

IEEE 802.3 DTE Power via MDI

Power Delivery Mechanisms

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Objectives: Help Resolve key issues

- Power over *signal pairs* or *spare pairs*?
- Need to Support 2-pair cables?

Outline

- Emphasize Key Solution Requirements
- Conclusions (in advance)
- Supporting Diagrams
 - Power Delivery Alternatives



Solution Requirements

Note: Others have already provided extensive requirements lists. We do not repeat those. Instead we emphasize key high level overall system requirements deserving high priority.

● Overall System

- Meet all applicable safety requirements & regulations
- Meet existing 802.3 Ethernet LAN standards
- Do not degrade Ethernet data transmission (10/100BaseT)
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- *Provide cost effective implementations, I.e.,*
 - *Without requiring replacing Ethernet switches*
 - *Be scalable from zero to many powered devices*
 - *COGs - Consider costs of alternatives*



- *Support power insertion to best meet customer needs: either along the span or via integration with the LAN switch*



Conclusions from Solution Requirements

System requirements:

- Cost effective, I.e.,

➤ *Without replacing Ethernet switches*



- Requires allowing mid-span insertion



Highly favors “spare pair” power and discovery

➤ *Scalable from zero to many powered devices*



- Favors mid-span insertion



Highly favors “spare pair” power & discovery

➤ Consider COGs



- Favors “spare pair” power & discovery (supposition)



Power Delivery Proposals

- Support **both** *mid-span* and *LAN switch* power insertion
- Power over two spare pairs
- Perform detection/discovery over spare (power) pairs
- Support 4-pair cables/groupings (not two pair cables/groupings)



Why Support 2-Pair Cables?

- They are not prevalent
 - Believed to be very, very rare
 - New applications: almost never 2-pair
- Huge impact on principal (4 pair) configuration
 - Two-pair cables are not amenable to mid-span power insertion
- Objectives for DTE Power: “Support current standard, 4-pair, horizontal cabling infrastructure for installed Cat 3 and Cat 5 cabling”
- *Power over two pair cables should not be an influencing factor*



Power Delivery Considerations

- Phantom over signaling pairs Vs use spare pairs?
- Coordination between Ethernet negotiation and power control

Alternatives examined (assume 4-pair cable):

Proposed

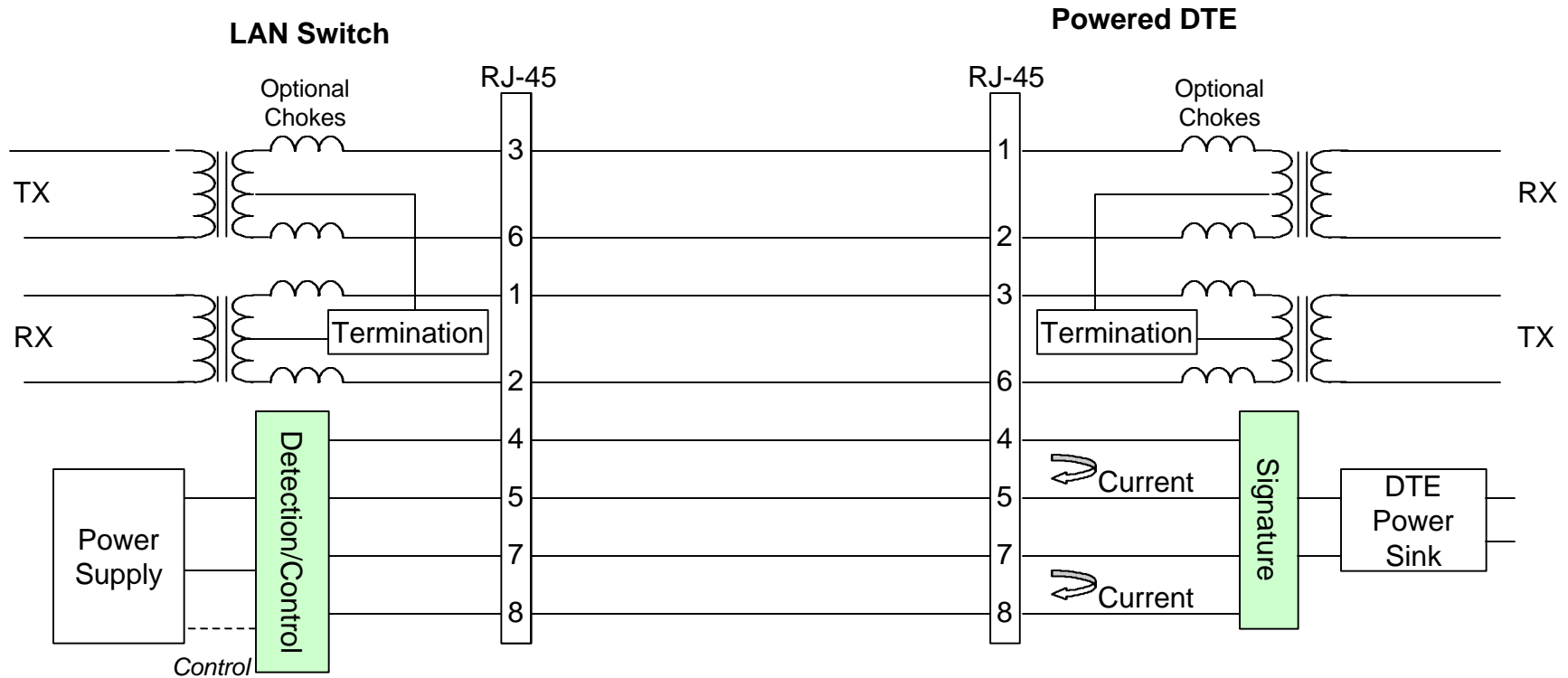
- Over two spare pairs
 - Power feed *in one wire* and *out other wire* of each spare pair

