

# P802.3bs optical reflection limits

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# Introduction

[anslow\\_01\\_0816\\_smf](#) discussed changing the specification for the maximum discrete reflectance of the cable plant in 121.11.2.2, 122.11.2.2, and 124.11.2.2 to allow different numbers of reflections with appropriate values.

During discussion of the presentation, two questions were raised:

- Can the limit for a reflection to be ignored be set to  $-55$  dB?
- What penalty would be incurred by 2 x  $-35$  dB reflections?

This presentation attempts to answer these questions and provides proposed reflection values that have been refined via further simulations.

# Limit for a reflection to be ignored

Simulations using a C program based on the calculations in the spreadsheet in [king\\_02a\\_0116\\_smf.7z](#) were performed appropriate to:

- 200GBASE-LR4 and 400GBASE-LR8 with 6 x  $-35$  dB and with 6 x  $-35$  dB + 4 x  $-55$  dB [page 10](#)
- 200GBASE-FR4 and 400GBASE-FR8 with 4 x  $-35$  dB and with 4 x  $-35$  dB + 6 x  $-55$  dB [page 11](#)
- 200GBASE-DR4 and 400GBASE-DR4 with 4 x  $-45$  dB and with 4 x  $-45$  dB + 6 x  $-55$  dB [page 12](#)

These results indicate that the limit for a reflection to be ignored can be set to  $-55$  dB.

# Penalty for 2 x -35 dB reflections

Simulations were performed appropriate to:

- 200GBASE-DR4 and 400GBASE-DR4 with 2 x -35 dB and with 2 x -35 dB + 8 x -55 dB [page 13](#)

These results indicate that 0.2 dB penalty would need to be allocated to allow 2 x -35 dB reflections in 200GBASE-DR4 or 400GBASE-DR4.

# 200GBASE-LR4 and 400GBASE-LR8

BER  $2.4E-4$ , ER 4.5 dB, 6.3 dB loss at Rx end, -26 dB Tx & Rx, 0.5 dB Pen

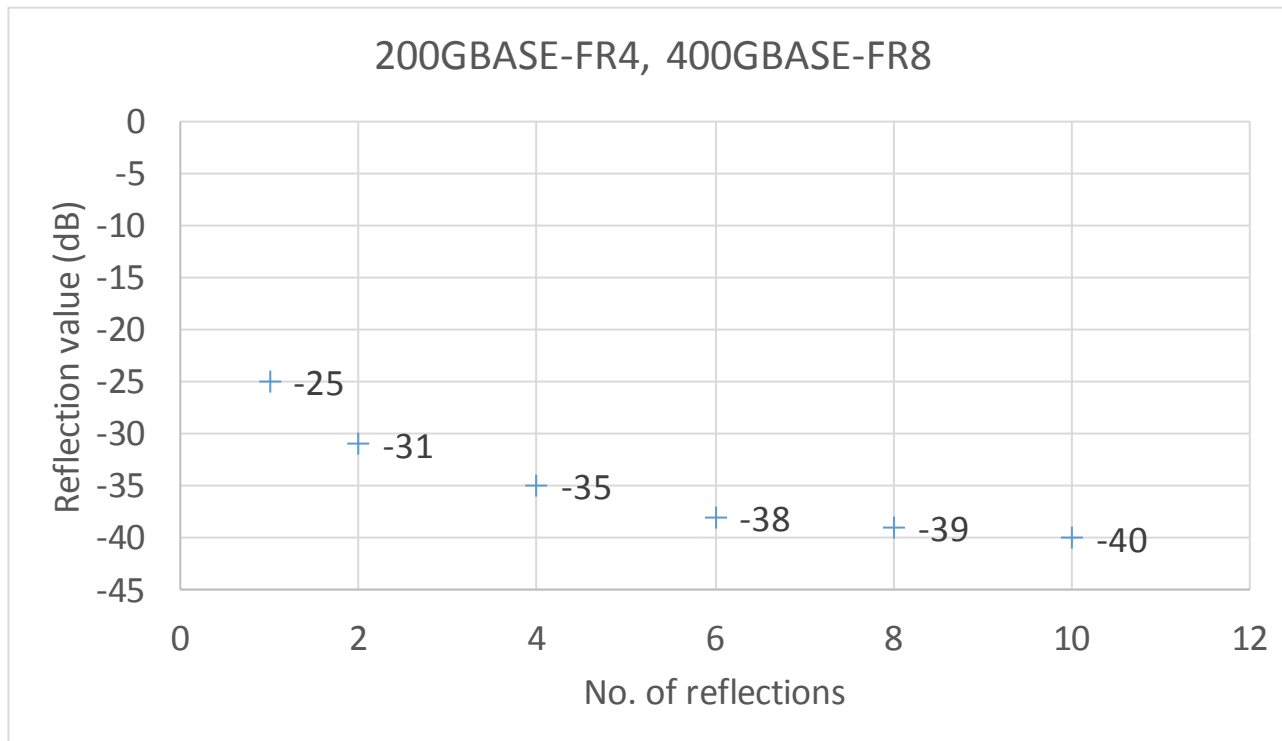
Curves on [page 14](#)



