Multidrop Topologies

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Panduit

Problem Statement

- Propose recommended physical topology that meets user application requirements while supporting optimal mixing segment performance.
  - Support IEEE P802.3da Objectives
    - #1 “Define performance characteristics of a mixing segment for 10Mb/s multidrop single balanced pair networks supporting up to at least 16 nodes, for up to at least 50m reach.
    - #4 “Support interoperability with Clause 147 multidrop.”
    - #6 “Select a single MDI connector.”
    - #11 “Support addition and removal of a node or set of nodes to a continuously operating powered mixing segment.”

IEEE P802.3cg Mixing Segment

- Clause 147, paragraph 147.7
  - "… a half-duplex shared-medium mode, referred to as multidrop mode, capable of operating with multiple stations connected to a mixing segment."
- Clause 147, Figure 147-20 (shown)
  - Implies "T" connector topology

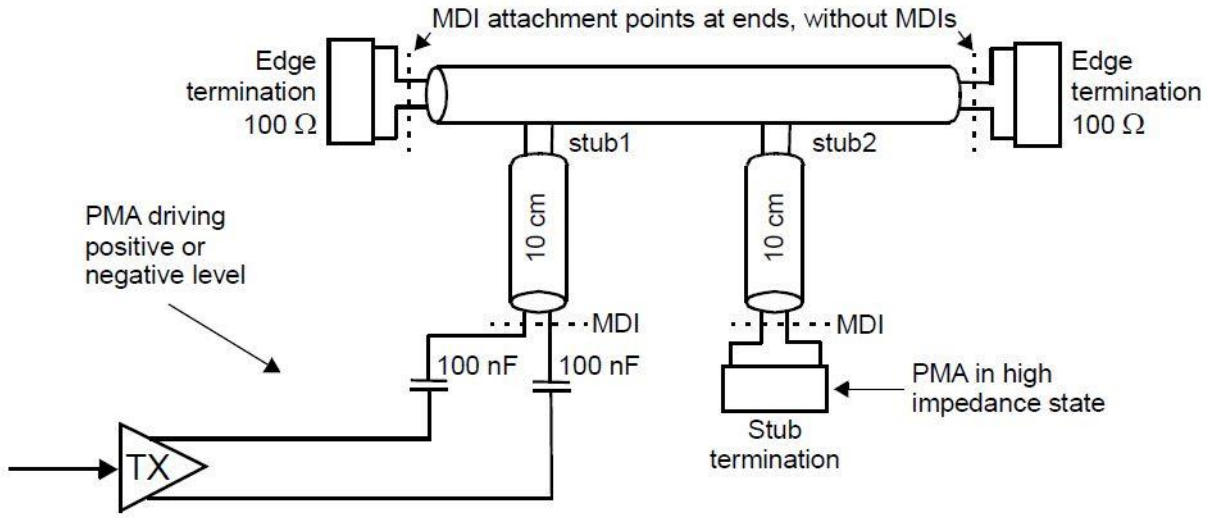


Figure 147–20—Multidrop line termination and PMA

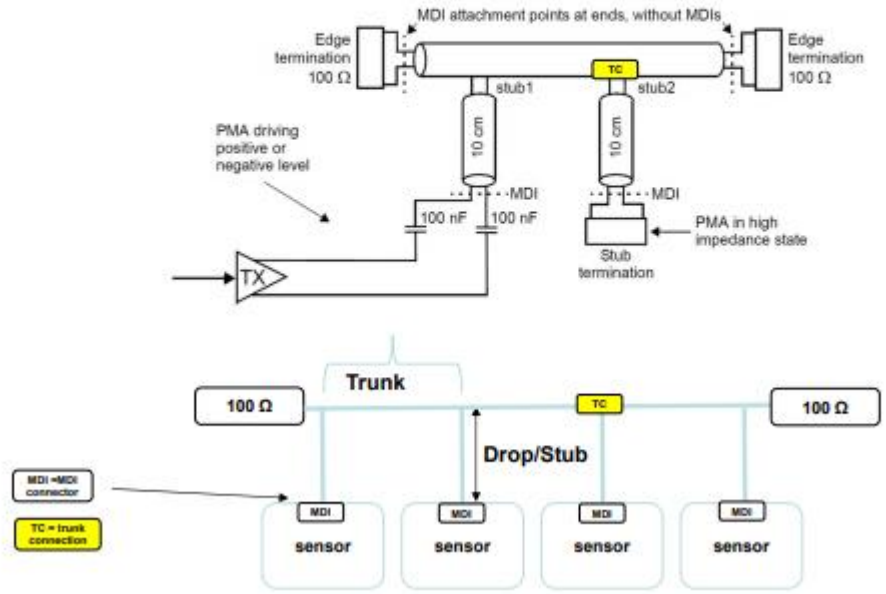
Multidrop Physical Topologies

- “T” connector with single device MDI connection
- “In/Out” with dual device MDI connections
- 10BASE2 Thinnet Tap

“T” connector w/ single device MDI connector

Trunk Connection

- 802.3cg does not specify trunk connection



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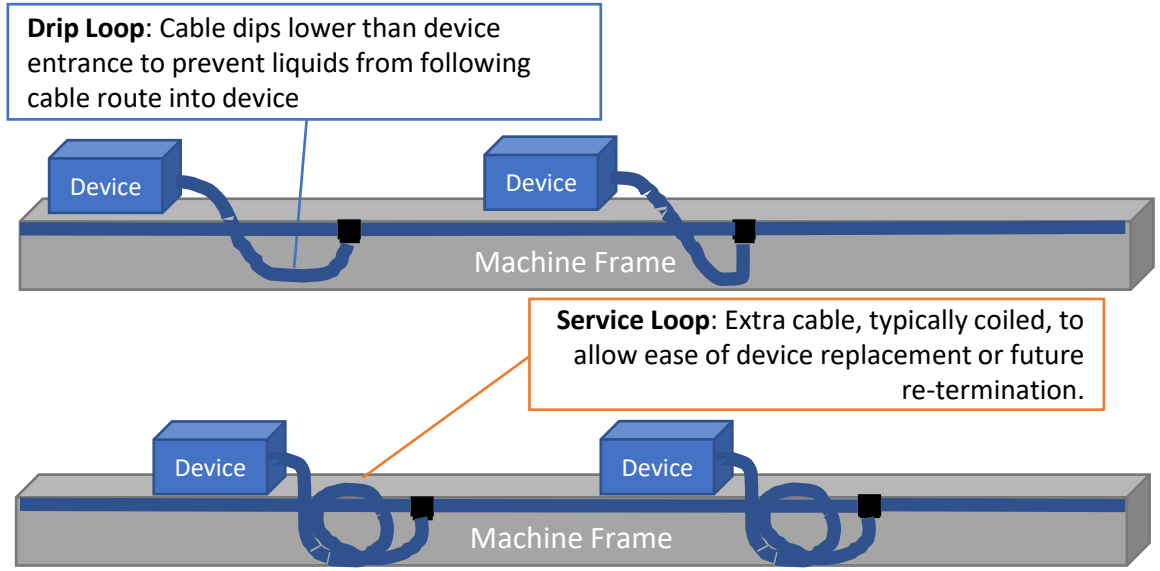
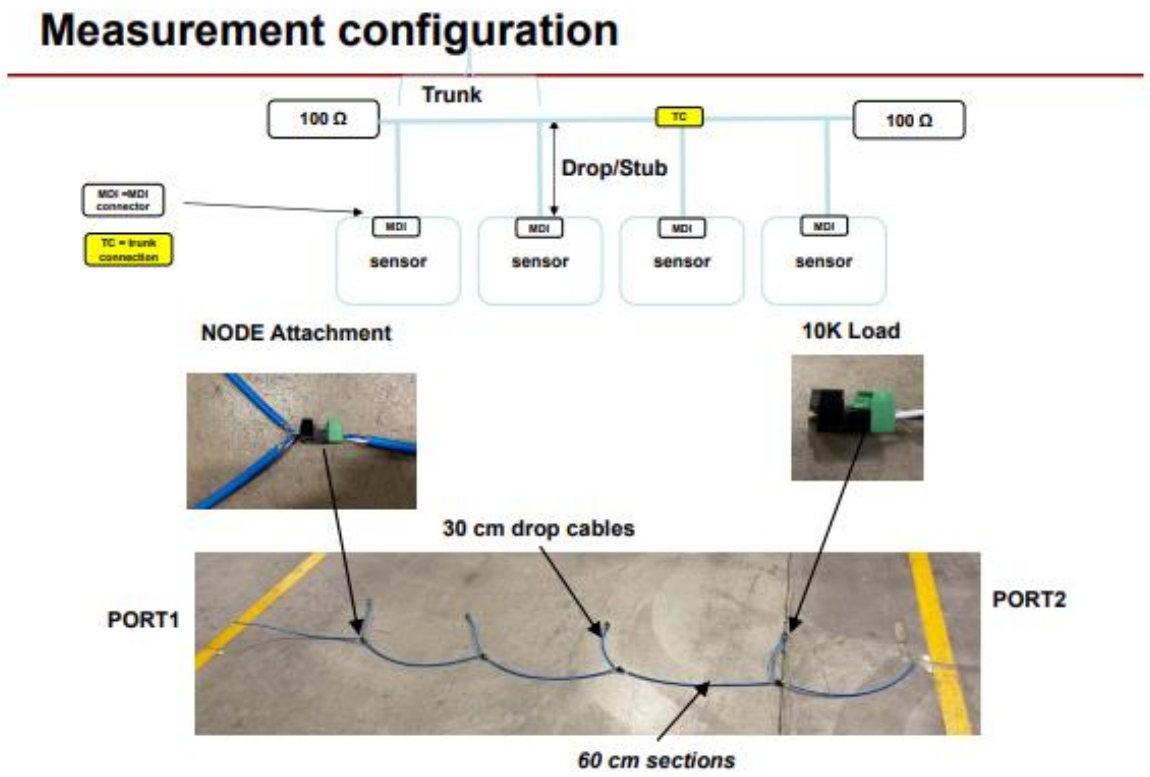


