Proposed PHY Objectives

IEEE 802.3 Multigig Automotive Ethernet PHY Study Group

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Basic PHY project objectives formulae

PHY projects typically have objectives of the form:

- Preserve the 802.3 / Ethernet frame format utilizing the 802.3 MAC
- Support a data rate of **X** Gbps at the MAC/PLS service **interface (may be multiple)**
- Preserve minimum and maximum Frame Size of current 802.3 standard
- Support full **(or half)** duplex operation
- Support a BER better than or equal to 10^{-x} at the MAC/PLS service interface
- Support optional single pair Auto-Negotiation
- Define optional Energy Efficient Ethernet
- Support point-to-point topologies
- Define or describe any link segments to be used **(see "hard objectives")**
- Define a PHY (or PHYs) capable of operation over **(various link segments)**
- Do not preclude meeting FCC and CISPR EMC requirements
- Support optional PoE/PoDL **?**
- Operate in any application environments/features necessary
  - E.g., Automotive, Industrial EMC, fault conditions, fast startup

Objectives Addressed Here

- Support a data rate of **>** Gbps at the MAC/PLS service interface
  - *IS THERE ONLY ONE RATE? WHAT IS X?*
- Support a BER better than or equal to 10^{-X} at the MAC/PLS service interface
  - *WHAT IS X? (10^{-10} consistent w/1G, 10^{-12} consistent w/10GE)*
- Define the performance characteristics of link segments and a PHY to support *X* Gbps point-to-point operation over this link segment with *<media, lanes>* supporting up to *Y* inline connectors using *<media description>* cabling for up to at least *Z* m reach
  - *Need to spell out rates, media lanes, media description & reach*
  - *May be duplicated for multiple PHYs, media, reaches, etc.*
- Support operation at *X* Gbps in automotive environments (e.g., EMC, temperature) over *<media description>* cabling.
  - *(Noncontroversial but goes with the "Define..." objective)*

BER Objective

- All 2.5Gbps/5Gbps/10Gbps BASE-T PHYs share the same BER objectives: 10^{-12}

- Propose objective:
  - Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface

Data Rate & Media: Presentations in Ad Hoc

- AdHocs heard presentations with survey showing use for 2.5Gbps, 5Gbps and 10Gbps, but converging on 10Gbps
  - Most respondents preferred 10 Gbps rate
  - Most respondents are OK with different media from 1000BASE-T1
  - [Multi-Gig Ethernet for Automotive Survey Results.pdf](#)
    - Most respondents preferred 10Gbps rate
  - [GMs Multi-Gig Ethernet Objectives Autosaved.pdf](#)

Market Potential, Technical/Economic Feasibility

- 10Gbps, 10m, 2 connectors supported by at least one major OEM

- 10Gbps, 15m, 4 connectors technically feasible as variant of 40GBASE-T technology
  - Same rate as 1 lane of 40GBASE-T, FTP cabling
  - Shielded cabling enables harsher EM environment
    - Technical feasibility as one lane of Cat 8
  - Lack of crosstalk & split pairs ease connector burden
  - Reduced distance (15m vs. 30m), single lane (no NEXT/FEXT cancellers) increases economic feasibility

Proposed PHY Objectives

1. Define the performance characteristics of a link segment and a PHY to support 10 Gbps operation over this link segment with a single twisted-pair supporting up to four inline connectors using shielded balanced copper cabling for up to at least 15 m reach

2. Support operation at 10Gbps in automotive environments (e.g., EMC, temperature) over single-twisted-pair shielded balanced copper cabling.

THANK YOU!