A Truly Redundant Wiring Solution for FOUNDTION Fieldbus

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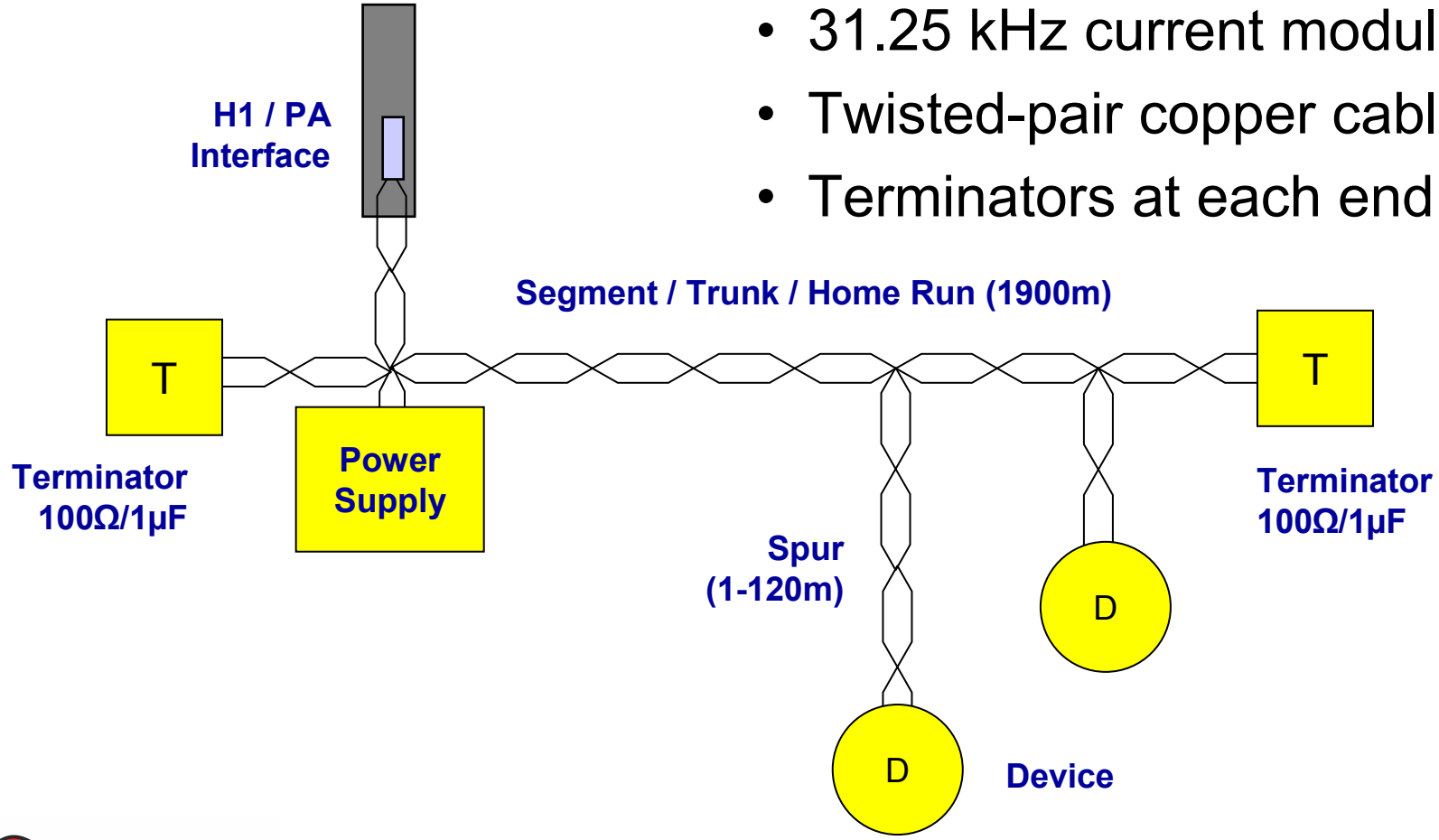
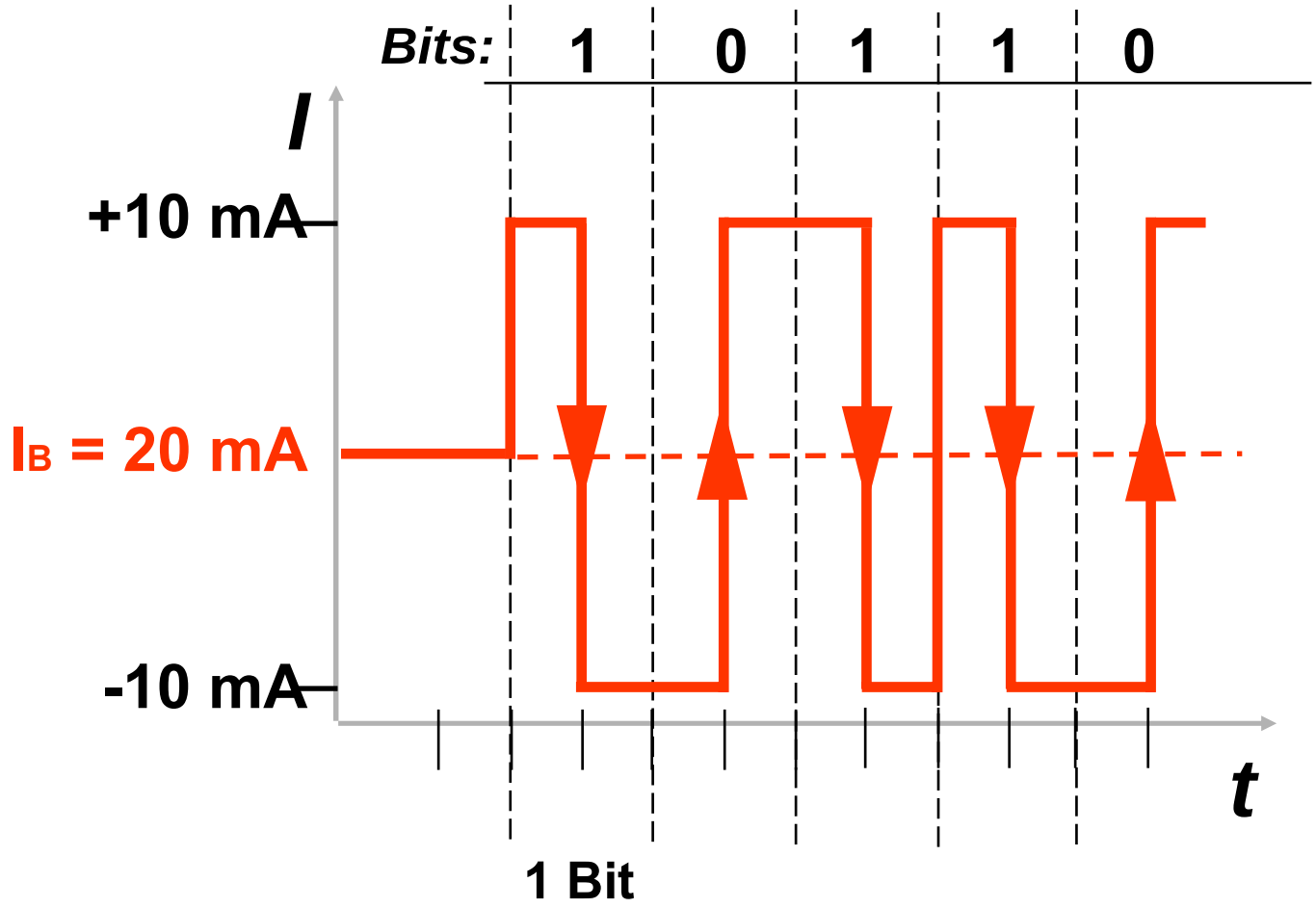
Segment Terminology

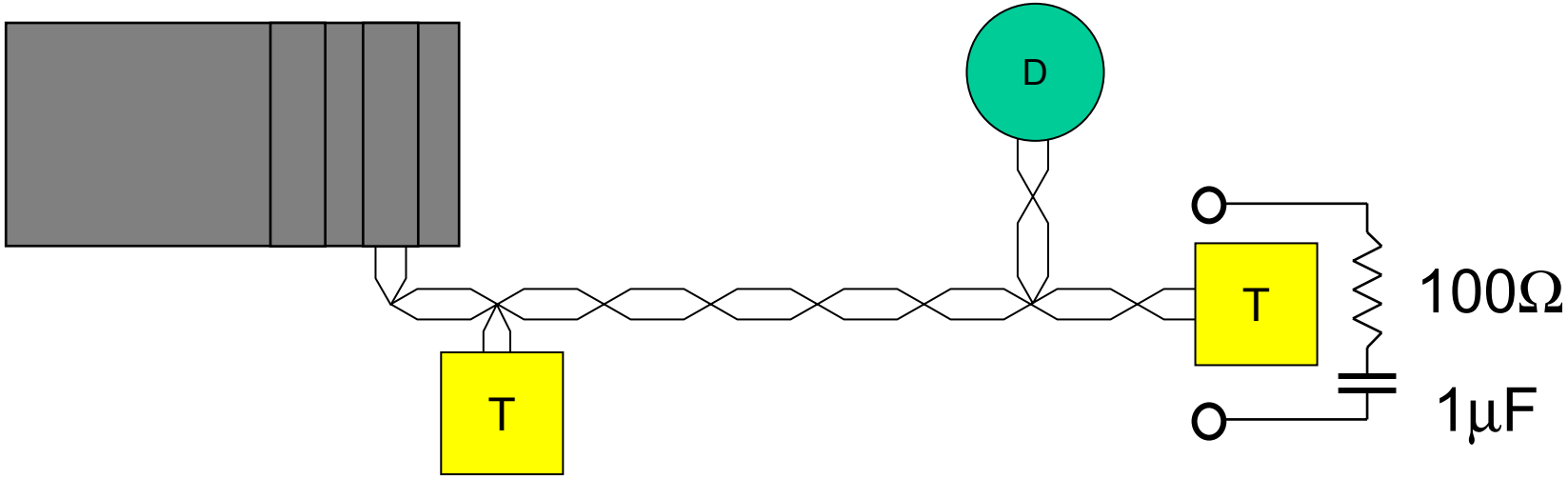
- Physical layer for H1 and PA
- 31.25 kHz current modulation
- Twisted-pair copper cable
- Terminators at each end