- Single device MDI connector conserves device PCB footprint
- Affords simple, single connection to end device
- Allows formation of service and drip loop cable configurations

“T” connector vulnerable to spur length, spur spacing



- Modeling shows this topology is vulnerable to spur length and spacing between spurs
  - Best performance occurs when spur length is half the spacing between spur drops,
  - For example, a 30mm spur length and 60mm spur spacing
  - While physically effective for end device installation, this performance is limiting

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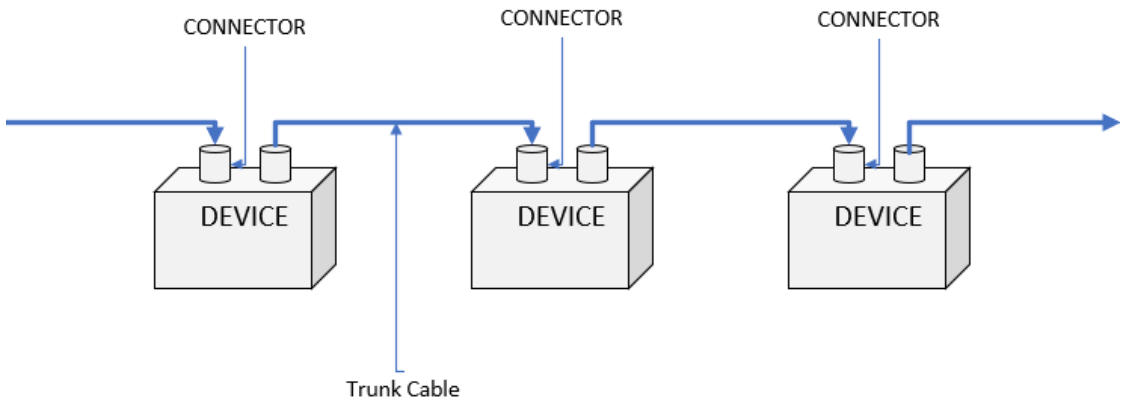
“In/Out” w/dual device MDI connections