# 200GBASE-FR4 and 400GBASE-FR8

BER  $2.4E-4$ , ER 4.5 dB, 4 dB loss at Rx end, -26 dB Tx & Rx, 0.3 dB Pen

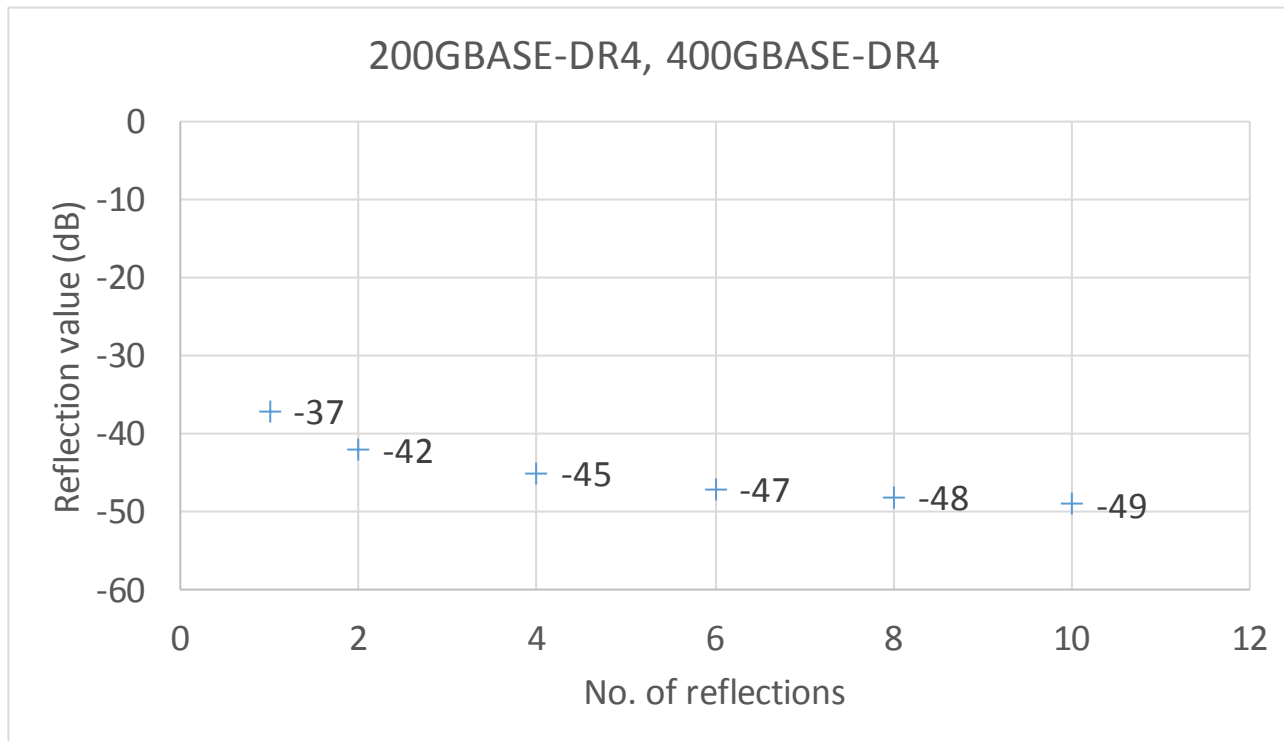
Curves on [page 15](#)



# 200GBASE-DR4 and 400GBASE-DR4

BER  $2.4E-4$ , ER 4.5 dB, 3 dB loss at Rx end, -26 dB Tx & Rx, 0.1 dB Pen

Curves on [page 16](#)



# Conclusions

The limit for a reflection to be ignored can be set to  $-55$  dB.

Allowing 2 x  $-35$  dB reflections for DR4 requires increasing the MPI penalty budget from 0.1 dB to 0.2 dB.

