



# IEEE 802.3af DTE Power via MDI Detection and Signature Tutorial

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# Outline



- Discovery Definition
- Basic Discovery Protocol
- Proposal Matrix
- Summary of Proposals
- Comparative Cost Matrix



# Discovery Definition

Lucent Technologies  
Bell Labs Innovations



**Discovery =**

**Detection Mechanism at Power Source End**

**+**

**Unique Electronic Signature at Appliance  
Needing Power**



# Discovery Goals



- **Protect** Equipment
  - Legacy
  - New
  - 802.3af Sources and Appliances
    - Limit power to  $I_{min}$ ,  $I_{max}$
    - detect shorts, opens, some parallel loads
- **Serve** 802.3af Equipment
  - Provide power within expected limits



# Proposal Matrix



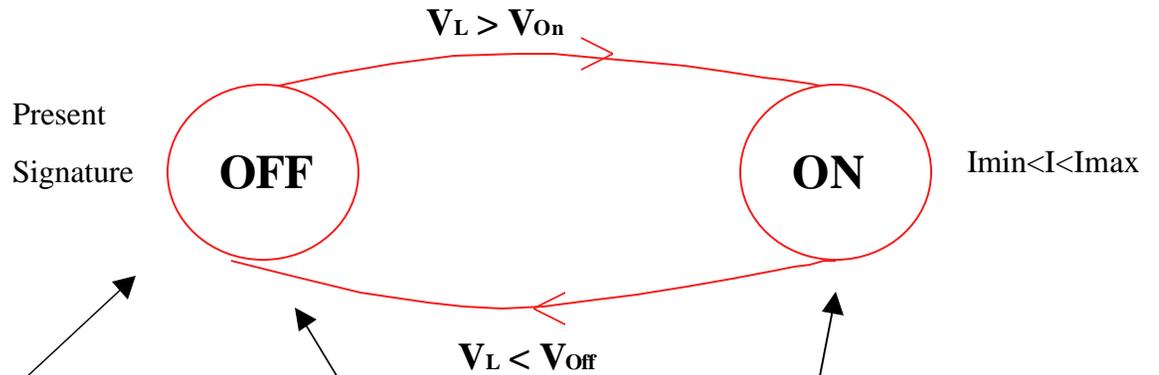
| Mode   | AC  | DC  |
|--|---|---|
| <b>Differential</b><br>(Transformer Coupled) | Modified Link Pulse<br>vrs FLP/NLP, Filtered,<br>Binary Word Match[3] | -   |
| <b>Common Mode</b><br>(Transformer Coupled)  | Low-frequency<br>Pulse, Binary Word<br>Match[1,2]                     | -   |
| <b>Common Mode</b><br>(Direct Coupled)       | Capacitor Voltage<br>Ramp[7]  | Resistor or Diode or<br>Current Source[5,6] |

Redesigned, keyed RJ-45 connectors were also proposed.[4]

