External noise events

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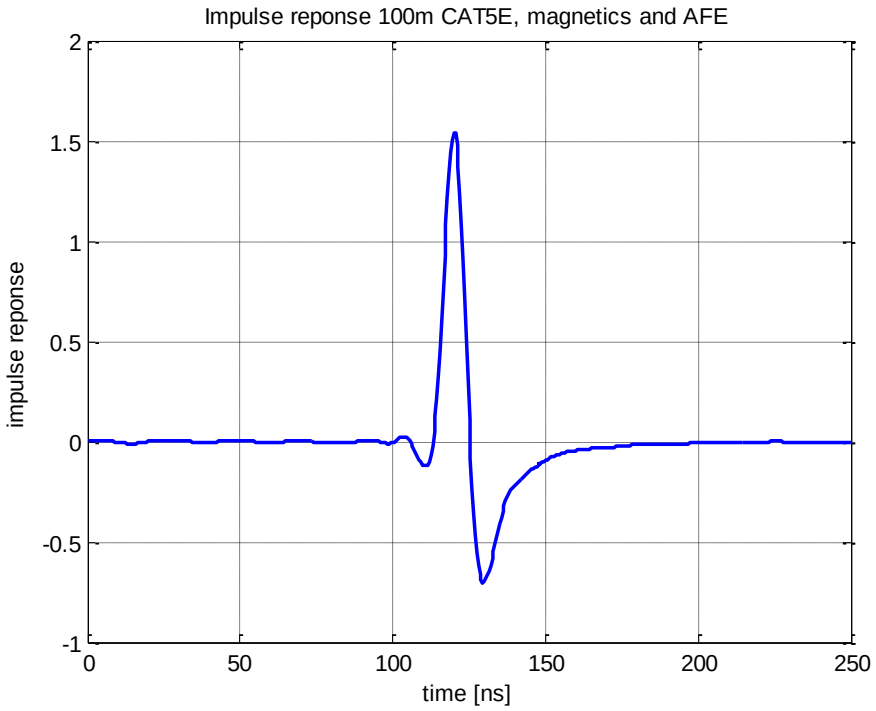
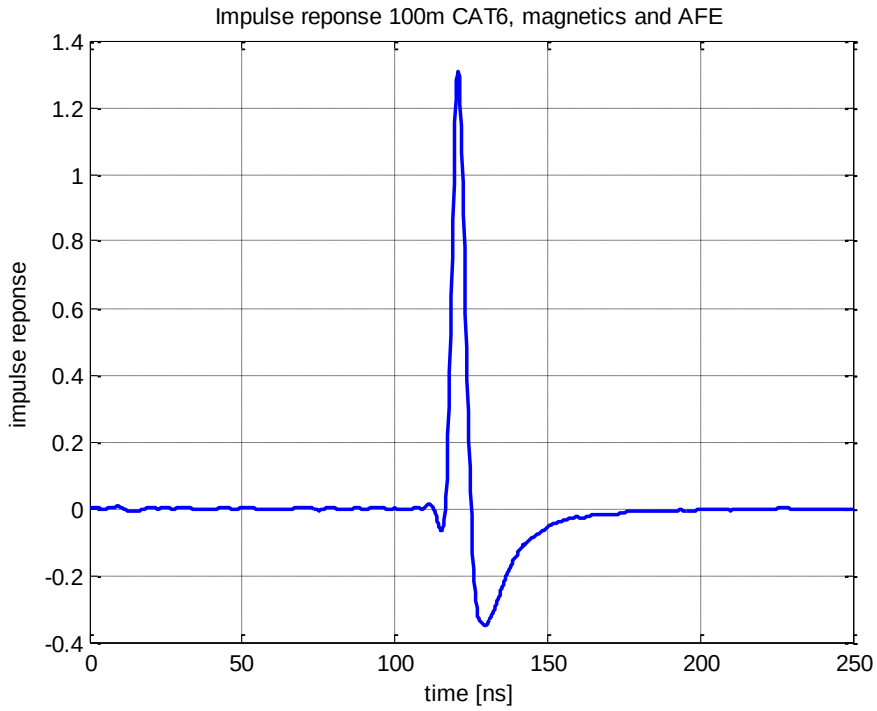
External vs. Internal Noise events

- Noise source specific
- Internal to a cable
  - Triboelectric effect
- Internal to a cable bundle
  - “Alien” noise considerations selected modulation/coding for 10G
- External to the cable and/or cable bundle
  - Electrical air discharge

Impulse response of cable, magnetics and analog front end

- Measured impulse responses
- Time span as 90 percent of total energy
- 100m cable, magnetics and AFE
  - CAT5E:19ns time span
  - CAT6: 18ns time span

