RTPGE EMC Channel Analysis Framework

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Objectives

- Define a framework for quantifying the relevant parameters which will enable an accurate EMC modeling

- First step, those parameters need to be determined, tested and documented for each component of the link segment which are
  - MDI connector(s)
  - Twisted pair cable(s)
  - Inline connector(s)

- Second step , the performance characteristics of the ‘chosen’ link segment(s) for automotive application needs to be tested and documented

- First step is proposed to be conducted by various component manufacturers

- The choice of link segments will be guided by OEMs and assembled & tested by independent test houses. The results will then reported to the task force.

EMC Channel Parameters

1) Single-line differential-mode parameters

- Sdd11, Sdd11, Sdd12, Sdd21, and TDR impedance

2) Multi-line differential-mode crosstalk parameters

- Sdd21NN, Sdd21FF, Sdd21NF, Sdd21FN (where N and F designate Near and Far ends of the adjacent lines)

3) Single-line and multi-line mixed mode conversion and crosstalk parameters:

a) Common-mode to differential-mode conversion with a single pair

b) Common-mode to differential-mode conversion and coupling between adjacent pairs (cross-conversion)

Things to consider

- Out of the three sets of parameters, 1) and 2) are well understood, tested and reported in the industry.

- 3) is critical and has a major impact on the EMC performance. It needs to be measured very accurately despite the large dynamic range of the measurement for certain cases. The parasitic effects of the end termination and connections may vary the results significantly.

- In particular, 3a) – being a conversion measurement on a single (isolated) differential pair – has been understood and covered to some degree with cabling standards. However, 3b) needs to studied carefully for RTPGE automotive applications as the coupling between the multiple pairs of an Ethernet interface leading to conversion-related parameters is critical.