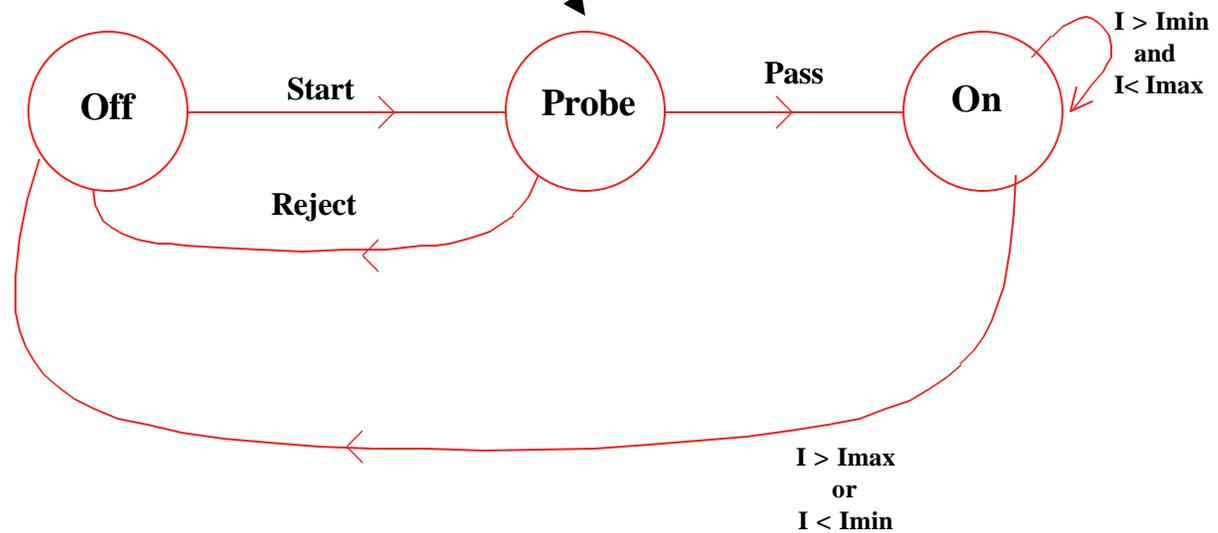
# Protocol at DTE and Source



**DTE:**



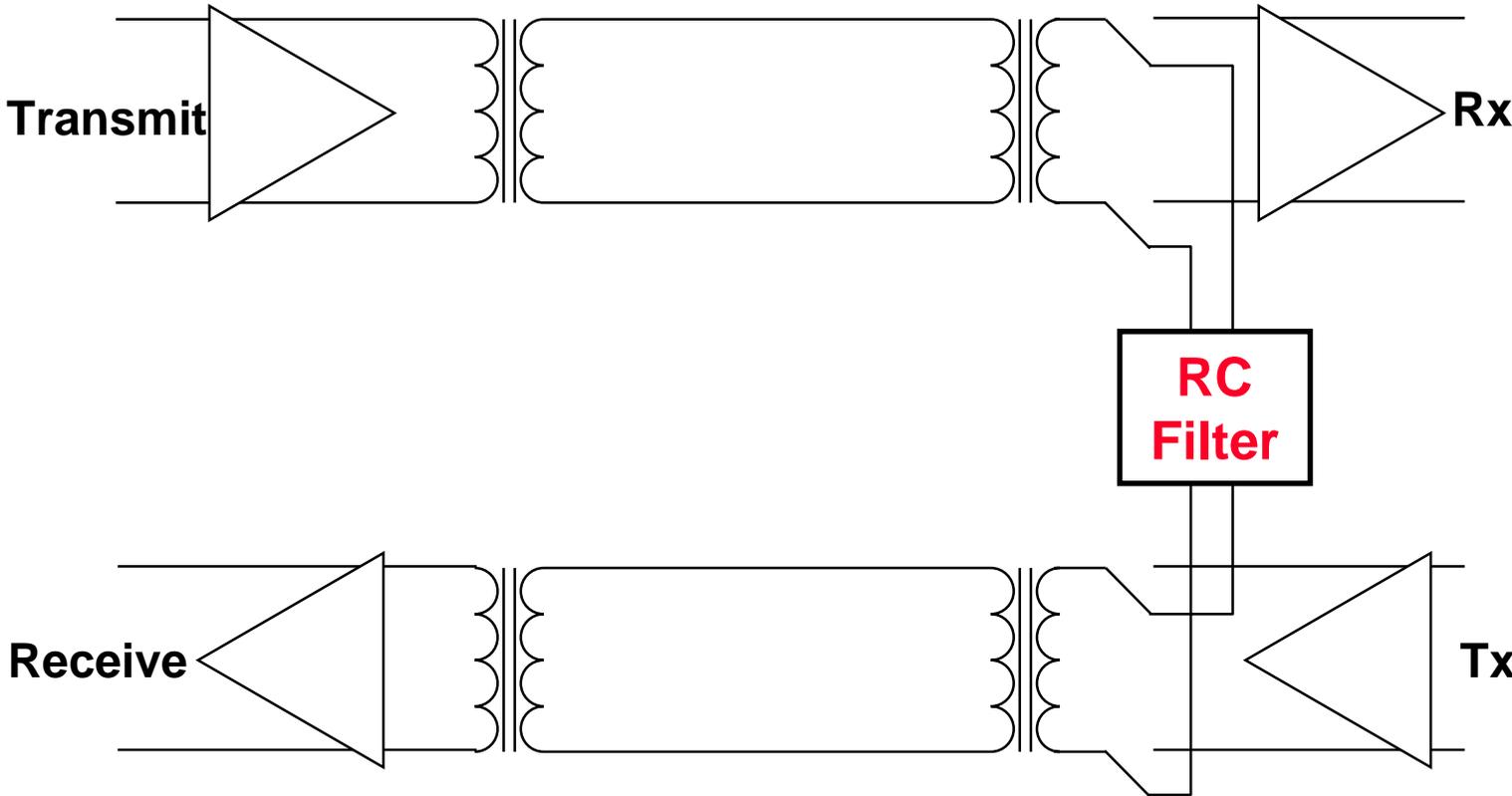
