

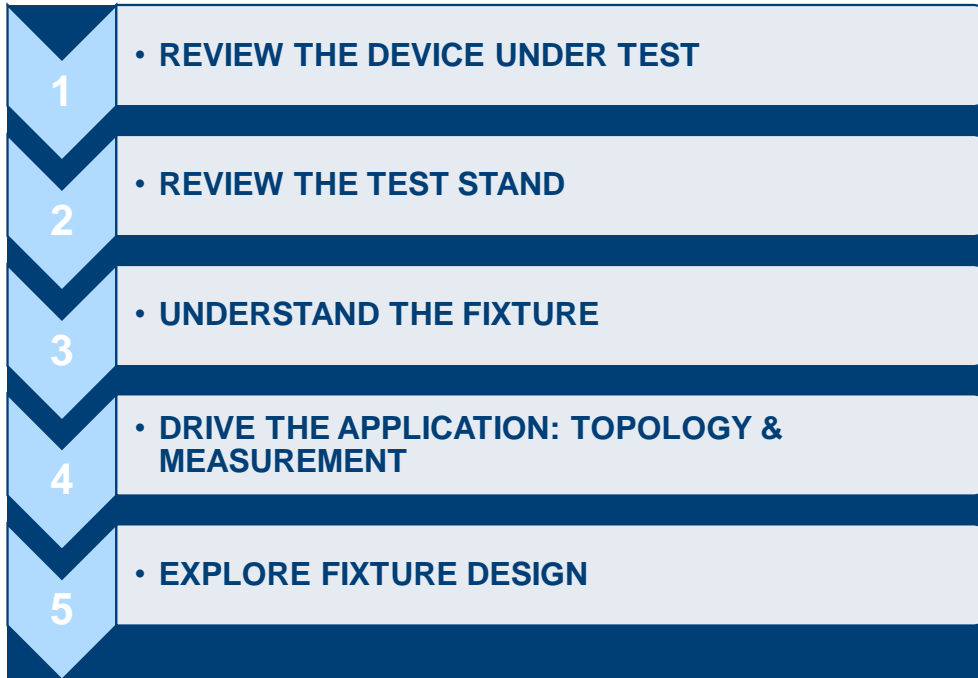
**A NOVEL VNA BASED UTILITY TO CREATE “N”
PORT S-PARAMETER MATRIXES WITH “M”
PHYSICAL PORTS, APPLIED TO ARBITRARY
TOPOLOGIES; WHERE $M < N$**

ROHDE & SCHWARZ

Make ideas real



SECTIONS





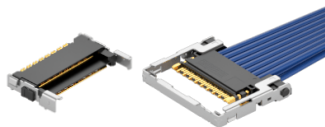
SI-FLY LOW-PROFILE CABLE

PAM4
56
Gbps

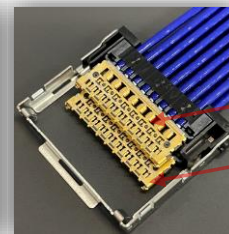
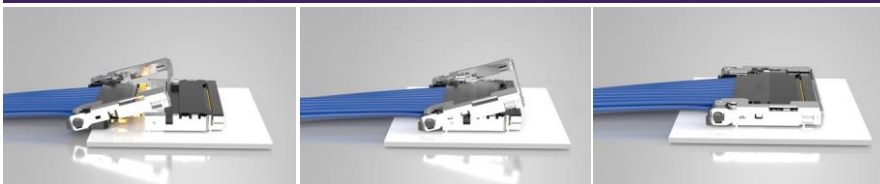
PAM4
112
Gbps

SI-FLY[™] LP CPC/CPI SERIES

- Low-profile cable system
 - 56G NRZ / 112G PAM4
 - PCIe[®] Gen 6 capable performance
 - 1-row (8 DP) or 2-row (16 DP) configurations
 - Able to easily fit under heat sinks or other hardware
 - 34 AWG, 92 Ohm ultra-low loss twinax cable
 - BGA attach board connector



SI-FLY[™] Mating Step 1, 2, 3



Side 2
Side 1

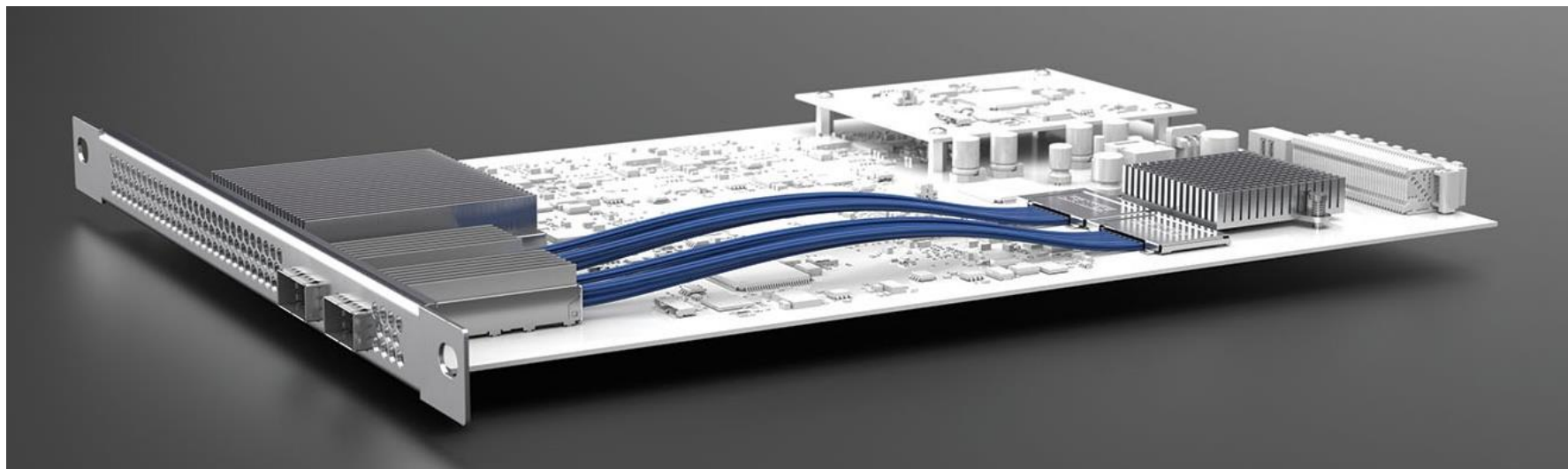




SAMTEC FLYOVER SOLUTIONS

PAM4
56
Gbps

PAM4
112
Gbps



TEST FIXTURE WITH FLYOVER CABLE



- <https://www.samtec.com/kits/si-eval-cable/si-fly-flyover/>
- <https://www.samtec.com/products/185-cm>