The limits in 121.11.2.2, 122.11.2.2, and 124.11.2.2 would be improved by being reformulated as a table. For example for 200GBASE-FR4 and 400GBASE-FR8:

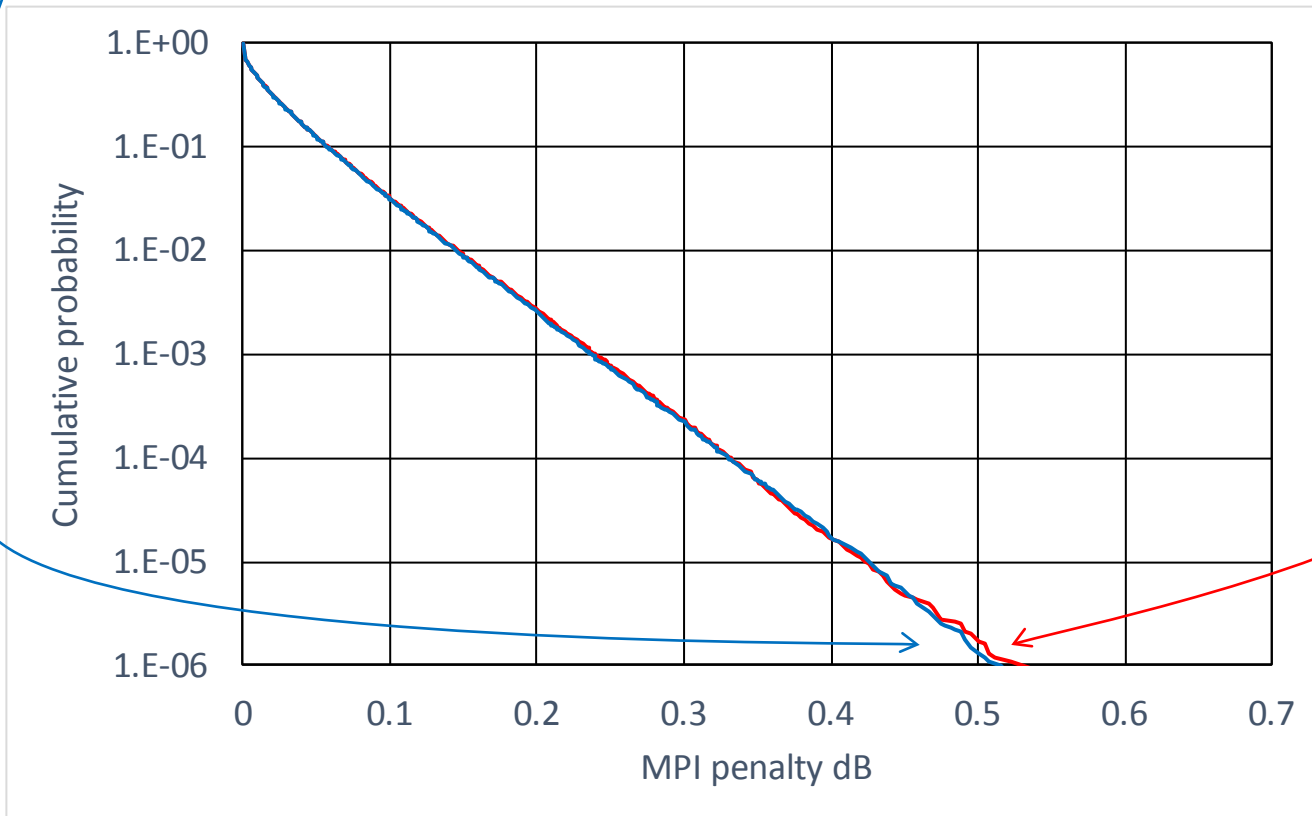
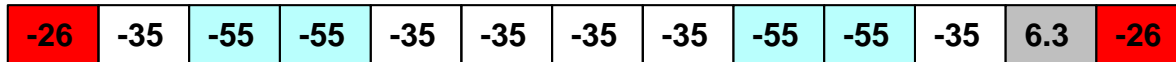
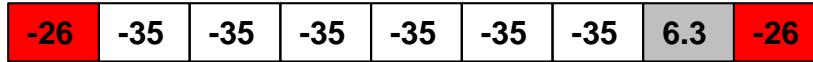
<b>Number of discrete reflectances above <math>-55</math> dB</b>	<b>Maximum value for each discrete reflectance</b>
1	$-25$ dB
2	$-31$ dB
4	$-35$ dB
6	$-38$ dB
8	$-39$ dB
10	$-40$ dB



