ANEXT reduction by correlative coding for 10GBASE-T

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Tetsuya Higuchi and Masahiro Murakawa
(Evolvable Systems Research Institute)

Shinji Nishimura
(Hitachi, Ltd.)

Supporters

- AIST
- The Tokyo Electric Power Company, Inc.
- POWEREDCOM, Inc.

Objectives

- Proposal: PAM12 signaling with correlative coding
- correlative coding
  - suppresses response of RX in high-frequency
  - reduces influence of ANEXT around Nyquist frequency
  - requires bandwidth of 417 MHz
- PAM12 with correlative coding improves SNR by 2.3dB

Features of PHY proposal

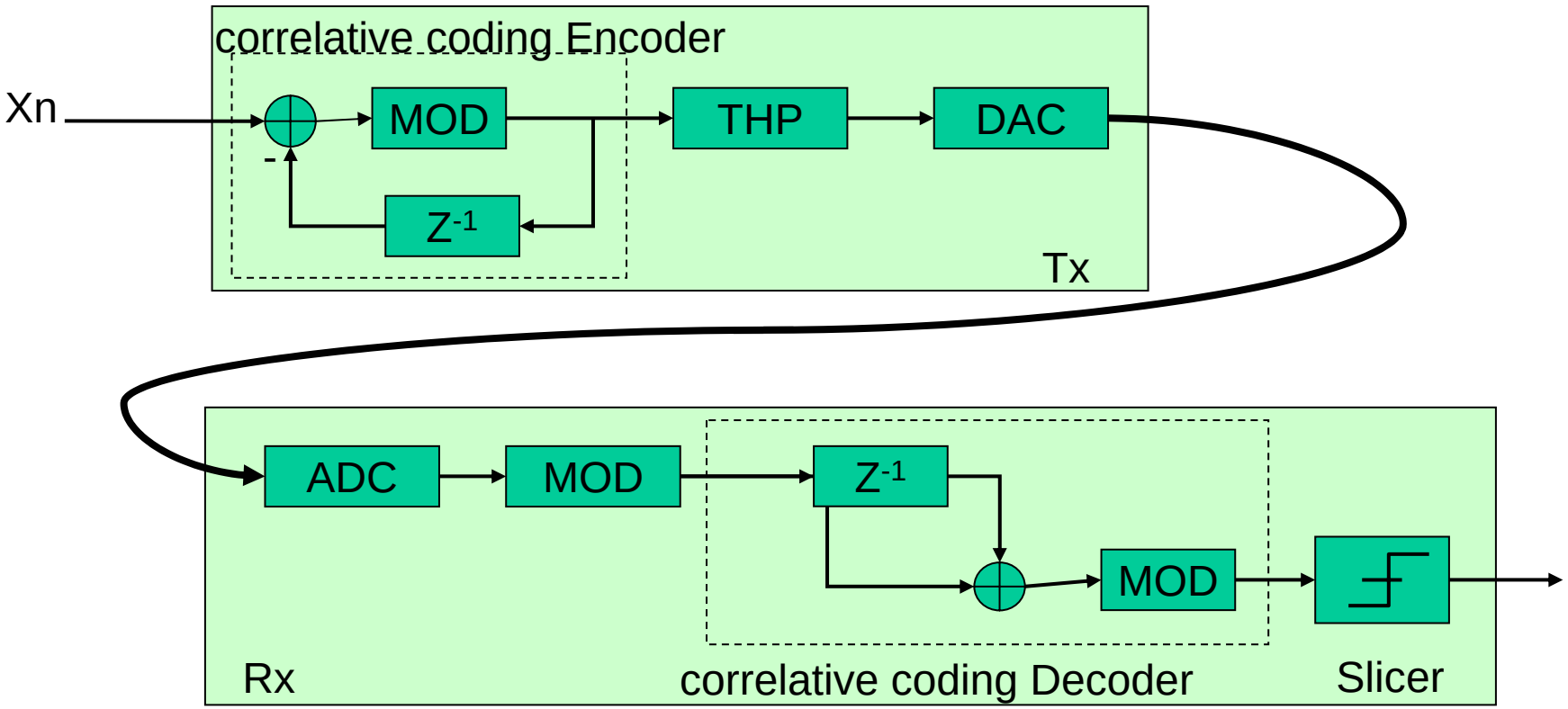
Modulation	PAM12
Encoding/Decoding	correlative coding
Transmitter equalization	THP (32 Taps)
FEC code	LDPC(845,1024)
Bandwidth	417 Mb/s
Symbol rate	833 Mb/s

correlative coding

correlative coding

- applied for encoding and decoding
- suppresses response of RX in high-frequency
- suppresses ANEXT over 300 MHz
- improves SNR of PAM12