TEST EQUIPMENT

1

• R&S®ZNB40 100 KHZ TO 40GHZ NETWORK ANALYZER

2

• FOUR PORTS

3

• 140 DB DYNAMIC RANGE

4

• BRIDGE BASED DIRECTIONAL COUPLER FOR HIGH ACCURACY AT LOW FREQUENCIES

5

• **SNP ASSISTANT** AND **DE-EMBEDDING UTILITY LICENSES**



BUILD THE TOPOLOGY

1

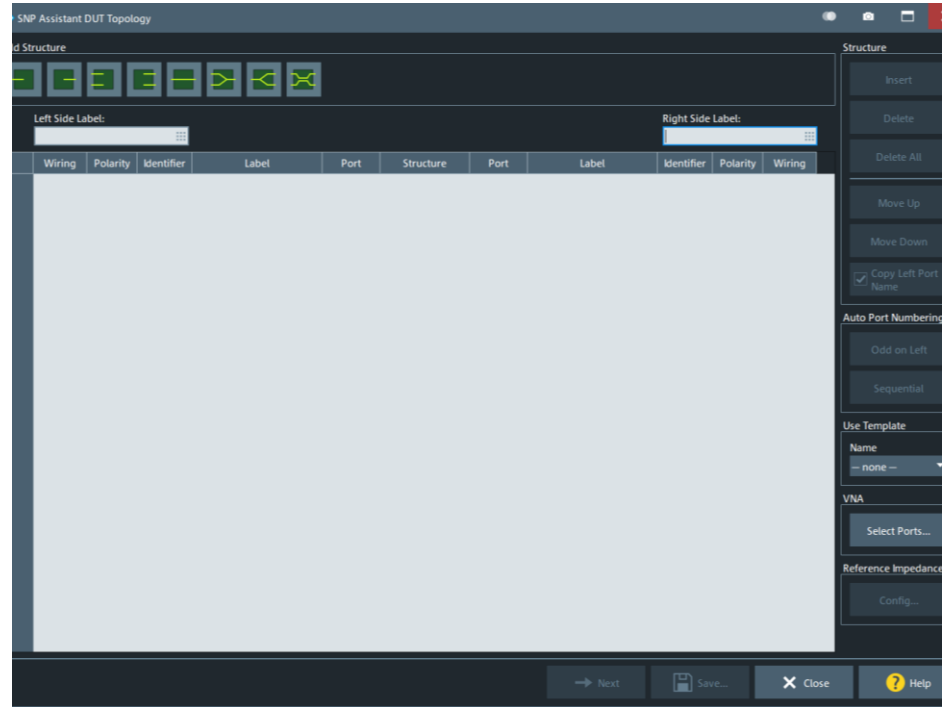
- WE LAUNCH THE UTILITY WHEREIN WE DEFINE AND BUILD THE MULTI-PORT DUT TOPOLOGY

2

- We know that our lanes are differential pairs, so we add a differential lane

3

- WE HAVE DEFINED TWO DIFFERENTIAL PAIRS IN OUR DUT SIMULATION SO WE ADD TWO DIFFERENTIAL PAIRS TO THE GUI



BUILD THE TOPOLOGY

1

- WE LAUNCH THE UTILITY WHICH ALLOW US TO DEFINE AND BUILD THE MULTI-PORT DUT TOPOLOGY

2

- WE KNOW THAT OUR LANES ARE DIFFERENTIAL PAIRS, SO WE ADD A DIFFERENTIAL LANE

3

- WE HAVE DEFINED TWO DIFFERENTIAL PAIRS IN OUR DUT SIMULATION SO WE ADD TWO DIFFERENTIAL PAIRS TO THE GUI

SNP Assistant DUT Topology

Left Side Label:

Wiring	Polarity	Identifier	Label	Port	Structure	Port	Label	Identifier	Polarity	Wiring
	+			1		2			+	
	-			3		4			-	

LANE 1

Structure

Insert

Delete

Delete All

Move Up

Move Down

Copy Left Port Name

Auto Port Numbering

Odd on Left

Sequential

Use Template

Name

-- none --

VNA

Select Ports...

Reference Impedance

Config...

Next Save... Close Help

BUILD THE TOPOLOGY

1

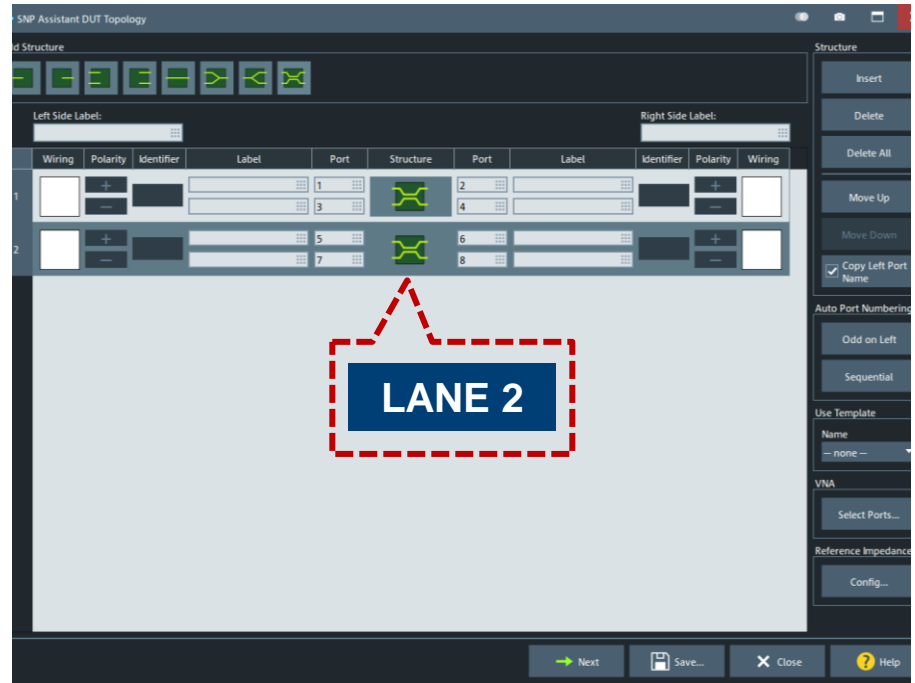
- WE LAUNCH THE UTILITY WHICH ALLOW US TO DEFINE AND BUILD THE MULTI-PORT DUT TOPOLOGY

