Passive Interconnect Performance Round Robins 01-076r0

A publication of the T10 PIP group.

1. Introduction:

This document contains all the details of round robin testing conducted under the direction of the PIP group that are substantially complete.

Round robin tests aimed at different issues have either been completed or are in various stages of completion under the auspices of PIP. A naming convention is used for each round robin based on the general subject description followed by the number of the round robin under this description. For example, there are two round robins aimed at the bulk cable performance: bulk cable round robin 1 and bulk cable round robin 2.

The remainder of this document is structured by reference to round robin descriptions.

2. Bulk Cable round robin 1

2.1 Bulk cable round robin 1 (Exploratory)

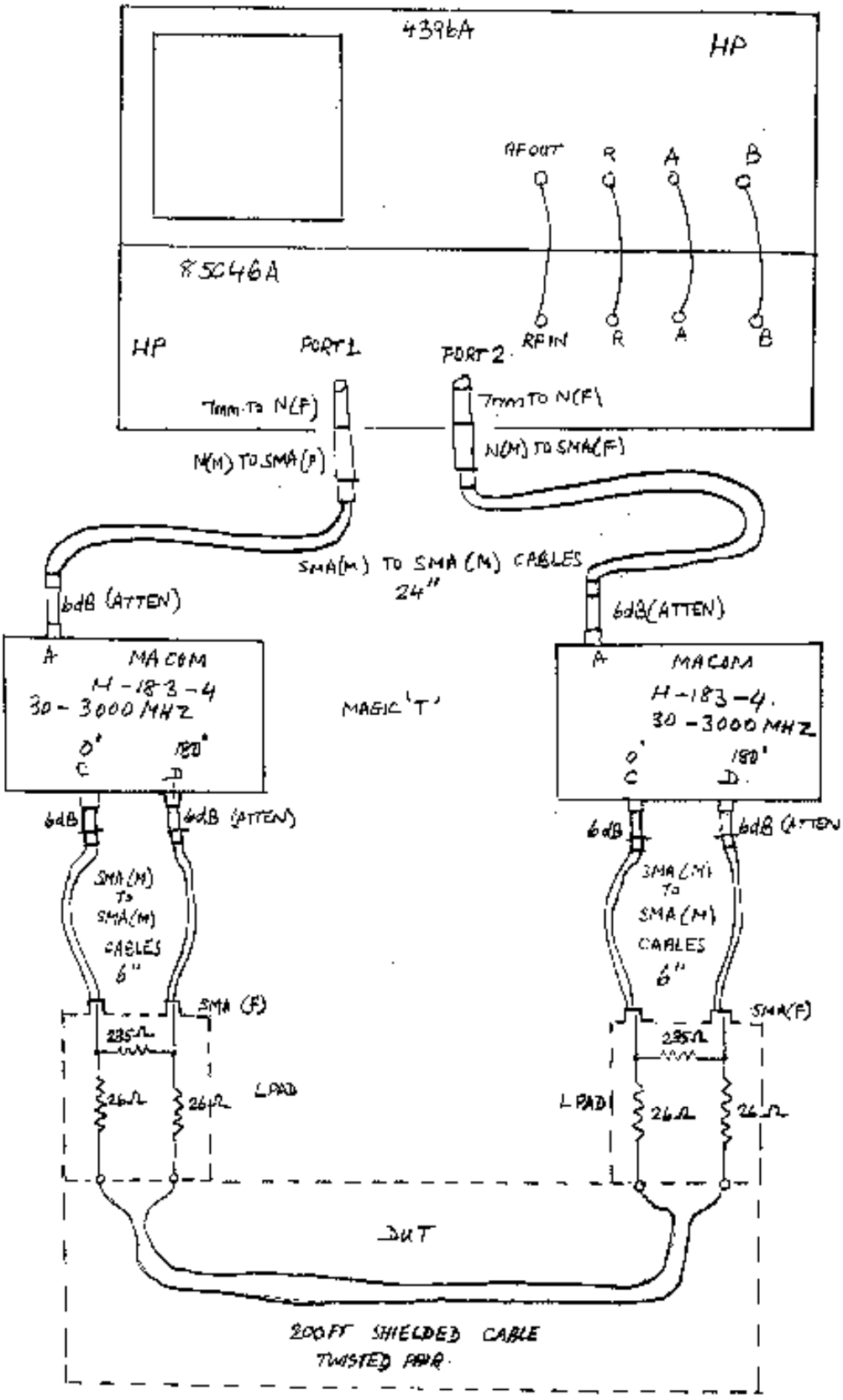
2.1.1 Progress report, Umesh Chandra, Seagate

