# DTE Power via MDI

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## ALCATEL

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# Matching the working group objectives

▼ **Objective 1 : Economical solution.**

  ☞ No consequences on the existing drivers and firmware.

  ☞ Easy to implement

▼ **Objective 2 : The power distribution technique can be used everywhere in the world.**

  ☞ Same technique usable on spare pairs or signal pairs as well.

  ☞ But... we suggest to use signal pairs

▼ **Objective 3 : Not cause dommage and interoperate with compliant RJ45 MDI Ethernet devices.**

  ☞ The discovery process is able to detect legacy equipment and not to power them.

  ☞ When multiple devices are in parallel position with a device to be powered it does not send power on the link

▼ **Objective 4 : Get right conclusion with powered or unpowered terminals.**

▼ **Objective 8 : Discovery process and power are at the same side of the insulation barrier. Then current insulation is preserved.**

▼ **Objective 10 : Mid-span insertion is possible with this proposal.**
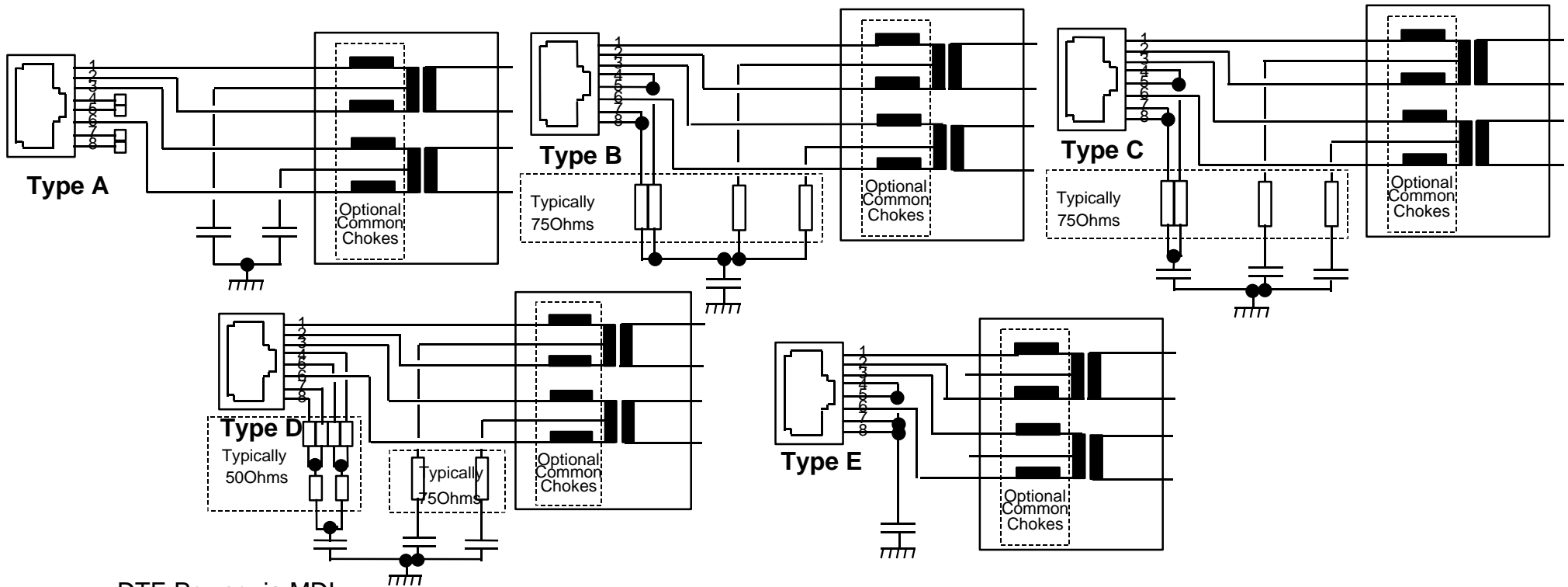
▼ **This process working is based on impedance analysis.**

▼ **This analysis is done alternatively or simultaneously with alternative and direct voltage.**