**Source:**



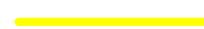
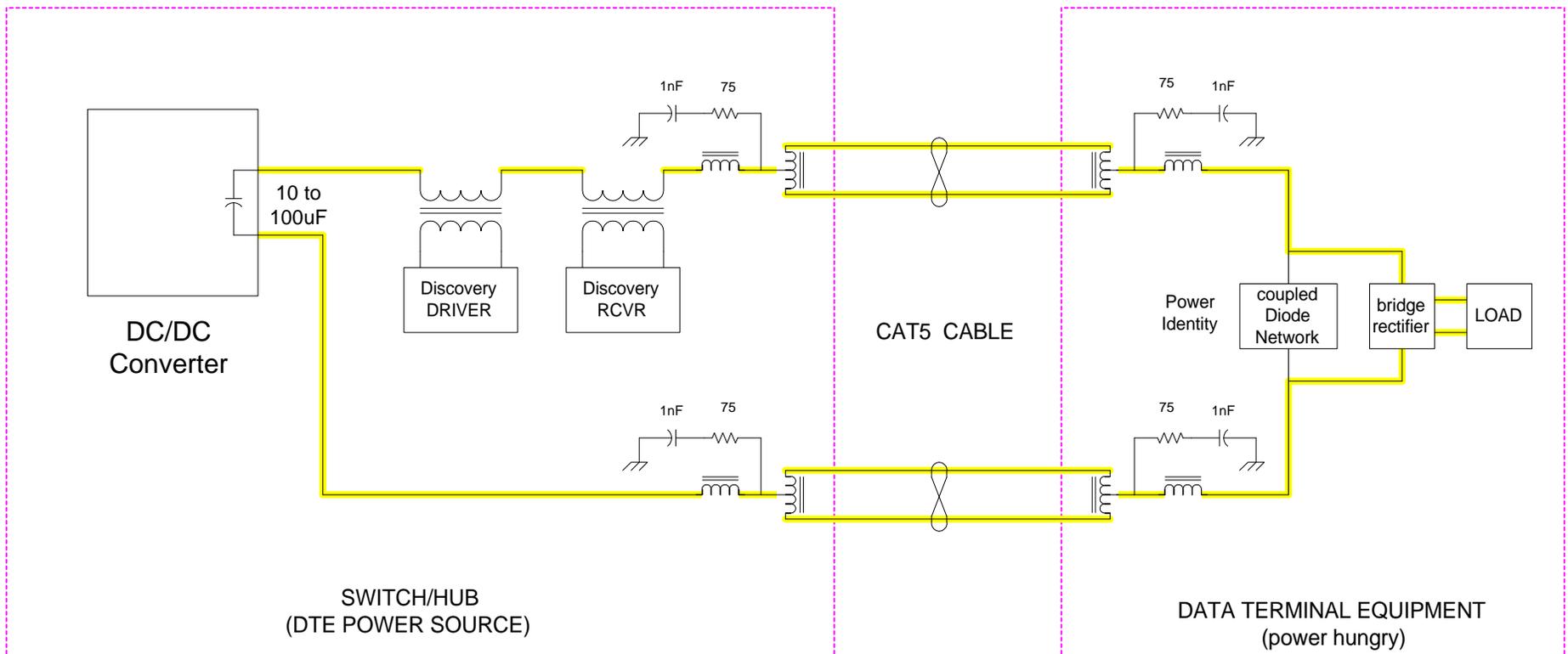
# Differential Mode, Transformer Coupled