Also
Examined

- Common mode power feed through 2 spare pairs
 - Power through the spare pairs with balanced current and termination
- Over one spare pair
 - Power feed *in one wire* and *out other wire* of one spare pair
- Phantom on 2 signaling pairs
 - Power fed through center taps of TX and RX transformer



Two Spare Pairs (A)



PROs

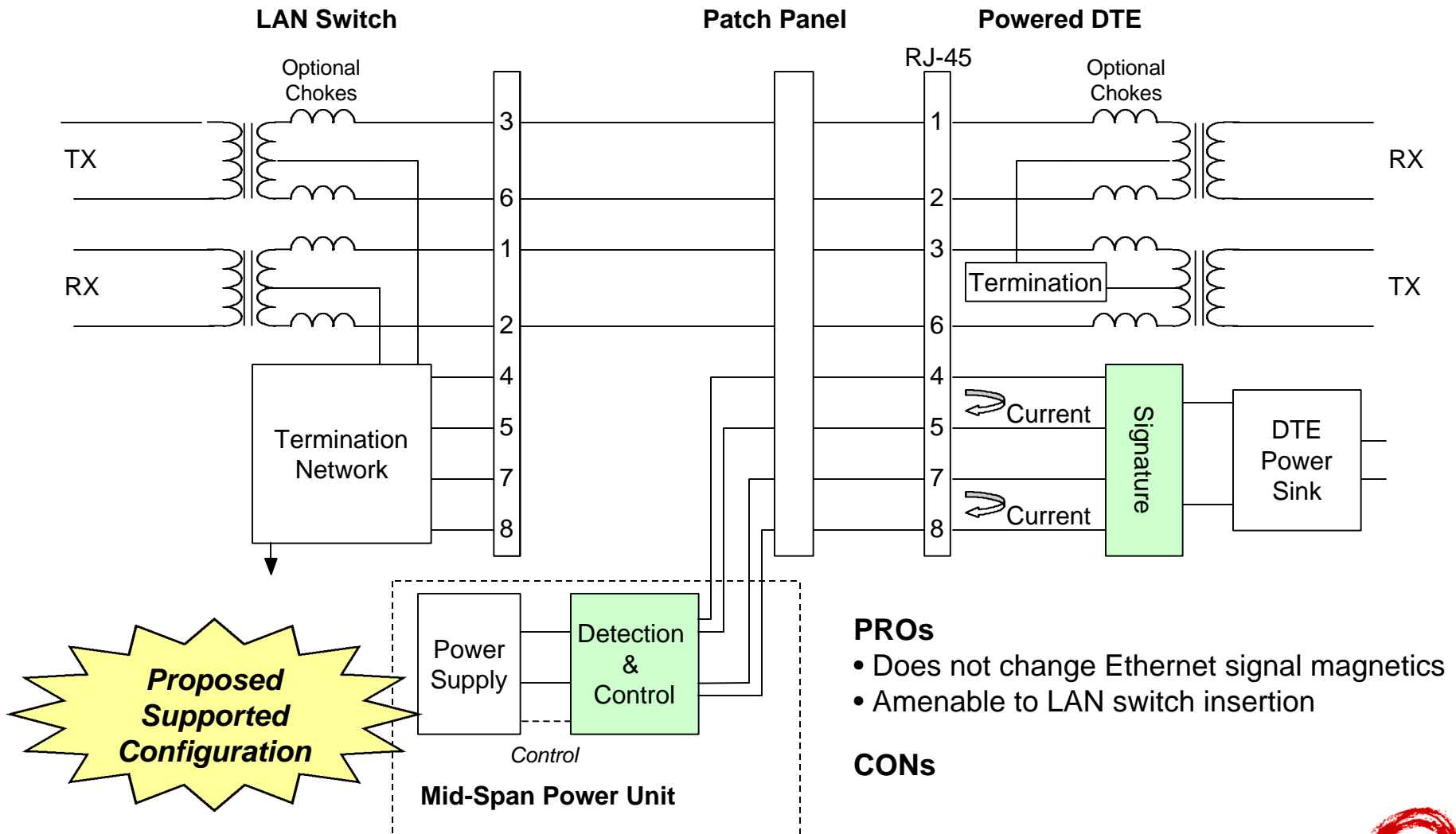
- Amenable to mid-span insertion
- Does not change Ethernet signal magnetics
- Preserves traditional polarity on 7/8

