

A network diagram consisting of several nodes (colored circles in white, orange, red, purple, and blue) connected by thin white lines. The background is a teal color with a pattern of various mobile-related icons like smartphones, Wi-Fi signals, and SMS messages.

System Modelling Considerations for a Successful A-PHY Implementation

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Synopsys



A-PHY Profile 1 Architecture

4.1.3 Downlink Validation

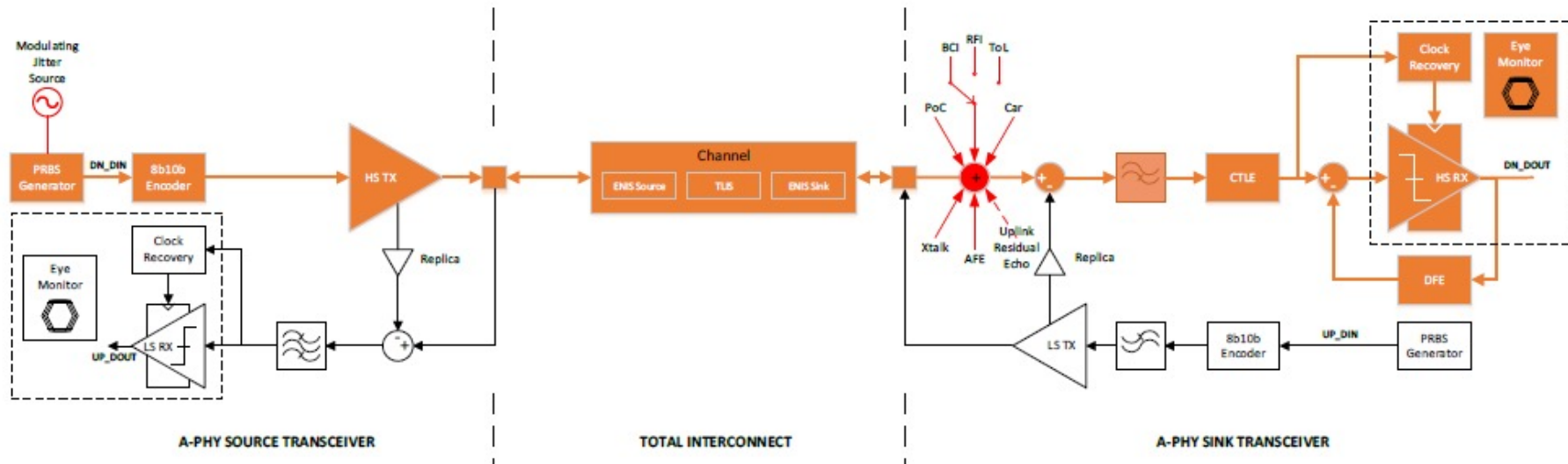
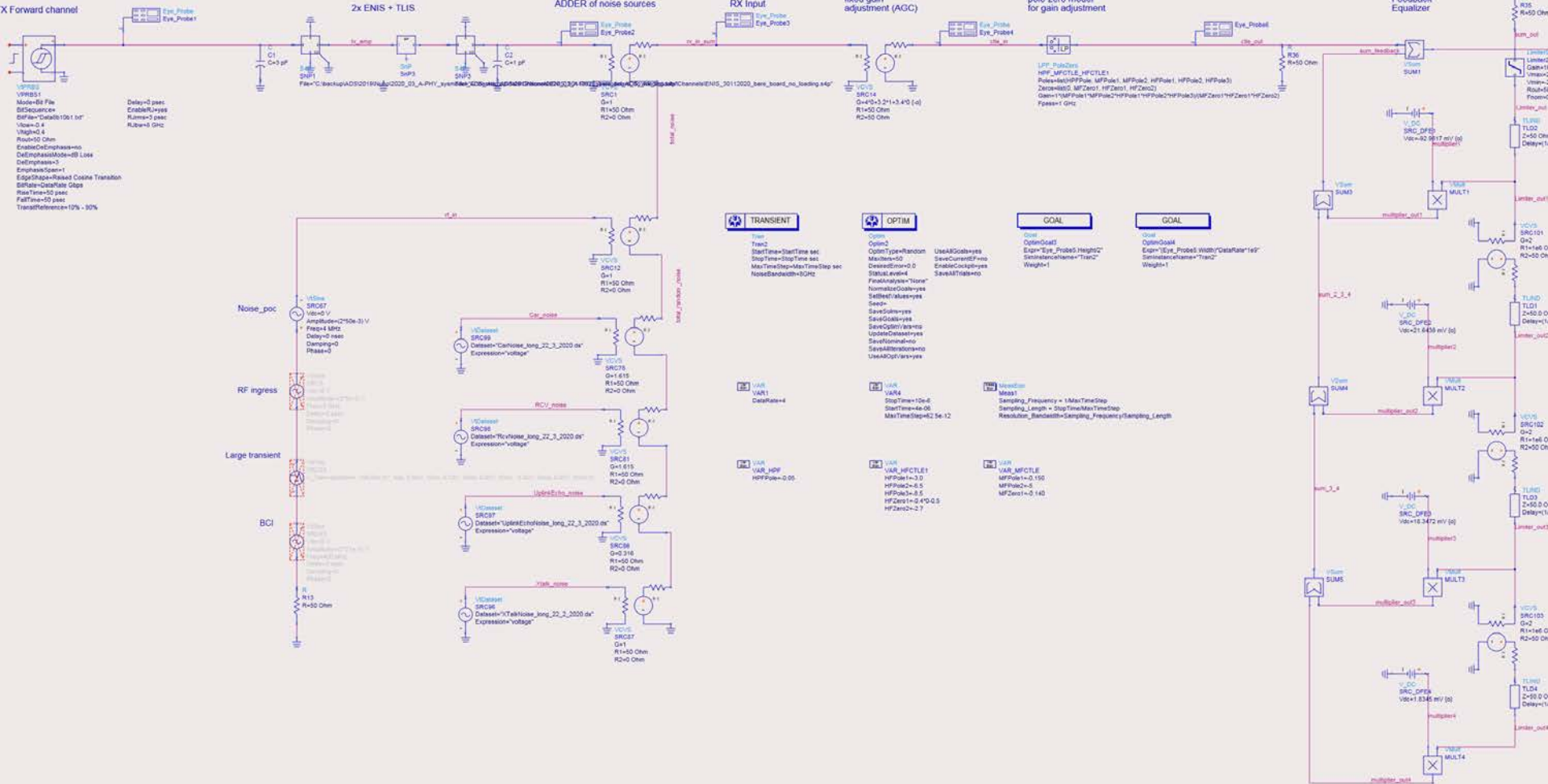


