



# ITU-T G.9806AM3 UPDATE

IEEE 802.3 WORKING GROUP INTERIM

GREATER THAN 50 GB/S BIDIRECTIONAL OPTICAL ACCESS PHYS

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# Background

- 100G-BiDi adhoc group formed for G.9806Am3 is progressing discussion
  - Monthly meetings
  - Target to complete in time for consent in the next ITU-T SG15 plenary on April 2023
- This contribution shares starting points for specification alignment between ITU-T and IEEE
  - Scope
  - Baseline specifications
  - Time plan

# G.9806Am3 scope

- 100Gbps up to 40km
  - Business user services
  - Backhauls for residential user services
  - Mobile services(MBH/MFH)
- Re-utilize existing specifications that are already well-supported by industry
  - 100G-lambda MSA
  - G.9806Am1/2
  - IEEE 802.3cp

# Comparison of wavelength plans

Source	PMD	Wavelength Range (nm)	Operating Distance (km)	Optical Path Loss (dB)	Channel Insertion Loss (dB)	Power Budget (dB)	Min Dispersion (ps/nm)	Max Dispersion (ps/nm)
100G Lambda	400G-LR4-10	1264.5 to 1277.5 1284.5 to 1297.5 1304.5 to 1317.5 1324.5 to 1337.5	10		6.3	11	-59.4	33.4
100G Lambda	100G-ER1-30	1304.5 to 1317.5	30		15	19.4	-55.6	47.9
100G Lambda	100G-ER1-40	1308.09 to 1310.19	40		18	22.4	-60.3	37.5
<b>G.9806 IEEE 802.3cp</b>	<b>10G (NRZ)</b>	1260 – 1280 (US) 1320 – 1340 (DS)	IEEE: 20, 40km	G.9806: 0-15dB (Class S) 10-23dB (Class B-)				
<b>G.9806Am1 G.9806Am2 IEEE 802.3cp</b>	<b>25G (NRZ) 50G (PAM4)</b>	1281 – 1297 (US) 1306 – 1322 (DS)	IEEE: 20, 40km	G.9806: 0-15dB (Class S) 10-23dB (Class B-)				
<b>G.9806Am3</b>	<b>100G (PAM4)</b>	TBD. 1) 1314 ± 2, 1289 ± 2 or 2) 1309 ± 1, 1305 ± 1		G.9806: 0-15dB (Class S) 10-23dB (Class B-)				

# Comparison of IEEE and ITU-T PMD Classes

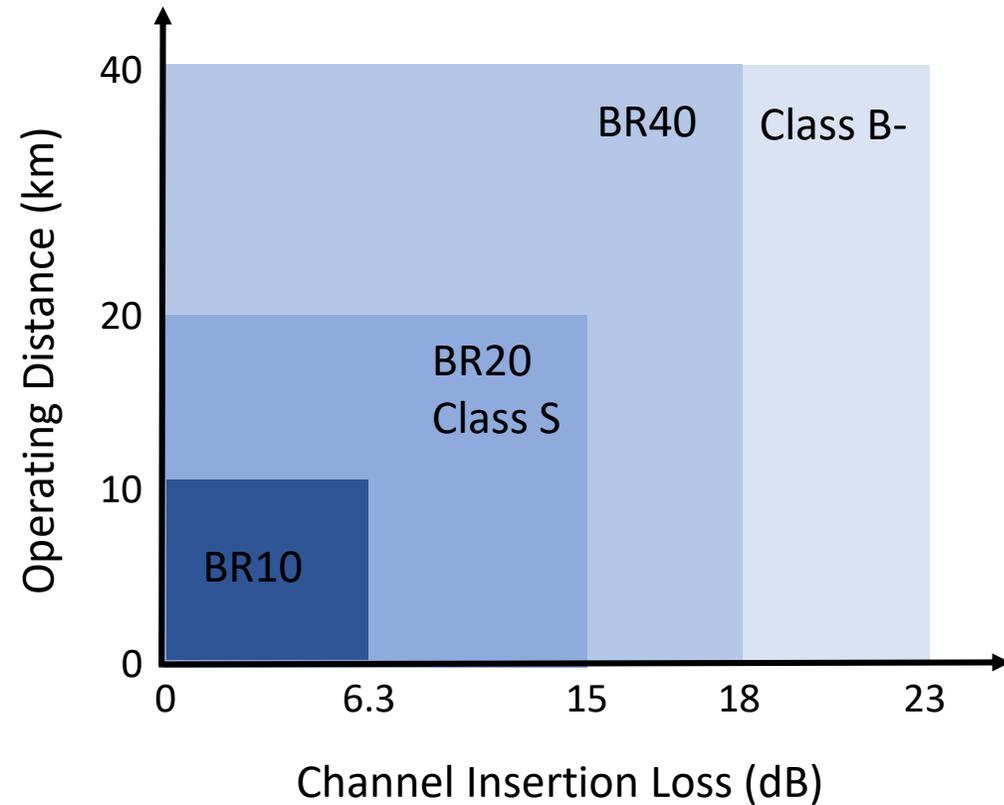


Table 160-8—50GBASE-BRx illustrative link power budgets

Parameter	50GBASE-BR10	50GBASE-BR20	50GBASE-BR40	Unit
Power budget (for maximum TDECQ)	10.1	18.7	21.7	dB
Operating distance	10	20	40	km
Channel insertion loss	6.3 <sup>a</sup>	15 <sup>b</sup>	18 <sup>a</sup>	dB
Maximum discrete reflectance	-26	-26	-26	dB
Allocation for penalties <sup>c</sup> (for maximum TDECQ)	3.8	3.7	3.7	dB