    ☞ **This allows detecting a PDTE even whether it is locally powered. That means a safe power is sent even it is still powered.**

# Type A, B, C, D and E terminations

▼ **On spare pairs all these terminations have :**

☛ **The same impedance whatever the type of voltage (Alternative or DC)**

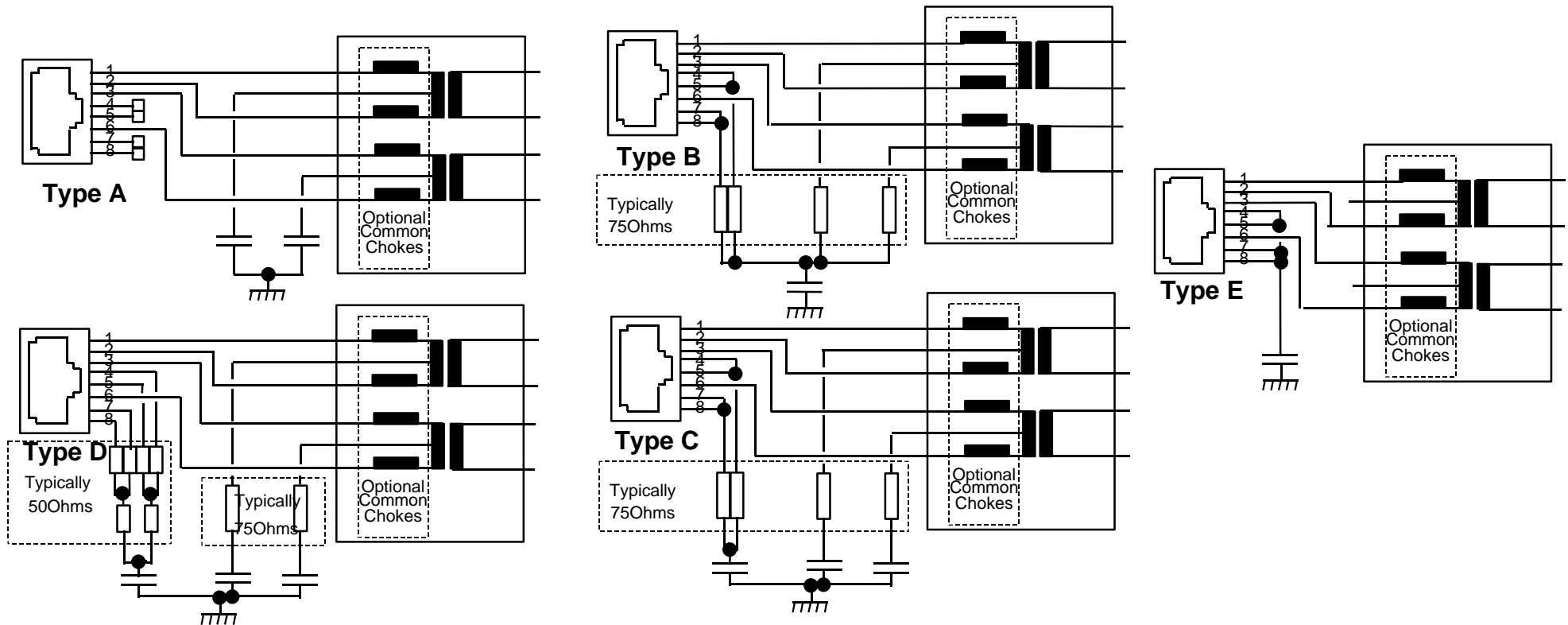▼ **And… these terminations have not to be powered**

