# Alien crosstalk and 2.5 G

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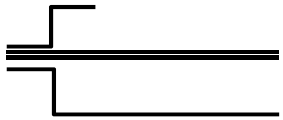
# PSANEXT

- Usually only the first meters are of relevance, but because we only care below 200 MHz it cannot be neglected
- But the get out clause for channels below 30m is hopefully neglectable
- PSANEXTavg is not helpful because if one receiver gets noisy signals, how can the others help?

# Supporters

- Dave Hess  Cord Data

# PSAFEXT (PSAACR-F)



- This one is critical because it increases at higher frequencies with shorter length and especially if the disturbing channel is shorter.

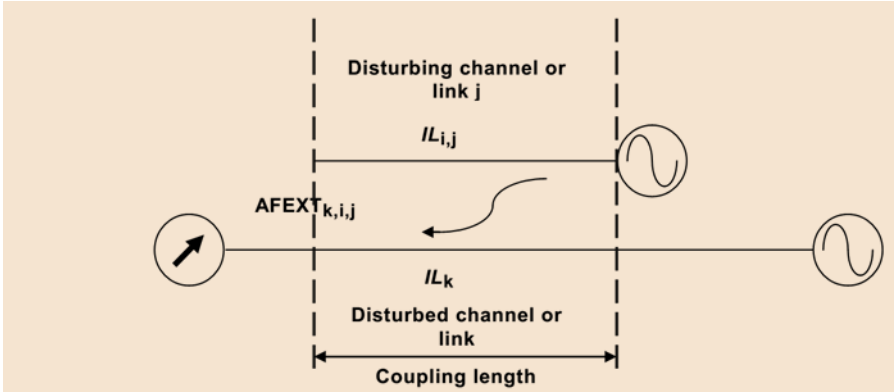



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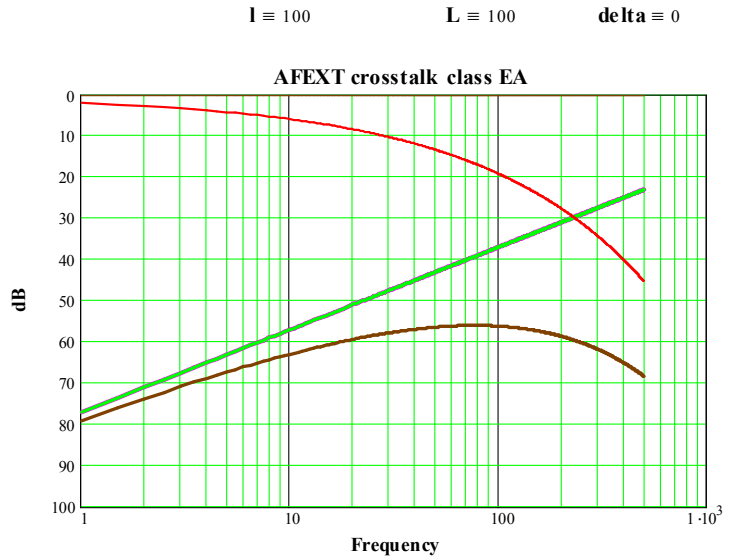
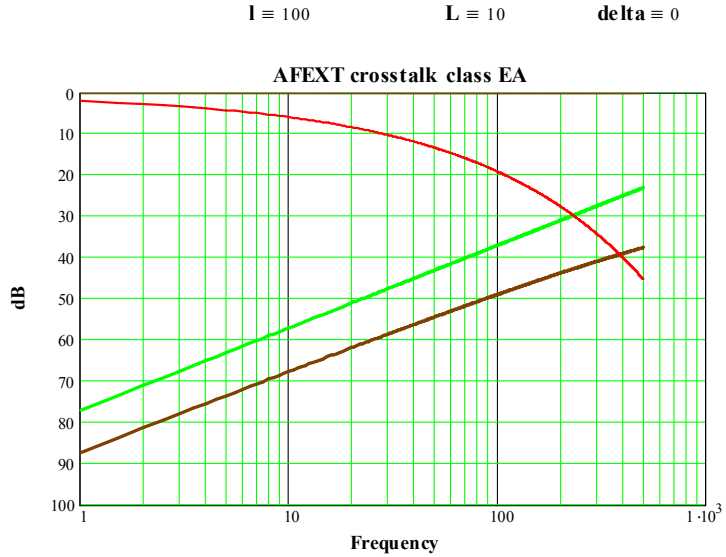
Figure F.2 – Example of increased impact of PS AFEXT.