Manchester-encoded Bus Powered communications

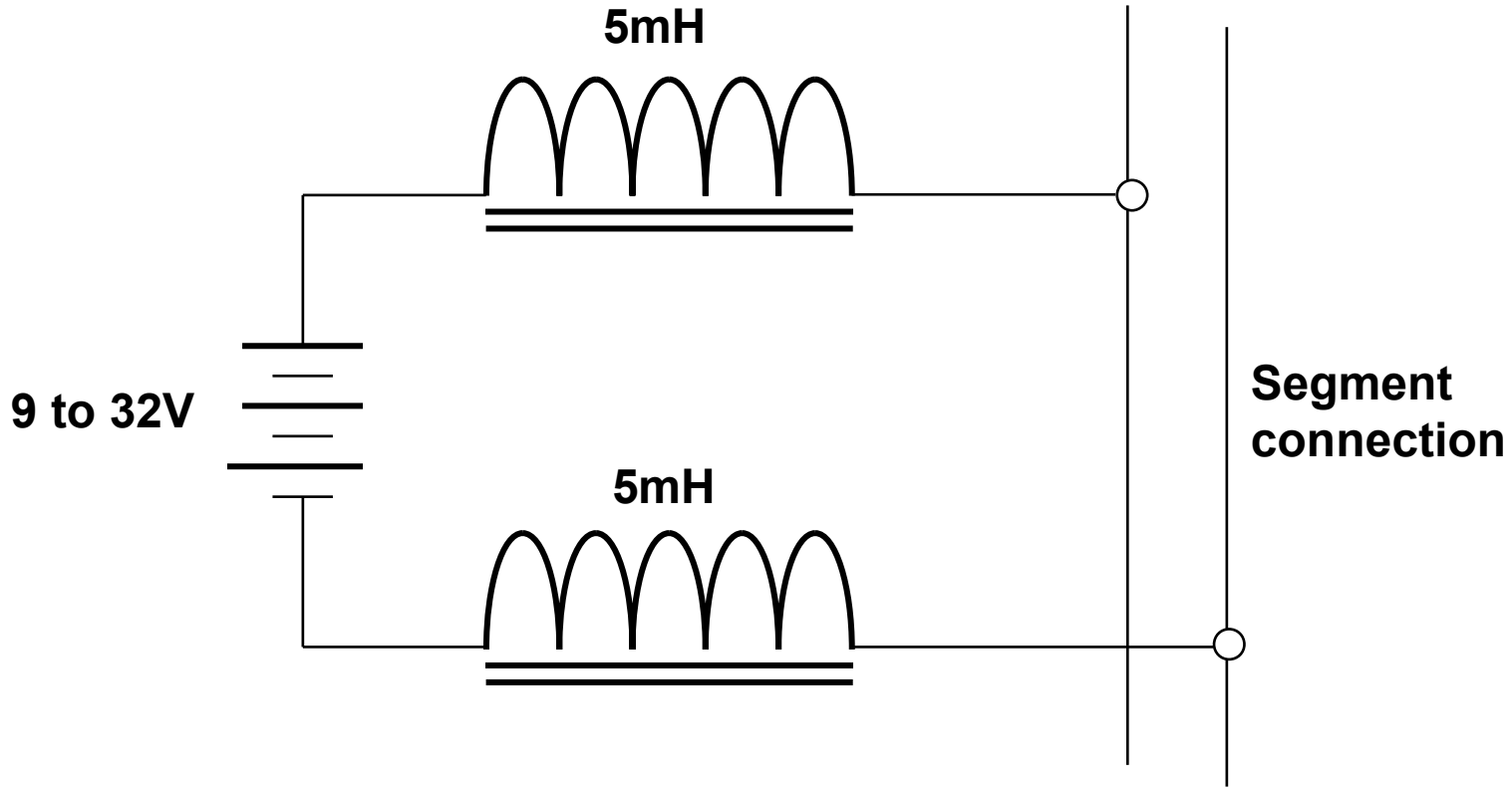


MBP Fieldbus needs Terminators



- Terminators are required, one at each end
  - match line impedance to minimise reflections & distortions
- No more than 2 terminators may be used

MBP Fieldbus Power Supplies

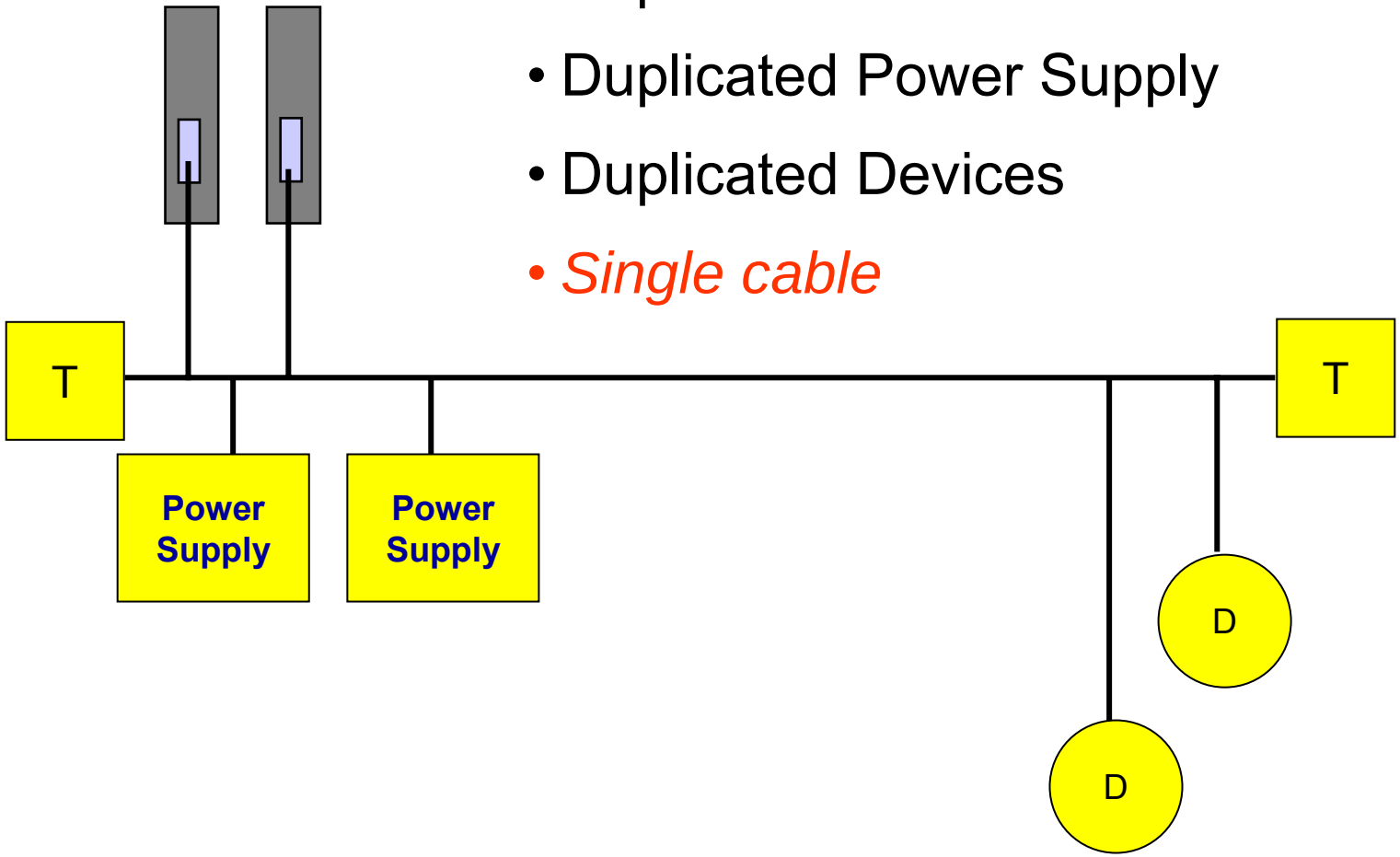


Power supply conditioning

Passes DC (power), rejects AC (signal)

