P802.3bs optical reflection limits

Pete Anslow, Ciena

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Introduction

P802.3bs D2.0 places the following limits on optical reflections within the cable plant:

121.11.2.2 (200GBASE-DR4)

The maximum discrete reflectance shall be less than –45 dB. The number of instances with a maximum discrete reflectance of –45 dB shall not exceed four.

122.11.2.2

The maximum discrete reflectance shall be less than –35 dB. The number of instances with a maximum discrete reflectance of –35 dB shall not exceed four for 200GBASE-FR4 and 400GBASE-FR8 and six for 200GBASE-LR4 and 400GBASE-LR8.

124.11.2.2 (400GBASE-DR4)

The maximum discrete reflectance shall be less than –45 dB. The number of instances with a maximum discrete reflectance of –45 dB shall not exceed four.

What about other reflections?

Is there any limit to the number of discrete reflections just below the -35 dB (or -45 dB) limit?

For example, 8 reflections of -36 dB seems to be allowed by the specification for 400GBASE-LR8, but may exceed the 0.5 dB MPI penalty allocation.

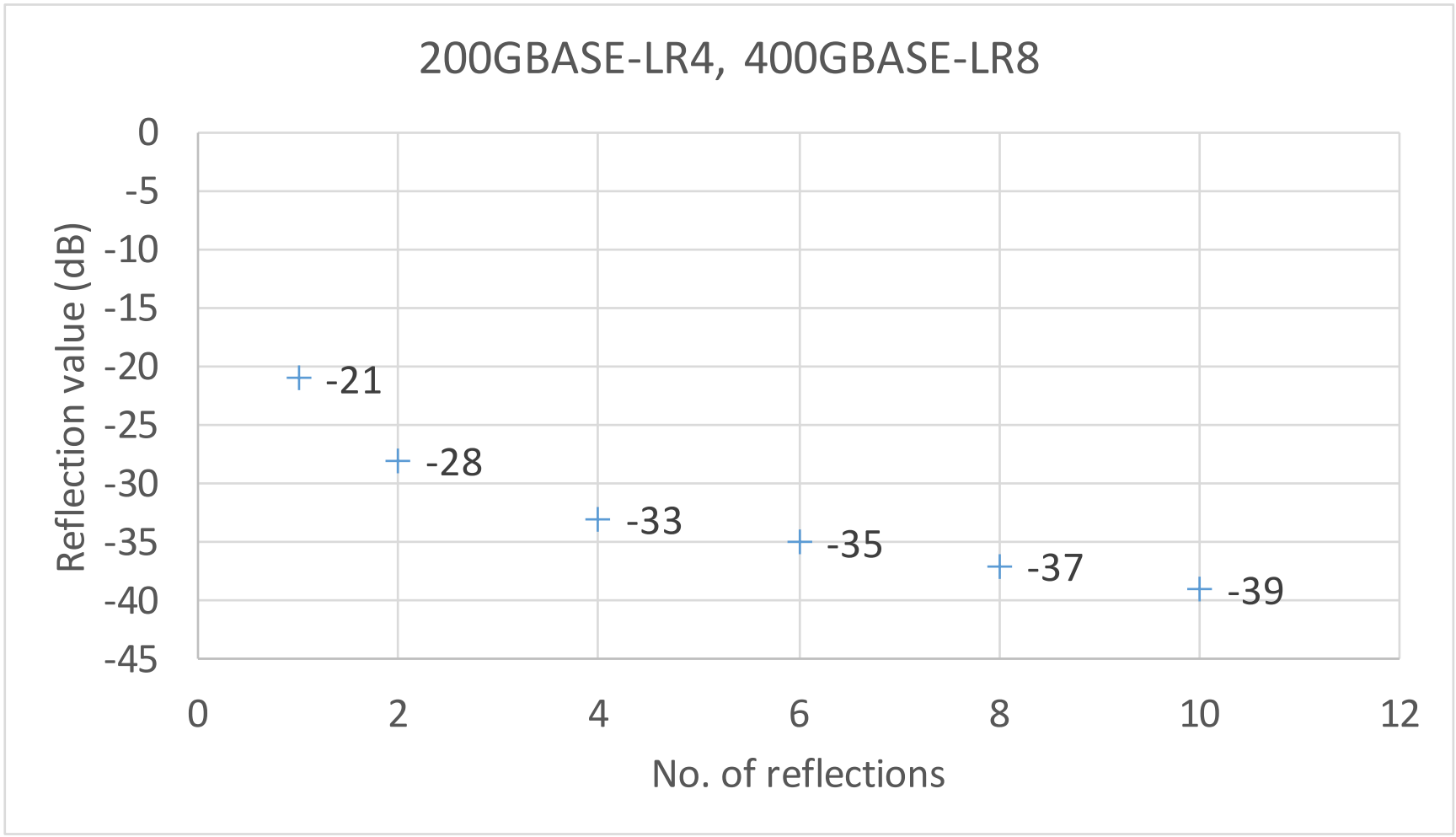
What about a smaller number of larger reflections? This could work satisfactorily, but is not currently allowed.