- Examples of this in the next pages

L is the disturbing length
l is the disturbed length(channel under consideration)
delta is a  power back off (PBO) value than can be inserted in the calculation
red is the disturbed channel insertion loss
brown is the PSAFEXT in the disturbed pair
Green is the limit line for class $E_A$
magenta is the calculated PSAACRF

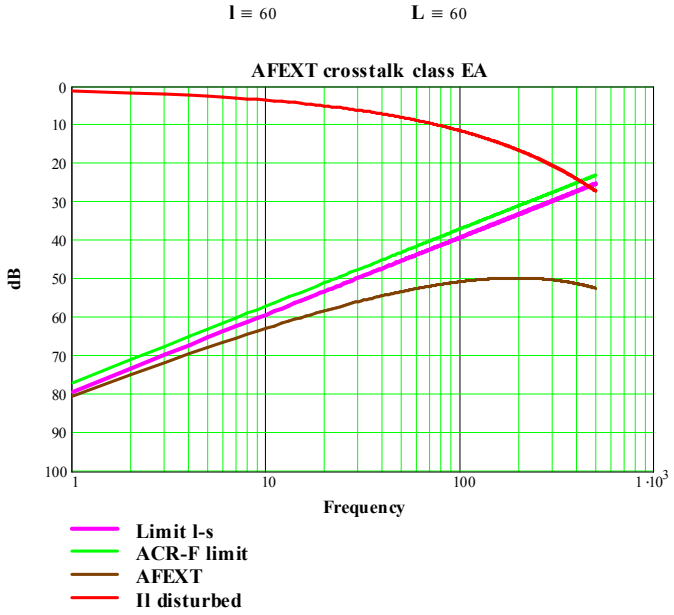


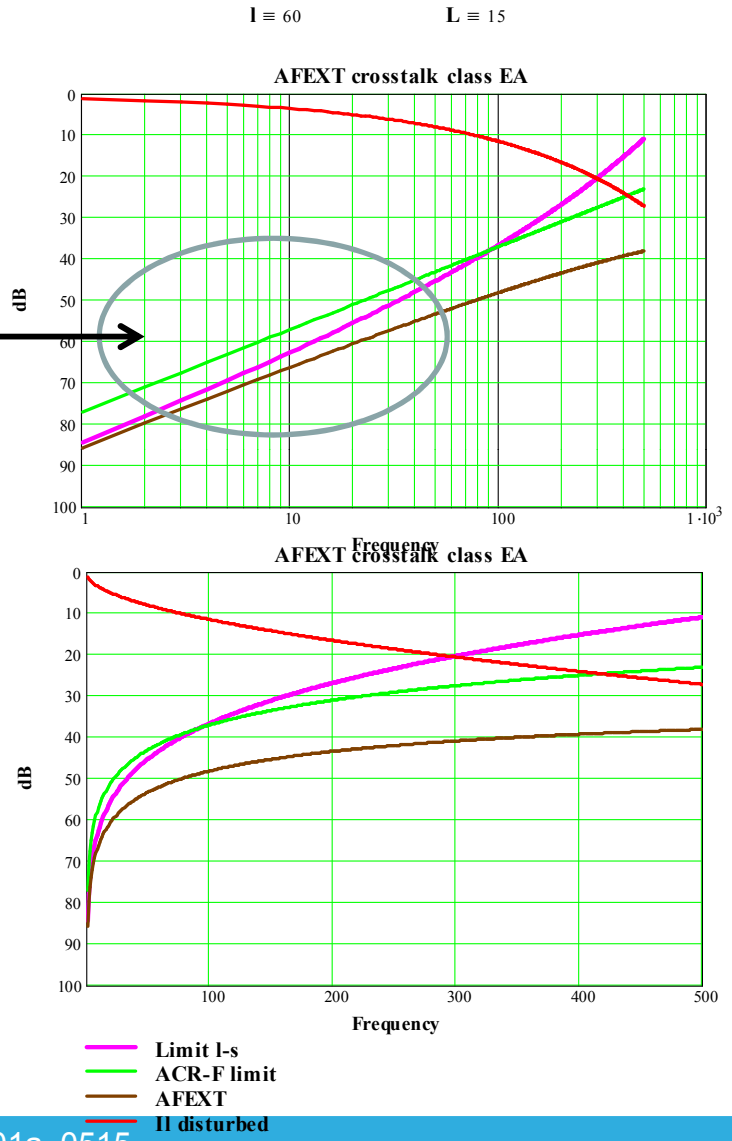



# If the length of disturbing and disturbed channel are different  PSAACR-F is curved (on log scale).

Therefore for the noise calculation the straight limit line should not be used.