# Plots

# LR4, LR8 6 x -35 dB, Tx & Rx -26 dB

BER 2.4E-4  
ER 4.5 dB



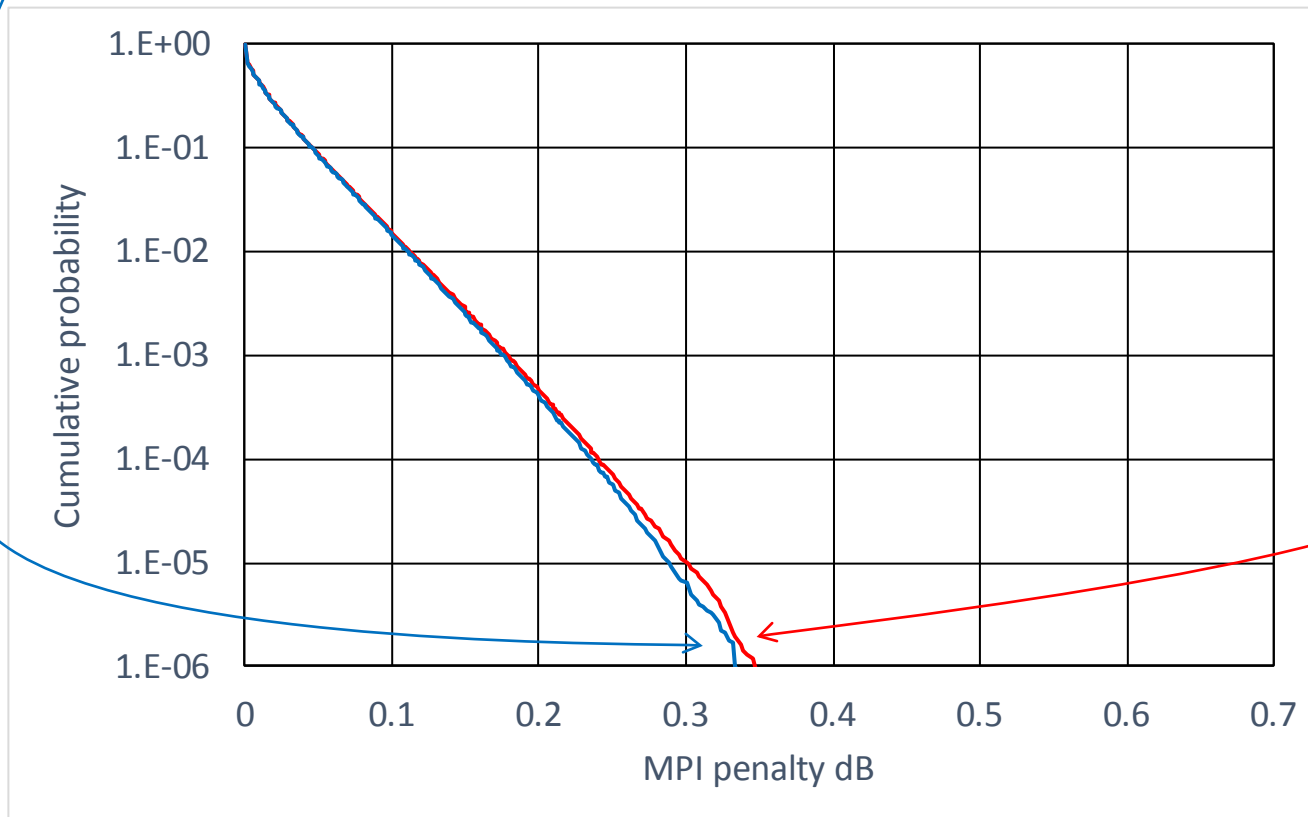
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# FR4, FR8 4 x -35 dB, Tx & Rx -26 dB