2

- WE KNOW THAT OUR LANES ARE DIFFERENTIAL PAIRS, SO WE ADD A DIFFERENTIAL LANE

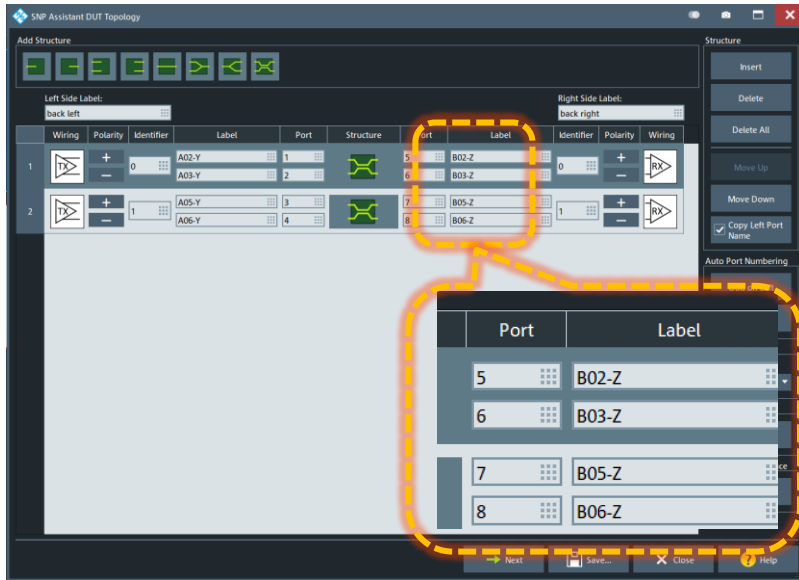
3

- WE HAVE DEFINED TWO DIFFERENTIAL PAIRS IN OUR DUT SIMULATION SO WE ADD TWO DIFFERENTIAL PAIRS TO THE GUI



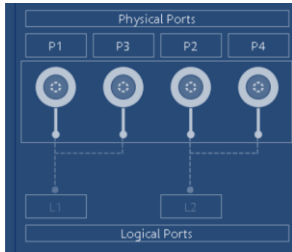
ALIGN THE FIXTURE LABELS WITH THE TOPOLOGY

- We want the tool to reflect the fixture topology.
- Therefore, we add the silk screen labels on the fixture into the label column of the topology



CONFIRM MODELED AND MEASURED PORT MAPS ARE ALIGNED

- 1 • THE PORT MAPPING BETWEEN MEASUREMENT AND SIMULATION MUST BE THE SAME TO ENSURE A CORRELATED COMPARE
- 2 • WE NOTE THE PORT MAP IS SEQUENTIAL AND USE THE “SEQUENTIAL FUNCTION” AUTO NUMBER THE PORTS



Measured Ports

01	02				
01	02	03	04		
J2	J3	J4	J5	J6	J7
A02	A03	A05	A06	A08	A09
B02	B03	B05	B06	B08	B09
J18	J19	J20	J21	J22	J23
05	06	07	08		
03	04				

Measurement Port Mapping: 8 Ports

...licity, 2 pairs were measured (8ports), the remaining pairs behave identically.

Measured Ports

01	02		
01	02	03	04
05	06	07	08
03	04		

The following electrical plots are numbered using differential port mapping

- Left side is - 1 2 3 4
- Right side is - 5 6 7 8

Label	Port	Structure	Port	Label
A02-Y	1		5	B02-Z
A03-Y	2		6	B03-Z
A05-Y	3		7	B05-Z
A06-Y	4		8	B06-Z

The screenshot shows the SFP Assistant DUT Topology interface. A table displays port mappings between left and right sides. A callout box titled "Auto Port Numbering" shows two options: "Odd on Left" and "Sequential". A blue arrow points to the "Sequential" option.

CREATE THE TEST PLAN

1

- FIRST, ALL THRUS AND REFLECTS ARE SET TO BE MEASURED - *TRANSMIT & REFLECTION BUTTONS*

2

- NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN

3

- FOR CORRELATION PURPOSES, WE MUST CONSIDER THE POSSIBILITY THAT ANY PORT CAN BE A TX OR RX

4

- SET VICTIM-AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AS WELL AS VICTIMS

5

- NOW WE CAN START THE MEASUREMENTERMINIE VIA COUNT

SNP Assistant Overview

	(1) back left TXOP A02-Y	(2) back left TXON A03-Y	(3) back left TXTP A05-Y	(4) back left TXIN A06-Y	(5) back right RXOP B02-Z	(6) back right RXON B03-Z	(7) back right RXTP B05-Z	(8) back right RXIN B06-Z
back left TXOP A02-Y (1)								
back left TXON A03-Y (2)								
back left TXTP A05-Y (3)								
back left TXIN A06-Y (4)								
back right RXOP B02-Z (5)								
back right RXON B03-Z (6)								
back right RXTP B05-Z (7)								
back right RXIN B06-Z (8)								

S-Parameters

Measure Idealize

Range

Begin S: 1 1

End S: 8 8

Set

Quick Set

Measure All

Idealize All

Data

Import...

