DTE Power via MDI

Delivery of *Power* in addition to *Data* over Ethernet cabling infrastructure

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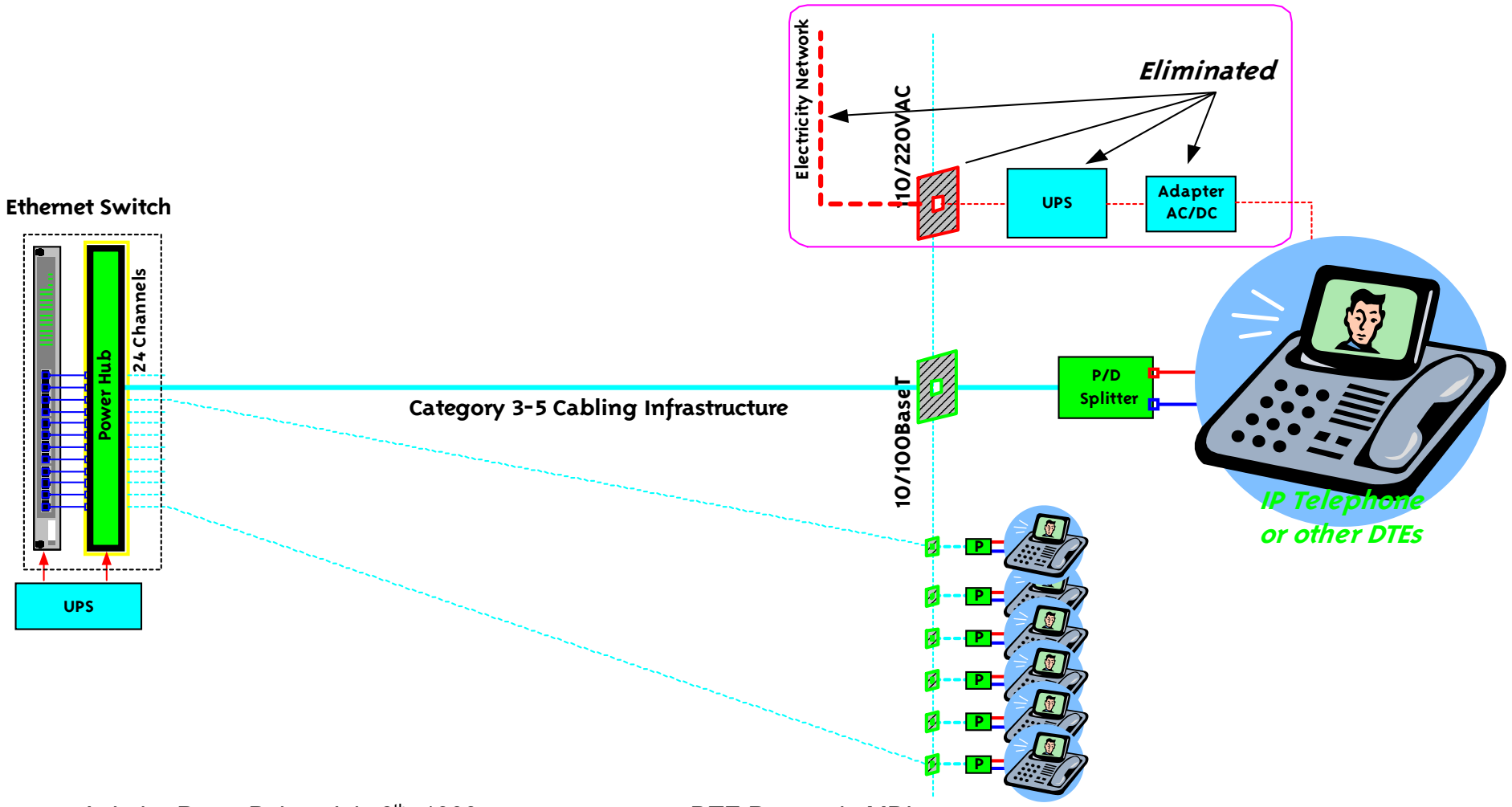
The Need in Ethernet Telephony

- Single Cable Connection Per Telephone Set
- Continuous Operation During Power Interruptions
- Independent of AC Mains Availability
- DTE Interoperability
- 10, 100, 1000BaseT? Support