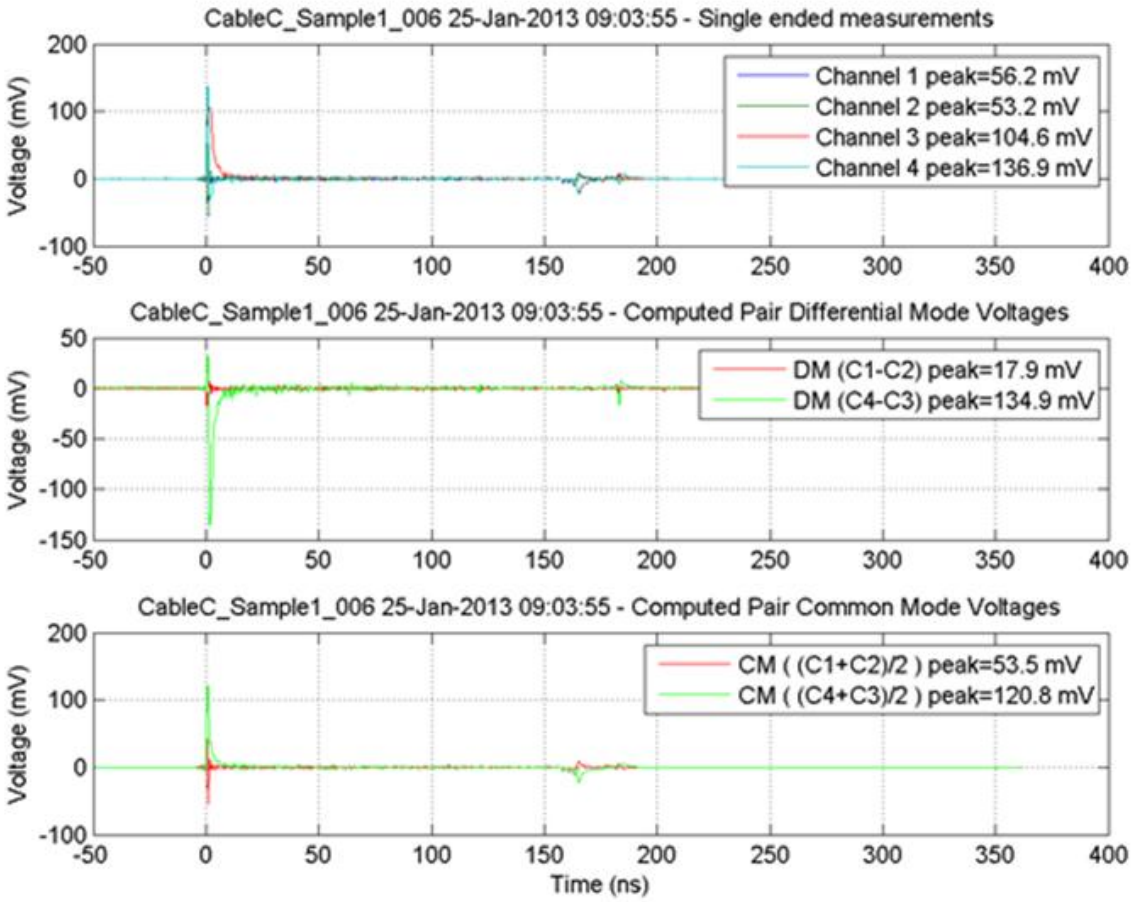




Triboelectric effect in F/UTP cables 25G and 40G

- F/UTP cable has an outer foil around unshielded twisted pairs.
- Moving F/UTP cables sometimes generate sporadic internal noise impulses after moving them, even if they are not further disturbed.
- Observed noise is truly “impulsive” compared to the system response of ~18ns.
- Short duration impulse on one TWP.
- For 25G/40G 2 byte error correcting Reed Solomon coding for the Euclidean distance protected bits was added.

Typical triboelectric impulse noise



- Most commonly observed noise event: Energy on one wire.
- Magnetics and AFE not included.

Nomenclature: "Enterprise Noise" or "External Noise Event"

- Time span as 90 percent of total energy
- Timespan of impulse response of a
  - 100m cable, magnetics and AFE: 18ns to 19ns
- Timespan of representative external noise events measured by Aquantia (March 2014):
  - Tool contact events: 48.8ns to 132.8ns
  - Lamp and desk fan: 167.0ns to 8048ns
  - Desk Chair Noise: 54.4ns to 166.8ns
- External noise events are 2.5 to 40 longer than the longest cable impulse response
- Misnomer: "impulse noise"
- Replace with: either "Enterprise Noise" or "External Noise Event"