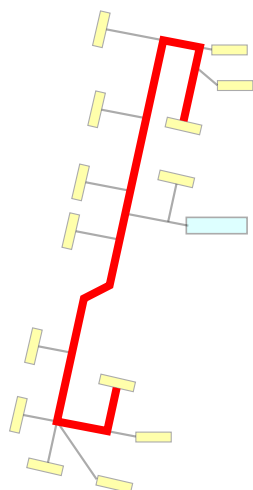
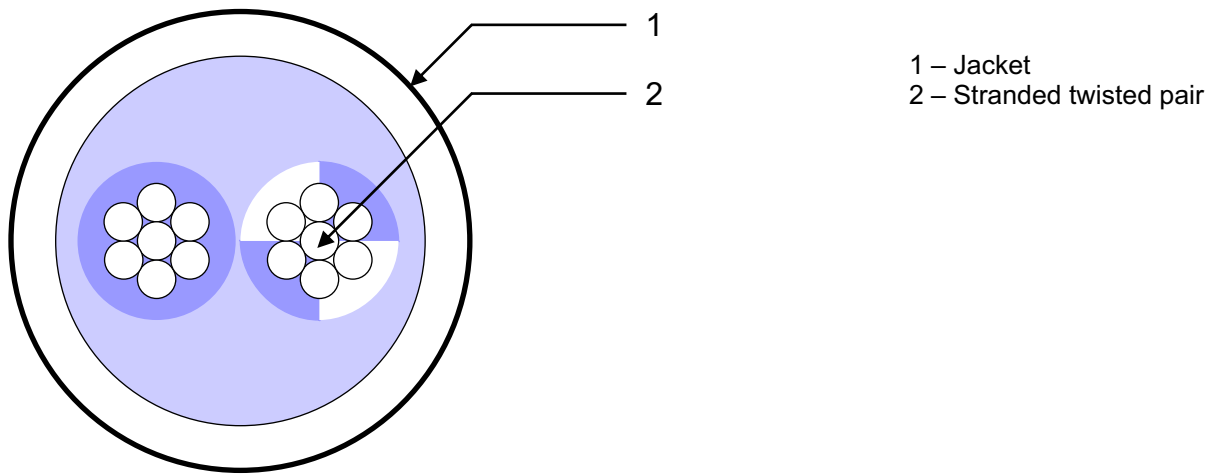


Diagram 1.2  
 Maximum device-to-device distance

- The maximum **TOTAL WIRE LENGTH** in any free topology using CAT 5e 24 AWG twisted pair wire is 450m. In diagram 1.1 that would be the sum of all the individual segments from segment 1 to segment 25. This may not exceed the allowed maximum.
- The maximum **DEVICE-TO-DEVICE DISTANCE** in any free topology using CAT 5e 24 AWG twisted pair wire is 250m. In diagram 1.2 the longest possible device-to-device route is highlighted and may not exceed the allowed maximum distance.

## CABLE SPECIFICATION

Unshielded Twisted Pair Cable UTP, 1 pair, Stranded (patch), Indoor



### Specifications:

Meets ANSI/EIA/TIA 568-B.2 requirements  
Fire protection – CM  
The cable meets UL 444 UL 1581 fire safety standard  
Application: Horizontal communication cable

### Description:

Unshielded Copper cable, 1 pair, category 5e, stranded (patch)  
Cable is used for indoor installation

### Materials:

Conductive material: wire made of soft annealed electrolytic copper  
Conductor insulation: HDPE  
The cable jacket: PVC

### Technical characteristics:

Conductor diameter: 7 x 0.008" (0.2 mm) (24 AWG)  
Insulated conductor diameter: 0.97 ± 0.05 mm (0.038" ± 0.002")  
Outer cable diameter: 3.1 ± 0.2 mm (0.12" ± 0.008")  
Jacket thickness: 0.5 mm (0.02")  
Minimum bend radius: 4 outer cable diameters  
Conductor elongation: 14% minimum  
Standard package: 500 m (1640 ft)  
Weight per 1000 m: 23 kg

Conductor resistance at 20°C (68°F)	9.38 Ohm/100 m (2.9 Ohm/100 ft)
DC Resistance Unbalance	5%
Pair-to-Ground Capacitance Unbalance	330 pF/100 m (101 pF/100 ft)
Impedance	0.772-100 MHz 85-115 Ohm
Mutual Capacitance	5.6 nF/m (1.7 nF/ft)
Spark Test	2.5 kV

### Ordering:

**CAT5-1** Unshielded Twisted Pair Cable UTP, 1 pair, Stranded (patch), Indoor