Structure of PHY with correlative coding

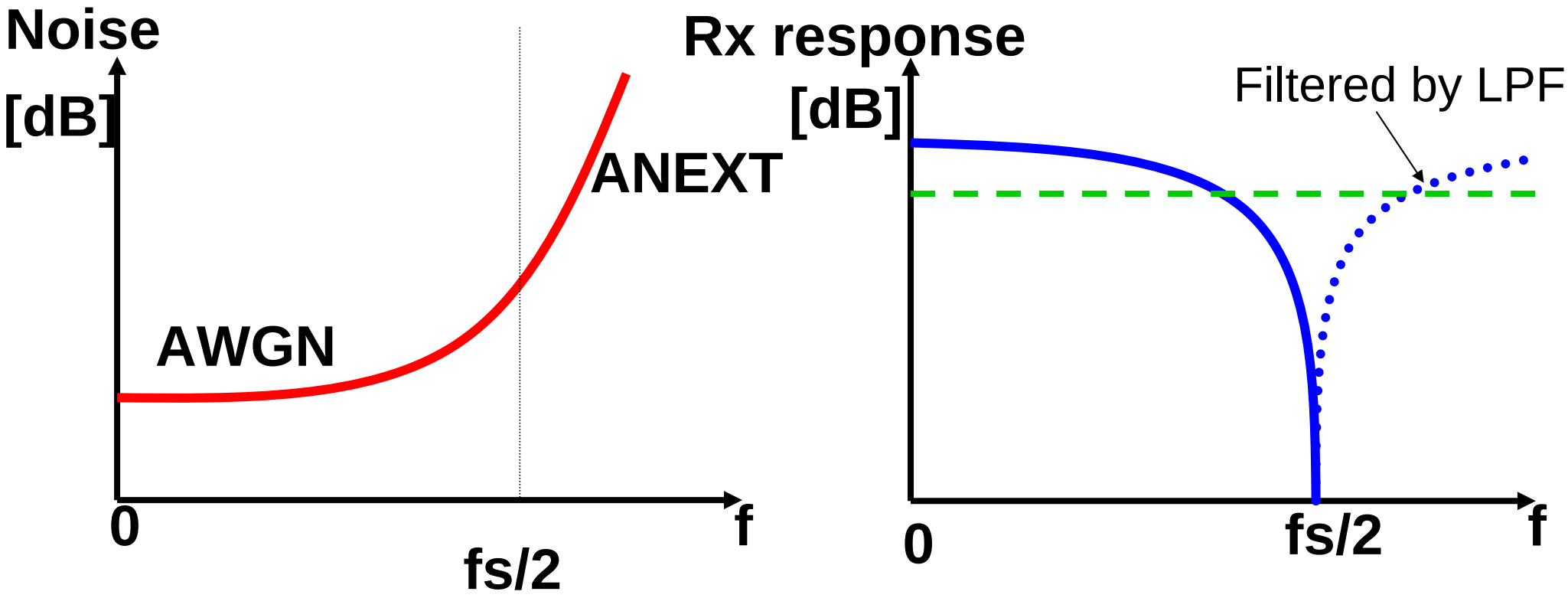


TX: $y_n=\mathrm{Mod}(x_n-y_{n-1})$

