Bit Error Ratio Objective

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Definitions

- ## Ratio
  - The relative magnitude of two quantities

- ## Rate
  - A magnitude or frequency relative to a time unit

- ## Bit error
  - A received bit from a channel that has been altered due to noise, interference, distortion or synchronization errors

- ## BER (rate or ratio)
  - Relative magnitude or magnitude of a received bit from a channel has been altered

System

- Functions are similar
  - Transmitter
  - Interconnect
  - Connectors
  - Channels
  - Receiver

- Assumptions
  - Transmitter doesn't generate errors
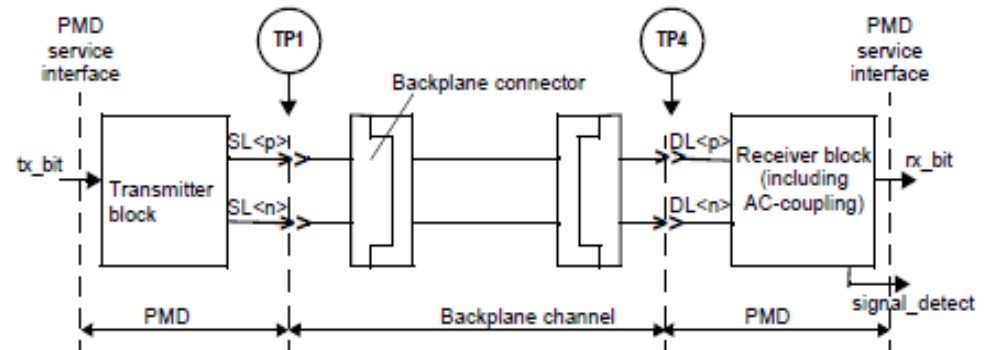 - Errors introduced by channel or receiver
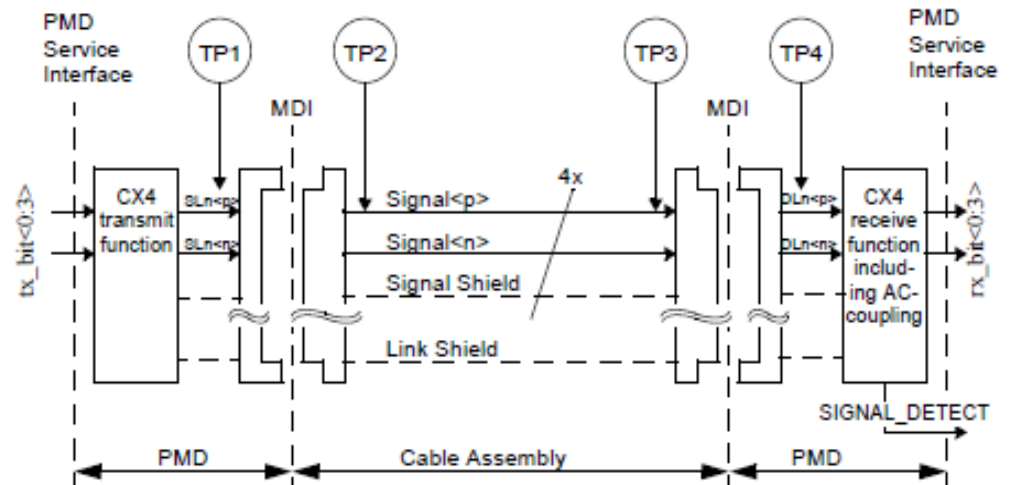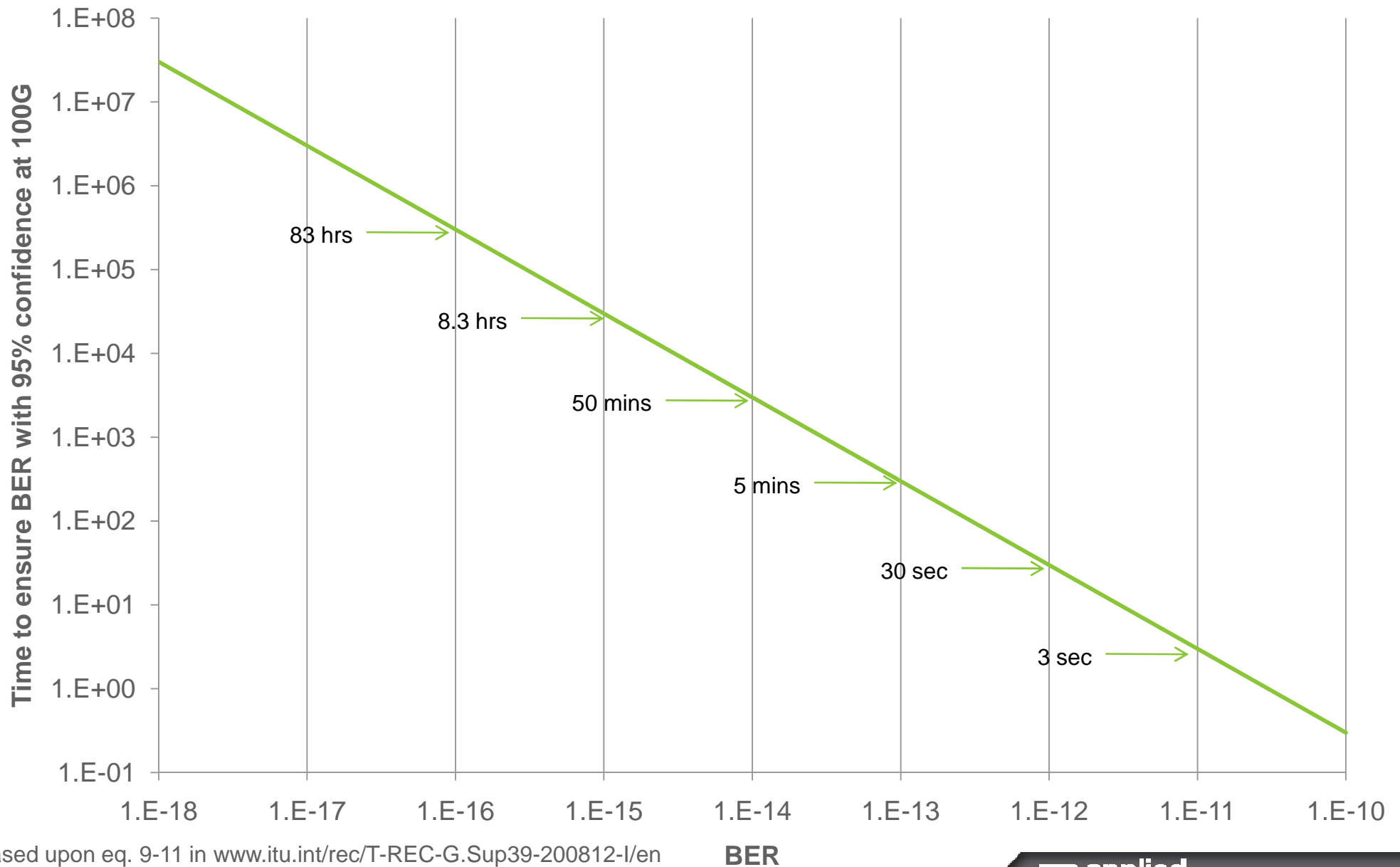

