

Proposal for Clause 86: Informative Annex for Extended Reach

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Supporters

- Scott Kipp – Brocade
- Robert Lingle – OFS
- Ernie Bergmann – Circadian
/ JDSU
- Rick Pimpinella – Panduit
- Olaf Storaasli – Draka
- George Oulundsen – OFS
- Terry Cobb – CommScope
- Ron Nordin – Panduit
- John Abbott - Corning
- Sharon Lutz – USConec
- Andy Jimenez – Anixter
- Steve Swanson – Corning
- Alan Sugg – Vega Wave
Systems
- Dave Lewis - JDSU

Outline

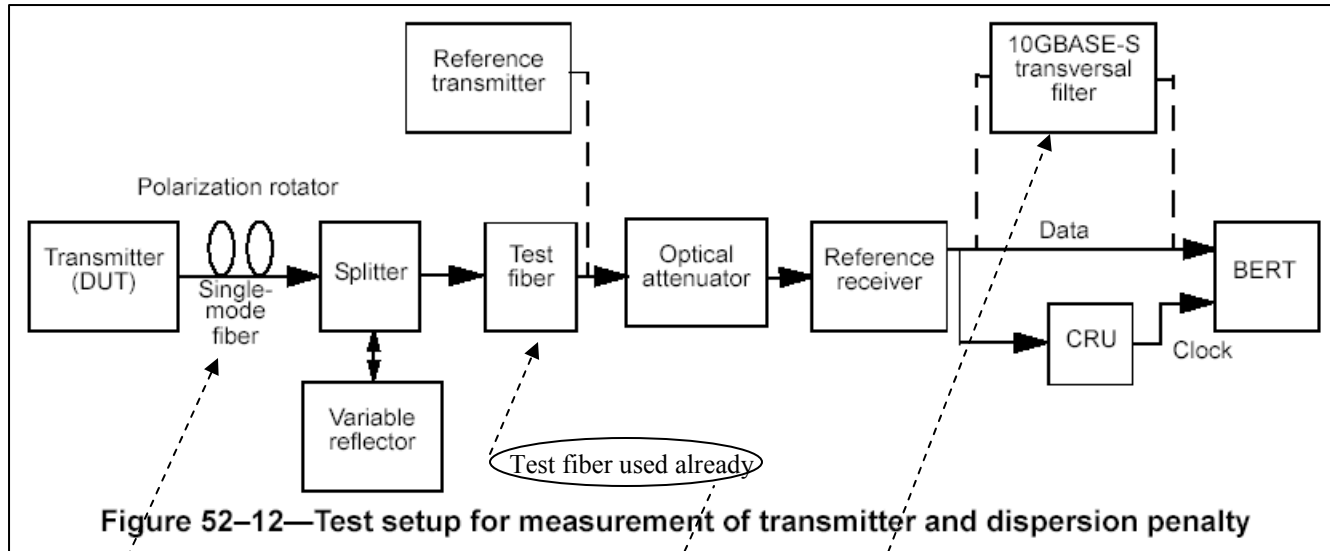
- Purpose
- Modified TDP test fixture
- Parametric tabulation of scenarios
- OM4 standardization status
- Addressing prior system vendor contributions
- Examining informative annex precedents
- Content for new informative annex 86A
- Examining impact on deterministic jitter