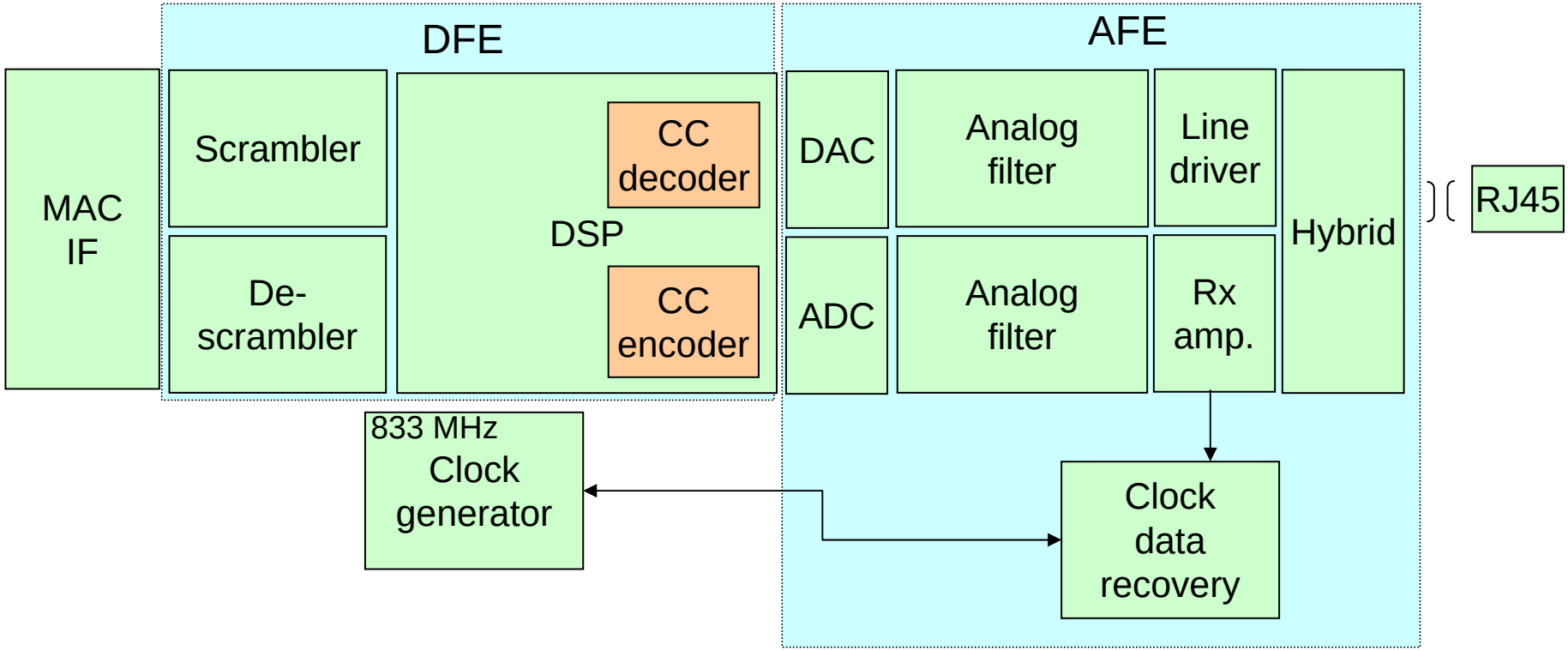
RX: $y_n=\mathrm{Mod}(x_n+x_{n-1})$

Merit of correlative coding