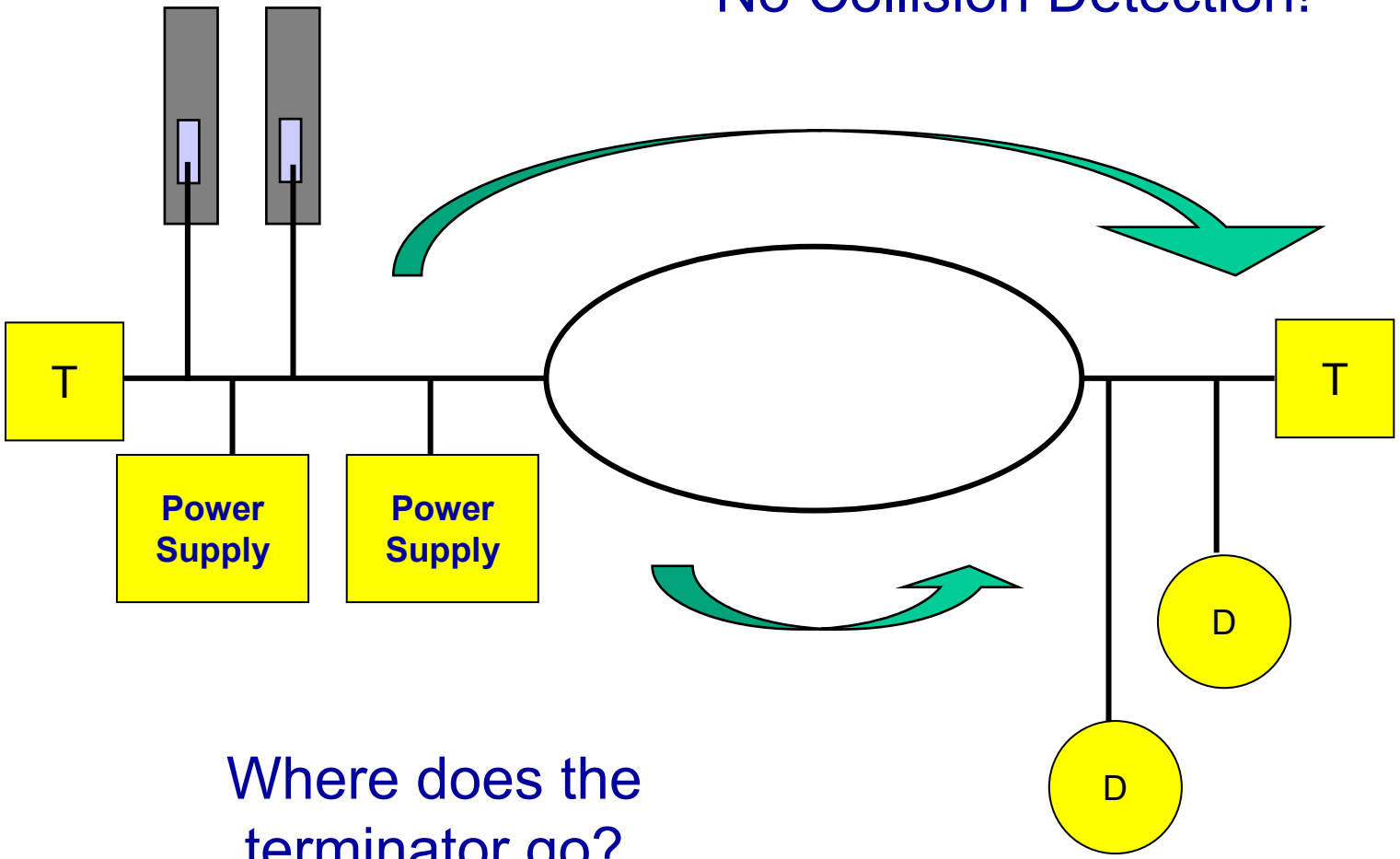
Current redundancy

- Duplicated H1 Interface
- Duplicated Power Supply
- Duplicated Devices
- *Single cable*



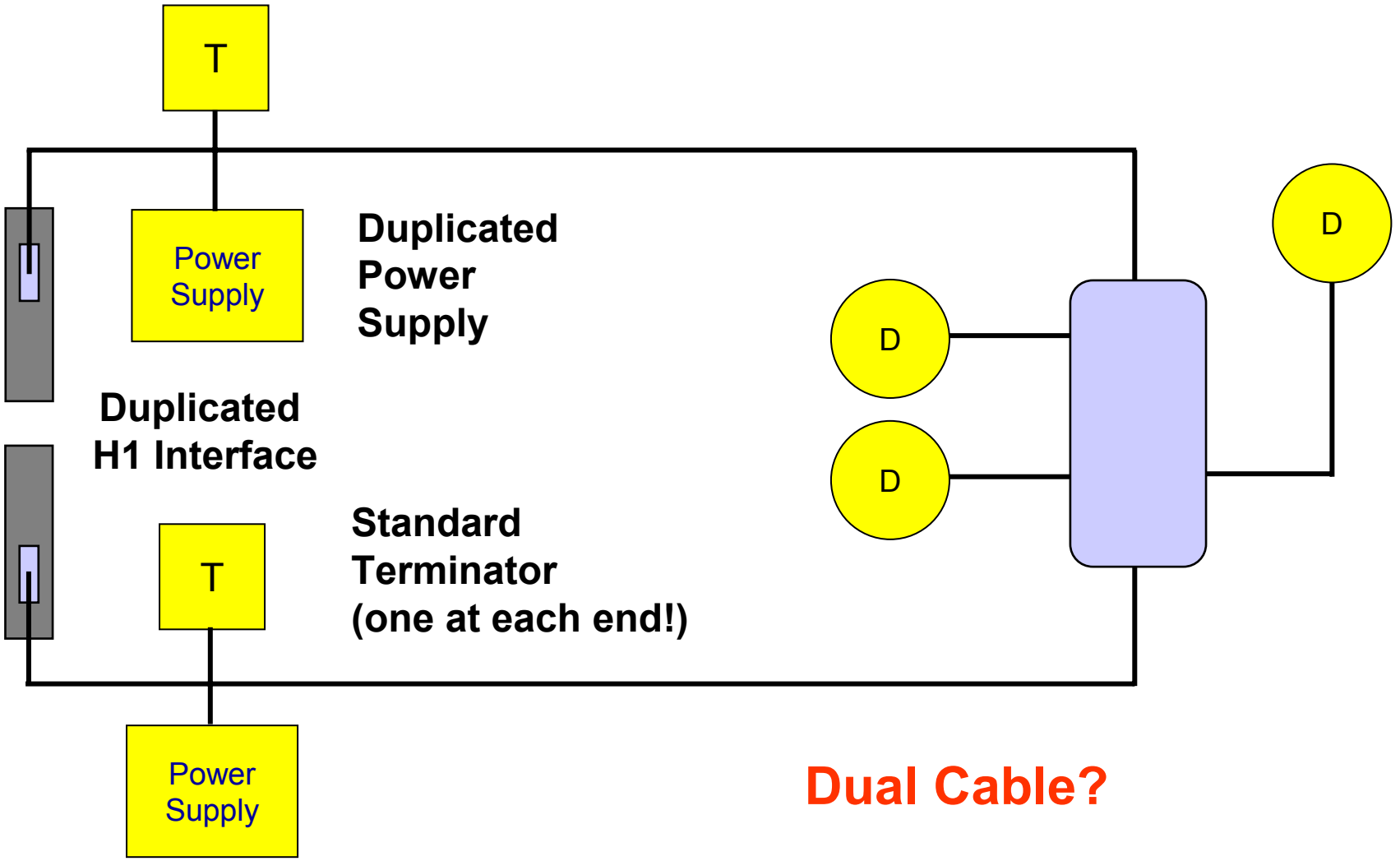
MBP Loops

No Collision Detection!