Figure 70–1—Link block diagram

Figure 54–2—10GBASE-CX4 link (half link is shown)

Time Required to Ensure BER

Time to ensure BER with 95% confidence at 100G

- 83 hrs
- 8.3 hrs
- 50 mins
- 5 mins
- 30 sec
- 3 sec

BER

Y-axis: 1.E-01, 1.E+00, 1.E+01, 1.E+02, 1.E+03, 1.E+04, 1.E+05, 1.E+06, 1.E+07, 1.E+08

X-axis: 1.E-18, 1.E-17, 1.E-16, 1.E-15, 1.E-14, 1.E-13, 1.E-12, 1.E-11, 1.E-10

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Test Environments

- Silicon
  - Controlled environment
  - Wafer probe or DUT board of all parts
  - Tester time is a valuable commodity
    - Impacts production throughput and cost

- Channel
  - Specified for cabling, not for backplane
  - Order of magnitude increase in tester time less impact than on silicon

- System
  - Uncontrolled environment
  - Longer test times are more tolerable for statistical sampling

Channel - Backplane

- ## Assumption
  - Components made for backplane re-used for twinax cabling

- ## BER primarily impacted by the channel
  - Not a mandatory part of specification
  - For 100G CU SG, recommend the same approach

- ## Interoperability
  - Specification of the transmitter and the receiver by 802.3ap
  - Channel provided as a reference

- ## Compliance testing will target PHYs
  - Silicon testing time impacts cost

BER Objective

- Guarantee a certain level of "statistical" performance reliability without adversely affecting the costs

- Previous projects
  - 1 Gb/s – BER of 10^{-12}
  - 10 Gb/s – BER of 10^{-12}
  - 100 Gb/s – BER of 10^{-12} (at MAC/PLS Service Interface)

- Decreasing BER target will require "specialization"
  - Impacts broad market potential
  - Impacts economic feasibility

- Compliance testing at 10^{-12} BER recommended

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Thanks

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Thank you!