BER OBJECTIVE FOR 400GE

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METRIC

There is an ongoing discussion on what the appropriate metric to use for stating the error objective

This presentation uses BER since we all understand it

All other metrics can be calculated from BER

- Foo{Loss,Error}Rat{e,io} = f(BER)

The use of BER here does not imply any opinion on the metric topic.

BER OBJECTIVE BACKGROUND

Ethernet BER has been effectively zero despite 1e-12 target

With more and more aggressive interface technology, we are worried that interfaces may actually achieve the minimum BER target

- If so, customers may take issue
- Currently customers ask us to explain even singleton errors in the system
- 400G at 1e-12 is an error every 2.5s
- 32 400G interfaces in a system is 12 errors per second

This will not impress people as a reliable technology

Danger is that we can no longer write our BER objective with a wink knowing that plentiful margin will make things work acceptably.

- We need to set an appropriate margin and document why it is the correct number (for perception, requirements, cost, complexity, etc. reasons).

HUMAN TIMESCALES

Three examples of interesting timescales for error free operation

- While you are watching (30min)
  - BER = 1e-15
- Weekend test (60 hours)
  - BER = 1e-17
- Active lifetime of module (5 years)
  - BER = 1e-20

MINIMUM BER OBJECTIVE PROPOSAL

Our (minimum) proposed BER objective:

- Support a BER better than or equal to 10^{-15} at the MAC/PLS service interface

If we pick a metric other than BER, then adjust this to state the right metric and the appropriate value to imply a 1e-15 BER.

If there is FEC, then each PMD will need to also specify a pre-FEC BER target that will be used to test to.

We will need to devise a testing methodology.

Note- this is the usual OIF target

A BETTER BER OBJECTIVE PROPOSAL

Our (better) proposed BER objective:

- Support a BER better than or equal to 10^{-17} at the MAC/PLS service interface

If we pick a metric other than BER, then adjust this to state the right metric and the appropriate value to imply a 1e-17 BER.

If there is FEC, then each PMD will need to also specify a pre-FEC BER target that will be used to test to.

We will need to devise a testing methodology.

BUT….. >OBJECTION< !!

Won’t you think of the children?

Test time:

- 1GE has the same BER target as 100GE
- With FEC, pre-FEC BER can be much lower
  - 1e-10 pre-FEC BER with the .3bj KR4 FEC should yield zero errors
  - Test time can actually decrease

“Errors don’t matter- just retransmit!”

- Not all traffic is TCP/IP
- An error rate that causes significant retransmission implies large latency for some packets and also large jitter

400GE will just aggregate, so reliability needs to be no better than that of the sub flows

- Sub flows are from older interfaces that have effectively zero errors