

Comment #451: Standardized Naming Nomenclature for Mixed Mode S-Parameter Measurements

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Comment

- Addresses comment# 451
 - Naming Parameters of mixed mode 4 port S-parameters is inconsistent within IEEE P802.3ba. A standard naming nomenclature is needed.
 - See next page for list of instances
- In general, all of the different modes are being used in the draft:
 - Differential to differential (S_{DD})
 - Differential to common (S_{CD})
 - Common to common (S_{CC})
 - Common to differential (S_{DC})
- Standardized names for the parameters are needed

List of Instances

- Table 85-6 (Line 23): Differential to common mode conversion SCD11
- Fig 85-5 caption
- Page 249, Line 3 - "fitted cable assembly insertion loss"
- Figure 86-8—Mode conversion of mated HCB-MCB
- Text in subclause 86.9 Recommended electrical channel (informative)
- Figure 86-12—Recommend response of PPI channel with HCB
- In Table 83A-1, Differential Output S-parameters and Common Mode Output S-parameters
- In Table 83A02, Differential Input S-parameters and Differential Common Mode Input Conversion S-parameters
- 83A.3.4.4 Reflected differential to common mode conversion and text in sub-clause
- Figure 83A-9—Reflected differential to common mode conversion
- Text in sub-clause 83A.4 Interconnect characteristics
- Figure 83A-11—Channel insertion loss
- Figure 83A-12—Channel Return Loss
- TC6 and TC7 in 83A.7.4 XLAUI/CAUI Transmitter Requirements
- RC2 and RC3 in 83A.7.5 XLAUI/CAUI Receiver Requirements
- In Table 83B-2, Module input reflection SDD11 and Module output reflection (SDD22)
- In Table 83B-4, Host output reflection SDD22 and Host input reflection SDD11
- HC3 and HC4 in 83B.4.4 Host requirements
- 85.10.4 Cable assembly return loss & test in subclause
- Fig 85-7 caption
- 85.9.1: Transmitter and receiver differential printed circuit board trace loss & text in subclause
- 85.9.2 Channel insertion loss & text in subclause
- 85.9.3 Channel return loss & text in subclause
- Table 85-7 (Line 40) Maximum Insertion Loss
- 85.10.2 Cable assembly insertion loss and text in subclause
- 86.6.1.1 SDD11 at TP1 and SDD22 at TP1a and text in subclause
- 86.6.1.2 Common mode output reflection coefficient SCC22 at TP1a and TP4
- In Table 86-6, Differential output reflection coefficient, SDD22 and Common mode output reflection coefficient, SCC22
- In Table 86-7 Differential input reflection coefficient, SDD11 and Reflected differential to common mode conversion, SCD11
- In Table 86-11 Differential output reflection coefficient, SDD22 and Common mode output reflection coefficient, SCC22
- In Table 86-12,
- Figure 86-3—Differential and common-mode reflection specifications
- 86.6.5.1 SDD22 at TP4 and SDD11 at TP4a & text in subclause
- Figure 86-5—Through response of HCB and MCB excluding connector
- Text in Sub-clause 86.7.1.1 Compliance board parameters
- Figure 86-6—Through response of mated HCB-MCB

Background

Reflection Measurements	Transmission Measurements
Return Loss	Insertion Loss
Reflection Coefficient	Transmission Coefficient