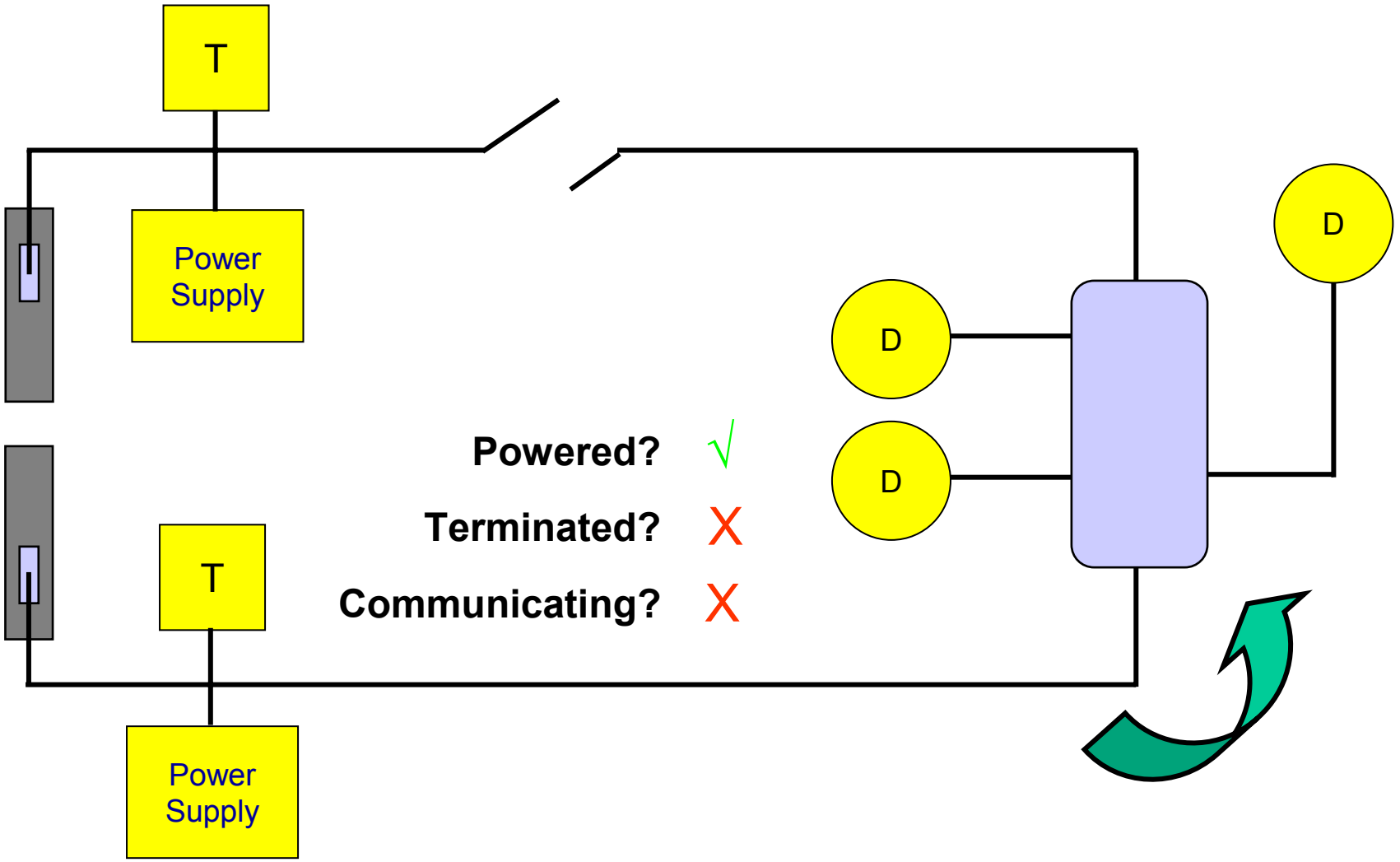


Where does the terminator go?

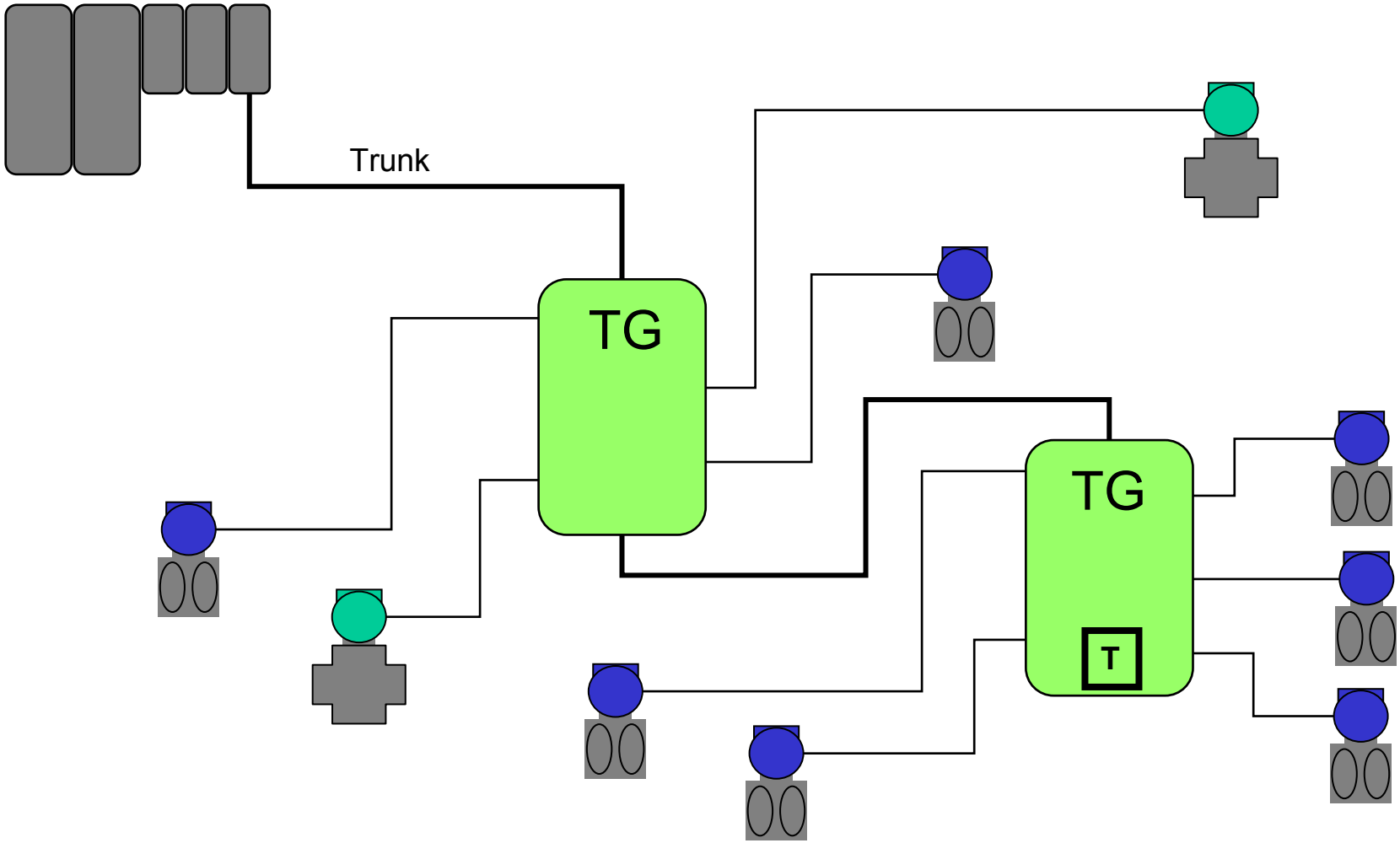
MBP Loop Solution?