BER 2.4E-4  
ER 4.5 dB

-26	-35	-35	-35	-35	4.0	-26
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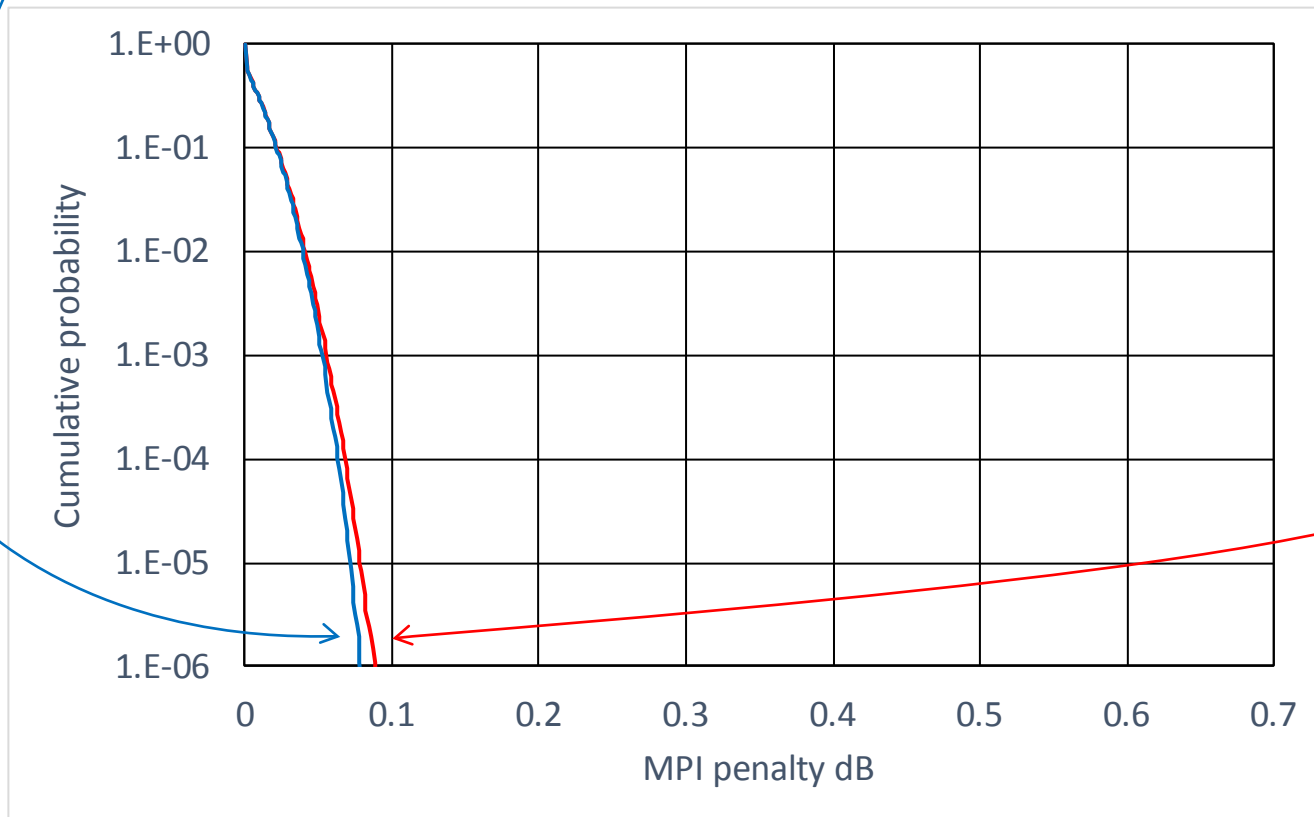
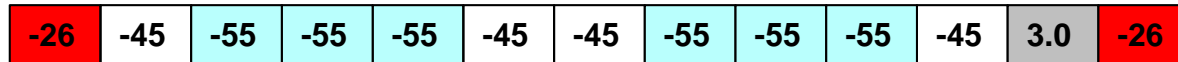
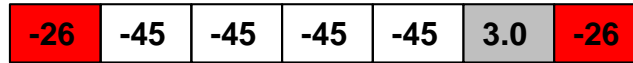
-26	-35	-55	-55	-55	-35	-35	-55	-55	-55	-35	4.0	-26
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# DR4, DR4 4 x -45 dB, Tx & Rx -26 dB

BER 2.4E-4  
ER 4.5 dB



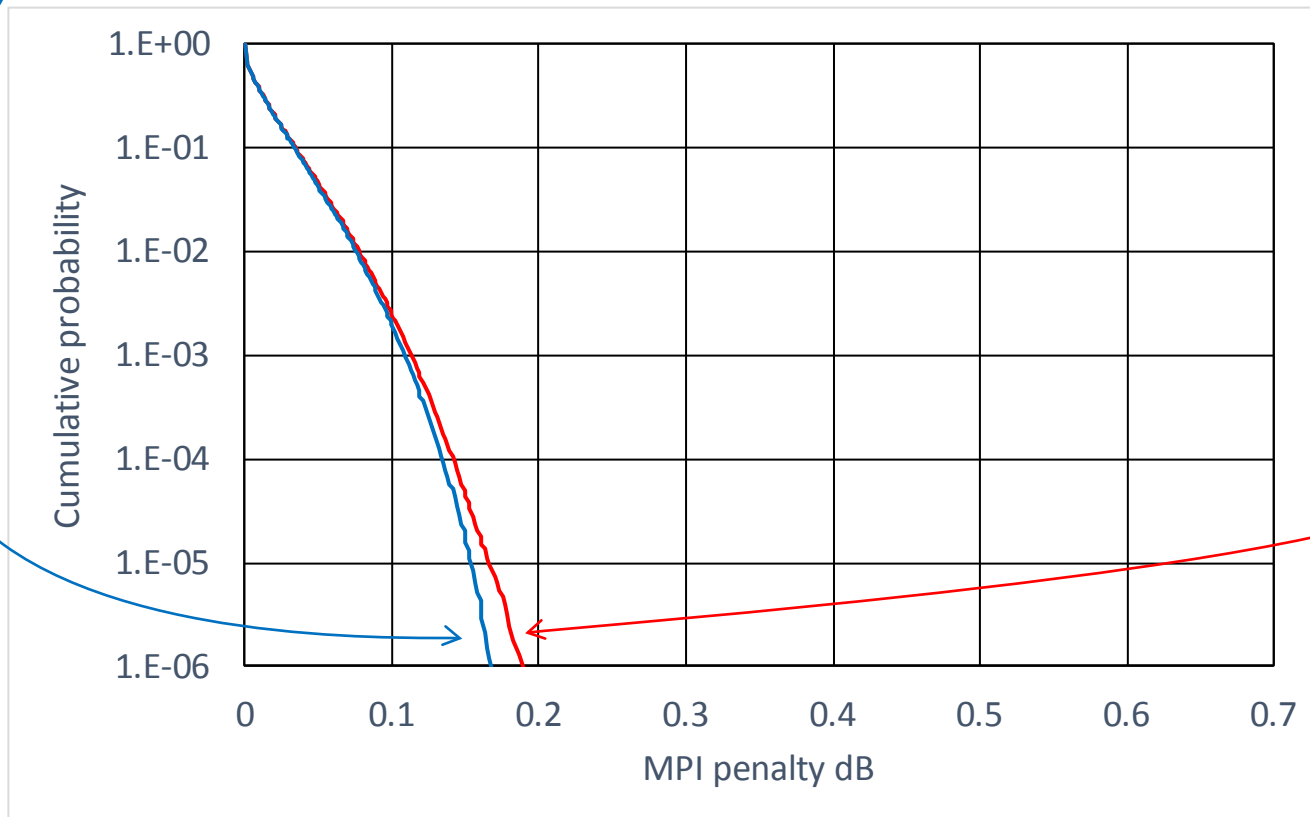
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# DR4, DR4 2 x -35 dB, Tx & Rx -26 dB