CONs

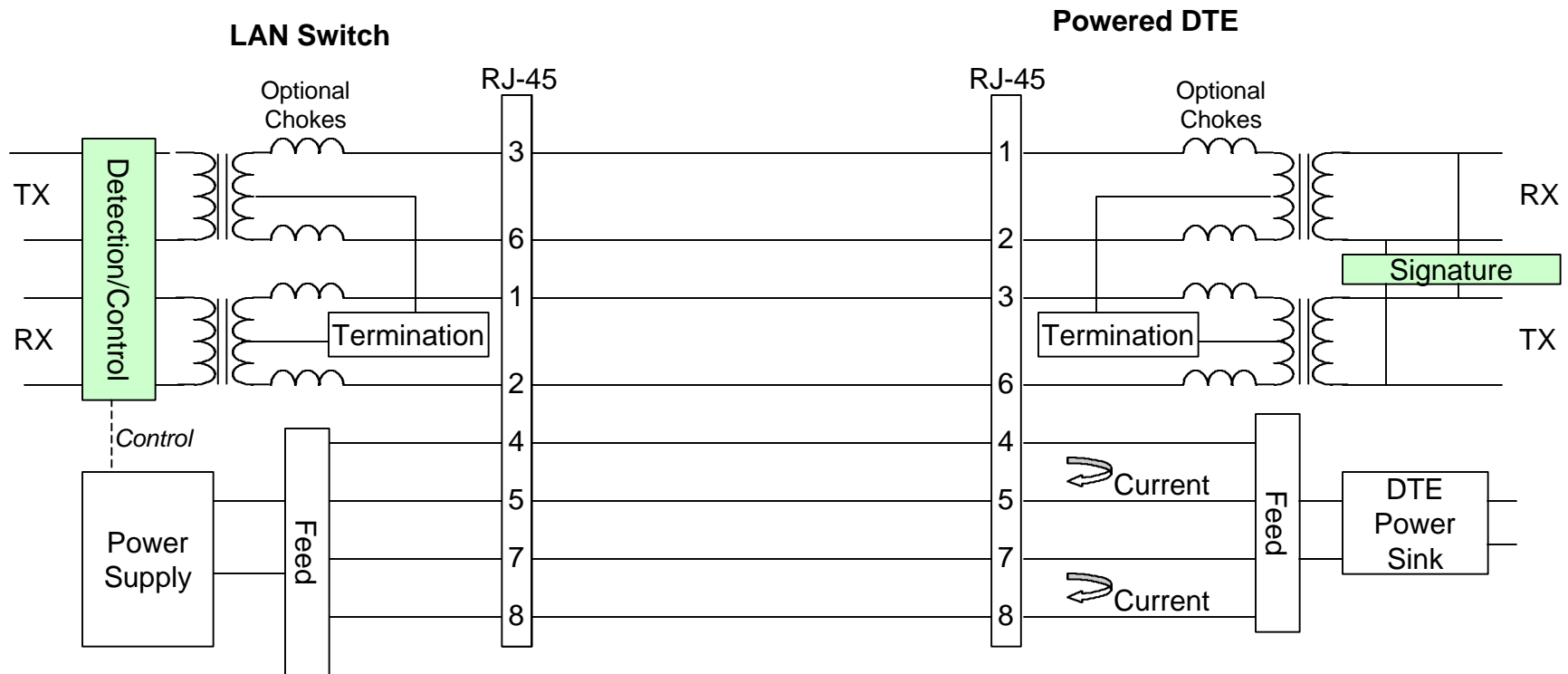
**Proposed
Supported
Configuration**



Two Spare Pairs (A) - Mid-Span Insertion



Two Spare Pairs (B)