[much of this material is retained for continuity – Madison data and a summary table was added]

The following samples have been collected:

- 30AWG solid round 57m (190 ft) [sample 1]
- 28AWG stranded round 57m (190 ft) [sample 2]
- 30 AWG solid twist and flat [sample 3]

A test procedure has been documented:


4396A
HP
RF OUT
R
A
B
85046A
HP
PORT 1
PORT 2
RF IN
R
A
B
7mm TO N(F)
7mm TO N(F)
N(M) TO SMA(F)
N(M) TO SMA(F)
SMA(M) TO SMA(M) CABLES
24"
6dB (ATTEN)
6dB(ATTEN)
A
MACOM
M-183-4
30-3000 MHZ
0°
180°
C
D
MAGIC 'T'
A
MACOM
M-183-4
30-3000 MHZ
0°
180°
C
D
6dB
6dB (ATTEN)
6dB
6dB (ATTEN)
SMA(M) TO SMA(M) CABLES 6"
SMA(M) TO SMA(M) CABLES 6"
SMA (F)
SMA(F)
235Ω
235Ω
26Ω
26Ω
L PAD
L PAD
26Ω
26Ω
DUT
200FT SHIELDED CABLE
TWISTED PAIR

Test Procedure using HP4396A/45046A

- Apply ‘shorts’ (thru) (2) in place of DUT
- Set ‘SOURCE’ level to +20 dB, ‘START’ to 0.5 MHz ‘STOP’ to 300 MHz
- ‘CAL’ -> ‘Cal Menu’ -> ‘Response’ -> ‘Thru’ -> ‘Done’
- ‘SAVE’ -> ‘State’ -> ‘Done’
- Replace ‘shorts’ with the DUT (Cable under Test)
- Collect Data
- ‘SAVE’ -> ‘ASCII Save’ -> ‘Data Only (ASCII)’
- Import file into XL and create graph

Test results:

- 30 AWG Solid Hitachi #49557-068 SCSI3
- dc R = 20.5 OHMS
- CHANNEL: 1
- MEASURE TYPE: S21
- FORMAT TYPE: LOG MAG
- NUMBER of POINTS: 201
- SWEEP TIME: 70 ms
- SWEEP TYPE: LIN FREQ
- SOURCE POWER: 20 dBm
- IF BANDWIDTH: 40 kHz

Data summary from Seagate:

Attenuation at 200 MHz for sample 1 9.21 dB/25m [30AWG solid] average of some 2 pairs
Attenuation at 200 MHz for sample 2 10.82 dB/25m tan/white single pair [28AWG stranded]
Attenuation at 200 MHz for sample 3 the number is somewhat meaningless (partly due to making the measurement in a “bunched up” mode)

Hitachi data:

Test set up: same as SPI-3 except used 100 ohm baluns (350 MHz) and no matching pads

Attenuation at 200 MHz for sample 1 9.25 dB/25m [30AWG solid] average of all 34 pairs
Attenuation at 200 MHz for sample 2 10.39 dB/25m [28AWG stranded] average of all 34 pairs 10.60 dB/25m for the same pair as used by Seagate
Attenuation at 200 MHz for sample 3 not measured