- Influence of ANEXT (~fs/2) is reduced

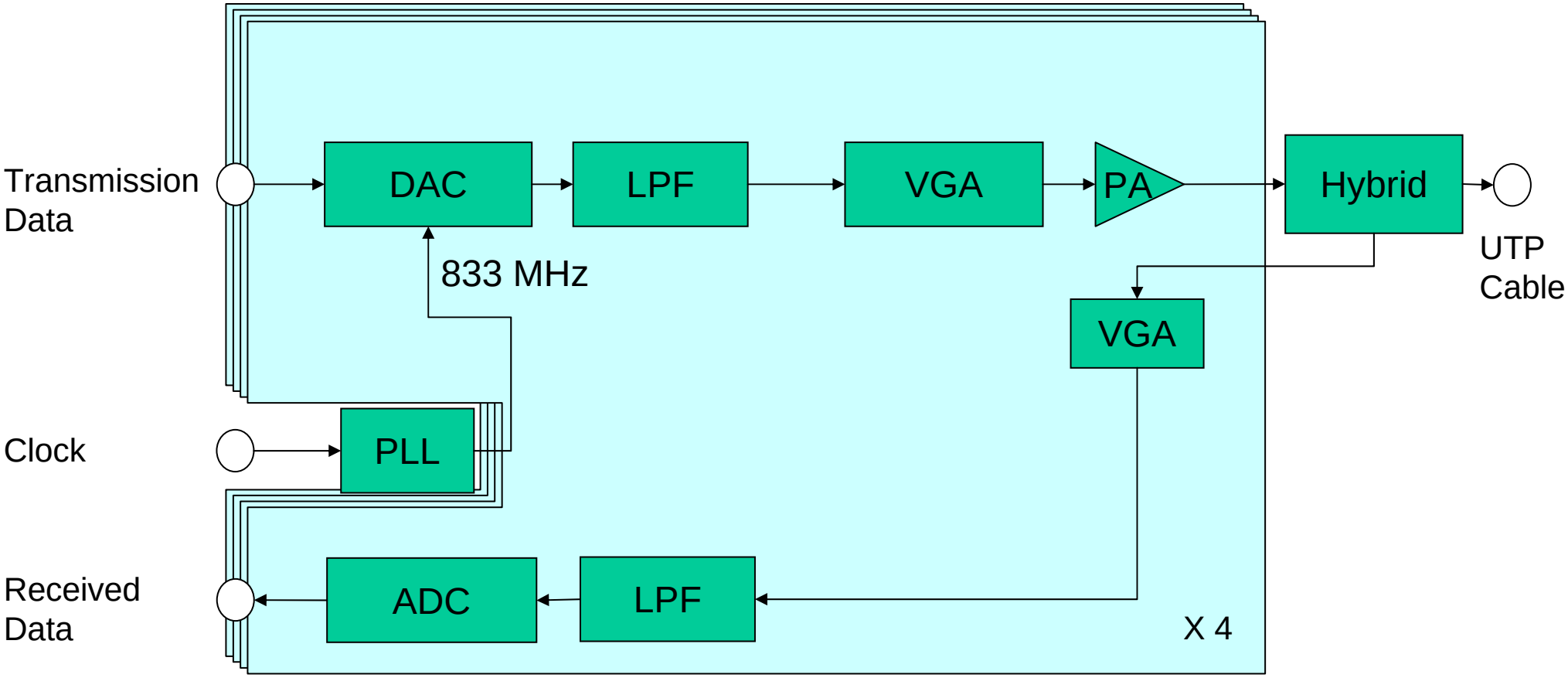


Block diagram of LSI



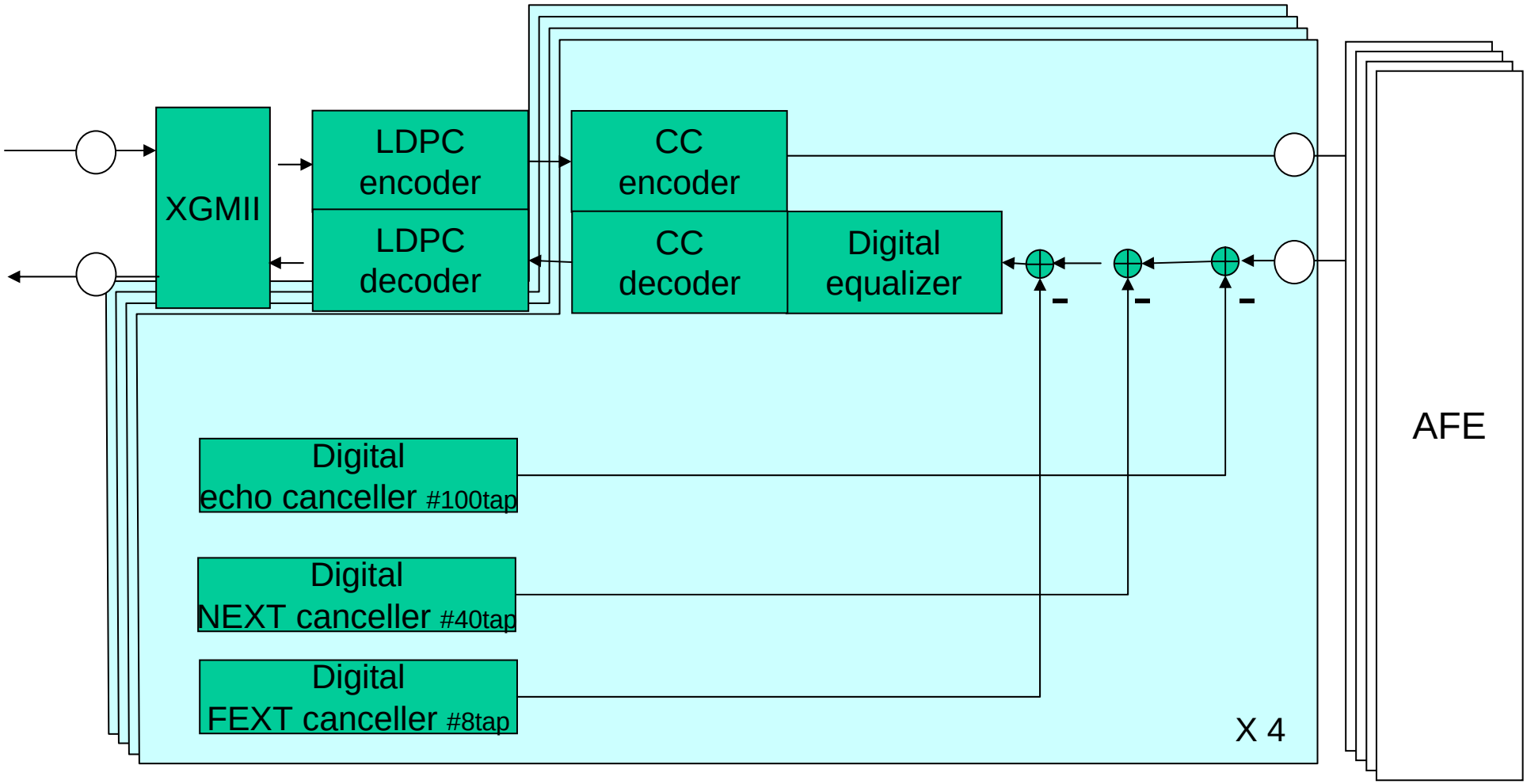