**Type A**

**Type B**

Typically 75Ohms

Optional Common Chokes

**Type C**

Typically 75Ohms

Optional Common Chokes

**Type D**

Typically 50Ohms

Typically 75Ohms

Optional Common Chokes

**Type E**

Optional Common Chokes

Optional Common Chokes

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24-25/05/00

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ALCATEL BUSINESS SYSTEMS

# Type A, C, B, D and E termination

▼ **On signal pairs all these terminations have :**

☛ **The same impedance whatever the type of voltage (Alternative or DC)**
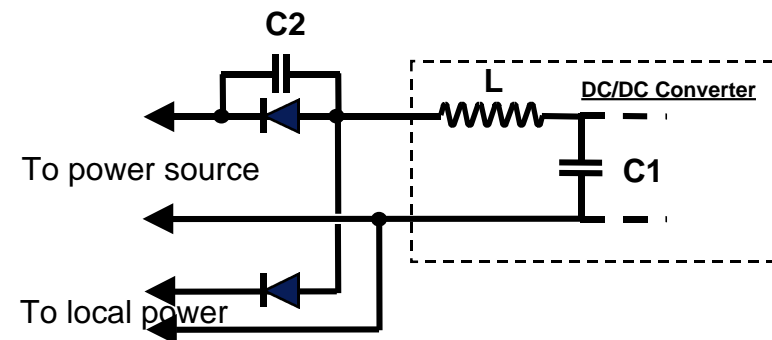
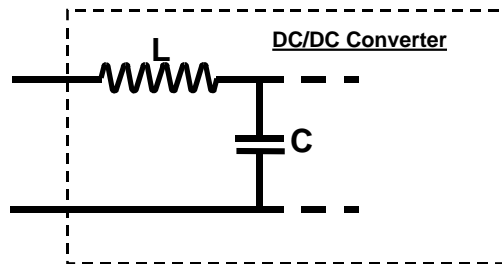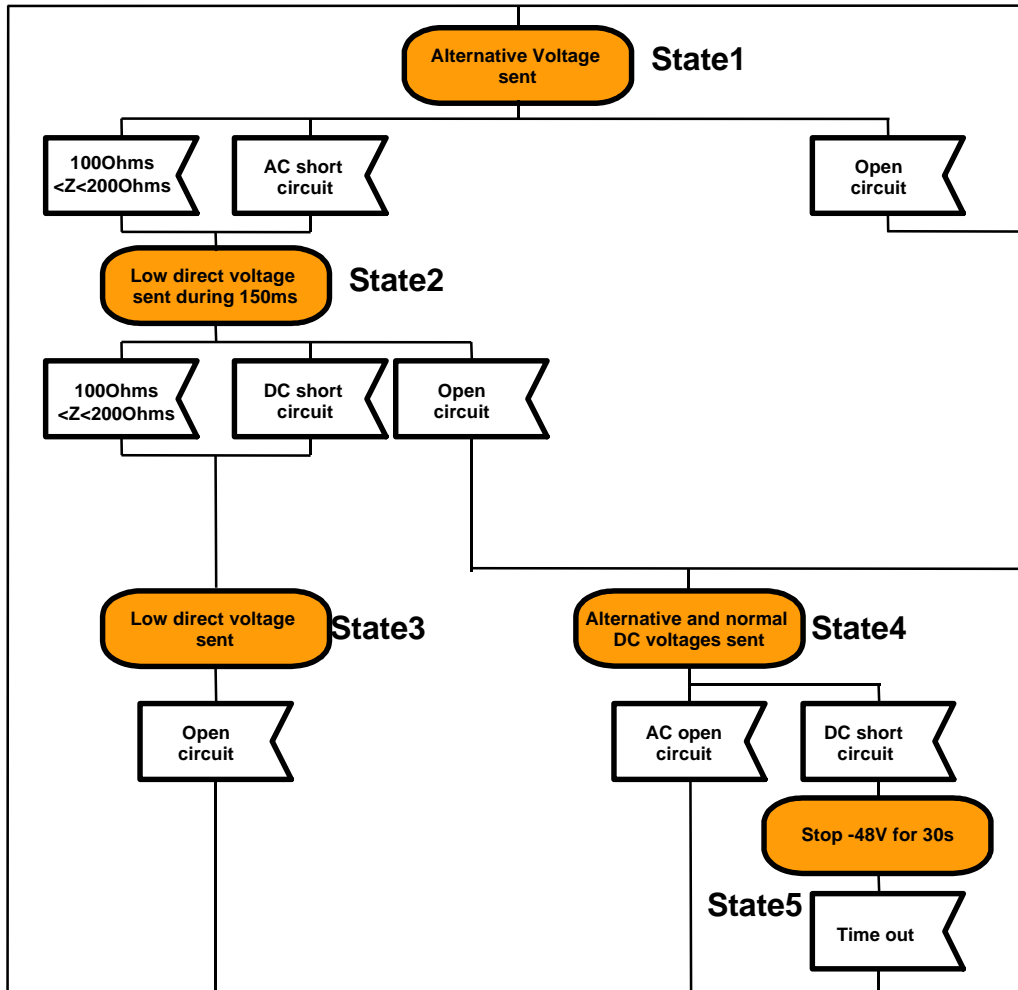▼ **And... these terminations have not to be powered**