BER 2.4E-4  
ER 4.5 dB

-26	-35	-35	3.0	-26
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-26	-35	-55	-55	-55	-55	-55	-55	-55	-55	-35	3.0	-26
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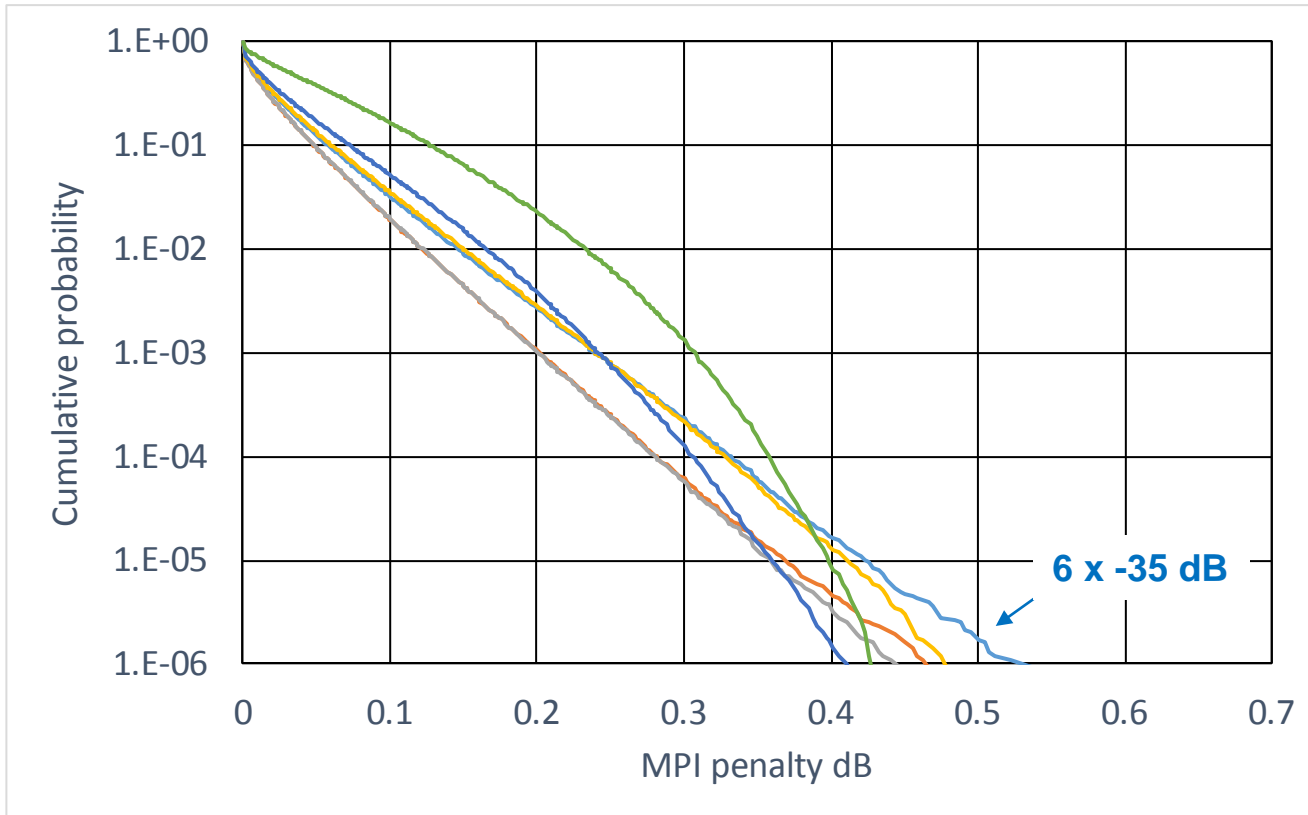