PROs

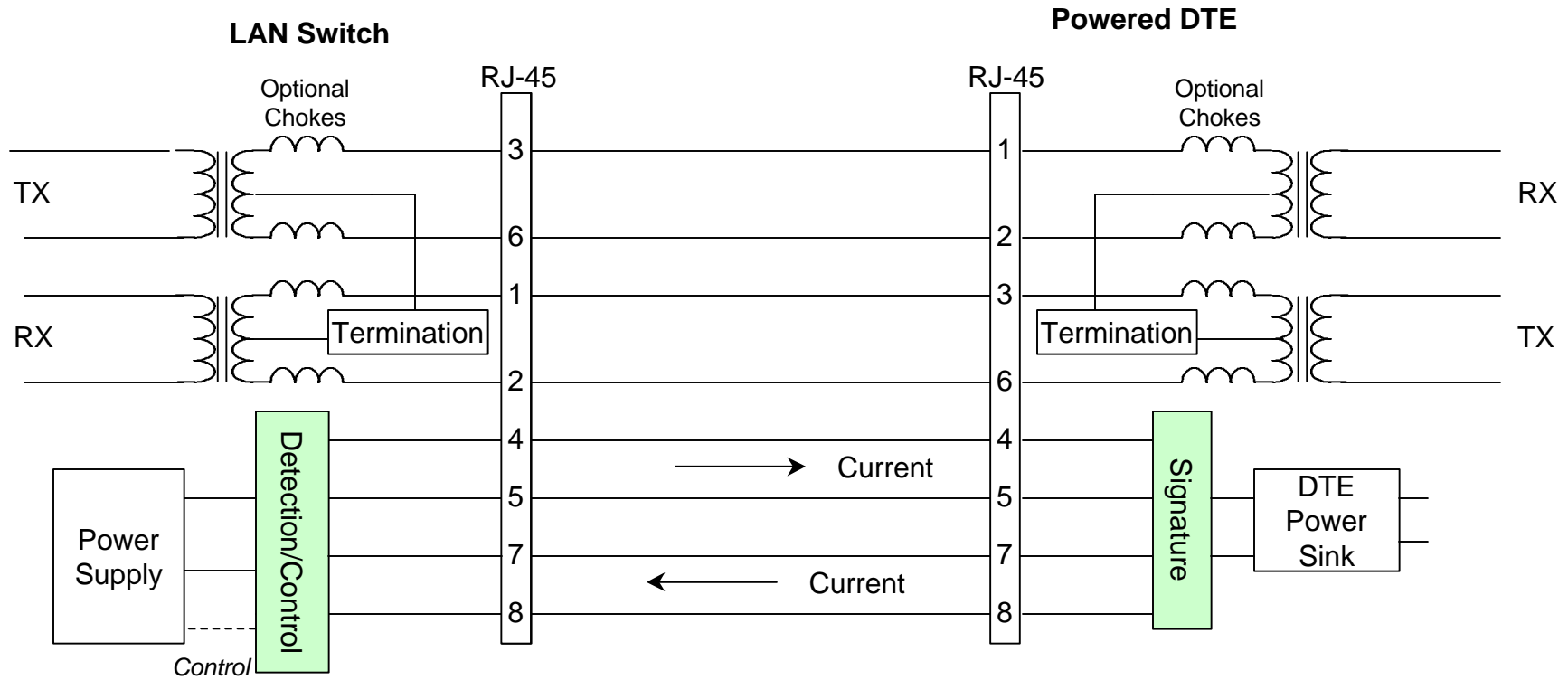
- Does not change Ethernet signal magnetics

CONs

- Not amenable to mid-span insertion (due to control)
- Changes Ethernet negotiation logic



Common Mode, Two Spare Pairs (A)



PROs

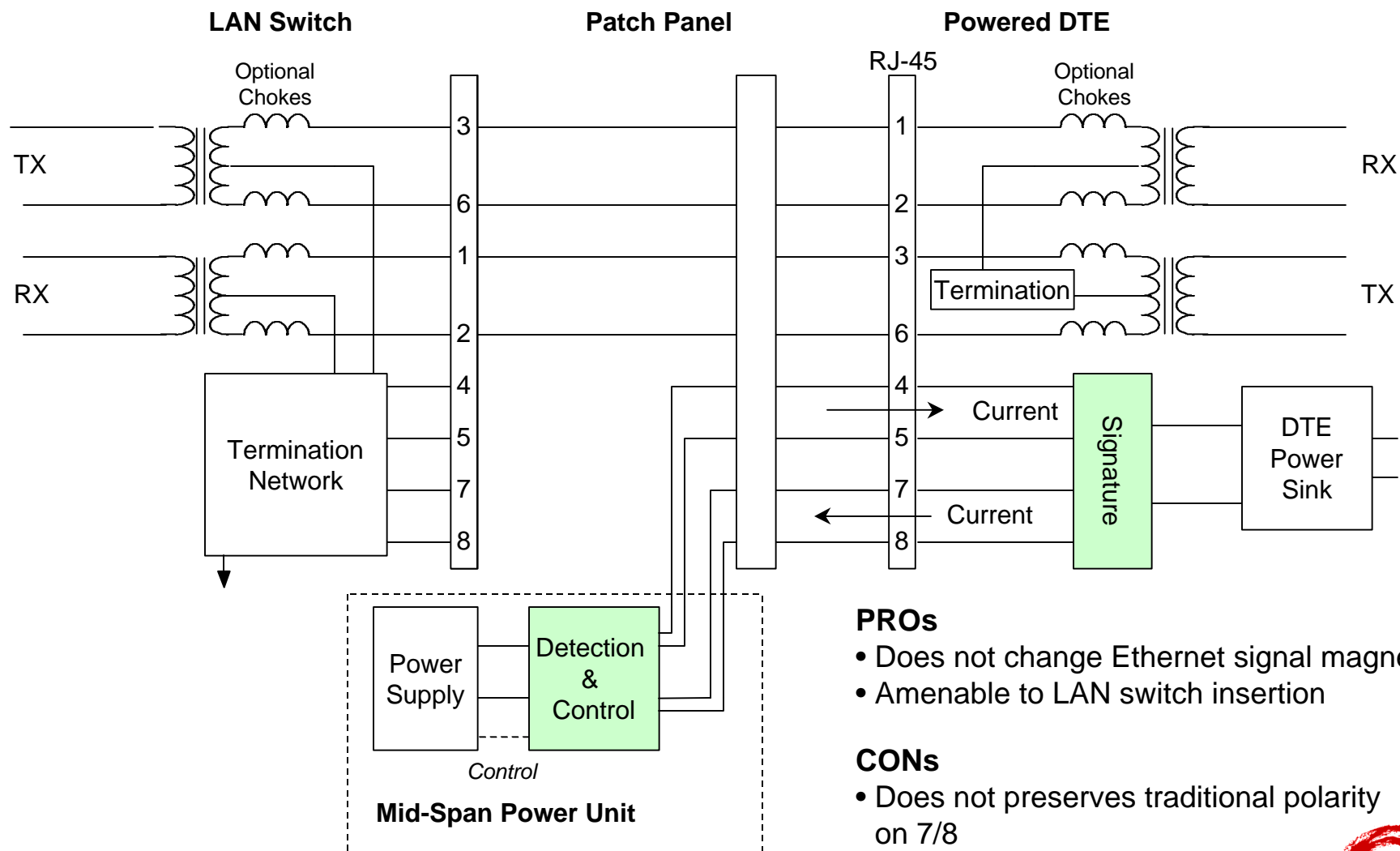
- Amenable to mid-span insertion
- Does not change Ethernet signal magnetics