**Type A**

**Type B**

Typically 75Ohms

Optional Common Chokes

**Type D**

Typically 50Ohms

Typically 75Ohms

Optional Common Chokes

**Type C**

Typically 75Ohms

Optional Common Chokes

**Type E**

Optional Common Chokes

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## ▼ This termination is :

- ☛ A short circuit for the alternative voltage or, at least, a low AC impedance

- ☛ And an open circuit for a low direct voltage (5V for instance) or, at least, a very high DC impedance

## ▼ And… this termination has to be powered

**State1** — Alternative Voltage sent

100Ohms <Z<200Ohms | AC short circuit | Open circuit

**State2** — Low direct voltage sent during 150ms

100Ohms <Z<200Ohms | DC short circuit | Open circuit

**State3** — Low direct voltage sent

Open circuit

**State4** — Alternative and normal DC voltages sent

AC open circuit | DC short circuit

Stop -48V for 30s

**State5** — Time out

▼ **Power is sent even if the PDTE is locally powered**

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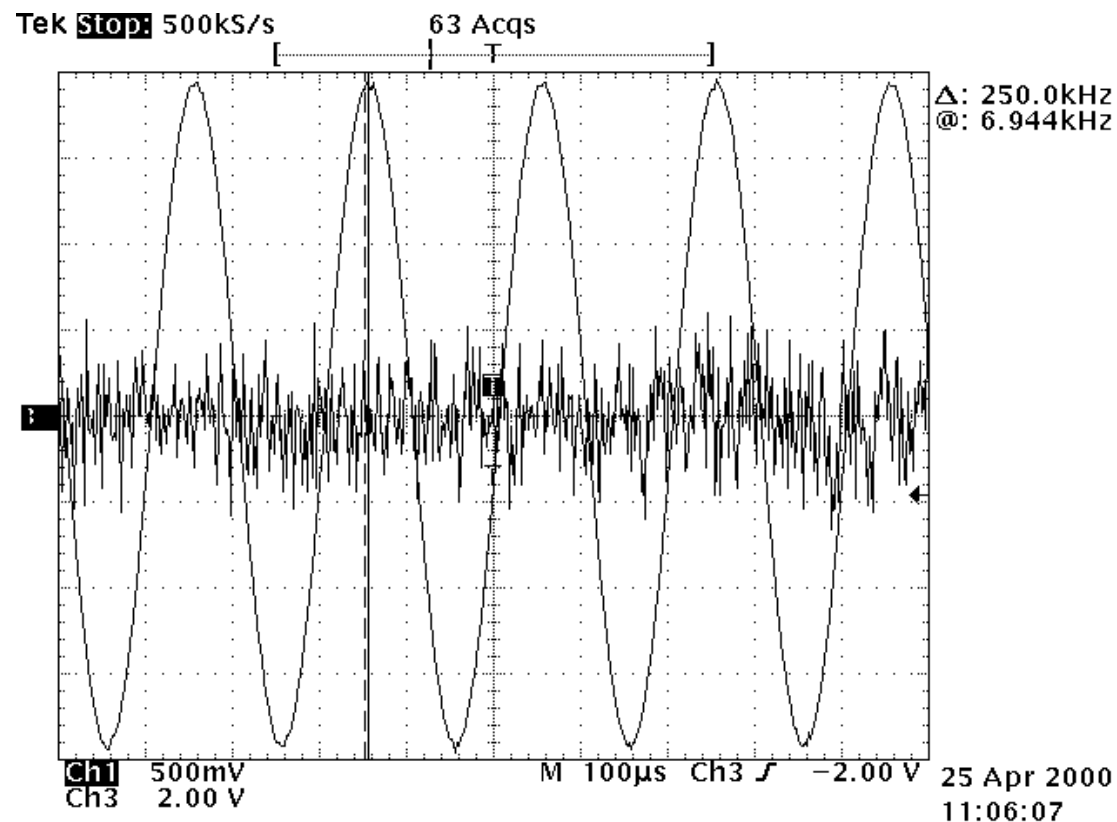▼ **Measurement on one wire of the pair done at the end of a 100m cable.**
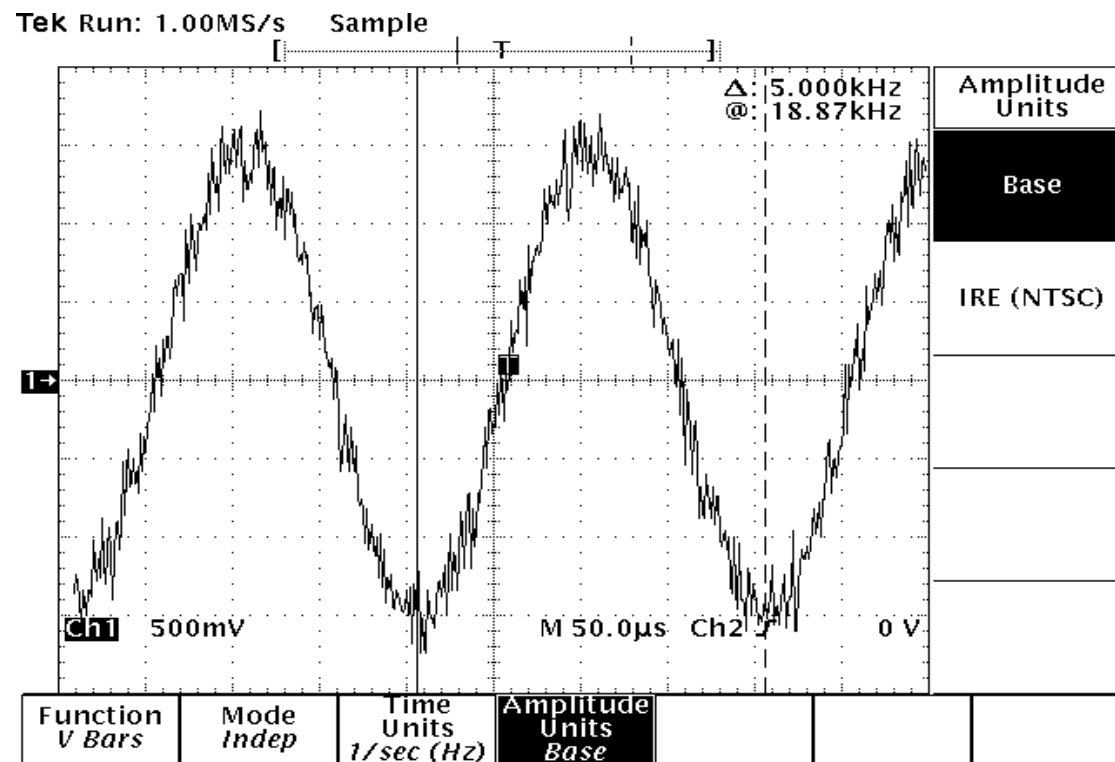
▼ **Measurement in differential mode done at the end of a 100m cable. An 8% artificial unbalanced resistor between two wires of the pair was introduced.**
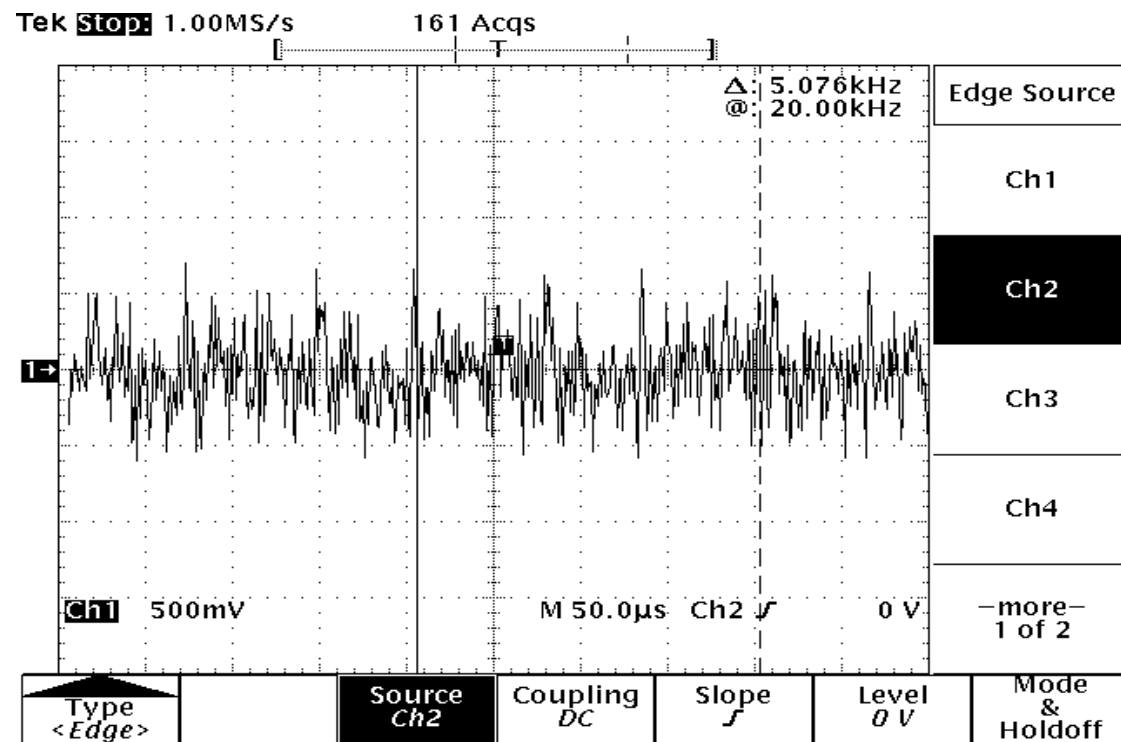
▼ **Measurement done with a 16Vpp/5kHz common mode alternative voltage : no packet or bit errors have been detected at 100Mbits/s.**