Auto Interpolate Imported File

Unmeasure Imported

Shortcuts

Transmission

Reflections

Balance Balanced Side

Crosstalk

NEXT

Near-End Crosstalk

FEKT

Far-End Crosstalk

V/A Pattern...

Crosstalk Intention

As specified by topology wiring

Sweep Settings

Start Freq: 10 MHz

Stop Freq: 40 GHz

Points: 4000

Step Size: 10 MHz

Type: Linear Grid

Legend

Imported

Measured

Unmeasured

Idealized

Default Colors

Previous Start Save Close Help

CREATE THE TEST PLAN

1

- FIRST, ALL THRU AND REFLECTS ARE SET TO BE MEASURED - **TRANSMIT** & **REFLECTION** BUTTONS

2

- NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN

3

- FOR CORRELATION PURPOSES, WE MUST CONSIDER THE POSSIBILITY THAT ANY PORT CAN BE A TX OR RX

4

- SET VICTIM-AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AS WELL AS VICTIMS

5

- NOW WE CAN START THE MEASUREMENTS VIA COUNT

The screenshot displays the SNP Assistant Overview software interface. On the left, a matrix shows the test plan for various port pairs. The columns represent the aggressor ports: (1) back left TXOP A02-Y, (2) back left TXON A03-Y, (3) back left TXTP A05-Y, (4) back left TXIN A06-Y, (5) back right RXOP B02-Z, (6) back right RXON B03-Z, (7) back right RXTP B05-Z, and (8) back right RXIN B06-Z. The rows represent the victim ports: back left TXOP A02-Y (1), back left TXON A03-Y (2), back left TXTP A05-Y (3), back left TXIN A06-Y (4), back right RXOP B02-Z (5), back right RXON B03-Z (6), back right RXTP B05-Z (7), and back right RXIN B06-Z (8). The matrix cells are colored based on the measurement status: yellow for 'Unmeasured', purple for 'Idealized', and green for 'Measured'. The right side of the interface shows the 'S-Parameters' configuration panel with 'Measure' selected, 'Range' settings (Begin 5, End 8), and various measurement shortcuts like 'Transmission', 'Reflections', 'Crosstalk', and 'V/A Pattern...'. The 'Sweep Settings' section shows Start Freq at 10 MHz, Stop Freq at 40 GHz, Points at 4000, Step Size at 10 MHz, and Type as Linear Grid. A legend at the bottom identifies the colors for Imported, Measured, Unmeasured, and Idealized states.

CREATE THE TEST PLAN

1

- FIRST, ALL THRUS AND REFLECTS ARE SET TO BE MEASURED - *TRANSMIT & REFLECTION BUTTONS*

2

- NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN

3

- FOR CORRELATION PURPOSES, WE MUST CONSIDER THE POSSIBILITY THAT ANY PORT CAN BE A TX OR RX

4

- SET VICTIM-AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AS WELL AS VICTIMS

5

- NOW WE CAN START THE MEASUREMENT TERMINATE VIA COUNT

The screenshot displays the 'SNR Assistant Overview' software interface. On the left, a matrix shows the test plan for 8 pairs of ports. The columns represent the aggressor ports and the rows represent the victim ports. The matrix is color-coded: yellow for 'Unmeasured', green for 'Measured', and purple for 'Idealized'. The legend at the bottom indicates these colors: Imported (blue), Measured (green), Unmeasured (yellow), Idealized (purple), and Default Colors (grey).

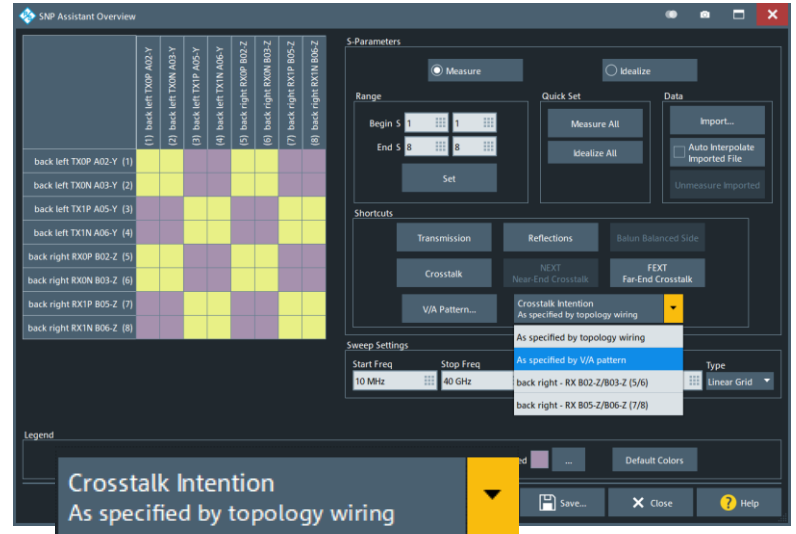
	(1) back left TX0P A02-Y	(2) back left TX0N A03-Y	(3) back left TX1P A05-Y	(4) back left TX1N A06-Y	(5) back right RX0P B02-Z	(6) back right RX0N B03-Z	(7) back right RX1P B05-Z	(8) back right RX1N B06-Z
back left TX0P A02-Y (1)								
back left TX0N A03-Y (2)								
back left TX1P A05-Y (3)								
back left TX1N A06-Y (4)								
back right RX0P B02-Z (5)								
back right RX0N B03-Z (6)								
back right RX1P B05-Z (7)								
back right RX1N B06-Z (8)								

The right side of the interface shows the 'S-Parameters' configuration panel. It includes a 'Range' section with 'Begin' and 'End' frequency settings (1 and 8 GHz), a 'Quick Set' section with 'Measure All' and 'Idealize All' buttons, and a 'Data' section with 'Import...' and 'Auto Interpolate Imported File' options. The 'Shortcuts' section contains buttons for 'Transmission', 'Reflections', 'Crosstalk', and 'V/A Pattern...'. The 'Sweep Settings' section shows 'Start Freq' (10 MHz), 'Stop Freq' (40 GHz), 'Points' (4000), 'Step Size' (10 MHz), and 'Type' (Linear Grid). A legend at the bottom identifies the color coding for the test plan matrix.