- Each device has two MDI connectors
- Trunk cable passes in first connector and continues to next device from second connector
- Drip loop and service loop topologies are feasible but use more cable than single connector topology
- Effectively the only “spur” length is internal to the device and therefore minimal impact on link performance
- Potential to maximize reach using this topology
- Not evaluated using consensus LTSpice model (pending)

10BASE2 Thinnet Tap

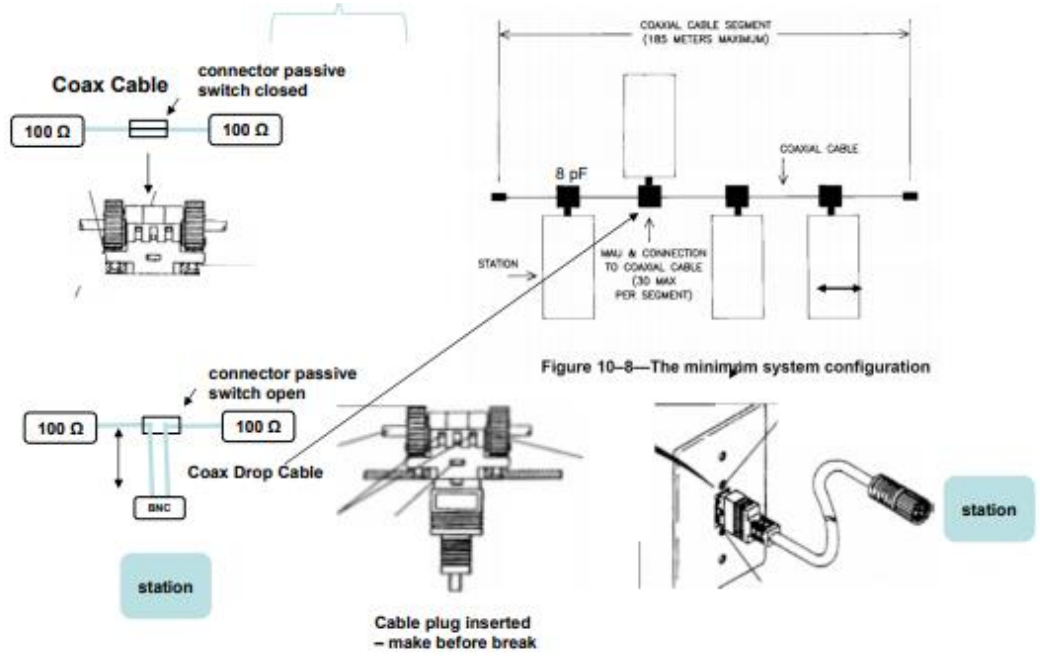


Figure 10–8—The minimum system configuration

- Adapt 10BASE2 physical infrastructure for multidrop use
- Advantages of passive switch in architecture already explained in cited Diminico presentation
- Possible deviation in cable and connector type for spur (drop) cable
  - 2-pair drop cable proposed rather than 1-pair drop cable
- Not evaluated using consensus LTSpice model (*pending*)

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Summary

- While physically desirable, trunk and spur with a single device connector has performance limitations
  - Borne out by modeling and subsequent validation
- In/Out with 2 device MDI connections increases connection footprint on device and requires double the cable and connectors of trunk/spur method
  - However, link performance is superior to what has been modeled for trunk and spur
  - Modeling is required to validate pursuit of this physical topology
- 10BASE2 Thinnet method is proven in similar applications
  - Modeling is required to validate pursuit of this physical topology