

Digital Signal Detect Function

Pat Thaler
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Agilent Technologies

Problem Statement

Robust analog signal detect functions are difficult to define and implement in the backplane Ethernet environment.

They must reject noise signals and detect all valid signals which may not leave much tolerance available.

All the PCS sublayers we use have mechanisms for qualifying signal quality in the digital domain.

Small changes to strengthen the digital signal quality tests can replace a mandatory analog signal detect.

Overly strict analog signal detect implementations have produced interoperability problems in the field.



Digital signal quality tests

- 1000BASE-KX and 10GBASE-KX4
 - state machines to detect synchronization to comma characters.
- 10GBASE-KX4
 - additionally requires alignment detection
- 10GBASE-KR
 - detection of block lock and
 - BER monitor state machine



1000BASE-KX sync detect

- Sync detect requires
 - Detection of three commas aligned in the odd code groups
 - No intervening bad code groups (8B/10B code violation or improperly aligned commas)
- Loss of sync requires a count of 4 bad code groups.
 - Count up when a bad code group is received
 - Count down when 4 successive good code groups are received



Strengthening 1000BASE-KX sync detect

- Detection of sync
 - Increase the number of good commas that must be received before setting `sync_status_KX = OK`
- Loss of sync.
 - A short burst error should not cause loss of sync so leave the count at 4 for loss of sync
 - Increase the number of good code groups need to cause a count down.



10GBASE-KX sync detect and alignment

- Sync detection and loss
 - same as 1000BASE-KX on each of the 4 lanes
- Alignment detection
 - Sync has been acquired on all four lanes followed by
 - Detection of 4 sets of properly aligned A characters with no intervening deskew errors
- Loss of alignment requires a count of 4
 - A deskew error causes a count up
 - Properly aligned set of A characters causes a count down.



Strengthening 10GBASE-KX4 quality detect

- The existing tests are probably strong enough.



10GBASE-KR block lock

- Block lock detection requires
 - 64 valid sync headers with no intervening invalid sync headers
- Loss of block lock requires
 - Detection of 16 invalid sync headers within 64 blocks
- Detection of high BER (hi_ber) requires
 - Detection of 16 or more invalid sync headers within 125 us.

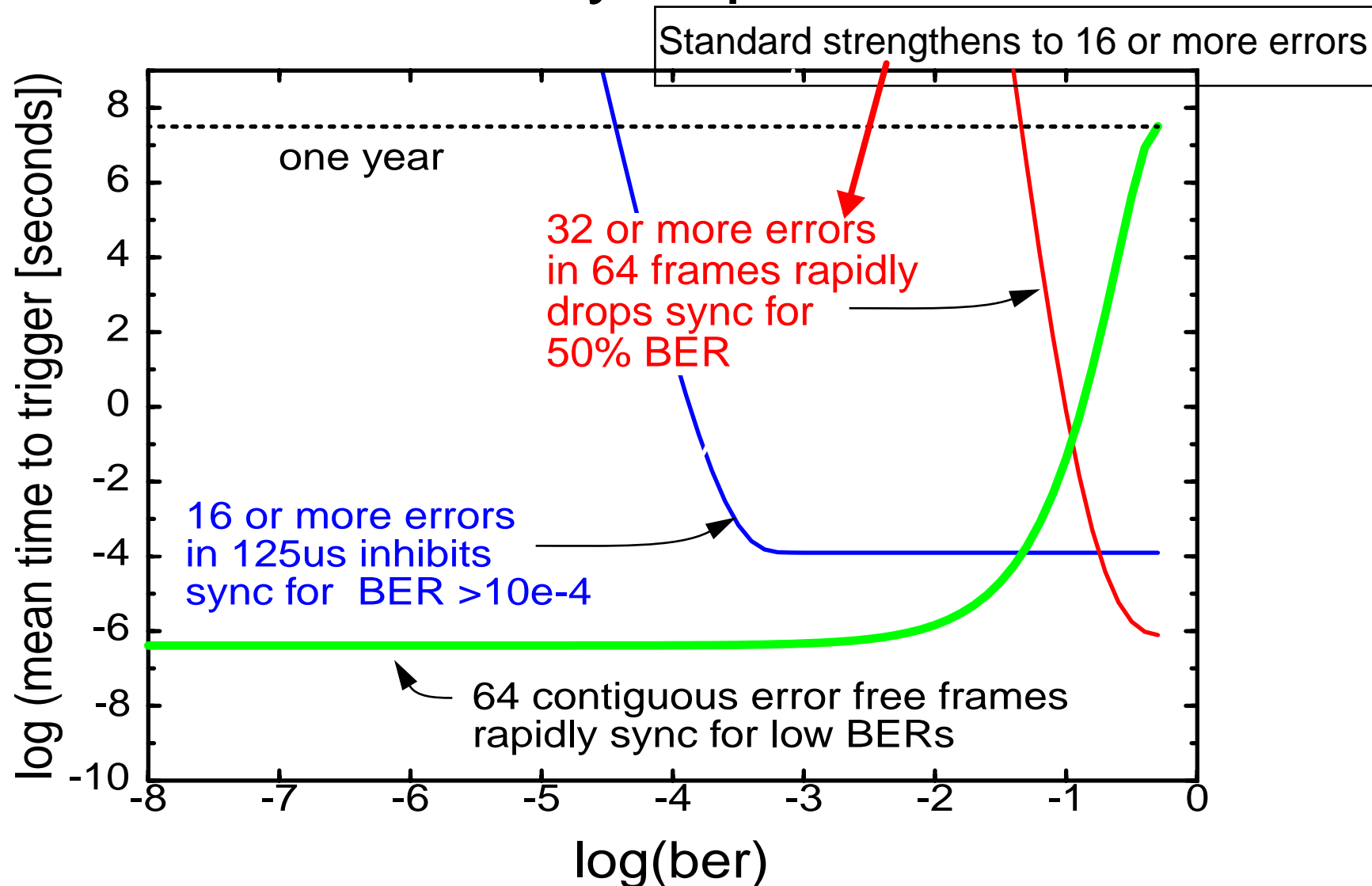


Strengthening 10GBASE-KR signal detect

- Current block lock and BER state machines may be strong enough
- If necessary we could
 - increase the number of valid sync headers that must be detected for block lock
 - decrease the number of bad sync headers for loss of block lock, or
 - decrease the number of bad sync headers for high BER or increase the duration of the test



64/66 frame sync performance



Conclusion

Rely on digital signal quality measures for signal detect.

Remove mandatory analog signal detect requirements.

May still allow optional analog signal detect which must detect any valid signal as signal present.