CREATE THE TEST PLAN

- 1 • FIRST, ALL THRU AND REFLECTS ARE SET TO BE MEASURED - TRANSMIT & REFLECTION BUTTONS
- 2 • NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN
- 3 • FOR CORRECT MEASUREMENTS, YOU MUST CONSIDER THE WIRING TO BE A TX OR RX

Consider a QSFP standard vs proprietary Backplane connector
- 4 • SET VICTIM-AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AS WELL AS AGGRESSORS
- 5 • NOW WE CAN START THE MEASUREMENTS VIA COUNT



As specified by topology wiring

As specified by V/A pattern

back right - RX B02-Z/B03-Z (5/6)

back right - RX B05-Z/B06-Z (7/8)

CREATE THE TEST PLAN

1

• FIRST, ALL THRU AND REFLECTS ARE SET TO BE MEASURED - TRANSMIT & REFLECTION BUTTONS

2

• NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN

3

• FOR CORRELATION PURPOSES, WE MUST CONSIDER THAT ANY PORT CAN BE A TX OR RX

4

• SET VICTIM-AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AS WELL AS VICTIMS

5

• NOW WE CAN START THE MEASUREMENT TERMINATE VIA COUNT

The screenshot shows the 'SNP Assistant Overview' window. On the left is a matrix of ports and their connections. The columns are labeled (1) back left TXOP A02-Y, (2) back left TXON A03-Y, (3) back left TXIP A05-Y, (4) back left TXIN A06-Y, (5) back right RXOP B02-Z, (6) back right RXON B03-Z, (7) back right RXIP B05-Z, and (8) back right RXIN B06-Z. The rows are labeled back left TXOP A02-Y (1), back left TXON A03-Y (2), back left TXIP A05-Y (3), back left TXIN A06-Y (4), back right RXOP B02-Z (5), back right RXON B03-Z (6), back right RXIP B05-Z (7), and back right RXIN B06-Z (8). The matrix cells are colored yellow or purple. On the right, the '5-Parameters' section has 'Measure' selected. Below it are 'Range' settings (Begin 5, End 5), 'Quick Set' buttons (Measure All, Idealize All), and 'Shortcuts' (Transmission, Reflections, Crosstalk, V/A Pattern...). 'Sweep Settings' are also visible (Start Freq 10 MHz, Stop Freq 40 GHz, Points 4000, Step Size 10 MHz, Type Linear Grid). A legend at the bottom shows color-coded boxes for Imported, Measured, Unmeasured, and Idealized.

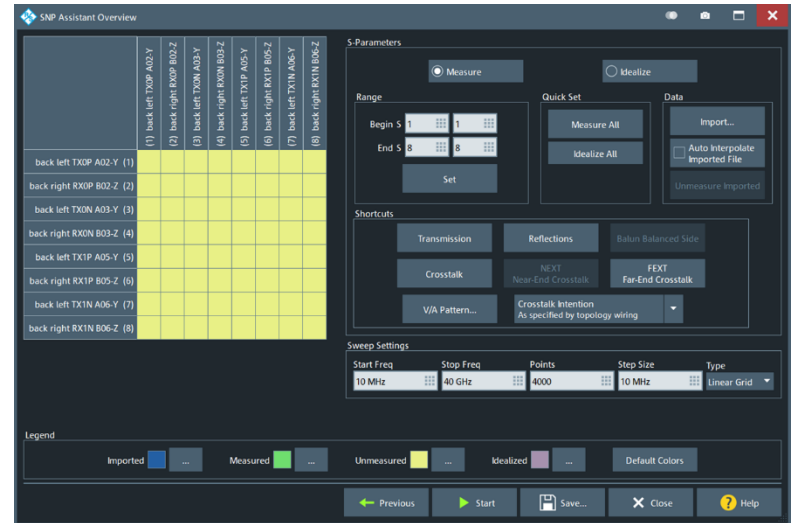
The screenshot shows the 'SNP Assistant Victim/Aggressor Pattern' window. It contains a table with the following data:

	Port	Aggressor	Victim
1	back left - TX A02-Y/A03-Y (1/2)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	back left - TX A05-Y/A06-Y (3/4)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	back right - RX B02-Z/B03-Z (5/6)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	back right - RX B05-Z/B06-Z (7/8)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

At the bottom of the window are buttons for OK, Cancel, and Help.

CREATE THE TEST PLAN

- 1 • FIRST, ALL THRUS AND REFLECTS ARE SET TO BE MEASURED - *TRANSMIT & REFLECTION BUTTONS*
- 2 • NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN
- 3 • FOR CORRELATION PURPOSES, WE MUST CONSIDER THAT ANY PORT CAN BE A TX OR RX
- 4 • SET VICTIM - AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AND ALSO AS AGGRESSORS
- 5 • NOW WE CAN START THE MEASUREMENT/TERMINE VIA COUNT