$$\Gamma = V_r / V_i$$

where

Γ : reflection coefficient

V_r : reflected wave

V_i : incident wave

$$RL \text{ (dB)} = -20\log_{10}|\Gamma|$$

$$T = V_t / V_i$$

where

T : transmission coefficient

V_t : transmitted wave

V_i : incident wave

$$IL \text{ (dB)} = -20\log_{10}(V_o/V_i)$$

where

V_o = Output Voltage

V_i = Input Voltage

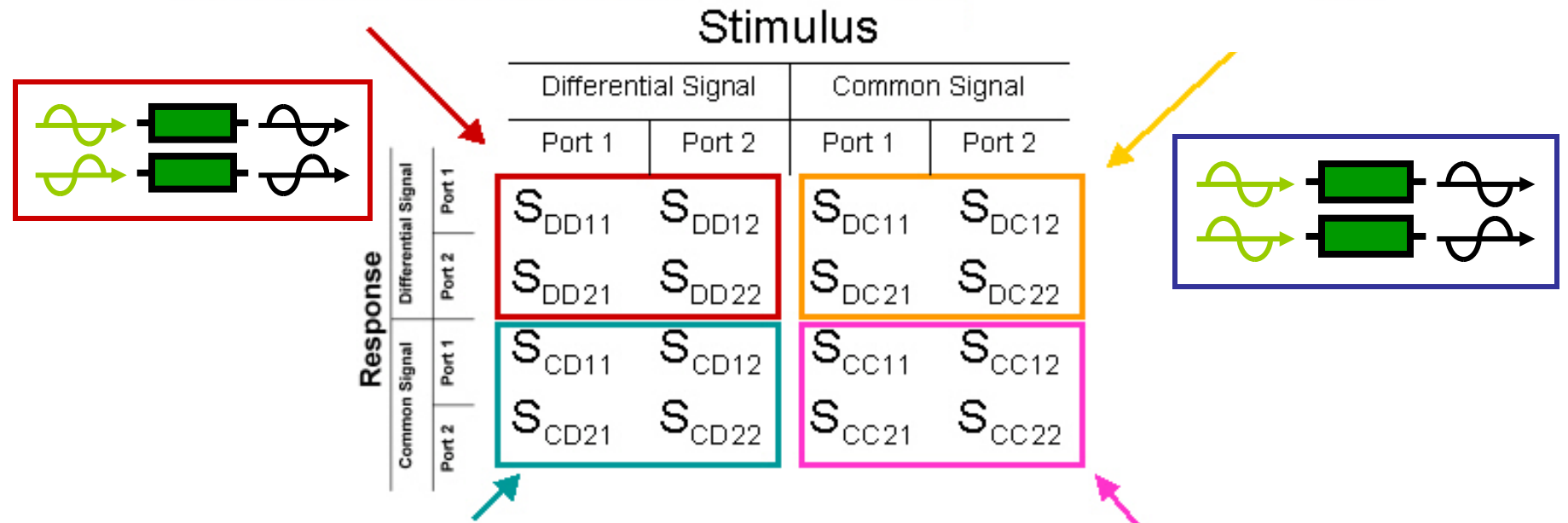
Parameters in frequency domain in IEEE P802.3ba have been specified in dB

Recommendation: Use
Return Loss
Insertion Loss

Differential S-Parameter Graphic

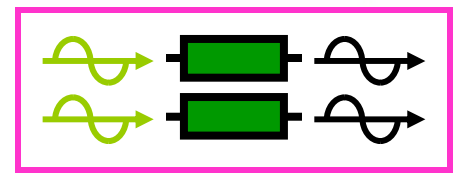
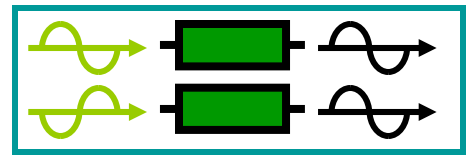
**Differential in, differential out:
Behavior of differential signals**

**Common in, differential out:
Behavior of mode conversion**



**Differential in, common out:
Behavior of mode conversion**

**Common in, common out:
Behavior of common signals**



Mixed-mode S-parameters

		Differential-Mode Stimulus		Common-Mode Stimulus	
		Port 1	Port 2	Port 1	Port 2
Differential-Mode Response	Port 1	S_{DD11}	S_{DD12}	S_{DC11}	S_{DC12}
	Port 2	S_{DD21}	S_{DD22}	S_{DC21}	S_{DC22}
Common-Mode Response	Port 1	S_{CD11}	S_{CD12}	S_{CC11}	S_{CC12}
	Port 2	S_{CD21}	S_{CD22}	S_{CC21}	S_{CC22}