CC: correlative coding

Structure of AFE



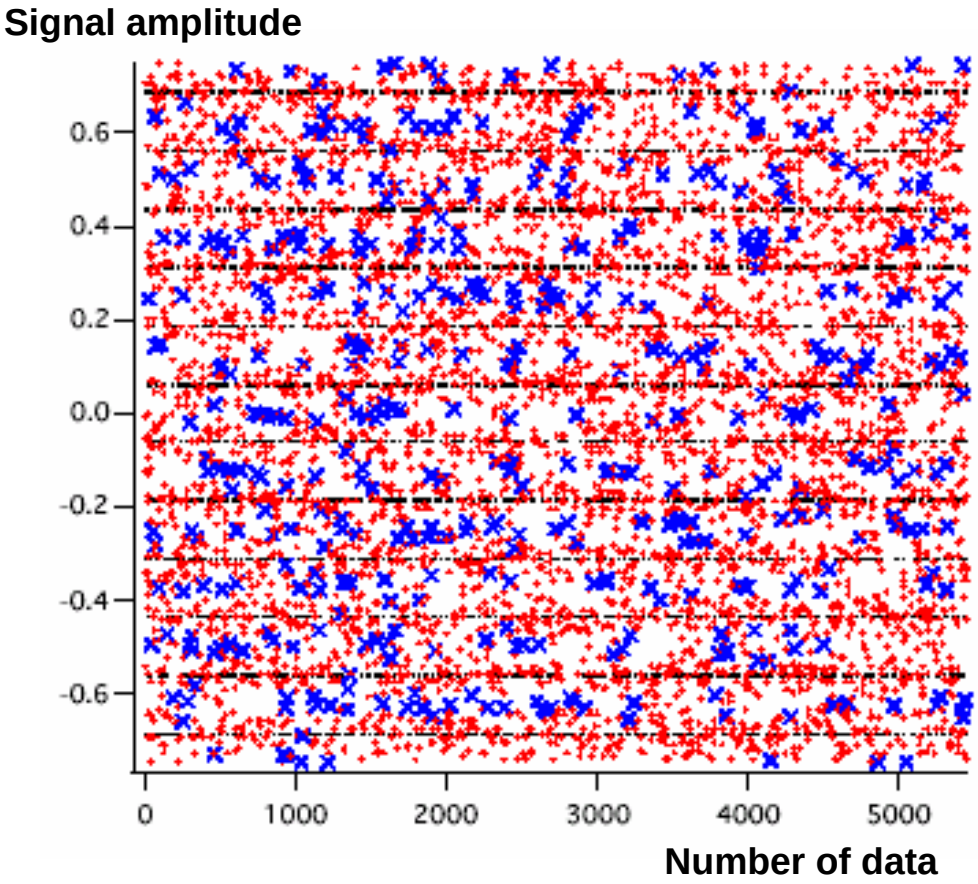