CONS

- Does not preserve traditional polarity on 7/8



Common Mode, Two Spare Pairs (A) - Mid-Span Insertion



PROs

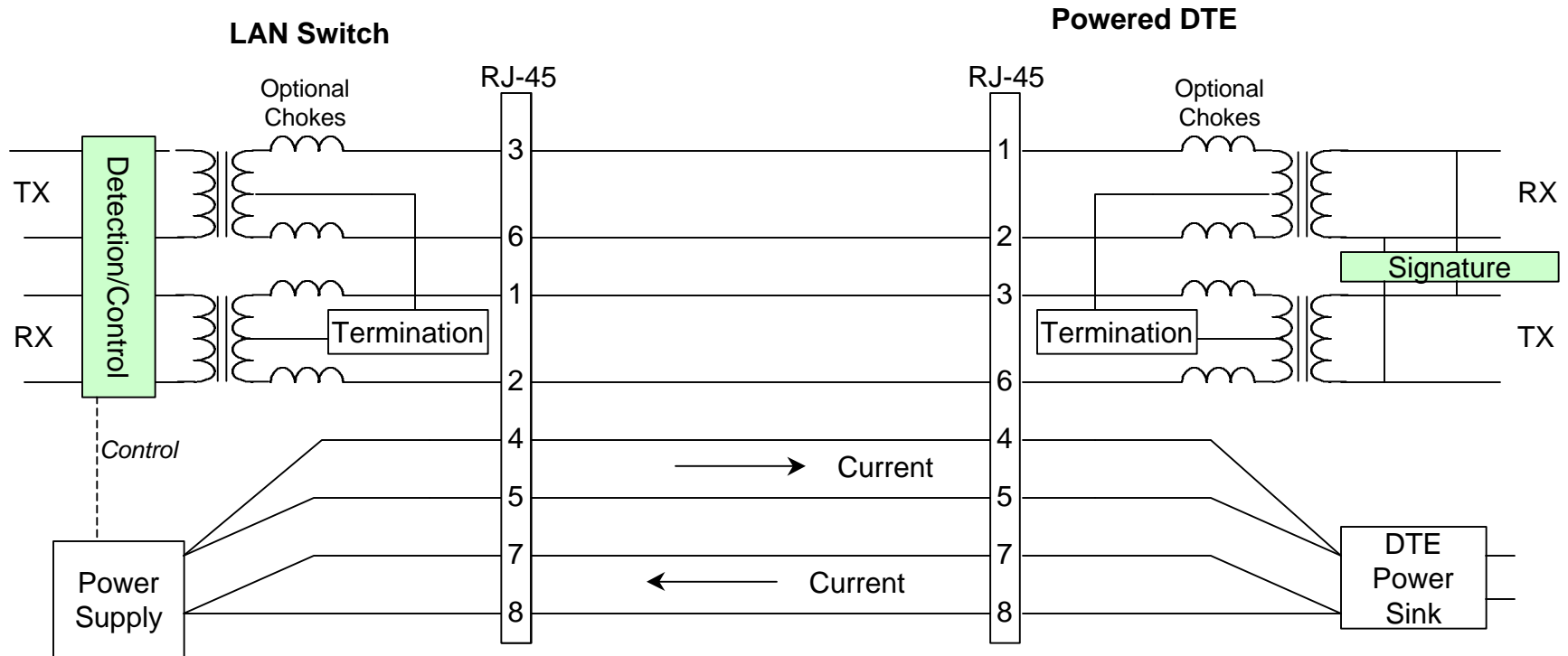
- Does not change Ethernet signal magnetics
- Amenable to LAN switch insertion

CONS

- Does not preserve traditional polarity on 7/8



Common Mode, Two Spare Pairs (B)