CREATE THE TEST PLAN

1

• FIRST, ALL THRU AND REFLECTS ARE SET TO BE MEASURED - TRANSMIT & REFLECTION BUTTONS

2

• NON-STANDARDIZED INTERCONNECTS DO NOT HAVE A FIXED WIRING PATTERN

3

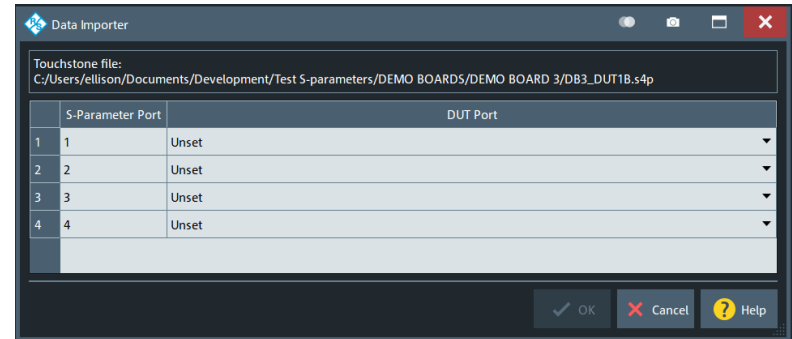
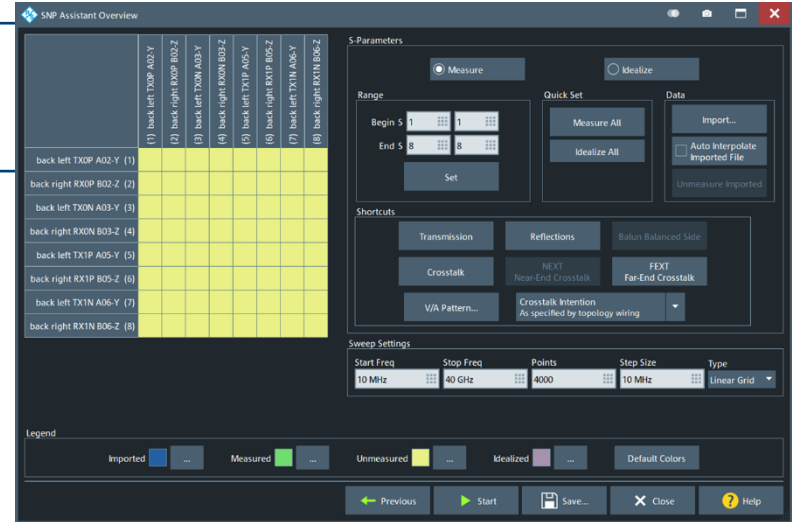
• FOR CORRELATION PURPOSES, WE MUST CONSIDER THAT ANY PORT CAN BE A TX OR RX

4

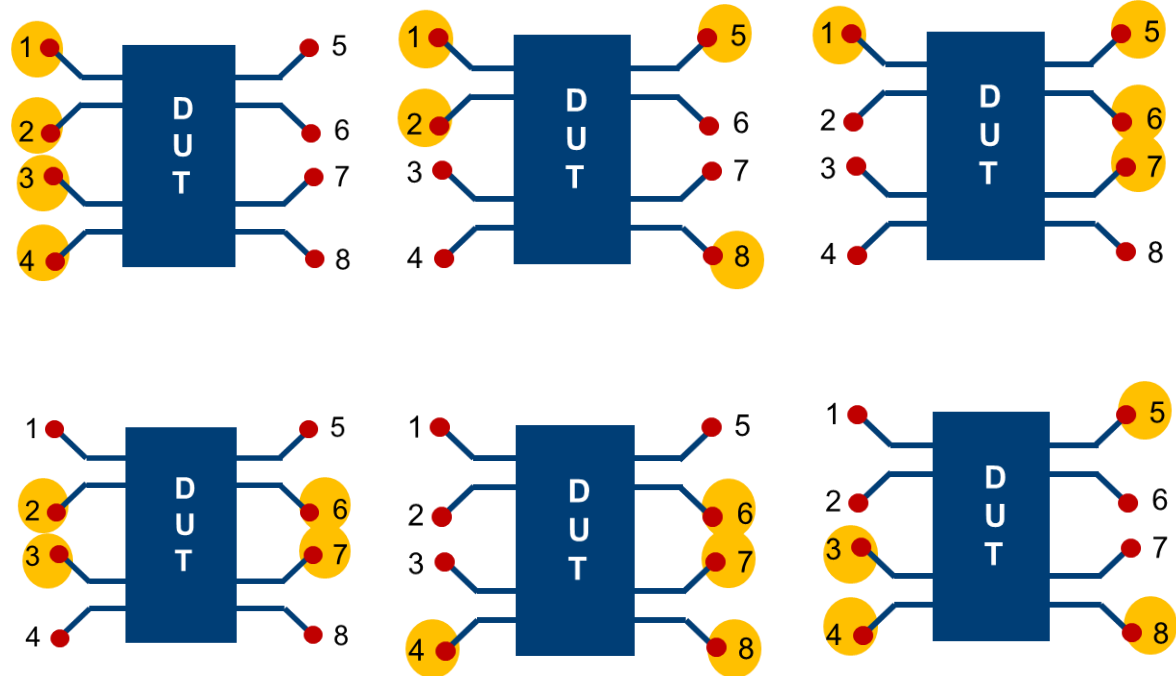
• SET VICTIM - AGGRESSOR PATTERN SUCH THAT ALL PAIRS CAN BE CONSIDERED VICTIMS AS WELL AS AGGRESSORS

5

• NOW WE CAN START THE MEASUREMENT



MEASUREMENTS: VNA 1,2,3,4, TO DUT 1,2,3,4,5,6,7,8



**TEST PLAN
CREATED** ✓

**INITIATE
MEASUREMENT
SEQUENCE**

**MEASUREMENT
COMPLETE – SAVE
DATA**

MEASUREMENTS: VNA 1,2,3,4, TO DUT 1,2,3,4

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 1,2,3,4

2

- This makes sure the port map is identical to the simulation and helps prevent mistakes from the person making the measurements

3

- EACH TIME A MEASUREMENT IS TAKEN, THE MEASURED S-PARAMETERS SHOW UP AS GREEN TILES IN THE MATRIX AND NEW PROMPTS ARE PROVIDED TO THE USER.

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.

VNA to DUT Connections			
V...	DUT	Name	DUT
1	1	left TX0P A02-Y	
2	2	left TX0N A03-Y	
3	→ 3	left TX1P A05-Y	
4	→ 4	left TX1N A06-Y	



MEASUREMENTS: VNA 1,2,3,4 TO DUT 1,2,5,8

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 1,2,5,8

2

- This makes sure the port map is identical to the simulation and helps prevent mistakes from the person making the measurements

3

- EACH TIME A MEASUREMENT IS TAKEN, THE MEASURED S-PARAMETERS SHOW UP AS GREEN TILES IN THE MATRIX AND NEW PROMPTS ARE PROVIDED TO THE USER.