- LPF: 4th Butterworth, f_c=417 MHz

Structure of DFE

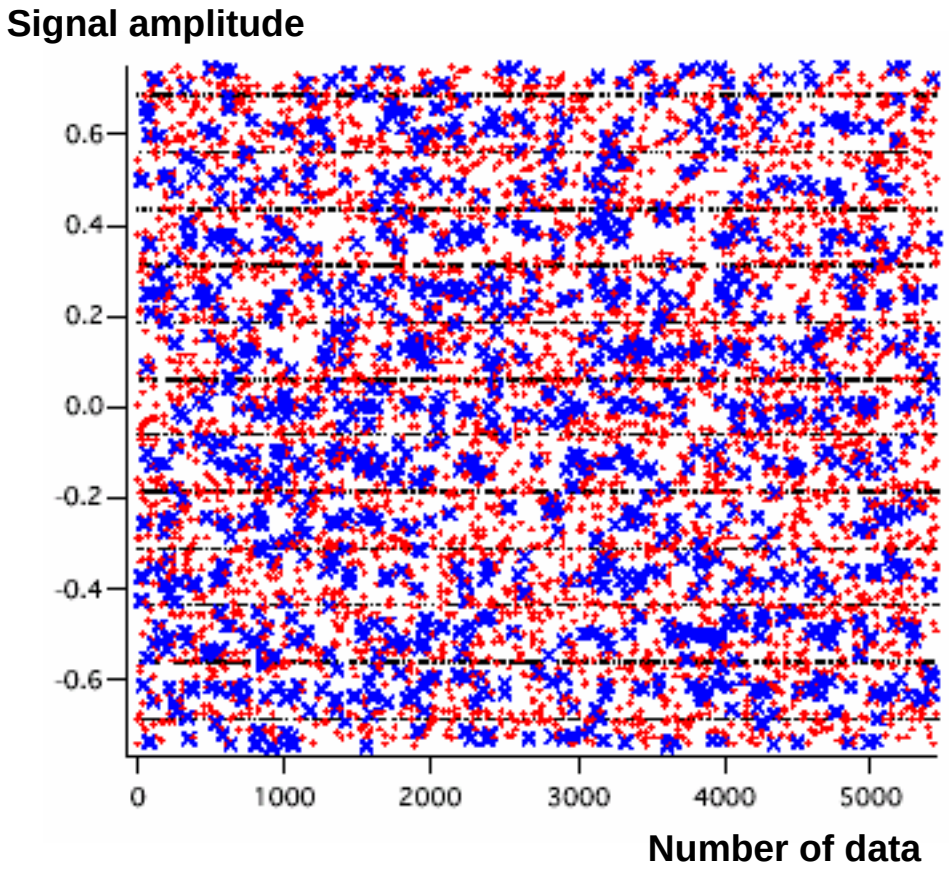


Simulation results (received signal)