Madison data:

Attenuation at 200 MHz for sample 1 [30 AWG solid] 9.22 dB/25m average for all 34 pairs ranging from 8.94 to 9.67 4 port VNA used for both samples
Attenuation at 200 MHz for sample 2 10.39 dB/25m average for all 34 pairs ranging from 9.83 to 11.03 [28 AWG stranded] tan/white was 10.77
Attenuation at 200 MHz for sample 3 not measured

Data summary:

company	sample 1 (dB/25m)	sample 2 (dB/25m)	sample 3 (dB/25m)
Seagate	9.21	10.82 tan/white	na
Hitachi	9.25	10.39 avg	na
Madison	9.22	10.39 avg 10.77 pair tan/white	na
Spectra strip			
Adaptec			

Conclusions so far:

- One conclusion is that measuring either way gives very similar results.

- Another conclusion is that the pulse amplitude method used previously by Seagate does not match well the results from the network analyzer methods (although the difference is less when d.c. attenuation is accounted for).

The round robin will continue as planned. To those who have not yet reported their results: no fair adjusting the results because the answers are now available.

Umesh agreed to document the round robin activities and results. Umesh to create the draft document for the next meeting.

2.1.2 Testing methodology and parameters

Test methods to be modified as follows:
[Following copied from SPI-3 and modified appropriately]
E.7.5 Measurement test fixture and measurement equipment
An instrument capable of supplying a sinusoidal signal is used as the signal source and an instrument capable of detecting the amplitude of a sinusoidal signal is used as the signal sink. Two measurement test fixtures are required: one for the source end and one for the sink end. Since most source and sink instruments capable of using variable frequency sinusoidal signals are single ended, a balun or a hybrid (M/A - Com) may be used between the instruments and the test fixtures. Impedance matching networks may be required.(Lpad). If a source or sink is used differential signals then no balun is required for the differential source or sink.

Equipment Required: Network Analyzer (HP 87xx Series) or equivalent.

The test fixture having 61 ohm single ended paths for each signal line shown in SPI-3 will NOT be used for the tests. Samples shall be directly soldered to the Lpads. The opens, shorts, through calibration method shall be used.

The tested lines shall be terminated by using 122 ohm nominal resistors between the + signal and the - signal line. [some observations have indicated different results when using the terminations instead of

keeping the untested line open as presently implied in SPI-3]. The question of whether to require this termination may be answered in subsequent testing.

2.1.3 Participating companies, all

Companies agreeing to participate in this initial exploratory measurement effort: Seagate, Hitachi, Madison, Amphenol Spectra-Strip, Adaptec,

Contacts:
Hitachi: Clint Heiser (603 669-4347 ext 362)
Seagate: Bruce Manildi (831 439-7229) [Coordinator]
Amphenol Spectra-Strip: Greg Vaupotic (203 287-7425)
Adaptec: Lee Hearn
Madison: Chuck Grant (508 752-2881 ext 306)

Samples requested: all round shielded raw media 25 meters long, one sample of each from Hitachi and Madison of 28AWG solid, 28 AWG stranded, 30 AWG stranded, 30 AWG solid (total of 8 samples)

2.1.4 Present status

The following order was used:

Hitachi: Zane Daggett (603 669-4347 ext 236)
Seagate: Bruce Manildi (831 439-7229) [Coordinator]
Madison: Chuck Grant (508 752-2881 ext 306)
Amphenol Spectra-Strip: Greg Vaupotic (203 287-7425)
Adaptec: Lee Hearn

Samples just delivered to:

Since Bruce, Umesh, Greg and Lee were not present a series of phone calls ensued to determine the status.

This round robin appears to be essentially completed but the data is needed from Spectra strip and Adaptec.

3. Bulk Cable round robin 2

4. Cable assembly round robin 1

5. Backplane round robin 1

6. Dielectric frequency response round robin 1