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# LR4, LR8 0.5 dB penalty

BER 2.4E-4  
ER 4.5 dB

-26	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	6.3	-26
-26	-37	-37	-55	-37	-37	-37	-37	-55	-37	-37	6.3	-26
-26	-35	-55	-55	-35	-35	-35	-35	-55	-55	-35	6.3	-26
-26	-33	-55	-55	-55	-33	-33	-55	-55	-55	-33	6.3	-26
-26	-29	-55	-55	-55	-55	-55	-55	-55	-55	-29	6.3	-26
-26	-55	-55	-55	-55	-55	-22	-55	-55	-55	-55	6.3	-26

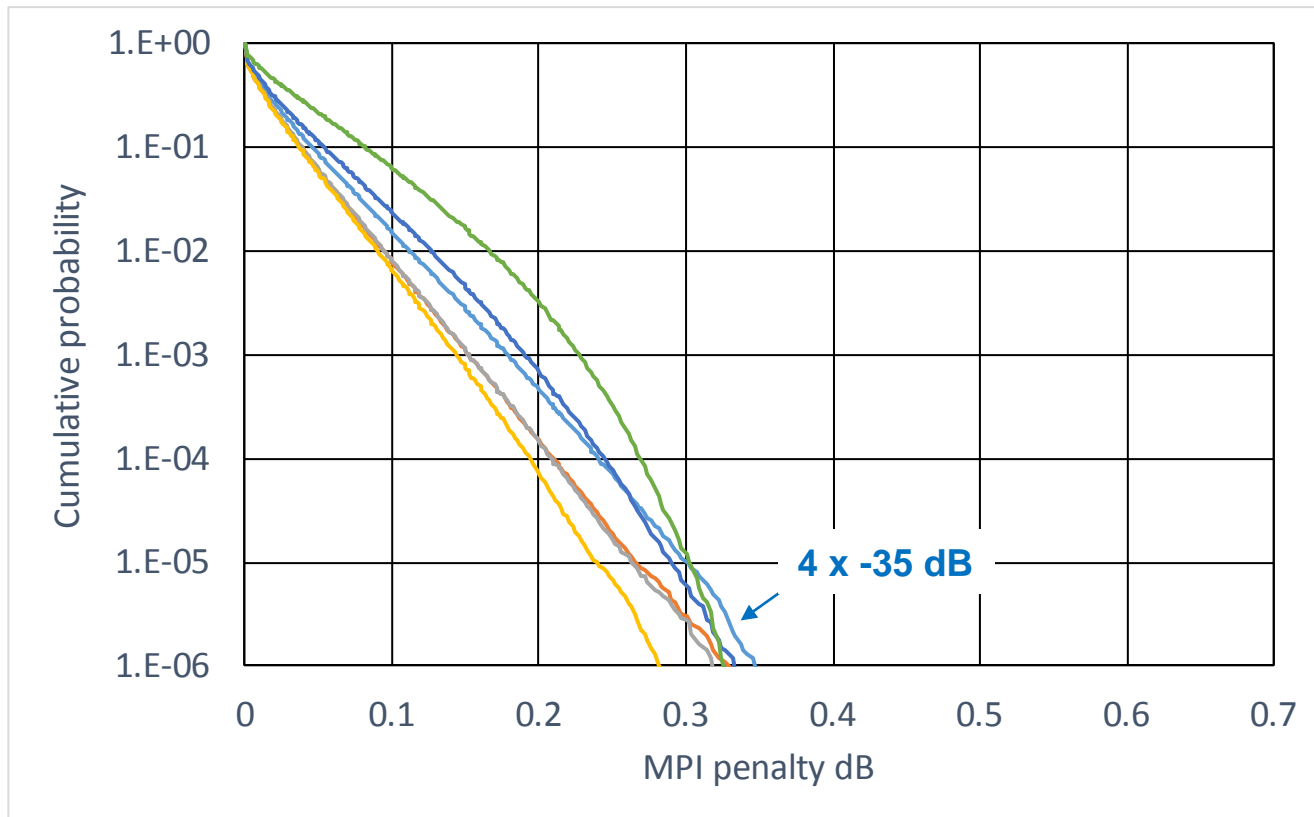


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# FR4, FR8 0.3 dB penalty

BER 2.4E-4  
ER 4.5 dB

-26	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	4.0	-26
-26	-39	-39	-55	-39	-39	-39	-39	-55	-39	-39	4.0	-26
-26	-38	-55	-55	-38	-38	-38	-38	-55	-55	-38	4.0	-26
-26	-35	-55	-55	-55	-35	-35	-55	-55	-55	-35	4.0	-26
-26	-31	-55	-55	-55	-55	-55	-55	-55	-55	-31	4.0	-26
-26	-55	-55	-55	-55	-55	-25	-55	-55	-55	-55	4.0	-26