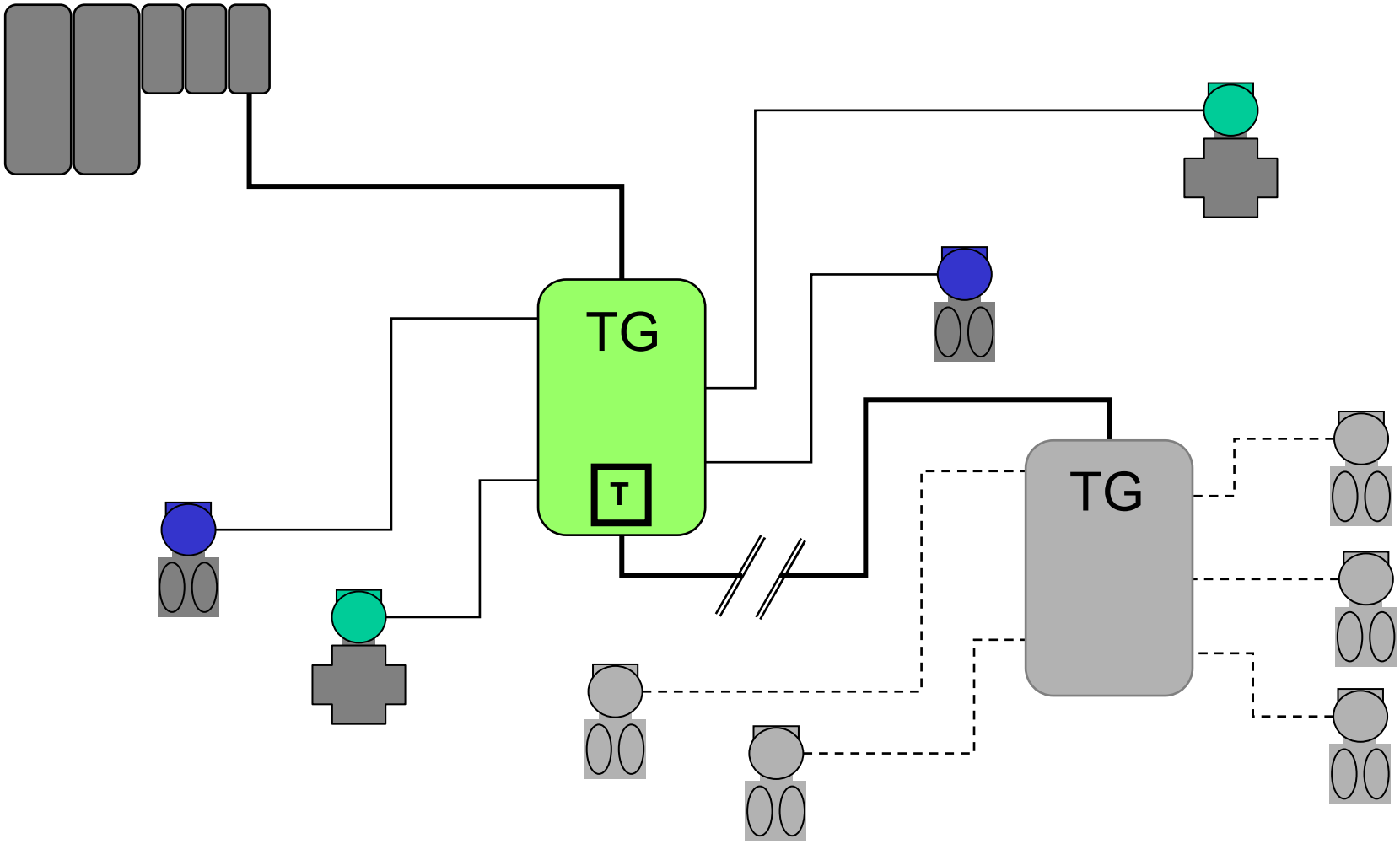
Termination Problem



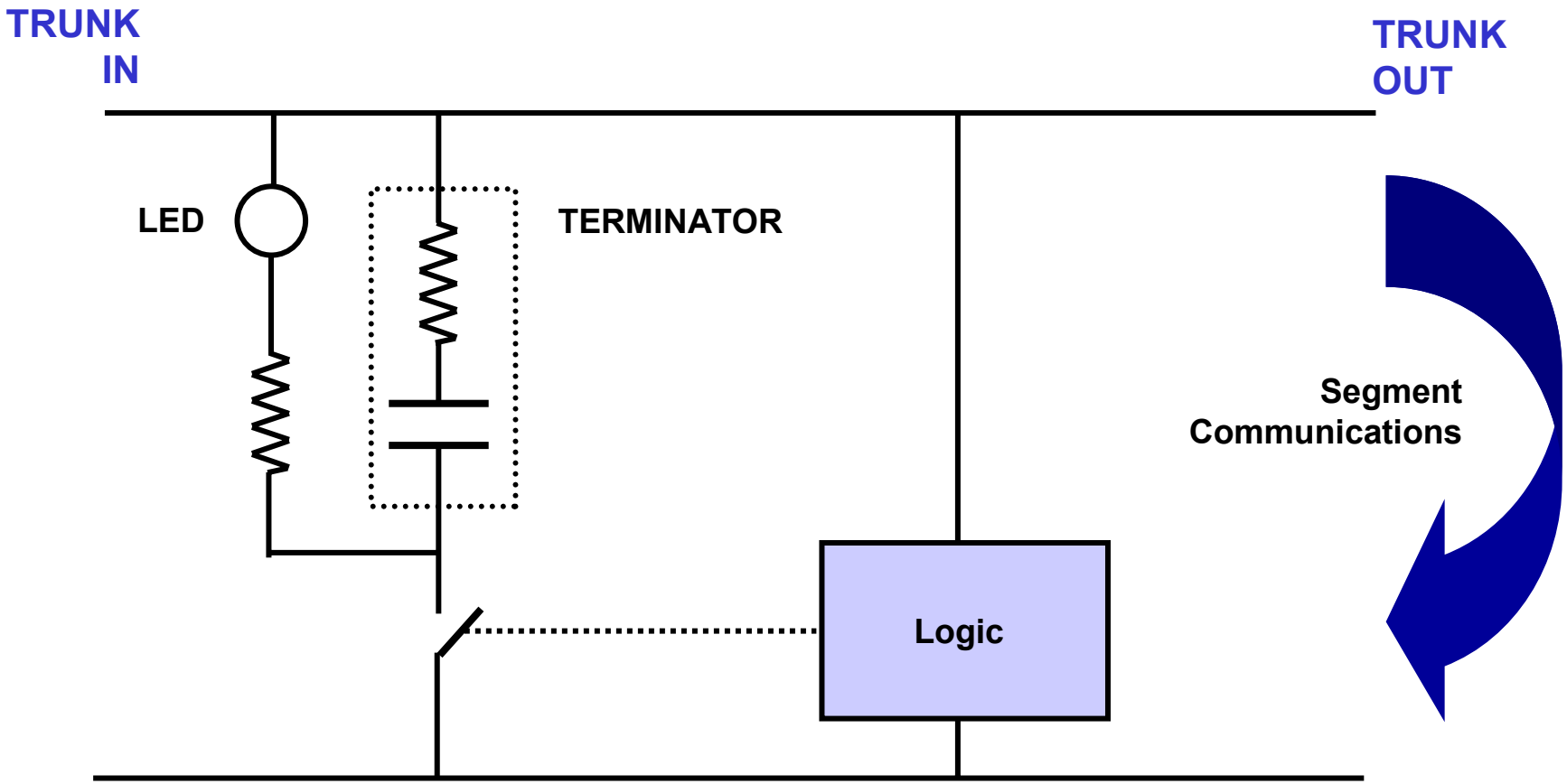
Auto-Termination



Auto-terminator recovery in standard segment

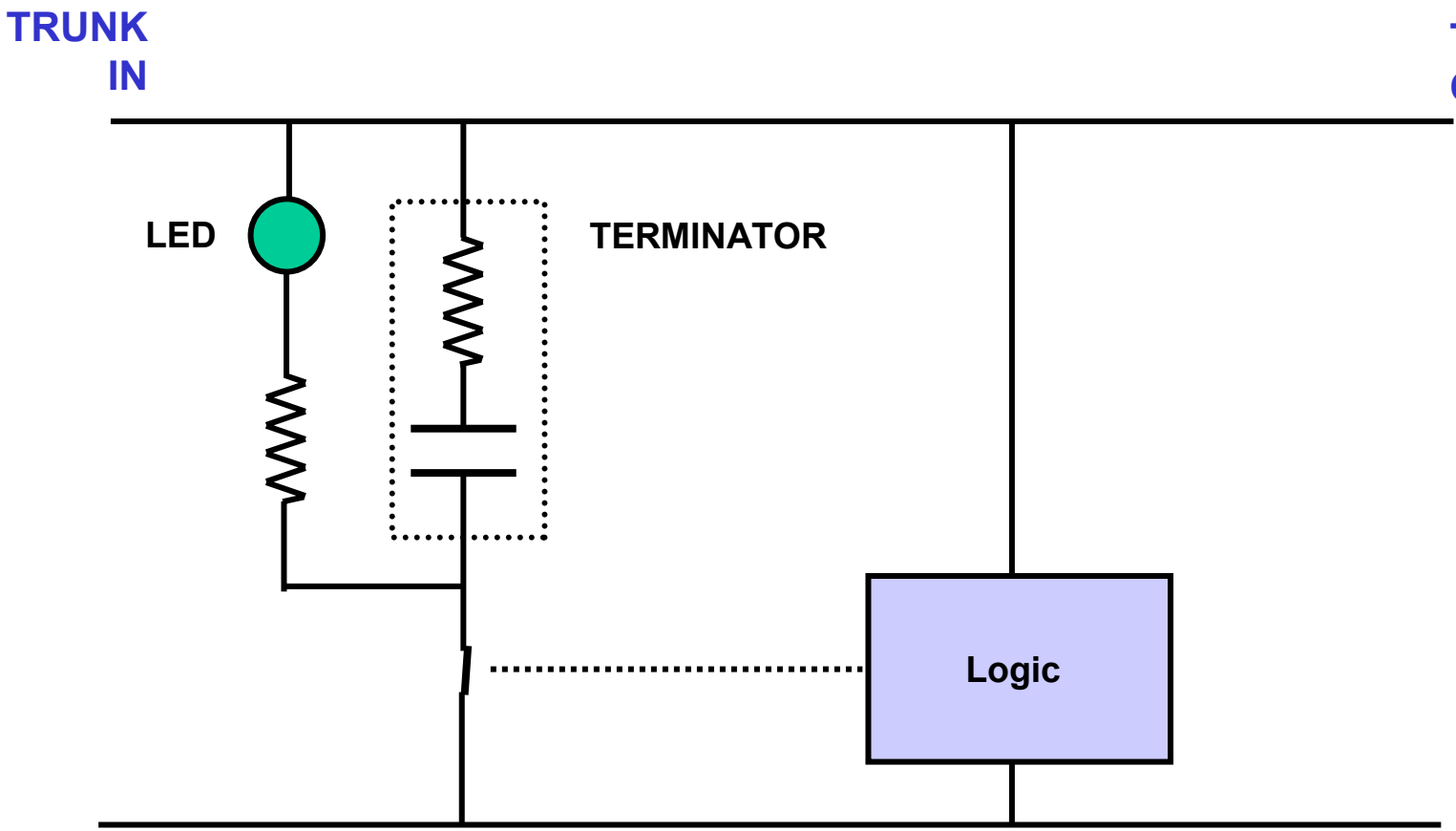


Auto-Terminator OFF



