ALIEN CROSSTALK MEASUREMENTS

AESA Solutions to fulfil Standards

INTRODUCTION

According to the latest industry standards, ANSI/TIA-568-C.2 (Cat6A), ANSI/TIA-568-C.2-1 (Cat8) and IEC 61156-9/ -10(Cat8.1 and Cat8.2), the balanced twisted-pair telecommunication cables have to go through different electrical tests. Among others, Alien Crosstalk is a critical test that deserves special attention.

For this specific test, the cables have to be arranged in a 6-around-1 bundle configuration. The construction is defined as follows (see Fig. 1): one 4-pair disturbed cable in the centre (#1) surrounded by 6 additional 4-pair disturbing cables (#2 to #7).

The "Alien crosstalk" test consists in measuring the perturbation created by the 6 disturbing cables on the centered disturbed cable. It implies that the crosstalk between the 6 "external" cables (24 pairs) and each pair of the central cable (4 pairs) has to be measured. These measurements have to be performed from both the near and far end of the cabling under test.

Example of a 6-around-1 bundle composed of seven 4-pair cables

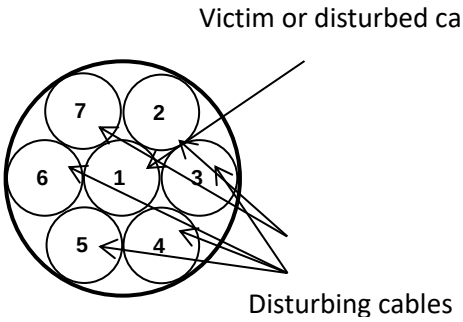

Fig. 1 : 6-around-1 configuration

The test starts with the measurement of the below parameters:

- Alien Near-End Crosstalk (also called ANEXT)
- Alien Far-End Crosstalk (also called AFEXT)
- Insertion Loss (IL)

Then, the power sums are calculated from the measurements above:

- Power Sum ANEXT (calculation for each of the pairs in the central bundle)
- Power Sum AACRF (calculation for each of the pairs in the central bundle)

AUTOMATIC SOLUTION

AESA has developed a 28-pair connecting frame called Vega AXT which can provide all these tests fully automatically.

Fig. 2 : Vega AXT

SEMI-AUTOMATIC SOLUTION FOR A 4-PAIR CONNECTING FRAME

For those customers who wish to perform the above test on a 4-pair connecting frame, for instance on a Vega (baluns) or on a Cobalt (balunless) system, AESA has developed a software package along with a test procedure that allows the swapping of the different cables on the connecting frame. It allows making all necessary measurements in a well-defined order. The software will then compute the measured crosstalk and show the results as specified in the standards.

To comply with the test methods in the standards, some test precautions need to be taken. All pairs not under test must be properly terminated in differential and common mode as illustrated in the below figures. Fig. 3 and Fig. 4 show an ANEXT test configuration for balun 2-port based and balunless 4-port based systems, respectively.