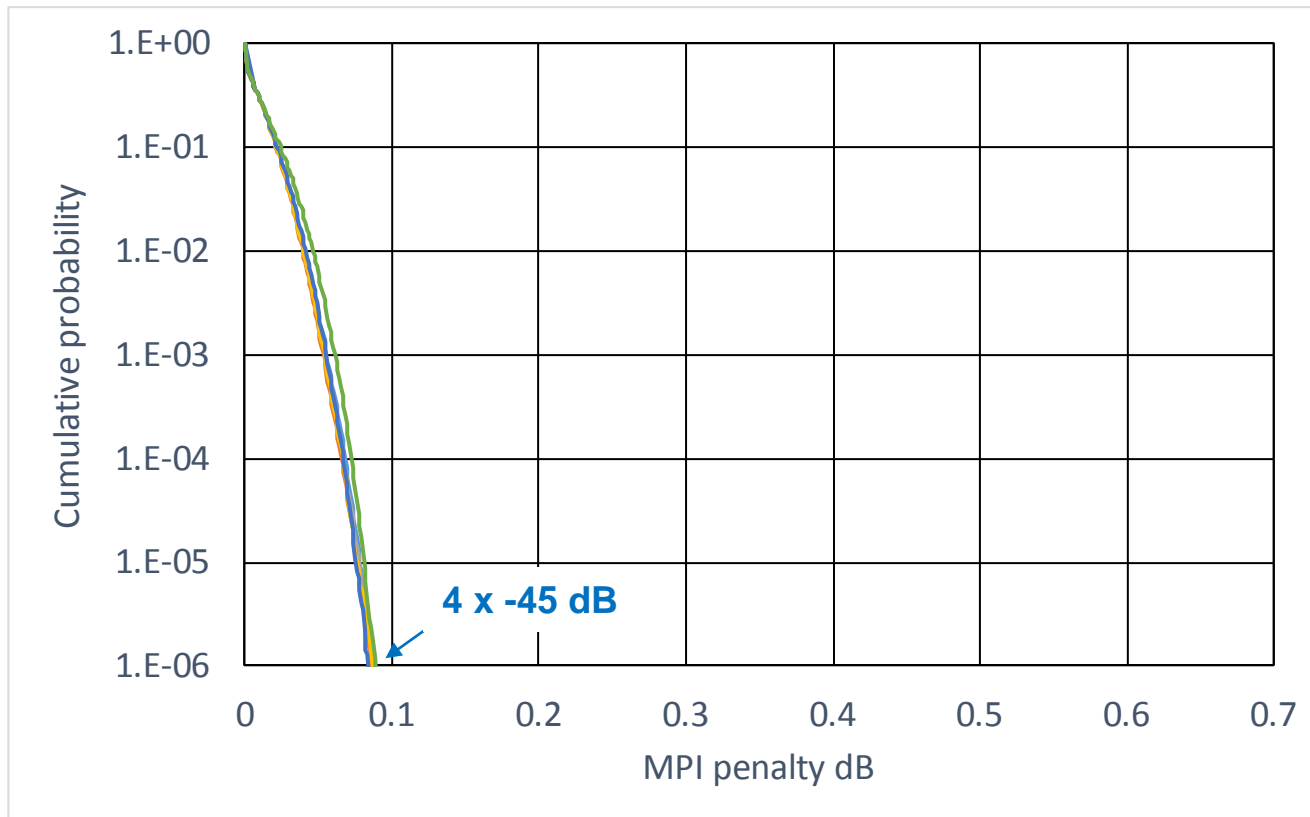


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# DR4, DR4 0.1 dB penalty

BER 2.4E-4  
ER 4.5 dB

-26	-49	-49	-49	-49	-49	-49	-49	-49	-49	-49	3.0	-26
-26	-48	-48	-55	-48	-48	-48	-48	-55	-48	-48	3.0	-26
-26	-47	-55	-55	-47	-47	-47	-47	-55	-55	-47	3.0	-26
-26	-45	-55	-55	-55	-45	-45	-55	-55	-55	-45	3.0	-26
-26	-42	-55	-55	-55	-55	-55	-55	-55	-55	-42	3.0	-26
-26	-55	-55	-55	-55	-55	-37	-55	-55	-55	-55	3.0	-26



[Return](#)



Thanks!