Figure 2 Downlink Validation Model with Noise Sources

SENSOR END NODE

CHANNEL

ECU END NODE



VPM31
 Mode=BF File
 BPSquence
 BDFlex="DataRate1001 bit"
 Vlsim=0.4
 Vsigin=4
 Rload=50 Ohm
 EnabledOutpass=no
 DeEmphasisMode=08 Loss
 DeEmphasis=3
 EmphasisSpan=1
 EdgeShape=Raised Cosine Transition
 BDFlex=CosineShp Class
 RiseTime=50 psec
 FallTime=50 psec
 TransfRelevance=10% - 30%

Noise_poc
 VNoise SRC12
 Vsigin=V
 AmpRstuden="250e-3 V"
 Freq=4 MHz
 Delay=0 nsec
 Damping=0
 Phase=0

RF ingress
 VNoise SRC13
 Vsigin=V
 AmpRstuden="250e-3 V"
 Freq=4 MHz
 Delay=0 nsec
 Damping=0
 Phase=0

Large transient
 VNoise SRC14
 Vsigin=V
 AmpRstuden="250e-3 V"
 Freq=4 MHz
 Delay=0 nsec
 Damping=0
 Phase=0

BCI
 VNoise SRC15
 Vsigin=V
 AmpRstuden="250e-3 V"
 Freq=4 MHz
 Delay=0 nsec
 Damping=0
 Phase=0

Cap_noise
 VNoise SRC16
 Dataset="CapNoise_jong_22_3_2020.d"

RCV_noise
 VNoise SRC17
 Dataset="RCVNoise_jong_22_3_2020.d"

UpdateEcu_noise
 VNoise SRC18
 Dataset="UpdateEcuNoise_jong_22_3_2020.d"

Vsigin_noise
 VNoise SRC19
 Dataset="VsiginNoise_jong_22_3_2020.d"

TRANSENT
 Trace
 Trace2
 StartTime=StartTime sec
 StopTime=StopTime sec
 MaxTimeStep=MaxTimeStep sec
 NoiseBandwidth=10MHz

VAR VAR1
 DataRate=4

VAR VAR_HPF
 HPFPower=0.05

OPTIM
 Optim
 Optim2
 OptimT=OptRandom
 MaxIter=50
 DesiredError=0.2
 StabCrit=evolve4
 FcnAnalysis="none"
 NormalizedCost=yes
 SelfTest/Always=yes
 Save=SaveSaves=yes
 SaveGoals=yes
 SaveOptim=save
 UpdateDataset=yes
 SaveInitial=no
 UseABOpt=save=yes

VAR VAR3
 Vsigin=V
 StopTime=10e-6
 StartTime=4e-6
 MaxTimeStep=0.25e-12

VAR VAR_MFCTLE
 VAR_MFCTLE1
 MFPower1=0.150
 MFPower2=0.150
 MFPower3=0.150
 MFPower4=0.140
 MFZero1=0.140
 MFZero2=2.7

GOAL
 Goal
 DeterGoal3
 Egan="Eye_Probe6.Height"
 SetObjectName="Trace2"
 Weight=1

VAR VAR4
 Mass3
 Sampling_Frequency = 1/MaxTimeStep
 Sampling_Length = StopTime/MaxTimeStep
 Resolution_Bandwidth=Sampling_Frequency/Sampling_Length

VAR VAR_MFCTLE
 VAR_MFCTLE1
 MFPower1=0.150
 MFPower2=0.150
 MFPower3=0.150
 MFPower4=0.140
 MFZero1=0.140
 MFZero2=2.7

LFF_PoleZeros
 HPF_MFCTLE1 MFCTLE1
 PoleZero1(MFPower1, MFZero1, MFPower2, HPFPole1, HPFZero1, HPFPole2, HPFPole3)
 ZeroZero1(MFZero1, MFZero1, MFZero2)
 Gain1(MFPower1, MFPower2, MFPower3, MFPower4, MFZero1, MFZero2, MFZero3, MFZero4)
 Fpass=1 GHz

SRC_DFES
 SRC_DFES1
 Vsigin=V
 Vsigin=42.9617 mV (0)
 Feedback1

SRC_DFES
 SRC_DFES2
 Vsigin=V
 Vsigin=21.6458 mV (0)
 Feedback2

SRC_DFES
 SRC_DFES3
 Vsigin=V
 Vsigin=18.3472 mV (0)
 Feedback3

SRC_DFES
 SRC_DFES4
 Vsigin=V
 Vsigin=13.346 mV (0)
 Feedback4

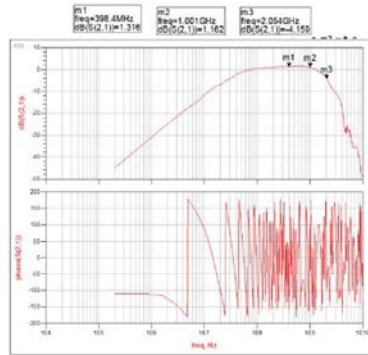
SRC_DFES
 SRC_DFES5
 Vsigin=V
 Vsigin=13.346 mV (0)
 Feedback5