To explore this space, the spreadsheet in king_02a_0116_smf.7z was used to try to get an idea of what number/reflection value combinations would just meet the MPI penalty allocation. See next slides.

Note: the values on the following slides were obtained with a small number of spreadsheet rows, so are approximate only.

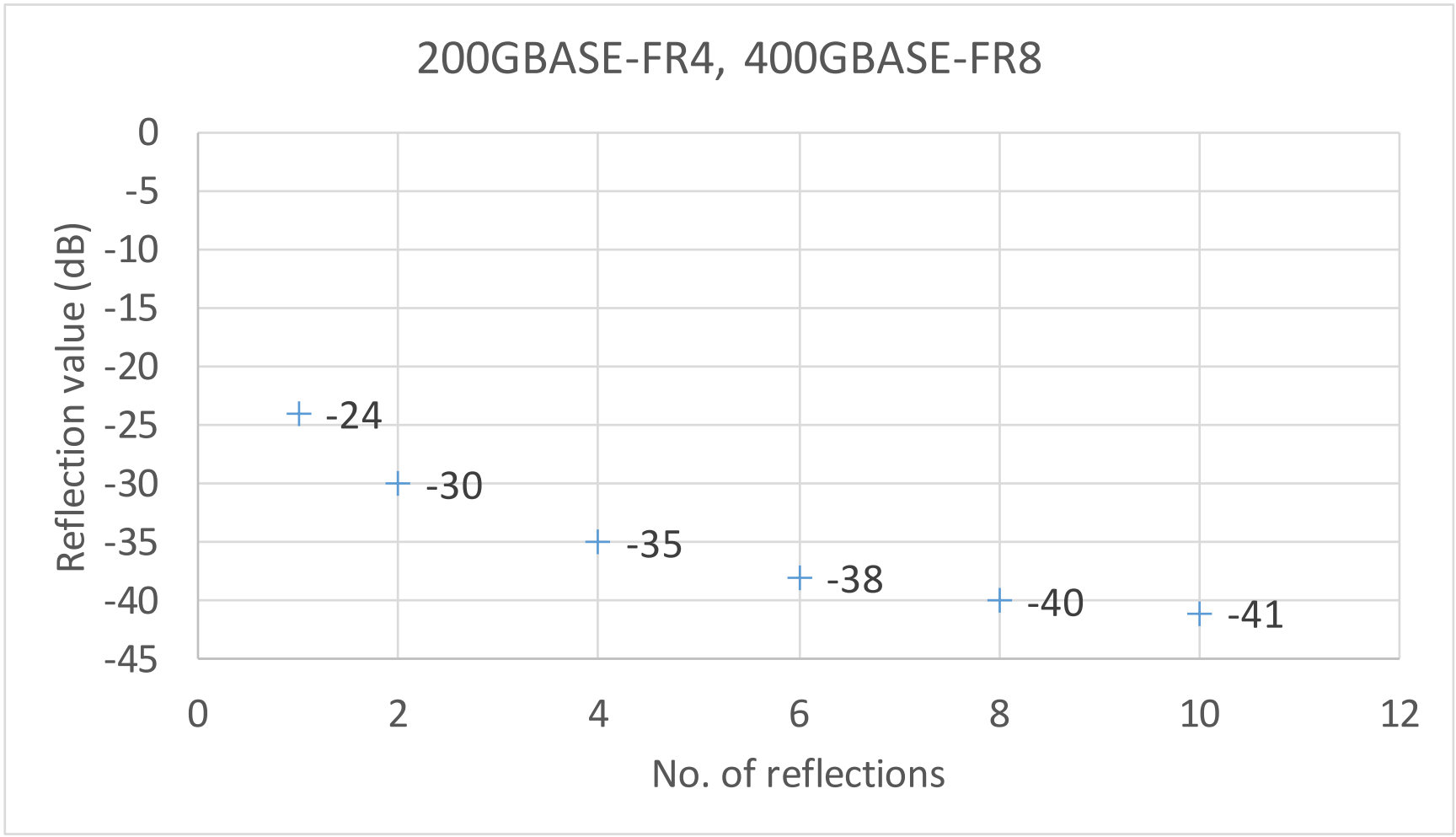
200GBASE-LR4 and 400GBASE-LR8

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



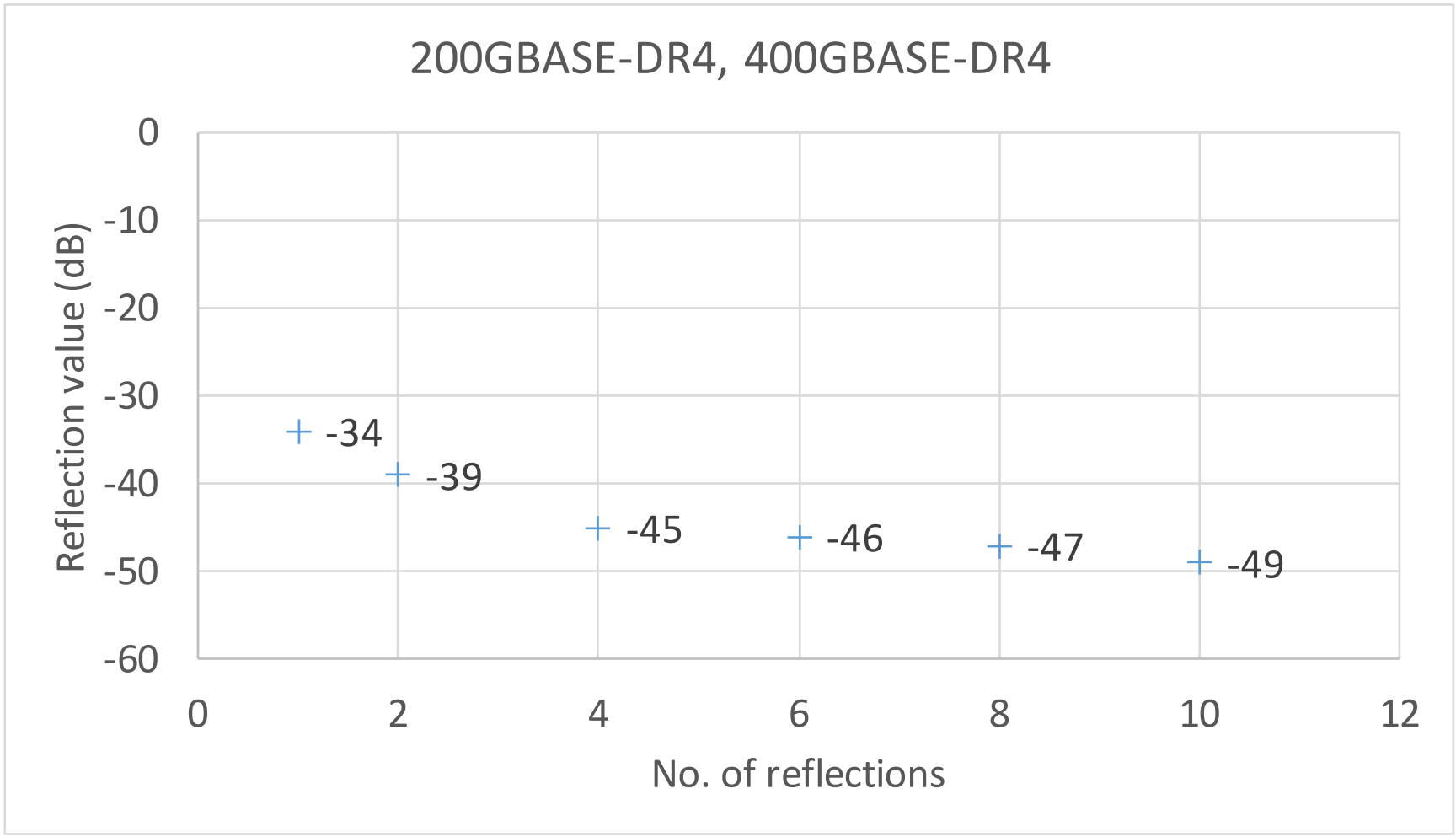
200GBASE-FR4 and 400GBASE-FR8

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



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



Conclusion

The limits in 121.11.2.2, 122.11.2.2, and 124.11.2.2 would be improved by being reformulated as something like:

If the number of discrete reflectances above –60 dB is 4, each discrete reflectance shall be less than –35 dB. If the number of discrete reflectances above –60 dB is 8, each discrete reflectance shall be less than –40 dB.

This would probably be better as a table:

Number of discrete reflectances above –60 dB	Maximum value for each discrete reflectance
1	–24 dB
2	–30 dB
4	–35 dB
6	–38 dB
8	–40 dB
10	–41 dB

Thanks!