PROs

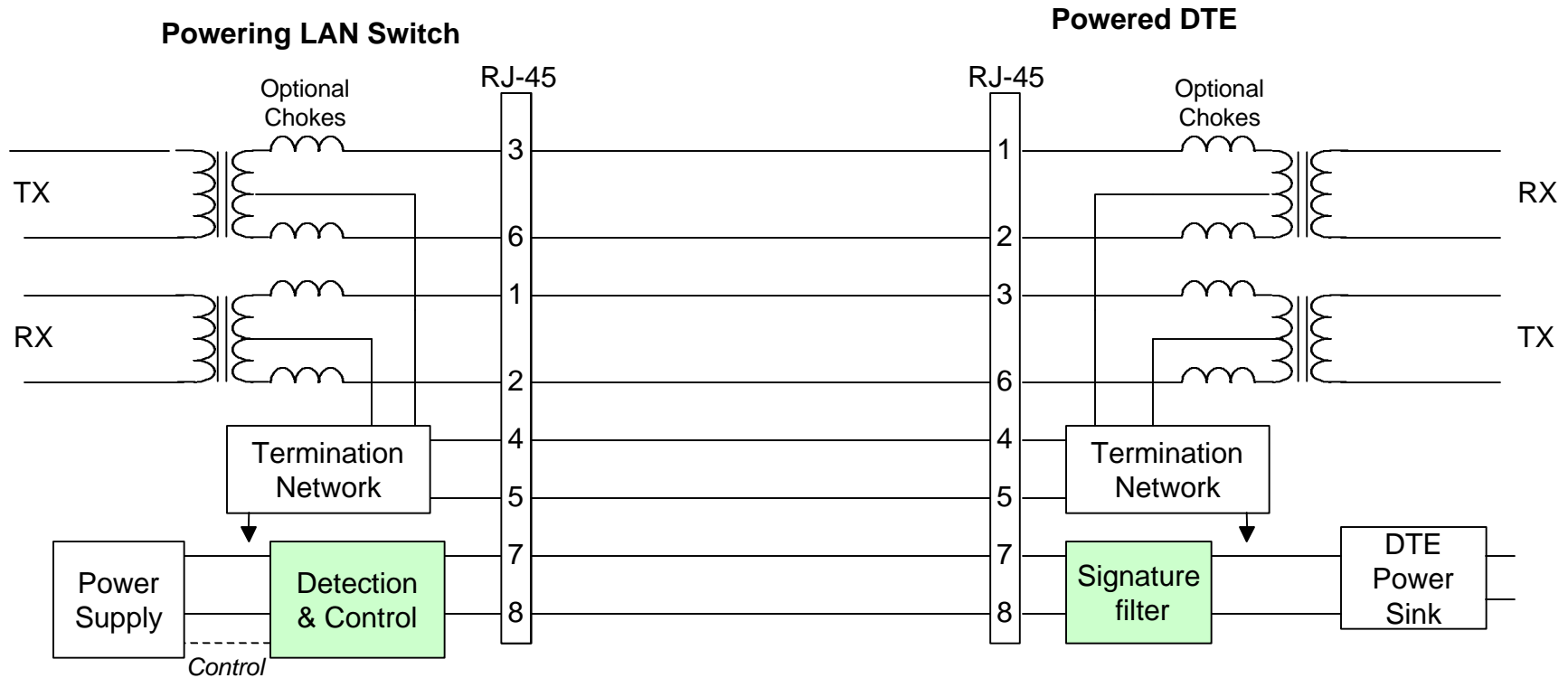
- Does not change Ethernet signal magnetics

CONs

- Not amenable to mid-span insertion
- Changes Ethernet negotiation logic
- Does not preserve traditional polarity on 7/8



One Spare Pair (A)