SRC_DFES
 SRC_DFES6
 Vsigin=V
 Vsigin=13.346 mV (0)
 Feedback6

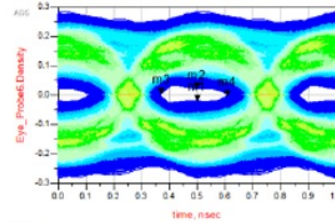
SRC_DFES
 SRC_DFES7
 Vsigin=V
 Vsigin=13.346 mV (0)
 Feedback7

SRC_DFES
 SRC_DFES8
 Vsigin=V
 Vsigin=13.346 mV (0)
 Feedback8

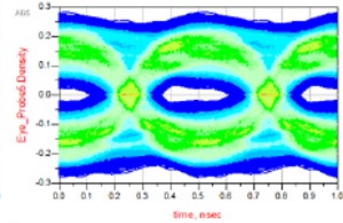
Profile 1 G1 – Channel + AGC + HPF + CTLE



After CTLE



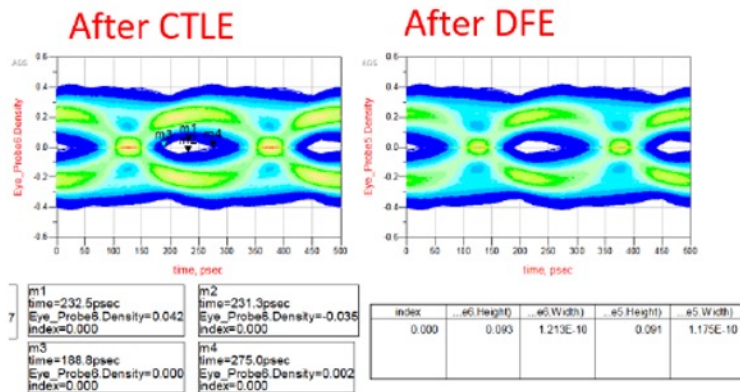
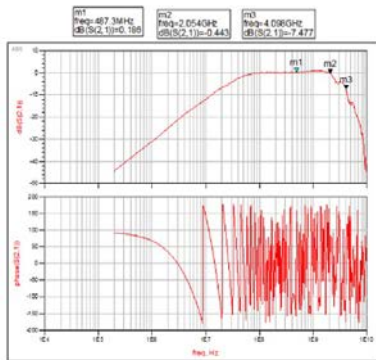
After DFE



m1 time=500.0psec Eye_Probe6.Density=-0.020 index=0.000	m2 time=497.5psec Eye_Probe6.Density=0.021 index=0.000
m3 time=370.0psec Eye_Probe6.Density=0.004 index=0.000	m4 time=607.5psec Eye_Probe6.Density=-0.004 index=0.000

index	e6.Height	e6.Width	e5.Height	e5.Width
0.000	0.040	2.725E-10	0.039	2.725E-10
1	0.040	2.300E-10	0.040	2.000E-10