"+"= OK, "x"= error

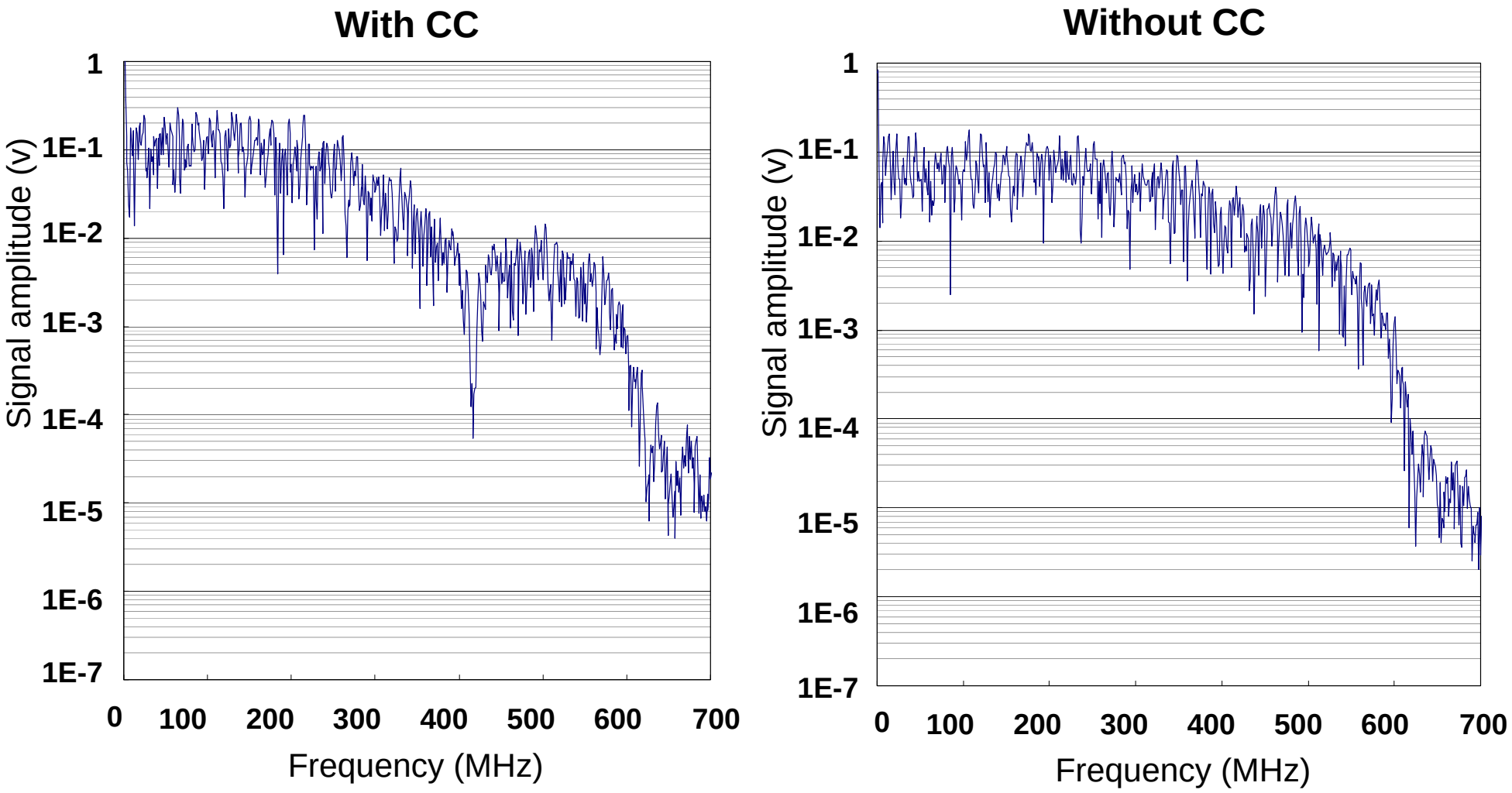


PAM12-with correlative coding



PAM12-without correlative coding

AFE simulation results (spectrum)



ANEXT inputted to slicer (Model #3)

Advantages of correlative coding

	PAM12-CC	PAM12
Bandwidth (Mb/s)	417	833
Symbol rate (Mb/s)	833	833
SNR (dB) Model #3	21.5	19.1

Summary

- Correlative coding
  - suppresses response of RX in high-frequency
  - reduces influence of ANEXT over 300 MHz
  - improves SNR by 2.3 dB (#3 cabling model)
- Simulation results including FFE will be reported in next meeting.