2.5G

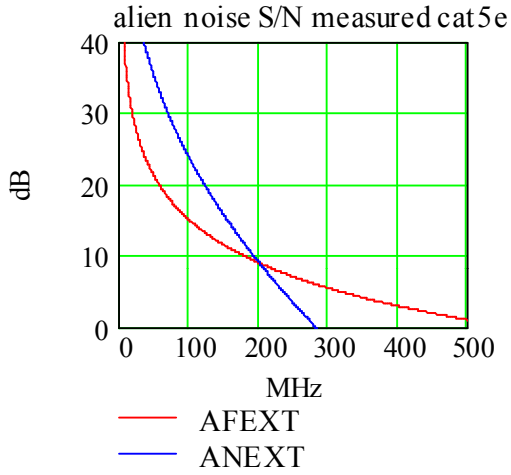


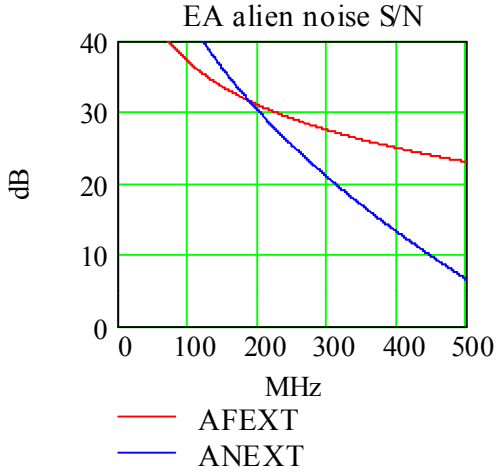



# Alien noise measurements

- From wagner_ngeabt_01a_0115 it can be deducted that for 100m the limit lines could be for cat5e:
  - PSANEXT : 75-15log(f) (10log(f) does not match)
  - PSAACR-F: (55 to 62) -20log(f)
  - S/N at 100 MHz 15 to 22 dB
- Cat6 : nordin_ngeabt_01a_0315 (for 5G)
- System implications:feyh_3bq_ngeabt_0115
  - 2.5 G to 2.5 G 20 dB at 100 MHz

# Level comparison of PSANEXT and PSAACR-F




Up to 200 MHz only AFEXT
From 200 MHz on PSNEXT is easy to mitigate by unbundling the patchcords

# Disturbers and alien noise: a fast overview

- It is assumed when applying the limits that the disturbers are either the same or similar protocol than the disturbed one.
- But here it will be different:
  - Different protocols
    - 1000BASE-T
    - 2.5G high frequency coverage and less transmit power, PBO ? The higher power will be assumed to be compensated by the less coverage
    - 5G less coverage to both

# 1000Base-T disturbing  2.5 G

- At the beginning a realistic scenario

- 1G and 2.5 G similar long length:
  - Disturbance by limit line as similar protocol
- All similar short length, 2 cases:
  - No power back off, as long length
  - Power back off, disturbance increases by the same amount

# 1000Base-T disturbing  2.5 G

- Short disturber, 2.5 G long channel
  - May be very disturbing, worse with PBO
    - The increased S/N may help, this case needs to be looked at carefully
- 2.5G disturbed but shorter, 2 cases
  - No PBO, better than limits
  - With PBO , very disturbing depending  on length

# 2.5 G only

- Same length: As with 10G  but alien noise limits are higher therefore less disturbance
- Short long channels even higher limits
  - w/o PBO no issue

# Summary

- Therefore it should be considered to avoid or restrict PBO for the case of alien noise
  - Limits to be found out.
  - The measured limits may be OK for this cases.
  - Without PBO less sensitivity to impulse/external noise.
- If principle accepted more precise calculation could be offered

# Summary II

- As 5G does not have the full low frequency advantage it needs to be studied separately.
  - 1000 BASE-T is not relevant any more
- In central Europe mainly shielded system are installed therefore 2 cases need to be looked at:
  - F/UTP cables: The outer shield attenuates alien noise by shielding effectiveness.
  - S/FTP cables: as they perform differently alien noise can only be evaluated by coupling attenuation.

# Thank You!