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▼ **Whatever the level of the common mode voltage the Ethernet signal keeps the same shape.**
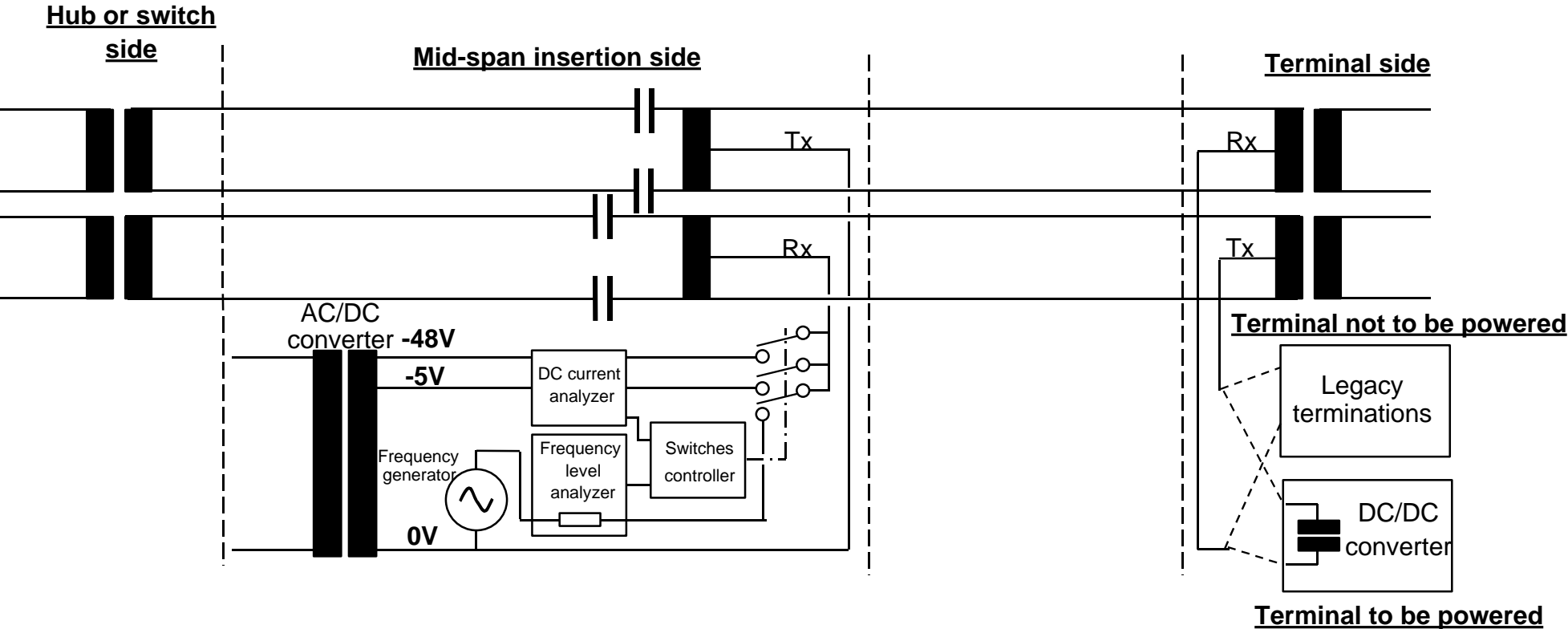
**Common mode voltage level**
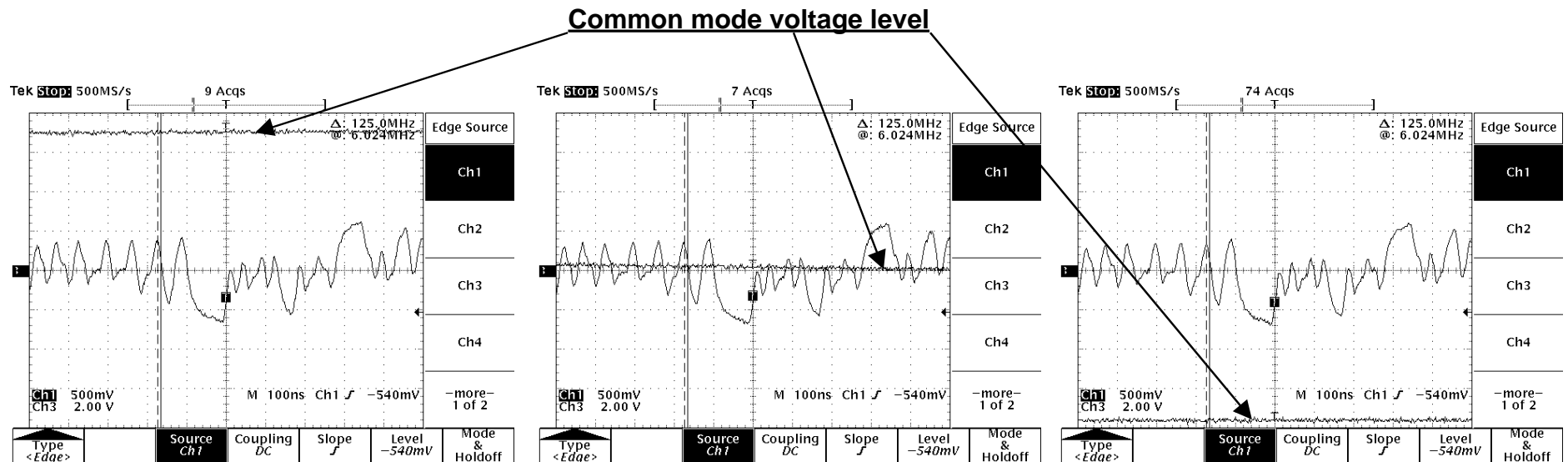
▼ **Our suggestion is to use signal pairs to preserve legacy installations and to facilitate the IP-Phone deployment.**