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.

VNA to DUT Connections			
V...	DUT	Name	DUT
1	1	left TXOP A02-Y	
2	2	left TXON A03-Y	
3	→ 5	right RXOP B02-Z	
4	→ 8	right RX1N B06-Z	



MEASUREMENTS: VNA 1,2,3,4 TO DUT 1,6,5,7

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 1,6,5,7

2

- THIS ENSURES THE PORT MAP IS ALIGNED WITH THE SIMULATION AND PREVENTS OPERATOR CONNECTION ERRORS

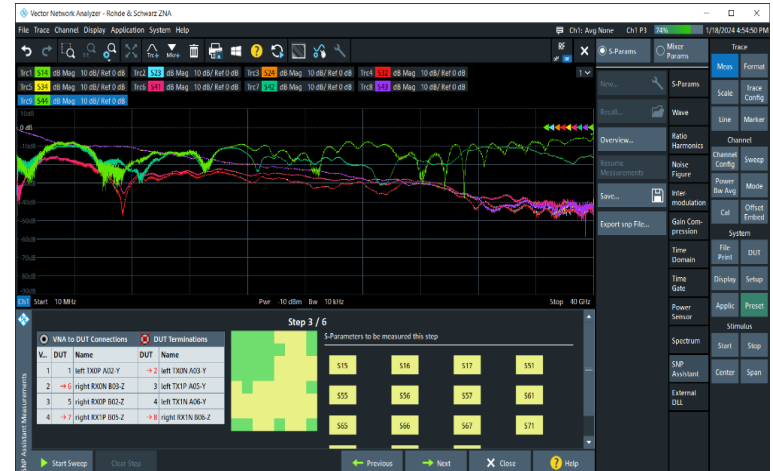
3

- EACH MEASUREMENT ITERATION HIGHLIGHTS THE MEASURED PORTS AS GREEN AND REFRESHES USER PROMPT

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.

VNA to DUT Connections		
V...	DUT	Name
1	1	left TX0P A02-Y
2	→ 6	right RX0N B03-Z
3	5	right RX0P B02-Z
4	→ 7	right RX1P B05-Z



MEASUREMENTS: VNA 1,2,3,4 TO DUT 2,6,3,7

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 2,6,3,7

2

- THIS ENSURES THE PORT MAP IS ALIGNED WITH THE SIMULATION AND PREVENTS OPERATOR CONNECTION ERRORS

3

- EACH MEASUREMENT ITERATION HIGHLIGHTS THE MEASURED PORTS AS GREEN AND REFRESHES USER PROMPT

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.

V...	DUT	Name
1	→ 2	left TX0N A03-Y
2	6	right RX0N B03-Z
3	→ 3	left TX1P A05-Y
4	7	right RX1P B05-Z



MEASUREMENTS: VNA 1,2,3,4 TO DUT 4,6,8,7

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 4,6,8,7

2

- THIS ENSURES THE PORT MAP IS ALIGNED WITH THE SIMULATION AND PREVENTS OPERATOR CONNECTION ERRORS

3

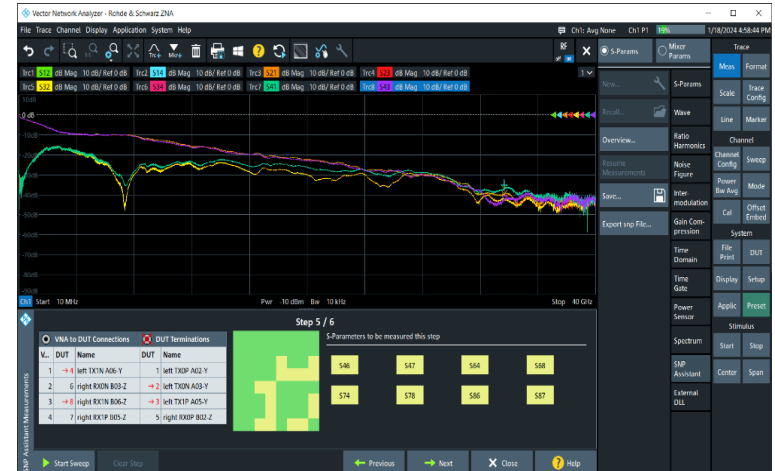
- EACH MEASUREMENT ITERATION HIGHLIGHTS THE MEASURED PORTS AS GREEN AND REFRESHES USER PROMPT

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.

VNA to DUT Connections

V...	DUT	Name
1	→ 4	left TX1N A06-Y
2	6	right RX0N B03-Z
3	→ 8	right RX1N B06-Z
4	7	right RX1P B05-Z



MEASUREMENTS: VNA 1,2,3,4 TO DUT 4,3,8,5

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 4,3,8,5

2

- THIS ENSURES THE PORT MAP IS ALIGNED WITH THE SIMULATION AND PREVENTS OPERATOR CONNECTION ERRORS

3

- EACH MEASUREMENT ITERATION HIGHLIGHTS THE MEASURED PORTS AS GREEN AND REFRESHES USER PROMPT

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.

VNA to DUT Connections			
V...	DUT	Name	DUT
1	4	left TX1N A06-Y	
2	→ 3	left TX1P A05-Y	
3	8	right RX1N B06-Z	
4	→ 5	right RX0P B02-Z	



MEASUREMENTS

1

- THE TOOL GUIDES THE OPERATOR FOR VNA PORT TO DUT PORT CONNECTION FOR EACH MEASUREMENT STEP – 1,2,3,4 to 4,3,8,5

2

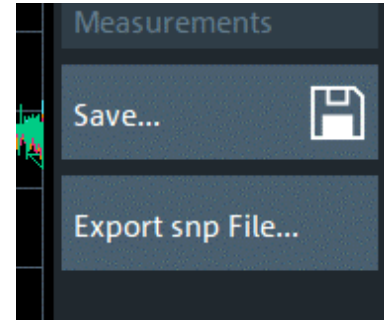
- THIS ENSURES THE PORT MAP IS ALIGNED WITH THE SIMULATION AND PREVENTS OPERATOR CONNECTION ERRORS

3

- EACH MEASUREMENT ITERATION HIGHLIGHTS THE MEASURED PORTS AS GREEN AND REFRESHES USER PROMPT

4

- WHEN THE MEASUREMENT IS COMPLETE, SAVE THE TOUCHSTONE FILE.