PROs

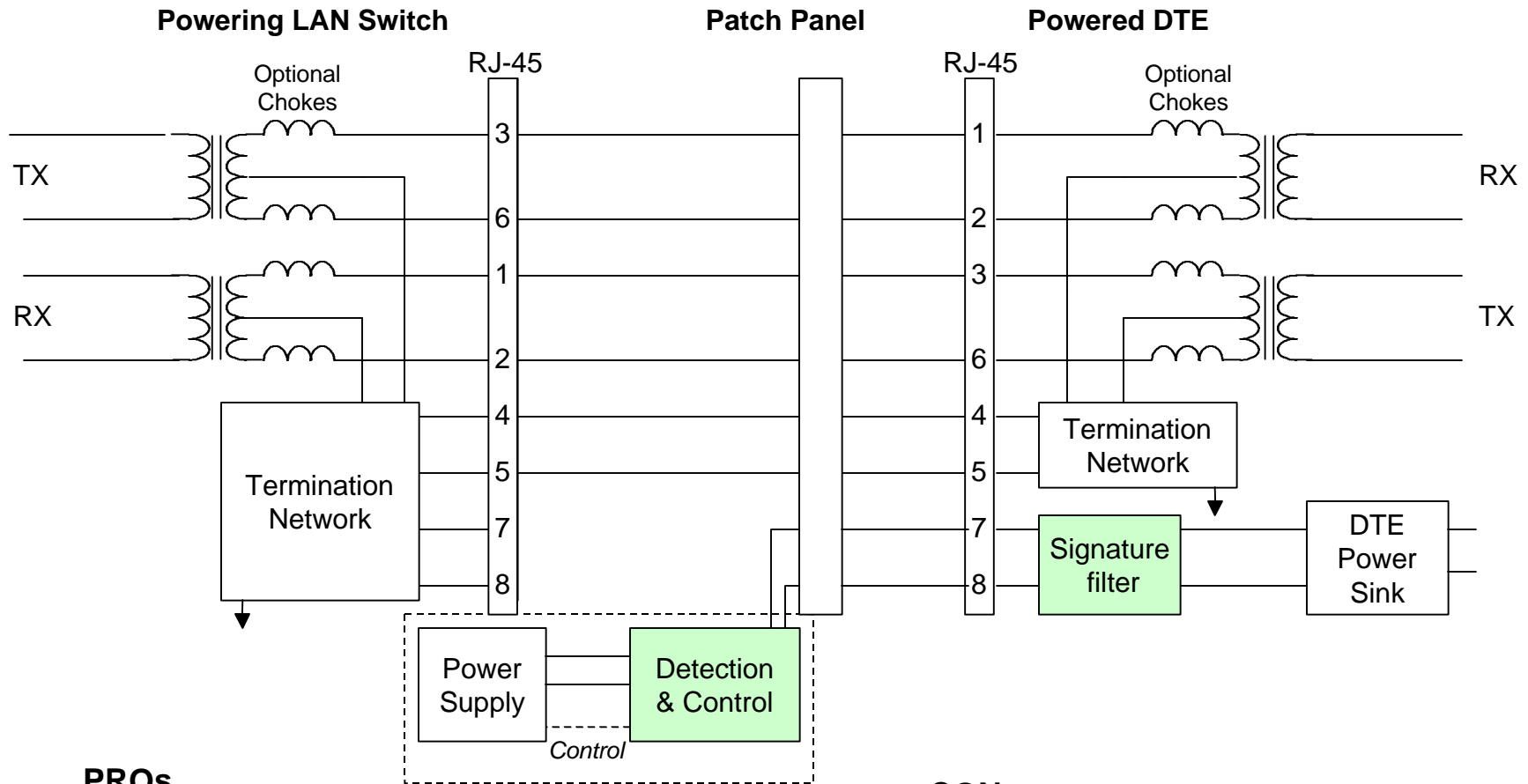
- Amenable to mid-span insertion
- Does not change Ethernet signal magnetics

CONS

- Single pair power limitations



One Spare Pair (A) - Mid-span Insertion



PROs

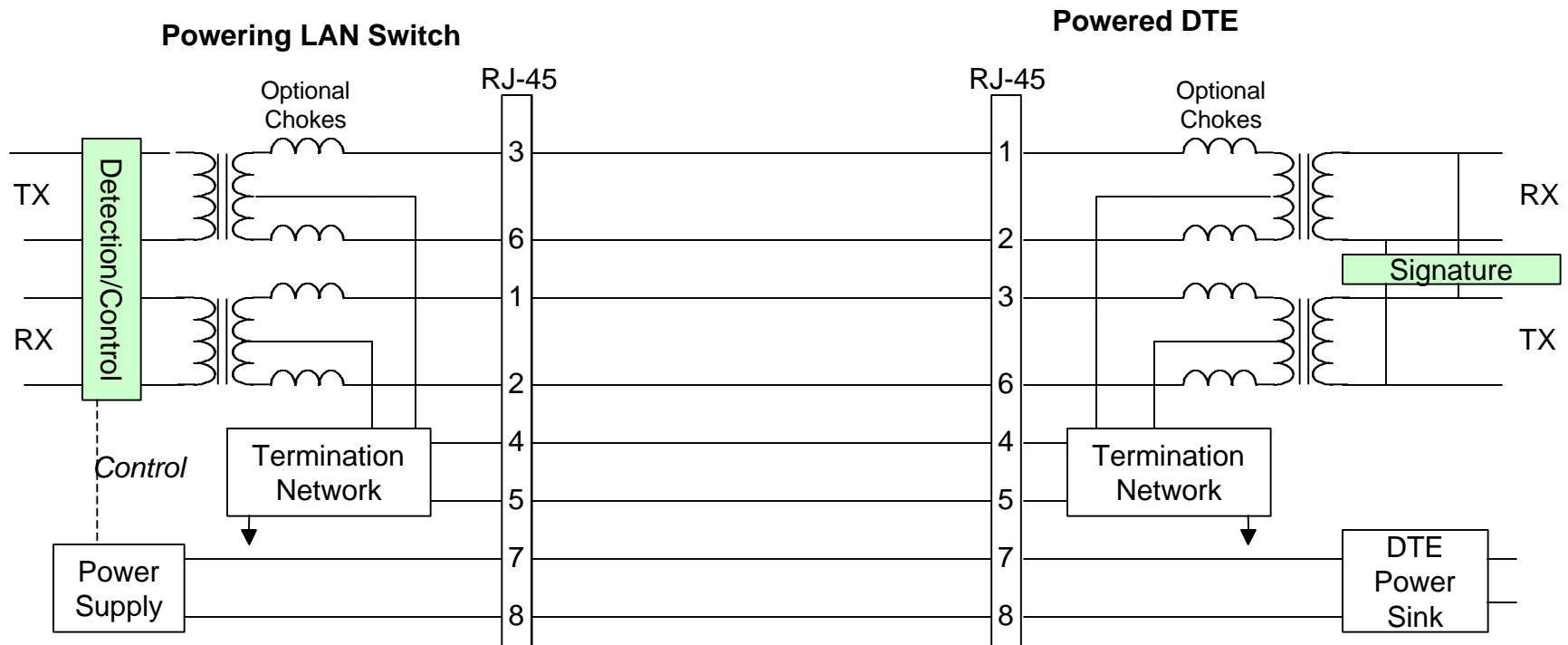
- Amenable to LAN switch insertion
- Does not change Ethernet signal magnetics

