

# The Environmental

- Channel Specifications
  - Long-reach communication mode (1000 m)
  - Shorter-reach (and intrinsically safe) communication mode (200 m)
  - Channel Model (including connectors)
    - Frequency dependent
    - Maximum possible insertion loss within communication frequency range
    - Maximum possible return loss within communication frequency range
- Noise Models and Parameters
  - Crosstalk between signal lines and power/signal lines in automotive and industrial environments
    - Change of noise environment over time (e. g. when switching different loads, e. g. motors, on and off)
    - AWGN and in-band disturbers should come from the crosstalk and EMI models.
    - Duration and behavior of impulse noise events
  - Supply disturbance signature (in-band, out-band)
    - Maximum allowed in-band ripple voltage (frequency range, peak-to-peak values); Maximum allowed out-band ripple voltage (frequency range, peak-to-peak values, ramp rate outside the in-band frequency range, e.g. 20 dB/decade)
    - Maximum allowed change rate in current consumption (e. g. 10 mA/ms) of the device without disturbing communication
    - Startup behavior of a device (peak current, additional startup current, continuous current) to support device hot plugging within a daisy-chain
    - Link impulse noise tolerance
- Noise emission limits to meet EMC regulations

# Design Evaluation

- Design Details
  - Line coding
  - Signal amplitudes (inc. trim capability)
  - Signal frequency range
  - Symbol synchronization
  - Signal forming
  - Termination
- Powering options and flexibility
- Power dissipation
  - A consideration affecting how many devices can be used for a constrained power infrastructure
  - Power down modes and energy efficiency
- Echo cancellation specification
  - Maximum allowed return loss
  - Linearity requirements
- Diagnostics implementation (what, how, when)
- Link-up time
- Latency
  - Constant latency
  - Latency Jitter
- Auto-negotiation