TOUCHSTONE FILE WITH TOPOLOGY

- It is important that the port mapping is not lost when the touchstone file is created.
- Therefore, the tool enters the topology information into the touchstone file so the person making the simulation to measurement correlation can confirm everything is correct.

```
# HZ S RI R 50.00
! Rohde & Schwarz Vector Network Analyzer
! Rohde-Schwarz,ZNA67-4Port,1332450064999999,3.00.1.487-23.09.1.239
! Created: UTC 1/18/2024, 10:02:20 PM
!
! ::MULTI-CHANNEL-INFORMATION::
!
! [SIDE1=left] [SIDE2=right]
! [:] [TX0P] [A02-Y] [1] ->>- [5] [B02-Z] [RX0P] [:]
! [:] [TX0N] [A03-Y] [2] ->>- [6] [B03-Z] [RX0N] [:]
! [:] [TX1P] [A05-Y] [3] ->>- [7] [B05-Z] [RX1P] [:]
! [:] [TX1N] [A06-Y] [4] ->>- [8] [B06-Z] [RX1N] [:]
!
! freq re:S11 im:S11 r
! re:S15 im:S15 r
! re:S21 im:S21 r
! re:S25 im:S25 r
! re:S31 im:S31 r
! re:S35 im:S35 r
! re:S41 im:S41 r
! re:S45 im:S45 r
! re:S51 im:S51 r
```

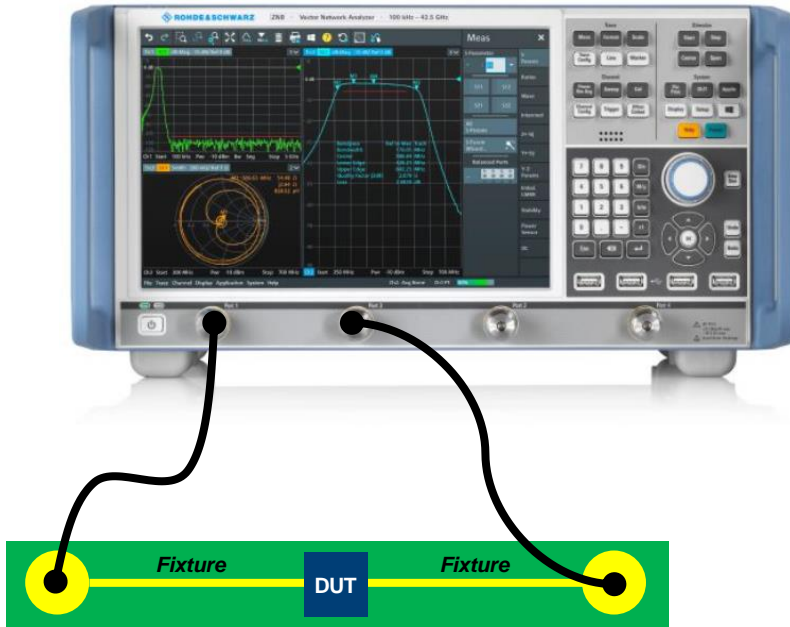


**TEST PLAN
CREATED** ✓

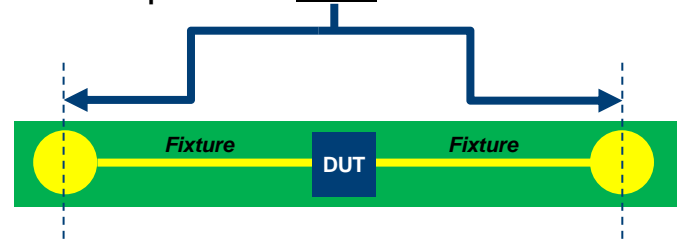
**INITIATE
MEASUREMENT
SEQUENCE** ✓

**MEASUREMENT
COMPLETE – SAVE
DATA** ✓

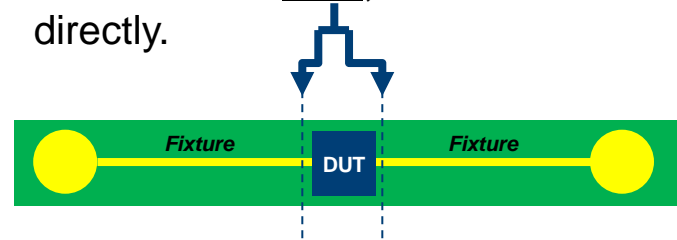
MATCHING REFERENCE PLANES – DEMEBDDING REQUIRED



The calibration plane is here.



I want it to be here, but I can't measure it directly.



DE-EMBEDDING ASSISTANT

- De-embedding Assistant walks the user through complex de-embedding tasks.
- When the Fixture-DUT-Fixture is greater than four ports, select n x Balanced in the DUT dropdown.

The screenshot displays the Rohde & Schwarz VNA interface. The main window shows a magnitude plot with multiple traces (Trc1 to Trc16) and a power level of -10 dBm. The De-embedding Assistant dialog is open, showing the DUT dropdown set to 'n x Balanced' and the 'Coupled .snp' file selected. The dialog also includes options for 'Left: Model A' and 'Right: Model A', and a 'Use same coupon Left and Right' checkbox.

**MEASURED "S"
PARAMETERS OF
CABLE &
FIXTURE** ✓

**FIXTURE DE-
EMBEDDED
FROM
MEASURED
RESULTS** ✓

**COMPARE DATA
TO SIMULATION** ✓

**APPROVE OR
BACK TO THE
DRAWING BOARD** ✓

Thank you!