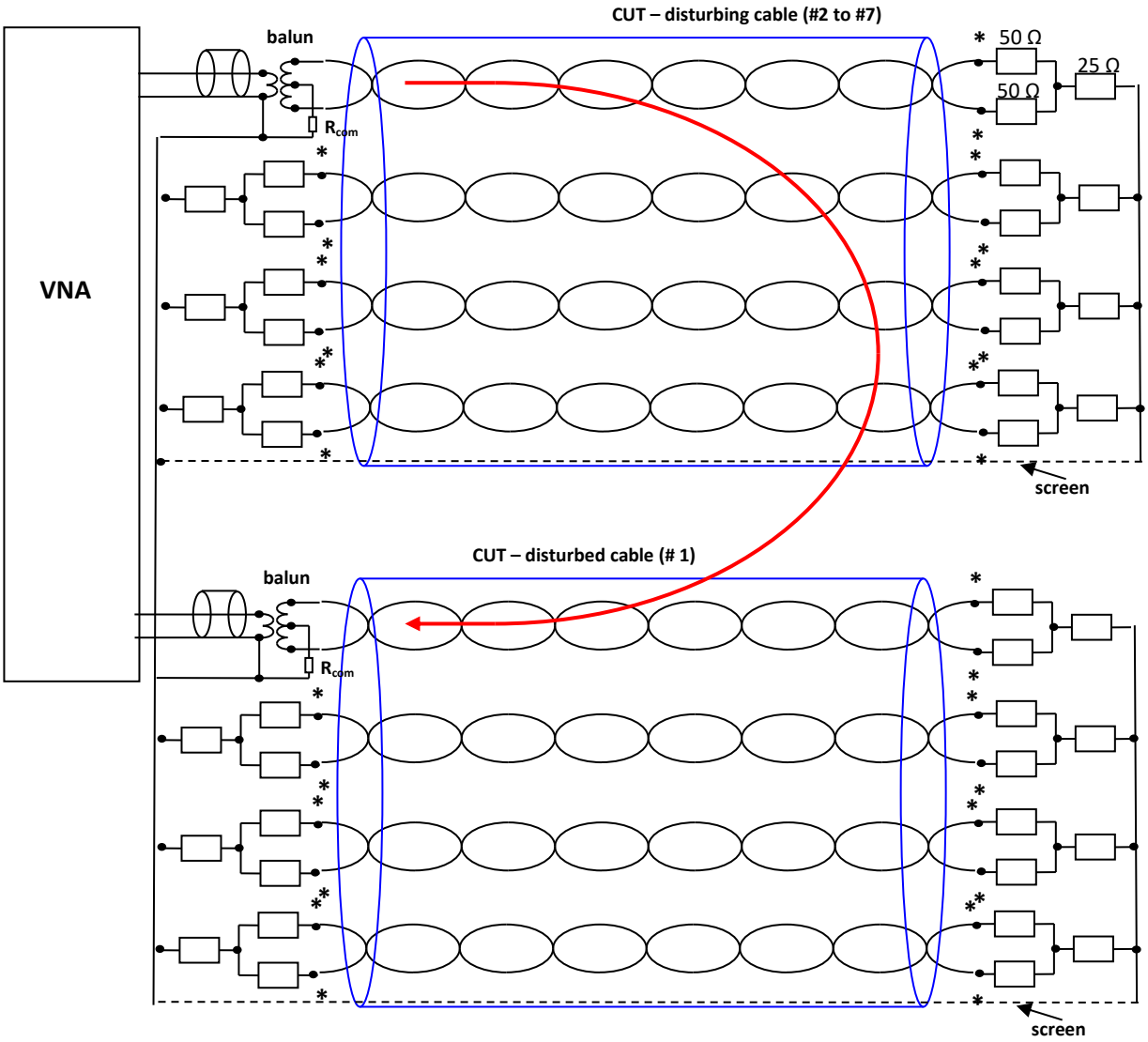

Fig. 3 : 2-port balun based test configuration

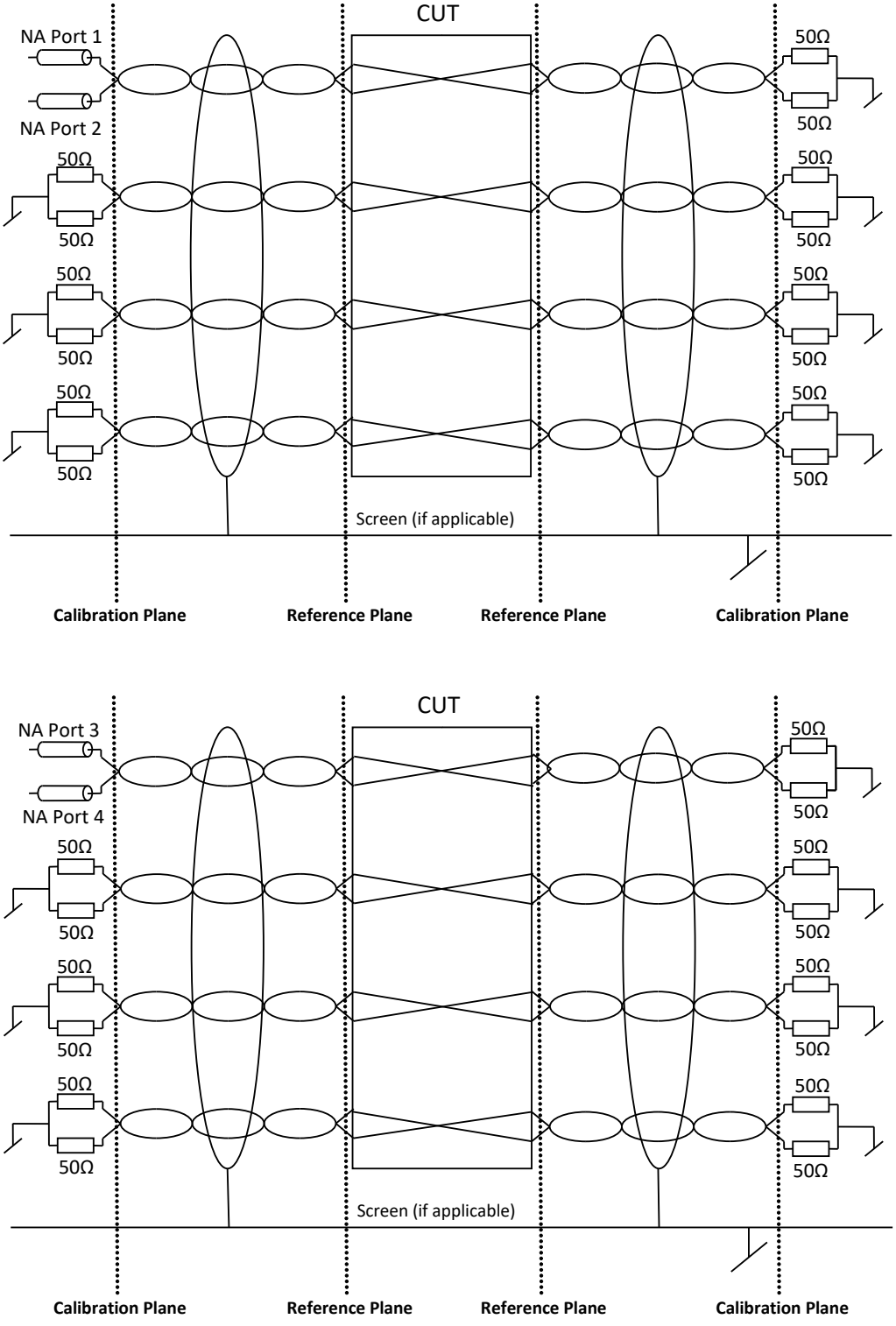

Fig. 4 : 4-port balunless test configuration

Fig. 5 & 6 below illustrates the AESA frames dedicated to the semi-automatic AXT measurement option.