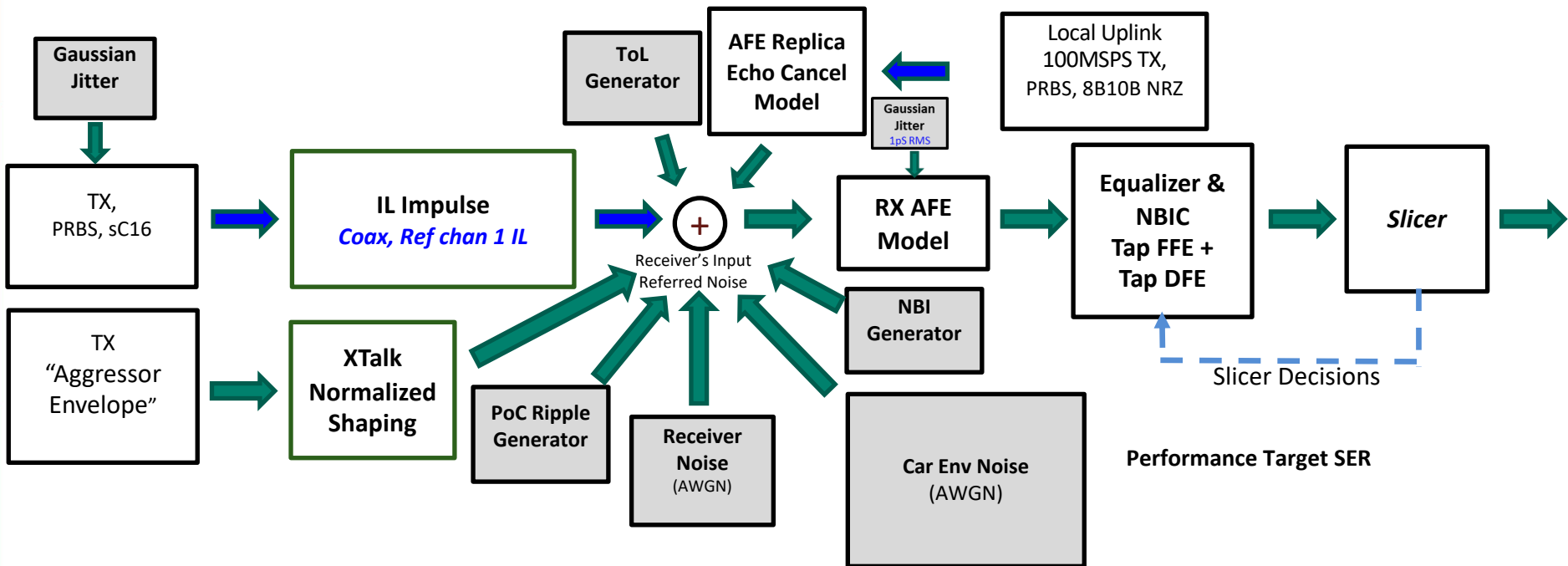
Profile 1 G2 – Channel + AGC + HPF + MFCTLE + HFCTLE



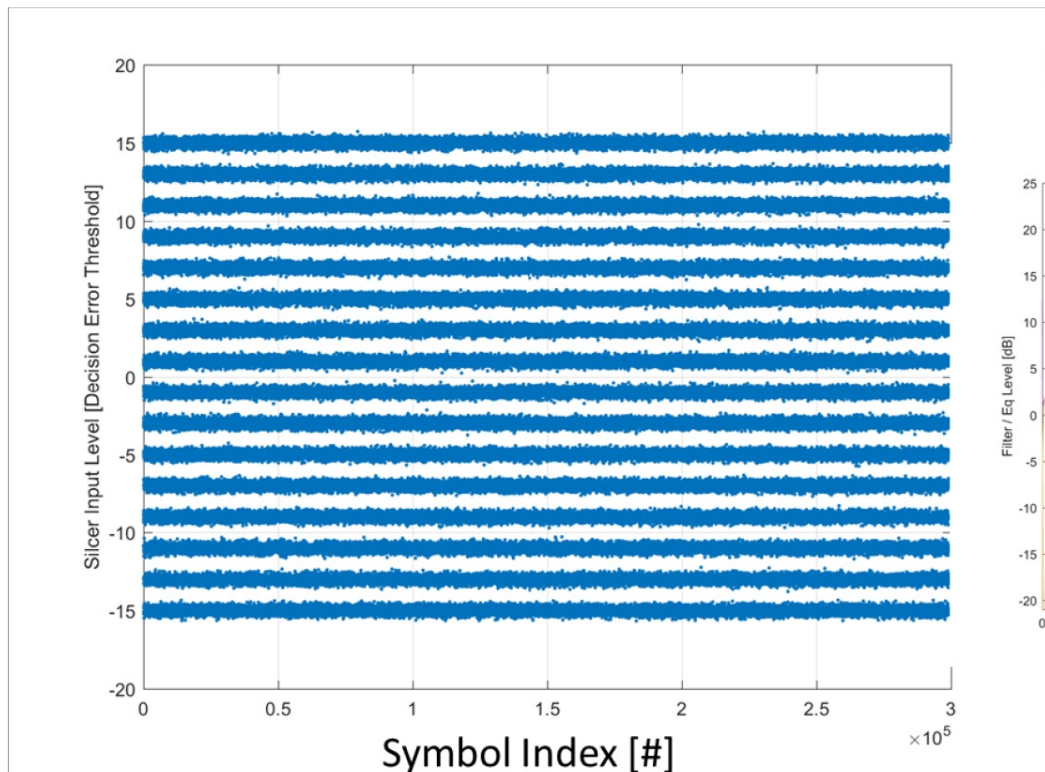
The background is a teal color with a dense pattern of small, light-colored icons representing various digital and communication concepts such as Wi-Fi, SMS, mobile phones, and social media. Overlaid on this is a network diagram consisting of several nodes (colored circles) connected by thin white lines. The nodes are located at various points: one orange node on the left edge, one white node below it, one red node in the upper-middle, one purple node to its right, one orange node further right, and one white node at the top right. Lines connect these nodes in a complex web.