▼ **When deployment will occur some existing installations will not have wall outlet enough to allow connecting the IP-Phone.**
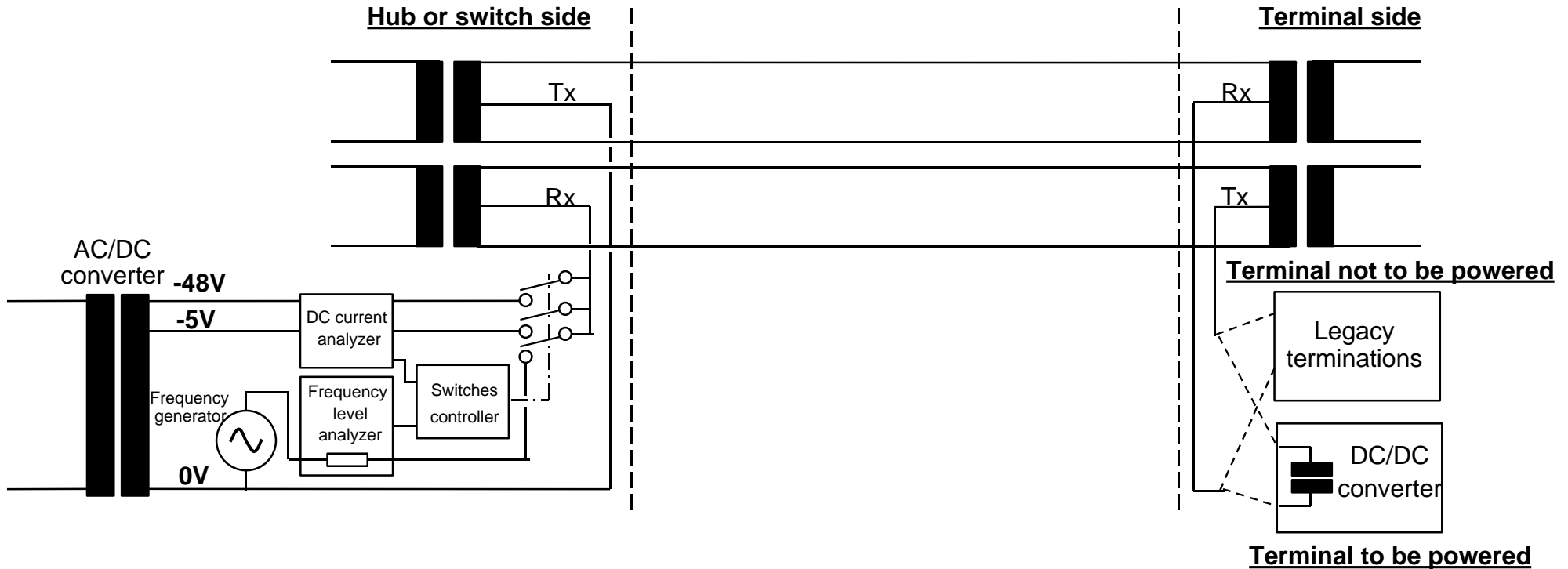
# Mid-Span Insertion

▼ **It is not necessary to use a transformer to carry out the mid-span insertion. Inductors and capacitors are sufficient.**



**Hub or switch side**

**Mid-span insertion side**

**Terminal side**

Tx

Rx

Rx

Tx

AC/DC converter **-48V**

**-5V**

DC current analyzer

Frequency generator

Frequency level analyzer

Switches controller

**0V**

**Terminal not to be powered**

Legacy terminations

DC/DC converter

**Terminal to be powered**

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▼ **Concerning the voltage to be used : we are suggesting a typical 48V DC voltage.**

▼ **We mean, as a large majority at the last Albuquerque meeting, a DC voltage included in 42 to 54V limits.**