CONS

- Single pair power capacity



One Spare Pair (B)



PROs

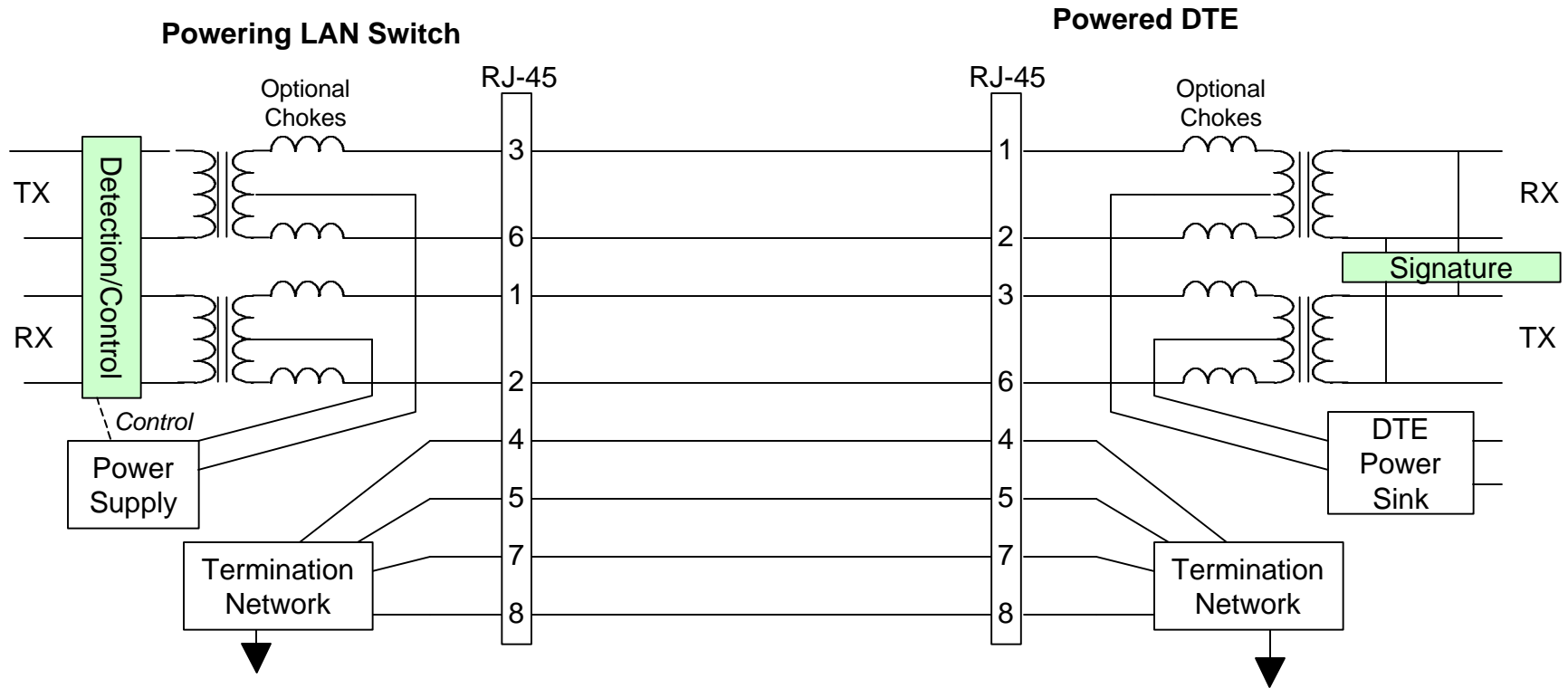
- Does not change Ethernet signal magnetics

CONs

- Not amenable to mid-span insertion (due to control)
- Changes Ethernet negotiation logic
- Single pair power capacity



Phantom on Two Signaling Pairs



PROs

- Works for 2-pair cables

CONs

- Not amenable to mid-span insertion
- Changes Ethernet magnetics
- Changes Ethernet negotiation logic