A-PHY Profile 2 Architecture

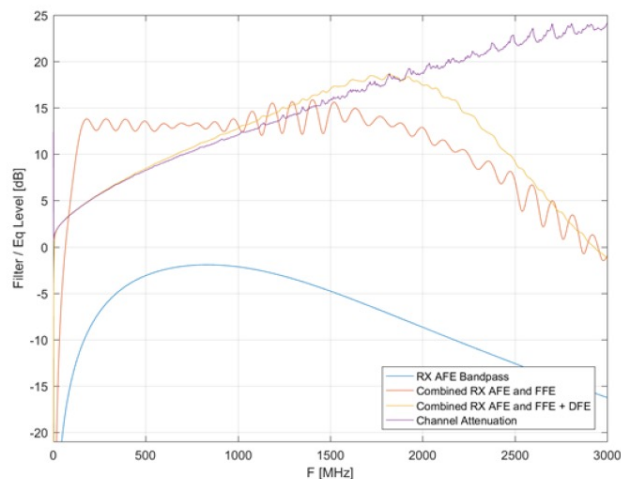
G5: sC16, 500mVpp Downlink, Time Domain Simulation



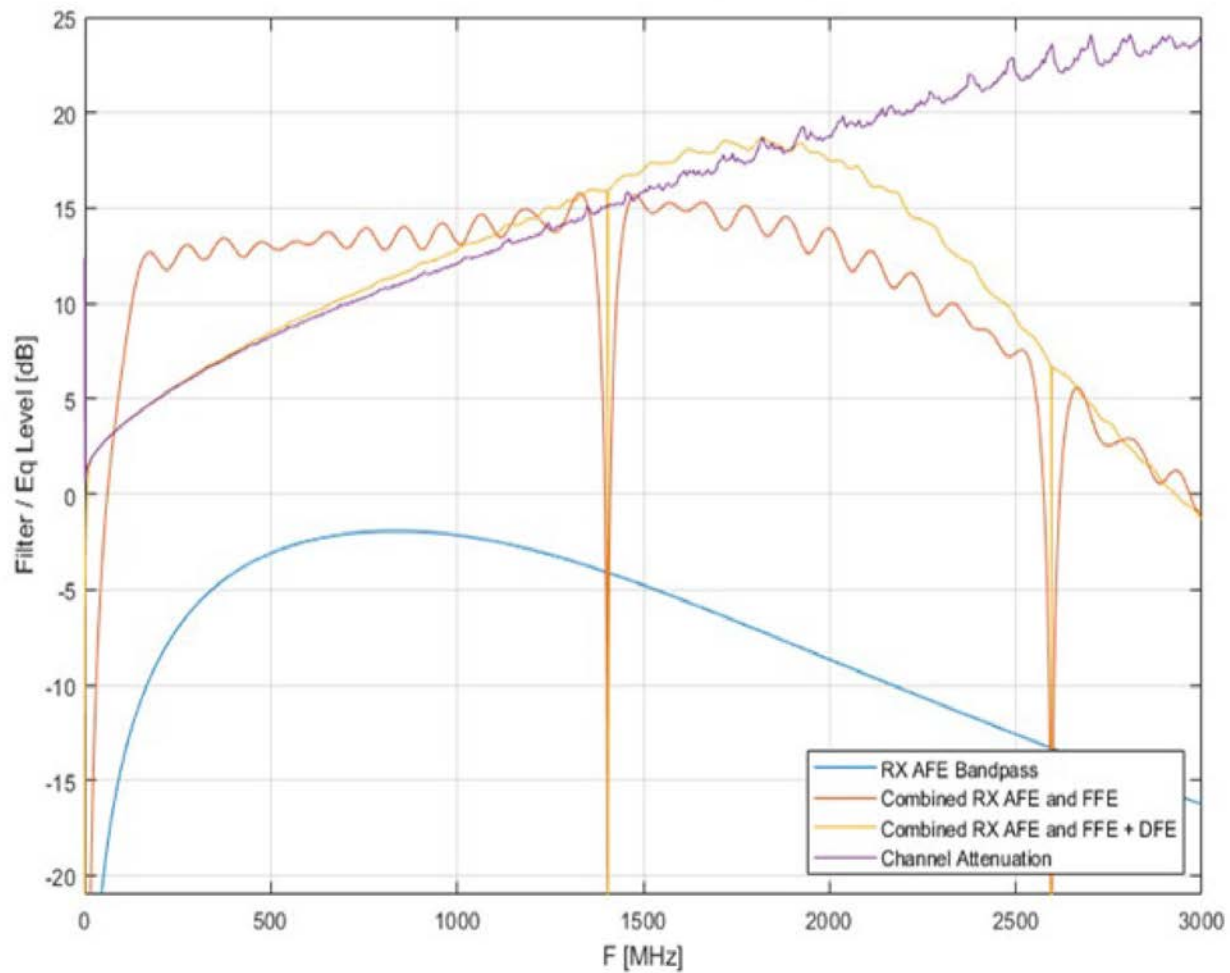
Step1: Pure RX Signal & Fixed Noises (wide band noises + PoC), Slicer Input After Equalizer, 44-Tap FFE, 84-Tap DFE (FFE and DFE are used for NBI Canceller)