Switch /  
DTE Detecting Station

End station  
DTE Requiring Power

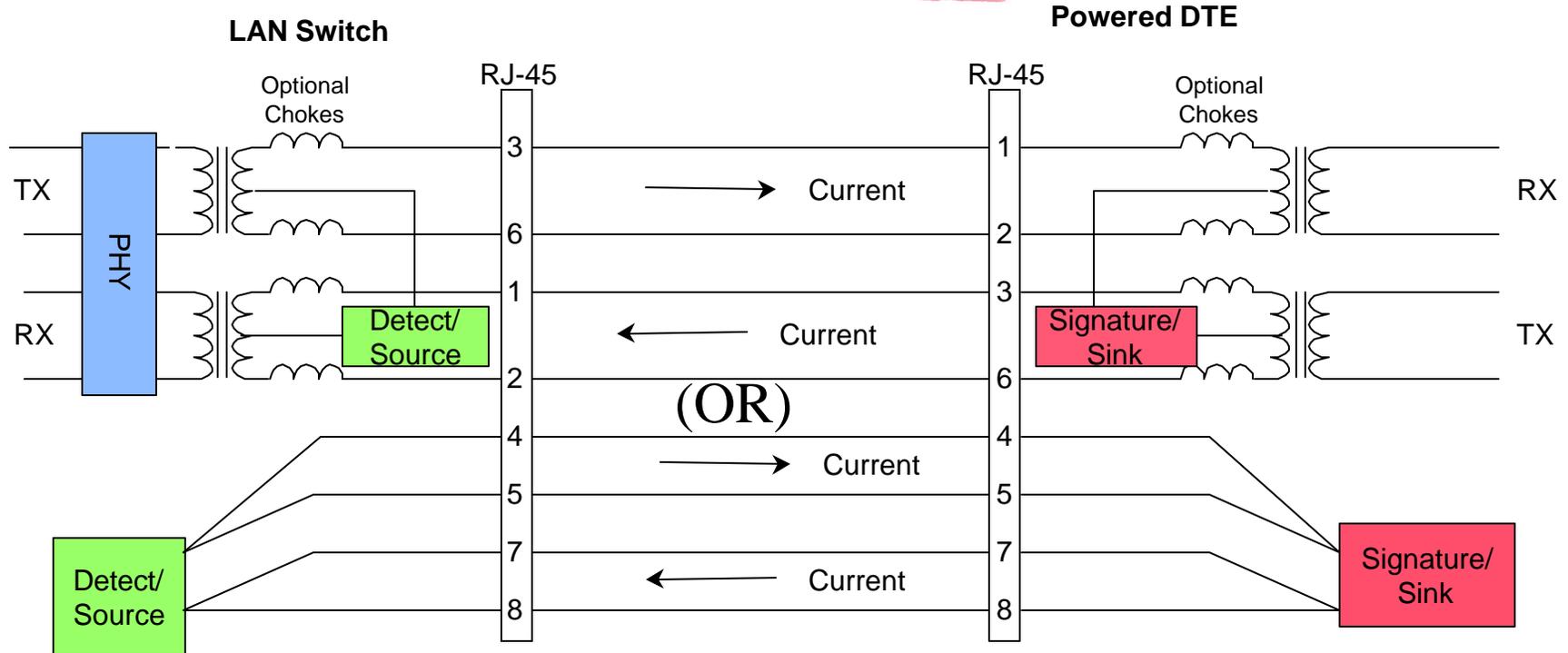


# Common Mode, Transformer Coupled



POWER DELIVERY PATH

# Common Mode, Direct Connect



# Comparative Cost Matrix



|   | <b>Differential<br/>AC</b> | <b>Common-mode<br/>AC</b> | <b>Direct<br/>Coupled</b> |
|---|----------------------------|---------------------------|---------------------------|
| <b>Inrush Limiting</b>                      | Y                          | Y                         | Y                         |
| <b>U-Controller</b>                         | Y                          | Y                         | Y                         |
| <b>Imin/Imax limit</b>                      | Y                          | Y                         | Y                         |
| <b>Opto-isolation<br/>Managed/Unmanaged</b> | Y/Y                        | Y/Y                       | Y/N                       |
| <b>C/R/L/Diodes</b>                         | 5                          | 8                         | 1                         |
| <b>Transformer</b>                          | Y                          | Y                         | N                         |
| <b>Relay</b>                                | Y                          | N                         | N                         |



# Acknowledgments



- [1] Robert Muir, Level One, “Update on Diode Discovery Process,” May, 2000.
- [2] Rick Brooks, Nortel, “Common Mode and Differential Mode Discovery Techniques,” May, 2000.
- [3] Kevin Brown, Broadcom, “DTE Detection Revisited,” May, 2000.
- [4] Hans Sitte, Agilent Technologies, “DTE power via MDI, an Alternative Proposal,” May, 2000.
- [5] Richard Glaser, et al., Lucent Technologies, “IEEE 802.3 DTE Power via MDI Detection and Signature Protocol,” May, 2000.
- [6] Dan Dove, Hewlett Packard, “Consensus Proposal,” May, 2000.
- [7] Amir Lehr, PowerDsine, “PDTE Detection Mechanism,” March, 2000.