Purpose

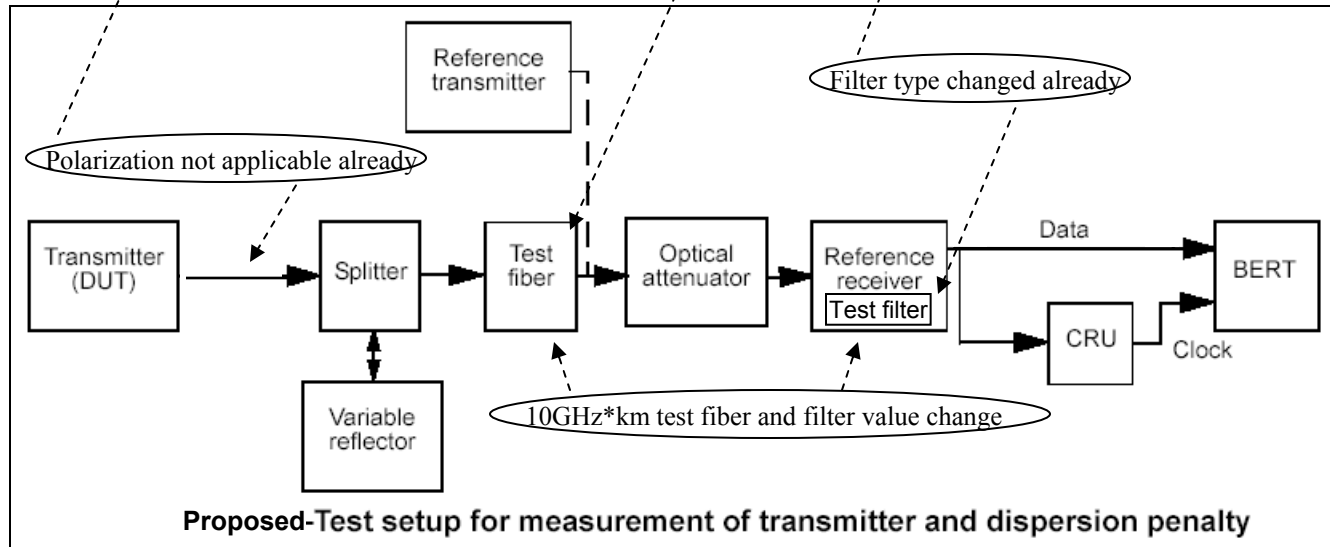
- Describe measurement-based methodology for screening extended-reach capability of 40GBASE-SR4 and 100GBASE-SR10
 - supporting transmission over at least 200 m of OM4
- Support proposed modifications to IEEE P802.3ba draft 2.0 submitted by comment
 - Comment number: 277

TDP Test Fixture Comparison

Clause 52



Clause 86.7.5.4
and XR Annex



Parametric Tabulation of Scenarios

Spreadsheet model parameters							Test parameters						
clause	target dist (km)	media code	EMB 840nm (MHz*km)	modal effBW 3dBe (GHz)	chrom BW 3dBe (GHz)	RefRx BW 3dBe (GHz)	test filter value	test filter unit	test filter type	test fiber length (km)	test fiber effBWm 3dBe (GHz)	test fixture effBW min (GHz)	fixture BW reduc. from test fiber (% of BW)
52.9.10	0.300	OM3	2000	4.7	9.0	7.5	55.0 ps		transversal	n.a.	n.a.	n.a.	n.a.
86.7.5.4	0.100	OM3	2000	14.1	18.8	7.5	6.25 GHz		4th ord BT	n.a.	n.a.	n.a.	n.a.
86.7.5.4 mod	0.100	OM3	2000	14.1	n.a.	7.5	6.63 GHz		4th ord BT	0.110	48.4	6.56	0.92
XR annex	0.200	OM4	4030*	14.2	n.a.	7.5	6.64 GHz		4th ord BT	0.219	24.2	6.40	3.56
XR annex	0.250	OM4	4030	11.4	n.a.	7.5	6.27 GHz		4th ord BT	0.274	19.4	5.96	4.86

100 m OM3 equates to 200 m OM4 using proposed 6.63 GHz test filter (equates to 250 m OM4 with existing 6.25 GHz test filter)

10 GHz*km test fiber inserts small reduction in test fixture bandwidth that produces a slightly more conservative test`

*Note: 4700 EMB worst-case de-rated for operation at 840 – 860 nm.

`Note: 10 GHz*km worst-case de-rated for operation at 840 – 860 nm.

Status of OM4 Standardization

- Ballots active in TIA and IEC
 - TIA 1st ballot (PN-3-0356) closed January 19
 - 88% approval
 - Comment resolution at February 4 meeting
 - No normative specs changed
 - TIA 2nd ballot (PN-3-0356-A) closed April 22
 - Comment resolution scheduled for May interim
 - If needed, 3rd ballot comment resolution at August plenary
 - Publication authorization possible in August
 - IEC 1st ballot (86A/1270/CD) closing in June
 - Partial comment preview at April 29 meeting
 - Completion of comment resolution likely in October

Addressing Prior System Vendor Contributions and Examining Informative Annex Precedents

Addressing prior contributions (1 of 3)