RX AFE, FFE only Equalizer and 1/Channel Responses

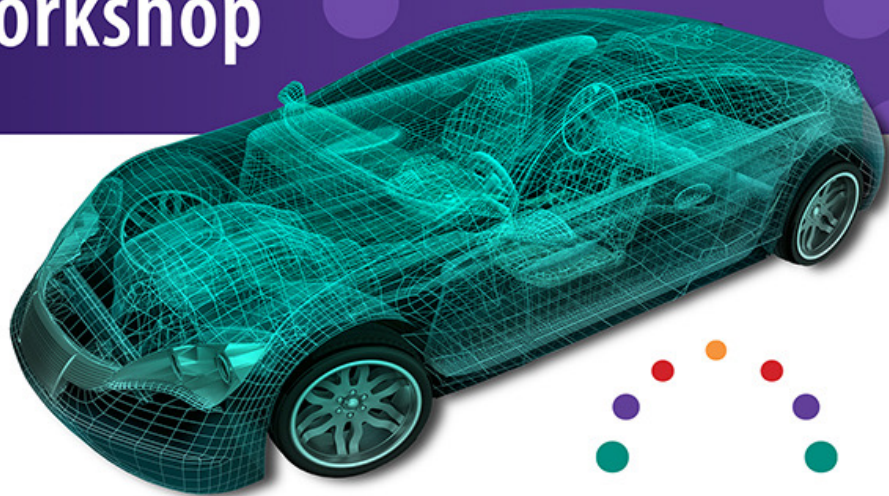


Receiver Transfer Function (NBIC applied)



MIPI Automotive Workshop

*An in-depth look at the
MIPI Automotive SerDes
Solutions (MASS) framework*



Q&A