<sup>a</sup> The channel insertion loss is calculated using the maximum distance specified in Table 160-5 for 50GBASE-BR10 and 50GBASE-BR40 and fiber attenuation of 0.4 dB/km plus an allocation for connection and splice loss given in 160.10.2.1.

<sup>b</sup> The channel insertion loss is calculated using the maximum distance specified in Table 160-5 for 50GBASE-BR20 and fiber attenuation of 0.5 dB/km plus an allocation for connection and splice loss given in 160.10.2.1.

<sup>c</sup> Link penalties are used for link budget calculations. They are not requirements and are not meant to be tested.

Reference: IEEE Std 802.3cp-2021

# 100G BiDi PtP adhoc group reached some agreements

- ✓ Refocus the scope to consent the specifications for optical path loss Class S (0-15dB) in the April ITU-T SG15 Plenary, leaving Class B- (10-23dB) for further study
- ✓ Adopt single wavelength 100G for each transmission direction
- ✓ Agree on wavelength plan for Class S:  $1304.6 \pm 1 / 1309.1 \pm 1$  nm
  - ✓ Minimize the CD penalty
  - ✓ Re-utilize LAN-WDM, 100G-lambda MSA

# Open topics under discussion

- Impacts of fiber non-linearity (based on VPI simulations):
  - SPM in the fiber has a significant impact on the 40km 100G PAM4 link performance
  - High TDECQ values induced by high launch OMA. Especially raised cosine shaped signals from transmitter can have high TDECQ values (e.g. 16dB)
  - CD limits: Can a statistical CD value be used as each link typically consists of multiple independent fiber spans? Operators' inputs needed.
  - Impact from SBS needs to be studied
  - Evaluation of simulation results by using commercially available components is needed
- For Class B-, further study to compare the pros and cons between 1x100G vs 2x50G is needed
  - Size(form factor), power consumption, cost(components, implementation)
- Inputs from IEEE members will be appreciated

# 100G BiDi PtP adhoc group -time plan-

Seven conference calls are planned. All are held at 14:00- 16:00 CEST (Geneva Time)

Five calls have been held in 2022-2023

Upcoming calls:

6<sup>th</sup> 2023.2.9 (Thu.)

7<sup>th</sup> 2023.3.2 (Thu.)

Now



	Oct.	Nov.	Dec.	Jan. 2023	Feb.	Mar.	Apr.	May
ITU-T Q2/15	▲ ITU interim 25 <sup>th</sup> -27 <sup>th</sup> Oct.	▲ ITU interim End of Nov.		▲ ITU interim Jan.	▲ ITU interim Feb.	▲ ITU interim Mar.	▲ ITU Plenary	
100G Bidi adhoc	▲ 2nd 10/13	▲ 3rd 11/22	▲ 4th 12/8	▲ 5th 1/12	▲ 6th 2/9	▲ 7th 3/2		
IEEE 802.3dk		▲ Plenary 2 <sup>nd</sup> week in Nov.		▲ Interim 1/16		▲ Plenary 2 <sup>nd</sup> week in Mar.		▲ Interim 2 <sup>nd</sup> week in May

# Summary

- ITU-T G.9806Am3 project are developing specifications based on technologies well-supported by industry
- Specification alignment between ITU-T and IEEE is essential for the ecosystem
- Time is of essence. G.9806Am3 targets to consent in the April 2023 SG15 Plenary. The adhoc group must conclude its work and reach consensus by March 9
  
- Requests to IEEE 802.3 participants
  - Prioritize working on the 100G objectives over 200G
  - Start discussion based on this joint contribution, e.g., wavelength plan, optical path loss
    - January Interim: Discussion and Straw polls
    - March Plenary: Motions
  - IEEE 802.3 participants are encouraged to join the ITU-T 100G BiDi PtP adhoc group.  
Contact to its co-chairs;  
Dr. Hirotaka Nakamura [hirotaka.nakamura.by@hco.ntt.co.jp](mailto:hirotaka.nakamura.by@hco.ntt.co.jp)  
Dr. Derek Nessel [derek.nessel@huawei.com](mailto:derek.nessel@huawei.com)

# Straw Poll #

- I support the specification of 100G PAM4 modulation format using wavelengths  $1304.6 \pm 1\text{nm}$  and  $1309.1 \pm 1\text{nm}$  for the 100G BiDi 10km and 20km PMD objectives.
  - Yes:
  - No:
  - Need more information:



THANK YOU