System Architecture



Additional Applications

- Wireless LAN Access Points
- Web Cams
- Palm & Laptop Computers
- *Countless <30 Watt Ethernet Devices*

OK, *Power over Ethernet can reduce costs, simplify deployment, increase reliability…* But, *do we really need a standard ??*

- Interoperability will drive:
  - Adoption
  - Cost reduction
  - Flexibility
  - Application development
- Proprietary solutions are currently introduced
  - May mislead users
  - May harm standard equipment

Technical Challenges

- Physical & Safety Limitations
- Available Power
- Effects on Link Performance:
  - Near End & Alien Crosstalk
  - Channel Attenuation, S/N
  - Link Balance
  - Common & Differential Mode Noise Susceptibility
  - Link Impedance Matching
- Power, Thermal & Mechanical Constrains
- Protection of Non MDI Powered Terminals

Available Power

Over a Single Class D Channel Wire Pair

Physical limitations

- Cables - Class D Category 5 - Limited to 80Vdc
  (some manufacturers do not rate max DC voltage)
- Connectors - RJ45 Rated for 250V/1.5A
- Connecting Hardware - PCB traces will support 250mA

Safety & Marketing Considerations

- Safety Standards rate voltages below 60Vdc as LVD
- 48V DC/DC are widely available
- I estimate a strong preference to 48Vdc as feeding voltage

Infrastructure

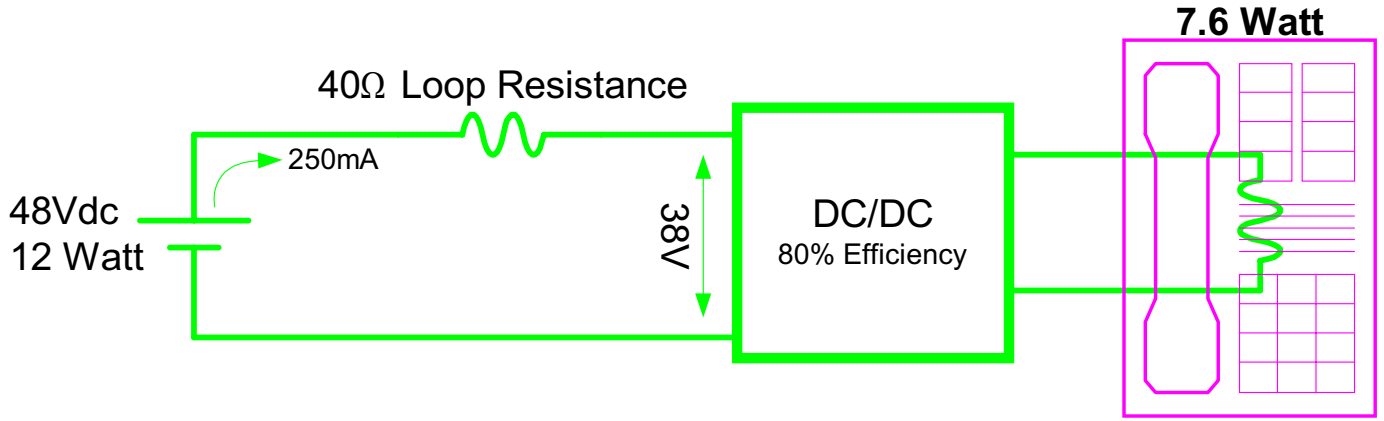
- Channel Maximum Resistance 40Ω

  Including 100m horizontal cable, patch cabling, connectors and connecting hardware

Available Power Over Cat 5 Cabling Plant

Assumptions:

- 48Vdc/250mA Input
- 80% DTE DC/DC Efficiency
- 40Ω Maximum Channel Resistance
- Single Twisted Pair Feeding



- **Maximum available power to DTE using a single pair = 7.6 Watt**
- **Up to 4 pairs may be used = 30.4 Watt maximum**

Power Feeding Alternatives

- Out-of-Band (7&8, 4&5)
- In-Band (3&6, 1&2)
  - Phantom
  - Parallel
  - Other
- Single/Multiple wire pair feeding

Recommendations

- Everyone will benefit from standard solutions
- Industry is in the right phase to initiate Study Group
- In-Band feeding is future ready & supports wider installation base
- Phantom feeding is simpler to implement