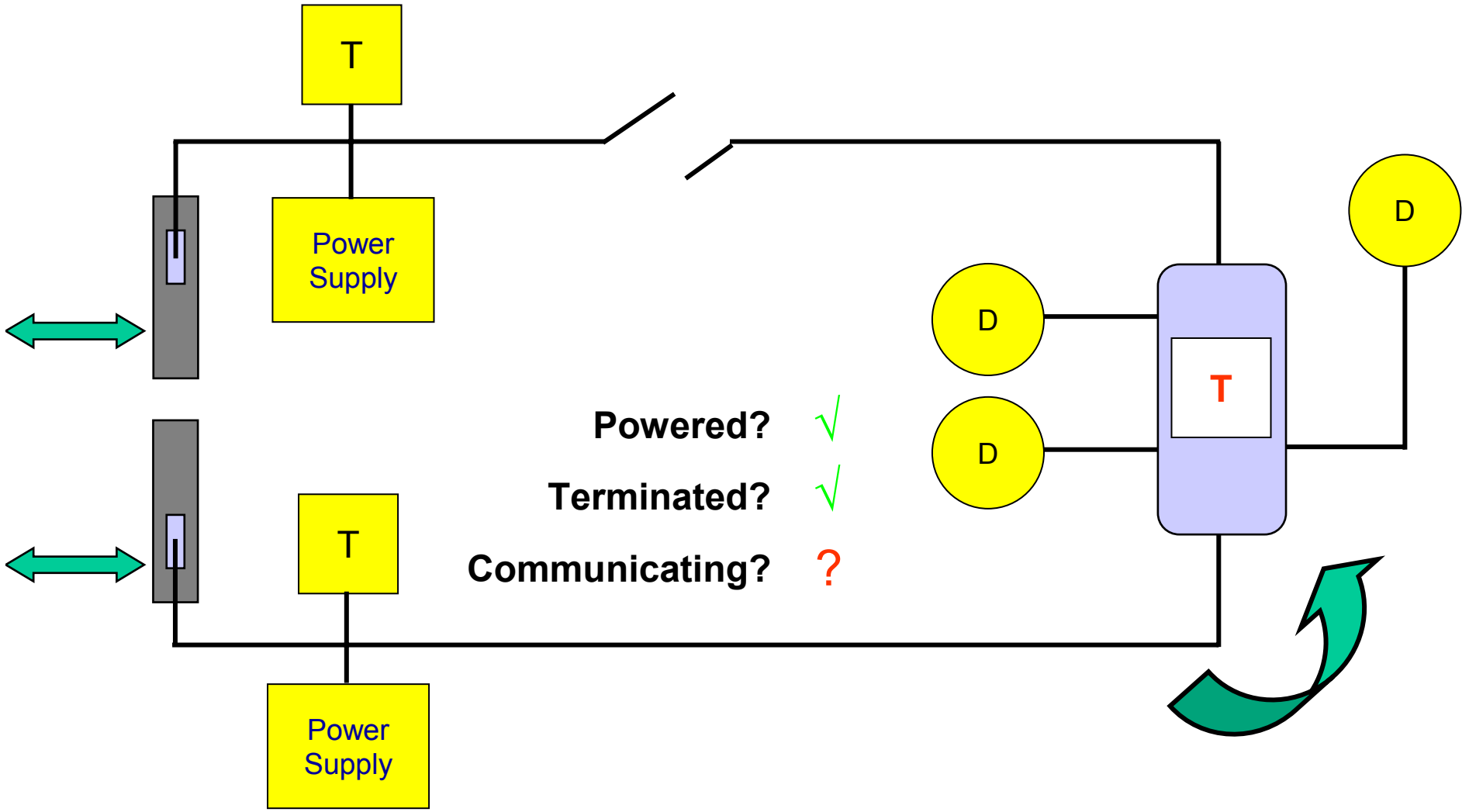
TG unit is not last in segment – Terminator OFF

Auto-Terminator ON

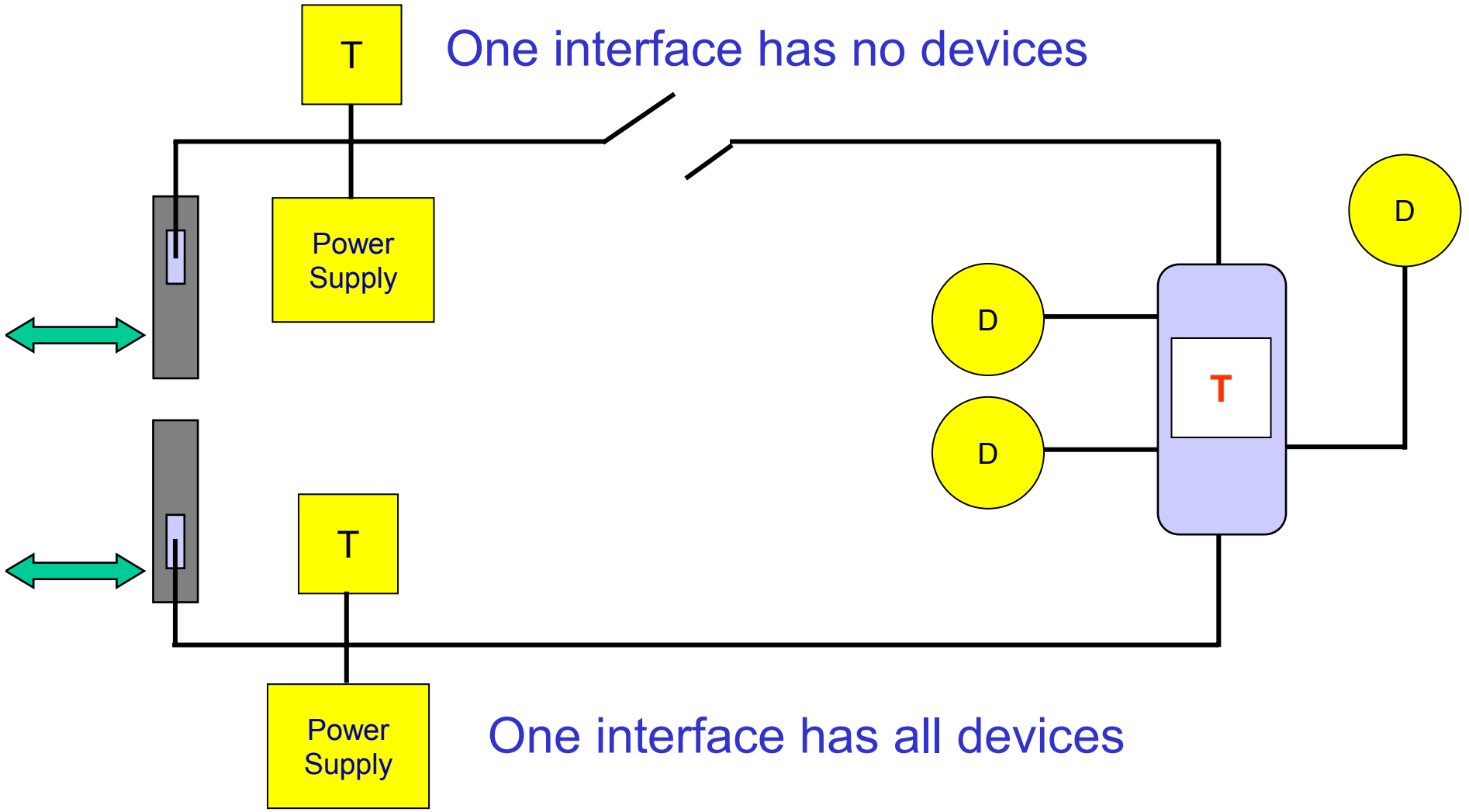


TG unit is last in segment – Terminator ON

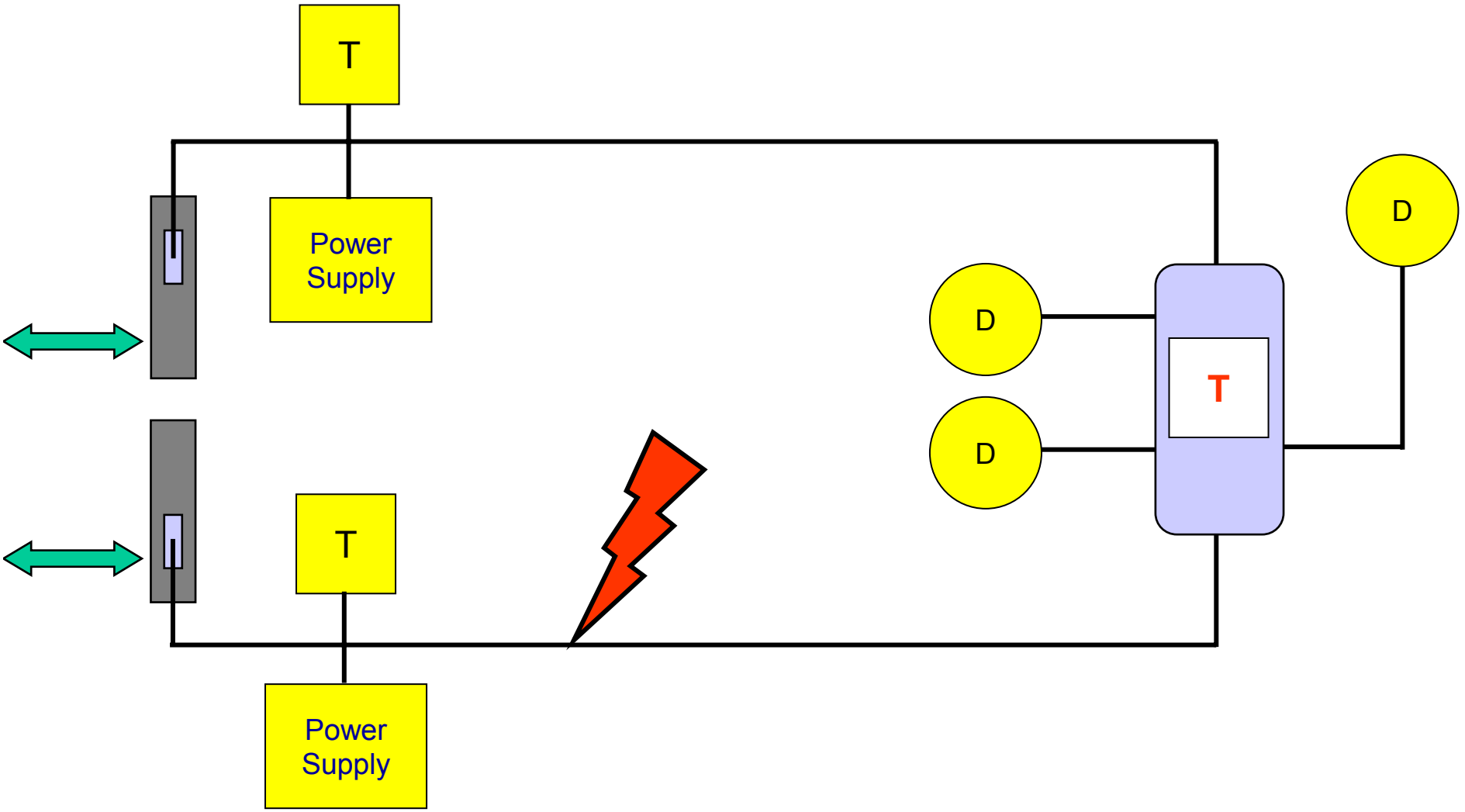
Termination solution on cable break!



