

An explanation of Impulse Crosstalk Matrix with an example using Touchstone terminology

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I will set up an example of a single victim channel (V) and two aggressor channels (1,2). Designators for the Tx and Rx models are for each of these three channels are:

Tx1 → Rx1

TxV → RxV

Tx2 → Rx2

Now consider the coupled S parameter channel that connects these 6 buffers differentially:

SDD(Tx1,Tx1)	SDD(Tx1,TxV)	SDD(Tx1,Tx2)	SDD(Tx1,Rx1)	SDD(Tx1,RxV)	SDD(Tx1,Rx2)
SDD(Tx2,Tx1)	SDD(Tx2,TxV)	SDD(Tx2,Tx2)	SDD(Tx2,Rx1)	SDD(Tx2,RxV)	SDD(Tx2,Rx2)
SDD(TxV,Tx1)	SDD(TxV,TxV)	SDD(TxV,Tx2)	SDD(TxV,Rx1)	SDD(TxV,RxV)	SDD(TxV,Rx2)
SDD(Rx1,Tx1)	SDD(Rx1,TxV)	SDD(Rx1,Tx2)	SDD(Rx1,Rx1)	SDD(Rx1,RxV)	SDD(Rx1,Rx2)
SDD(RxV,Tx1)	SDD(RxV,TxV)	SDD(RxV,Tx2)	SDD(RxV,Rx1)	SDD(RxV,RxV)	SDD(RxV,Rx2)
SDD(Rx2,Tx1)	SDD(Rx2,TxV)	SDD(Rx2,Tx2)	SDD(Rx2,Rx1)	SDD(Rx2,RxV)	SDD(Rx2,Rx2)

Note that each of these SDD(i,j) can be easily represented by an Impulse Response. Elements from columns of this matrix are included in the three Tx AMI_Init functions, and elements from rows of this matrix are included in the three Rx AMI_Init functions.

The following example assumes that we only want to analyze the effect of crosstalk on RxV (there is nothing to prohibit also to be able to analyze the crosstalk on Rx1, and Rx2). The following table defines the input impulse matrix for each Tx AMI_Init call:

Tx1	SDD(Rx1,Tx1)	SDD(RxV,Tx1)
TxV	SDD(RxV,TxV)	
Tx2	SDD(Rx2,Tx2)	SDD(RxV,Tx2)

Each of these three AMI_Init calls modifies these impulse responses to be:

SDD(Rx1,Tx1)'	SDD(RxV,Tx1)'	(both include Tx1 filter)
SDD(RxV,TxV)'		(includes TxV filter)
SDD(Rx2,Tx2)'	SDD(RxV,Tx2)'	(both include Tx2 filter)

The impulse matrix to input RxV is

SDD(RxV,TxV)' SDD(RxV,Tx1)' SDD(RxV,Tx2)'

The impulse response output of RxV is

SDD(RxV,TxV)'' SDD(RxV,Tx1)'' SDD(RxV,Tx2)'' (All three include RxV filter)