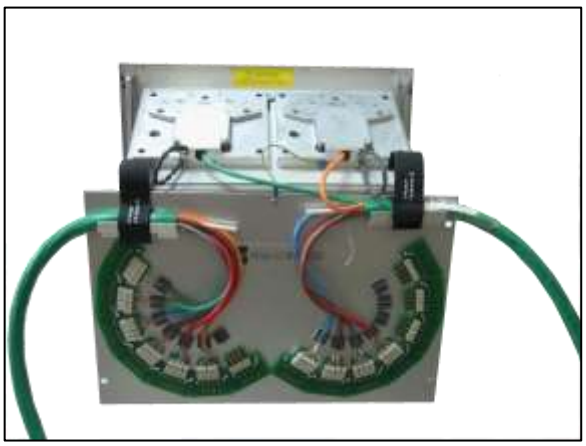

Fig. 5 : Vega 4-pair semi-automatic option

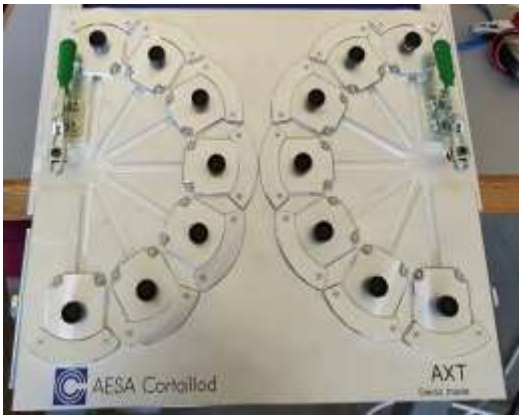

Fig. 6 : Vega shielded 4-pair semi-automatic option

The measurement procedure is divided in three different phases:

- Phase 1: Insertion loss measurements
- Phase 2: ANEXT measurements
- Phase 3: AFEXT measurements

The following tables detail the successive connecting frame loadings for a 6-around-1 bundle configuration).

Phase 1

Attenuation measurements			
Loading No.	Connecting frame Near-End	Connecting frame Far-End	Remarks
1	Cable 1 Near-End	Cable 1 Far-End	4 measurements
			4 measurements

Phase 2

Alien Near-End Crosstalk (ANEXT) measurements Near-End of the bundle			
Loading No.	Connecting frame Near-End	Connecting frame Far-End	Remarks
2	Cable 1 Near-End	Cable 2 Near-End	16 measurements
3	Cable 1 Near-End	Cable 3 Near-End	16 measurements
4	Cable 1 Near-End	Cable 4 Near-End	16 measurements
5	Cable 1 Near-End	Cable 5 Near-End	16 measurements
6	Cable 1 Near-End	Cable 6 Near-End	16 measurements
7	Cable 1 Near-End	Cable 7 Near-End	16 measurements
			96 measurements

Alien Near-End Crosstalk (ANEXT) measurements Far-End of the bundle			
Loading No.	Connecting frame Near-End	Connecting frame Far-End	Remarks
8	Cable 1 Far-End	Cable 2 Far-End	16 measurements
9	Cable 1 Far-End	Cable 3 Far-End	16 measurements
10	Cable 1 Far-End	Cable 4 Far-End	16 measurements
11	Cable 1 Far-End	Cable 5 Far-End	16 measurements
12	Cable 1 Far-End	Cable 6 Far-End	16 measurements
13	Cable 1 Far-End	Cable 7 Far-End	16 measurements
			96 measurements

Phase 3

Alien Far-End Crosstalk (AFEXT) measurements Near-End of the bundle			
Loading No.	Connecting frame Near-End	Connecting frame Far-End	Remarks
14	Cable 1 Near-End	Cable 2 Far-End	16 measurements
15	Cable 1 Near-End	Cable 3 Far-End	16 measurements
16	Cable 1 Near-End	Cable 4 Far-End	16 measurements
17	Cable 1 Near-End	Cable 5 Far-End	16 measurements
18	Cable 1 Near-End	Cable 6 Far-End	16 measurements
19	Cable 1 Near-End	Cable 7 Far-End	16 measurements
			96 measurements

Alien Far-End Crosstalk (AFEXT) measurements Far-End of the bundle			
Loading No.	Connecting frame Near-End	Connecting frame Far-End	Remarks
20	Cable 1 Far-End	Cable 2 Near-End	16 measurements
21	Cable 1 Far-End	Cable 3 Near-End	16 measurements
22	Cable 1 Far-End	Cable 4 Near-End	16 measurements
23	Cable 1 Far-End	Cable 5 Near-End	16 measurements
24	Cable 1 Far-End	Cable 6 Near-End	16 measurements
25	Cable 1 Far-End	Cable 7 Near-End	16 measurements
			96 measurements

In order to avoid any mistakes during the test procedure, we built this software option in an operator friendly way. The software package indicates to the user for where each cable must be connected on the connecting frame before launching a partial test. Specific knowledge about the procedure in not needed as full guidance is provided.

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