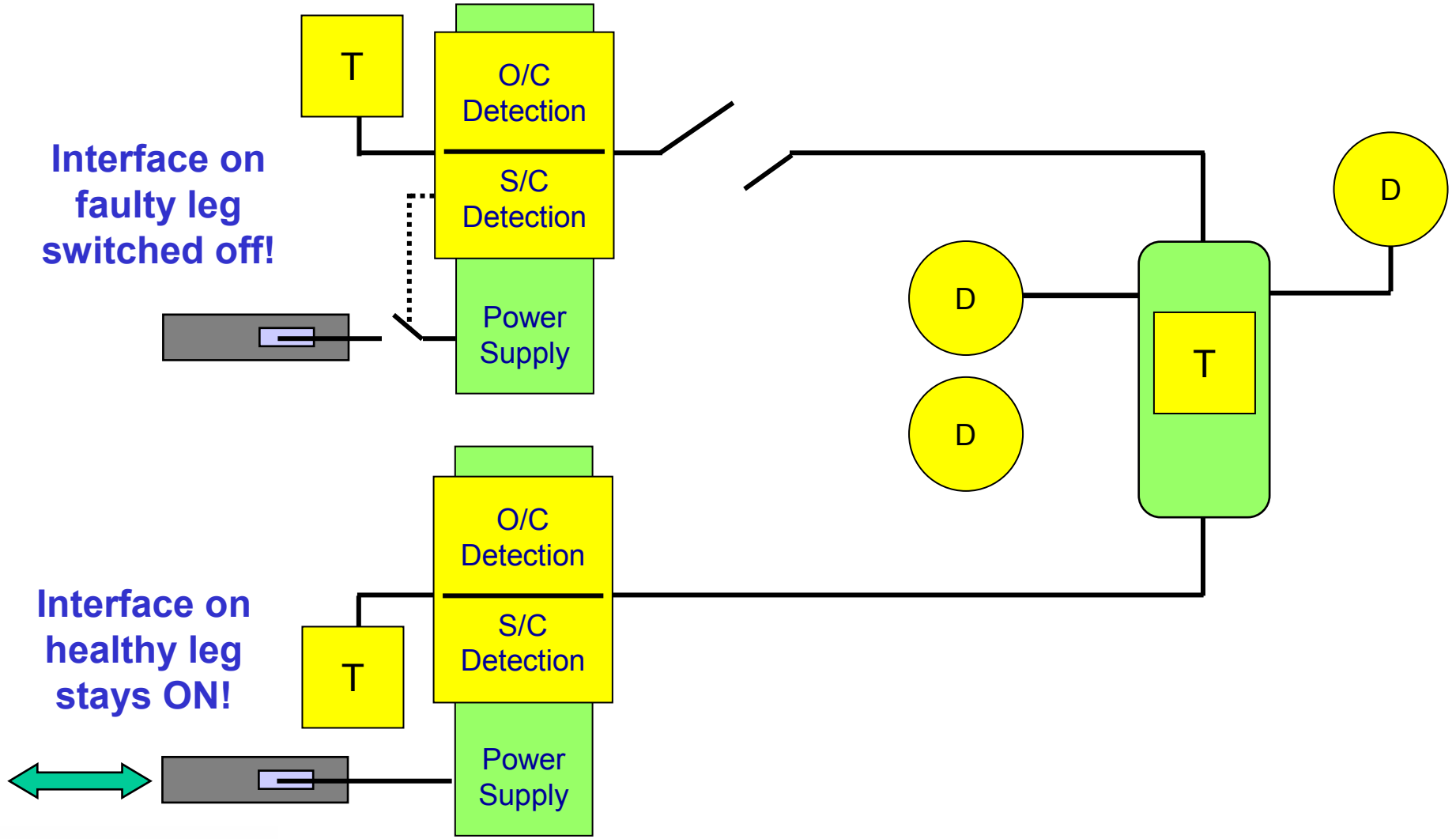
Software Issues?



Cable short-circuit



Full Bus Protection



Hazardous area choices for fieldbus users

- Non-Incendive
  - Zone 2
  - Inexpensive, easy to design
- Flameproof
  - Zone 2 / 1
  - Big, heavy junction boxes
  - Widely used, good experience, simple
- Intrinsic Safety
  - Zone 2 / 1 / 0
  - Limited capacity (especially for fieldbus)
  - Expensive systems approach

Reasons for using I.S.

- Natural technique for instrumentation
  - Low power
- Safest technique?
  - Zone 0 applications
- Live working?
  - Useful for maintenance in the field

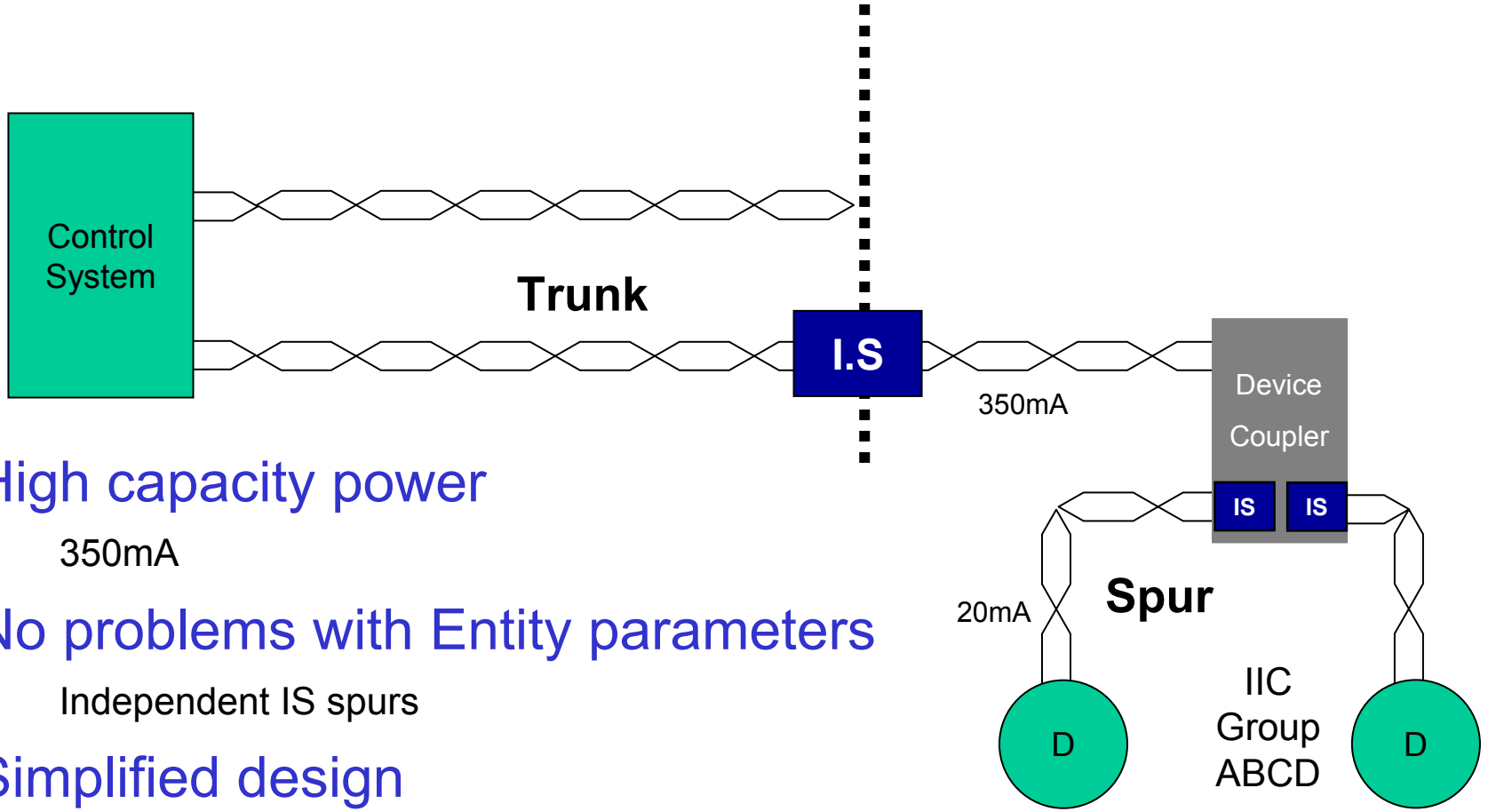
Intrinsic Safety vs. Fieldbus

- Intrinsic Safety
  - Limits energy available in hazardous area to below level capable of causing ignition
  - Circuit to limit energy is called an I.S interface (barrier / isolator)
- Fieldbus seeks to put power for many devices on one twisted-pair