- Gustlin_xr_01_0508 (Cisco)
 - interest in 200 to 250 m on OM4
 - preferably one PMD, but open to two
 - no long table of options
- Proposal achieves:
 - 200 m on OM4
 - single PMD design
 - no table of options

Addressing prior contributions (2 of 3)

- Maki_xr_01_0708 (Juniper)
 - single PMD desirable, but not paramount
 - not acceptable:
 - cost increase of baseline PMD
 - EDC or CDR on host or in baseline PMD
 - acceptable:
 - use of OM4
 - use of better than minimally compliant PMDs
- Proposal achieves:
 - single PMD design
 - no:
 - cost increase of baseline PMD
 - EDC or CDR required anywhere
 - use of:
 - OM4
 - better than minimally compliant PMDs (sorted only)

Addressing prior contributions (3 of 3)

- Kipp_xr_01_0908 (Brocade)
 - recommended informative annex
 - 200 m on OM3
- Proposal achieves:
 - placement in informative annex
 - at least 200 m on OM4

Informative Annex Precedents in Std 802.3

- Annex D (pertains to clauses 7-10, 14 -18)
 - operation over alternate fiber types (e.g. 50 μm) and copper types (120 ohm and 150 ohm)
- Annex E (clause 9)
 - alternative spec for FOIRL PMD wavelength range
- Annex 23C
 - guidelines for use of 120 ohm cable
- Annex 32A
 - guidelines for use of 120 ohm or 150 ohm cable

Precedents exist for both alternative PMD specs and alternative media



Content for new informative annex 86A Transmitter and dispersion penalty (TDP) test for extended-reach capability

- See file `kolesar_03_0509`
 - if proposal of comments 276, 353 is accepted (i.e. the content of `kolesar_02_0509`)
 - Uses *normatively* modified TDP test fixture to screen for 200 m on OM4
- See file `kolesar_04_0509`
 - if proposal of comments 276, 353 is not accepted
 - Uses *informatively* modified TDP test fixture to screen for 200 m on OM4

Examining Impact on Deterministic Jitter with Normative Change to TDP Test in the absence of other parametric improvements (i.e. reduction in RIN, DCD, Rise/Fall times)

For a given TDP, tabulate the effect on required DJ (ps) compared to Draft 2.0.
Rise/fall times, DCD and RIN unchanged. MPN k-factor = 0.3 for all cases.
Positive numbers indicate an increase in allowable DJ.

DJ change (ps) with 6.64GHz test receive bandwidth and 10GHz*km test fiber						
RMS Spectral Width (nm)	Screen for 100m OM3 Center Wavelength (nm)			Screen for 200m OM4 Center Wavelength (nm)		
	840	850	860	840	850	860
0.35	0.5	0.5	0.6	-0.7	-0.5	-0.3
0.45	0.5	0.6	0.7	-1.8	-1.3	-1.1
0.55	0.1	0.2	0.3	-3.4	-2.8	-2.4
0.65	-0.2	-0.1	0.0	-5.9	-5.0	-4.2

Color code legend	
Same as Draft 2.0 (within 1ps)	
More than 1ps smaller	

Examining Impact on Deterministic Jitter without Normative Change to TDP Test and in the absence of other parametric improvements (i.e. reduction in RIN, DCD, Rise/Fall times)

For a given TDP, tabulate the effect on required DJ (ps) for XR parts. Rise/fall times, DCD and RIN unchanged. MPN k-factor = 0.3 for all cases.

DJ change (ps) with 6.27GHz test receive bandwidth and no test fiber for 100m						
RMS Spectral Width (nm)	Screen for 100m OM3			Screen for 200m OM4		
	Center Wavelength (nm)			Center Wavelength (nm)		
	840	850	860	840	850	860
0.35	0.0	0.0	0.0	-1.5	-1.3	-1.1
0.45	0.0	0.0	0.0	-2.6	-2.1	-1.9
0.55	0.0	0.0	0.0	-4.3	-3.7	-3.3
0.65	0.0	0.0	0.0	-6.9	-6.0	-5.2

Note: a screen for 250m OM4 was deemed too stressful, so the proposal is limited to 200m.

Decrease in allowed DJ
0.8 – 1.0 ps larger
than with TDP filter change

Color code legend	
Same as Draft 2.0 (within 1ps)	
More than 1ps smaller	