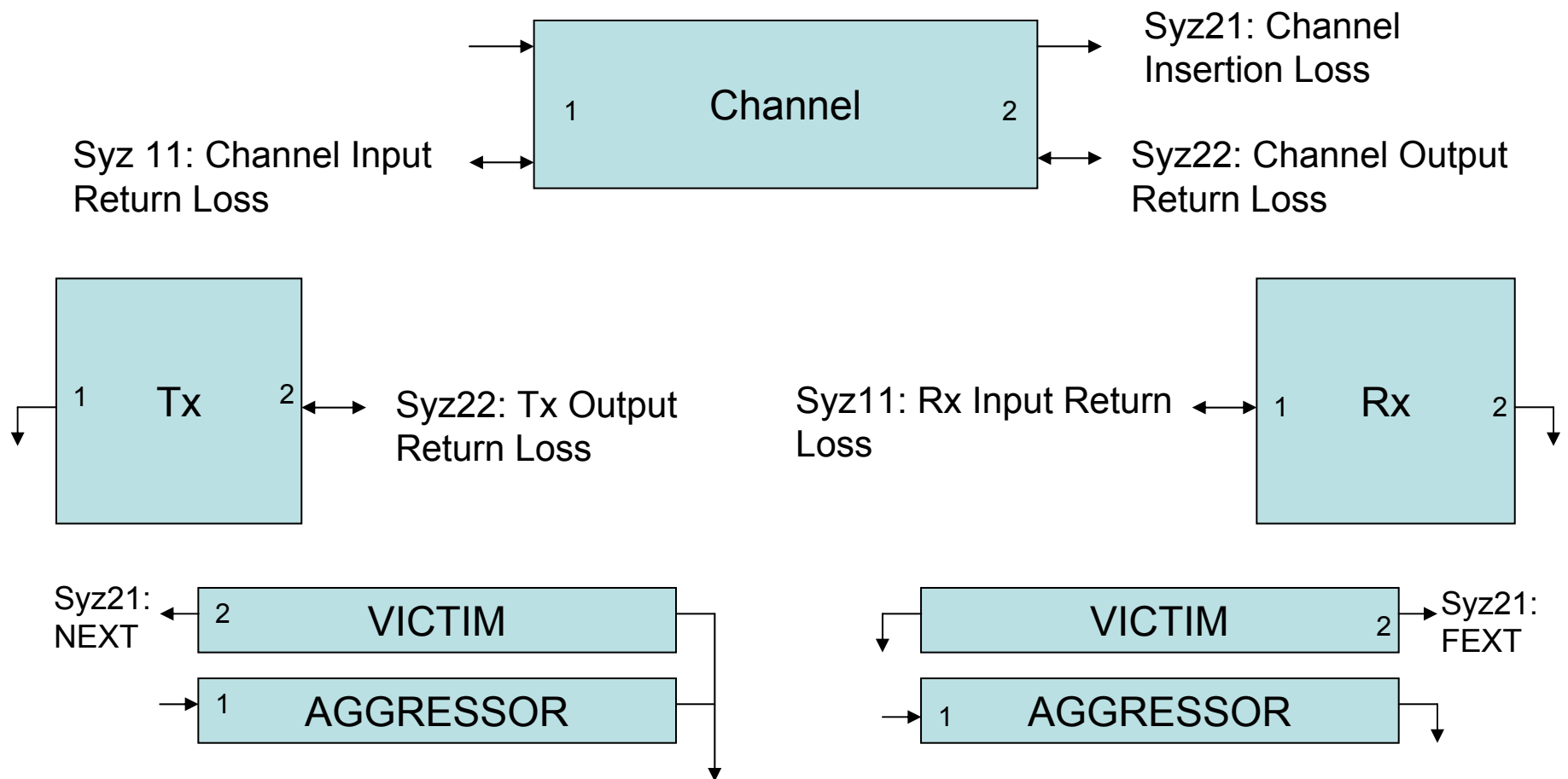
Syz (z = stimulus port, y = response port)

Naming: “Z to Y”

- “Differential” (SDD, implies stimulus and response are differential-mode)
- “Common” (SCC, implies stimulus and response are common-mode)
- “Differential to Common-mode” (SCD, differential is stimulus, common-mode is response)
- “Common-mode to Differential” (SDC, common-mode is stimulus, differential is response)

Background

Ports and nature of measurement need considered



Recommendation: Naming the Parameter

“DUT”: “Z to Y” “Condition” “Measurement”

“DUT”:

- Tx
- Channel
- Cable
- Rx
- Other

“Z to Y”:

- “Differential” (SDD, implies stimulus and response are differential-mode)
- “Common-mode” (SCC, implies stimulus and response are common-mode)
- “Differential to Common-mode” (SCD, differential is stimulus, common-mode is response)
- “Common-mode to Differential” (SDC, common-mode is stimulus, differential is response)

“Condition”:

- Input (channel, cable, or Rx Return Loss measurements)
- Output (channel, cable, or Tx Return Loss measurements)
- Left Blank (Insertion loss or crosstalk measurements)

“Measurement”:

- Insertion Loss
- Return Loss
- Near-End Crosstalk
- Far-End Crosstalk

Example

- Comment: In Table 83B-2, Module input reflection SDD11 and Module output reflection (SDD22)
- “Module Input Reflection SDD11” would become “Module Rx Differential Input Return Loss”
- “Module output reflection (SDD22)” would become “Module Tx Differential Output Return Loss”