I.S. Solutions

- FISCO
  - Slightly more current in IIC (110mA up from 80mA)
  - Complex electronics, low MTTF
  - Segment limited to 1000m, Spur limited to 30m
- FieldBarriers (P+F, Stahl, Ceag)
  - Complex electronics, low MTBF
  - Limit on spur length
- Split-Architecture Entity System (**Moore***Hawke*)
  - Excellent current capacity (350mA in IIC)
  - Passive electronics, Redundant power, highest MTTF
  - No limit of segment or spur length

Split Architecture Concept



High capacity power

350mA

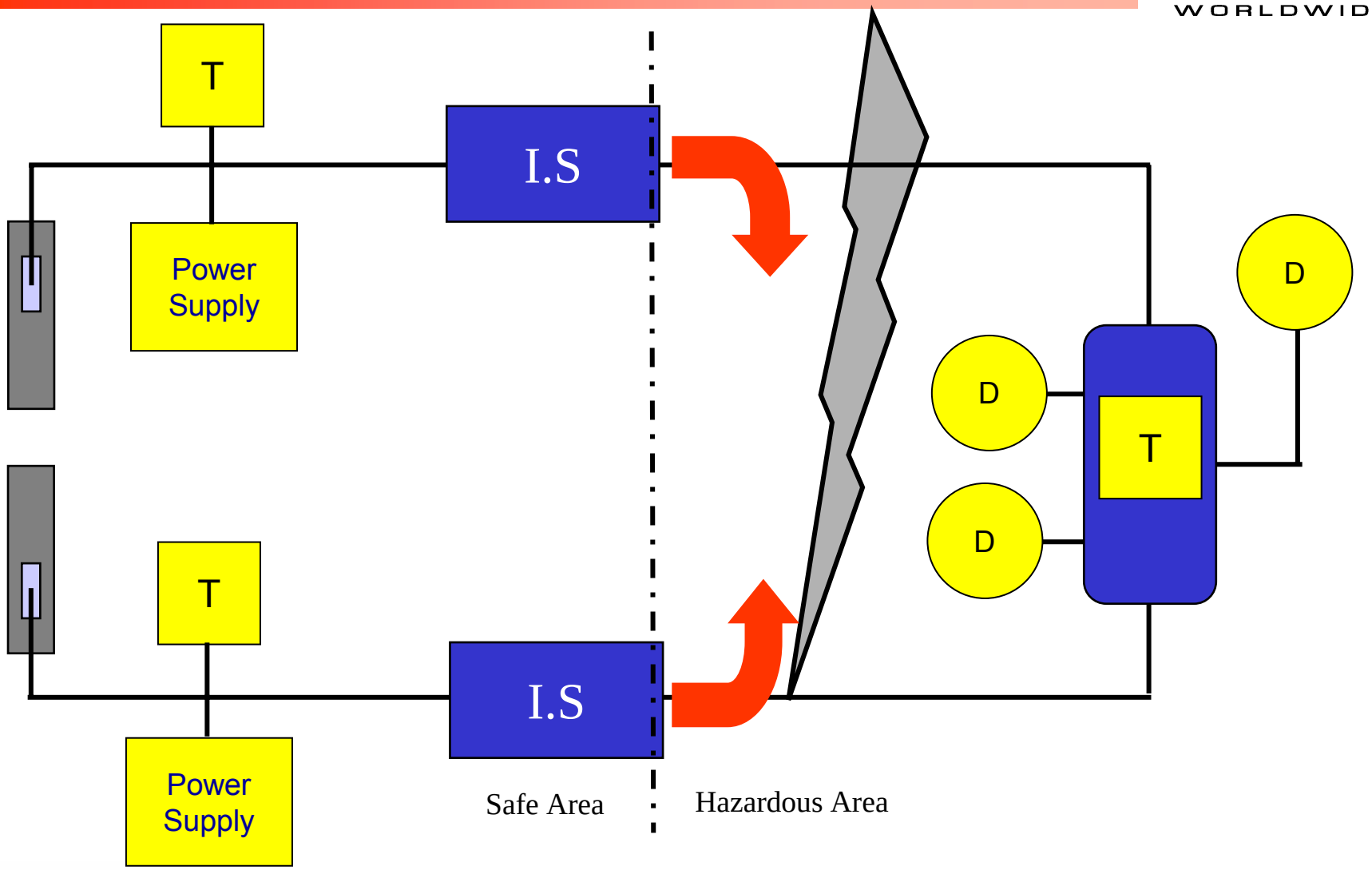
No problems with Entity parameters

Independent IS spurs

Simplified design

Excellent MTTF

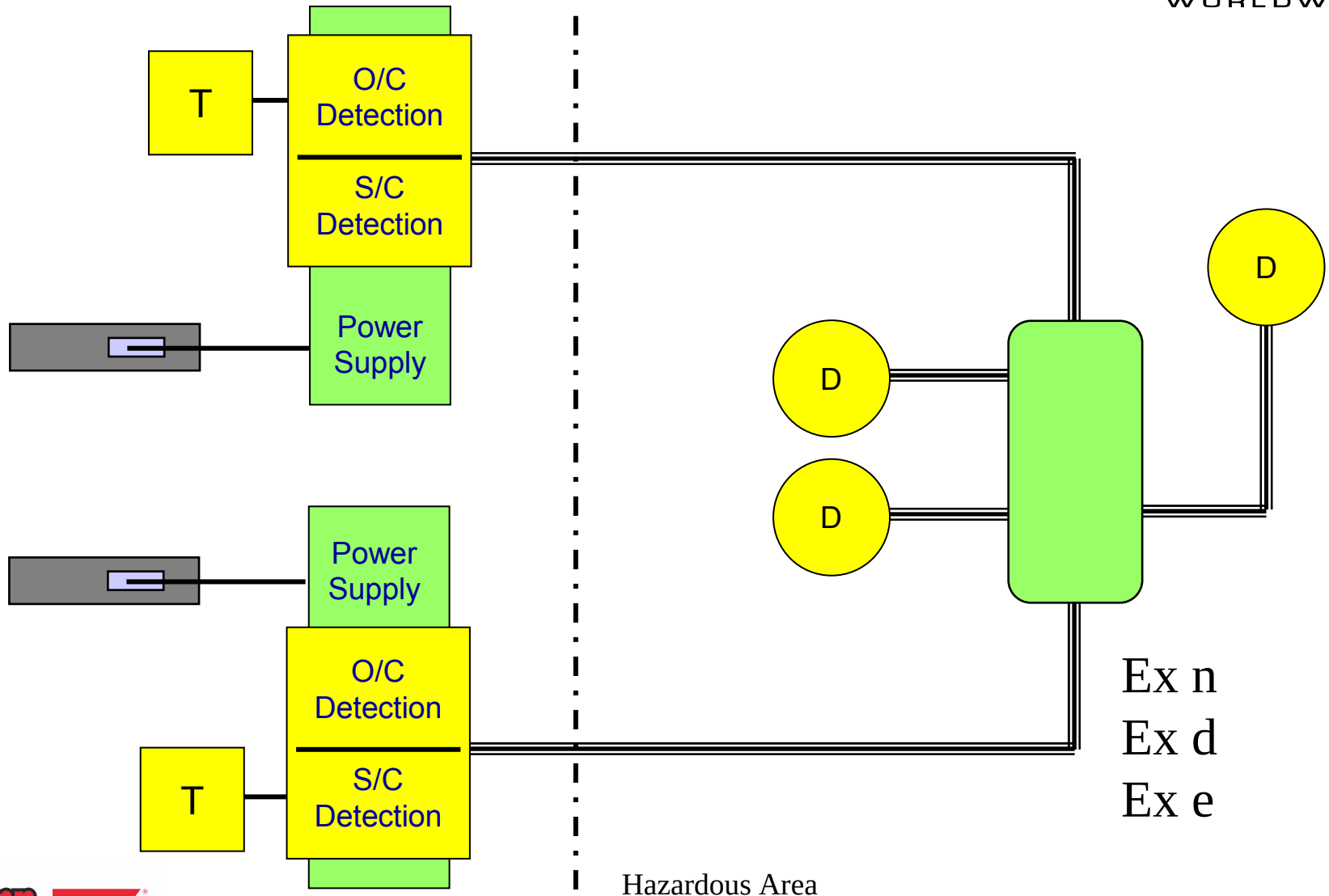
Redundant I.S. Power?



‘Live’ working with Fieldbus?

- Fieldbus eliminates need for ‘live’ working
  - Remote ‘re-ranging’
  - Performance diagnostics via ‘bus
- Modern electronics have excellent performance
  - Lifetime warranty
  - 5-year drift specification

Hazardous Area Redundant Systems



Device removal in hazardous area

- Ex n devices
  - Non-Arcing trunk can't be touched
  - Non-Incendive spurs can be removed
- Ex d devices
  - Ex d wiring can't be touched
  - Special mechanisms available to allow individual Ex d device disconnection

Conclusion

1. **Truly redundant fieldbus is now possible for Manchester-Encoded Bus Powered Systems.**

2. **Intrinsic Safety will be replaced as the ‘natural’ protection method for hazardous area fieldbus systems.**

Thank You