802.3bp test points

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Presentation objectives

- **Provide reference information on related 802.3 test points.**

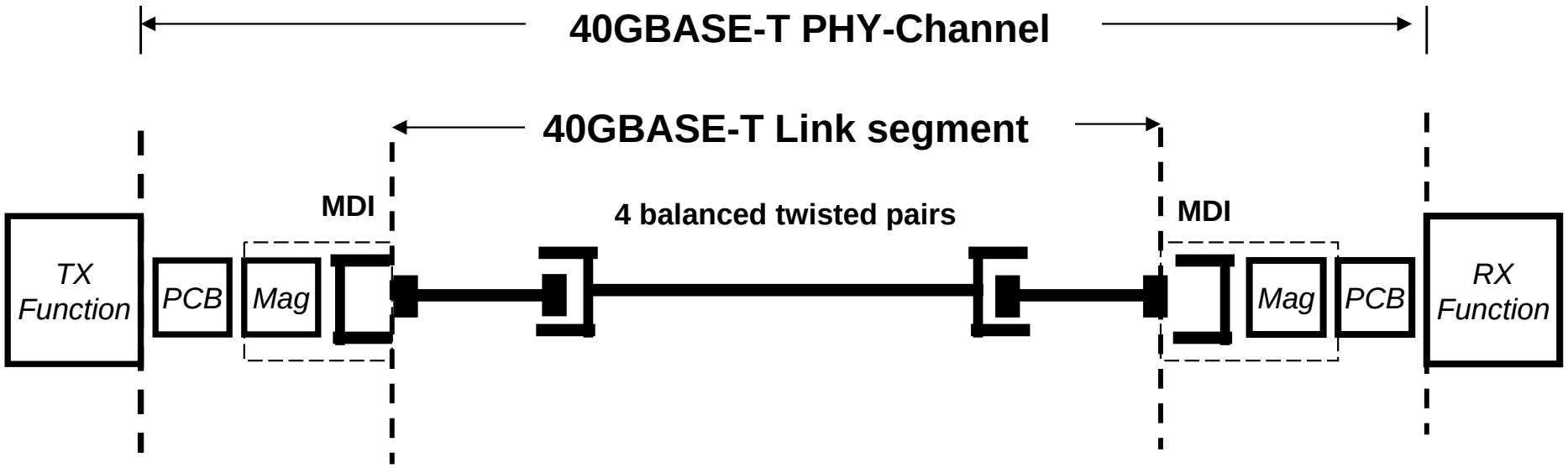
- **Illustrate possible 802.3bp test points based on existing related 802.3 test points.**

- **Discussion on what channel/link segment specifications/guidelines to include in Standard**

802.3bp physical layer specifications TP references

802.3 test point references
802.3bj - 92.7.1 Link block diagram
802.3ba - 85.7.1 Link block diagram
802.3ap - 70.6.1 Link block diagram
10GBASE-CX4 - 54.5.1 Link block diagram
1000BASE-X - 38.2.1 PMD block diagram 10GBASE-R/W - 52.4.1 PMD block diagram 10GBASE-LX4 - 53.4.1 PMD block diagram
1000BASE-X - 38.2.1 PMD block diagram 10GBASE-R/W - 52.4.1 PMD block diagram 10GBASE-LX4 - 53.4.1 PMD block diagram
1000BASE-X - 38.2.1 PMD block diagram 10GBASE-R/W - 52.4.1 PMD block diagram 10GBASE-LX4 - 53.4.1 PMD block diagram

40GBASE-T PHY- Channel



Modeling to optimize PHY and PHY-channel performance

PHY-Channel

- MDI/Magnetics
- Host PCB
- Link segment - based upon copper media specified by ISO/IEC JTC1/SC25/WG3 and TIA TR42.7
  - –4 pair, balanced twisted-pair copper cabling
  - –Up to 2 connectors
  - –Up to at least 30 meters

100GBASE-CR4 link segment

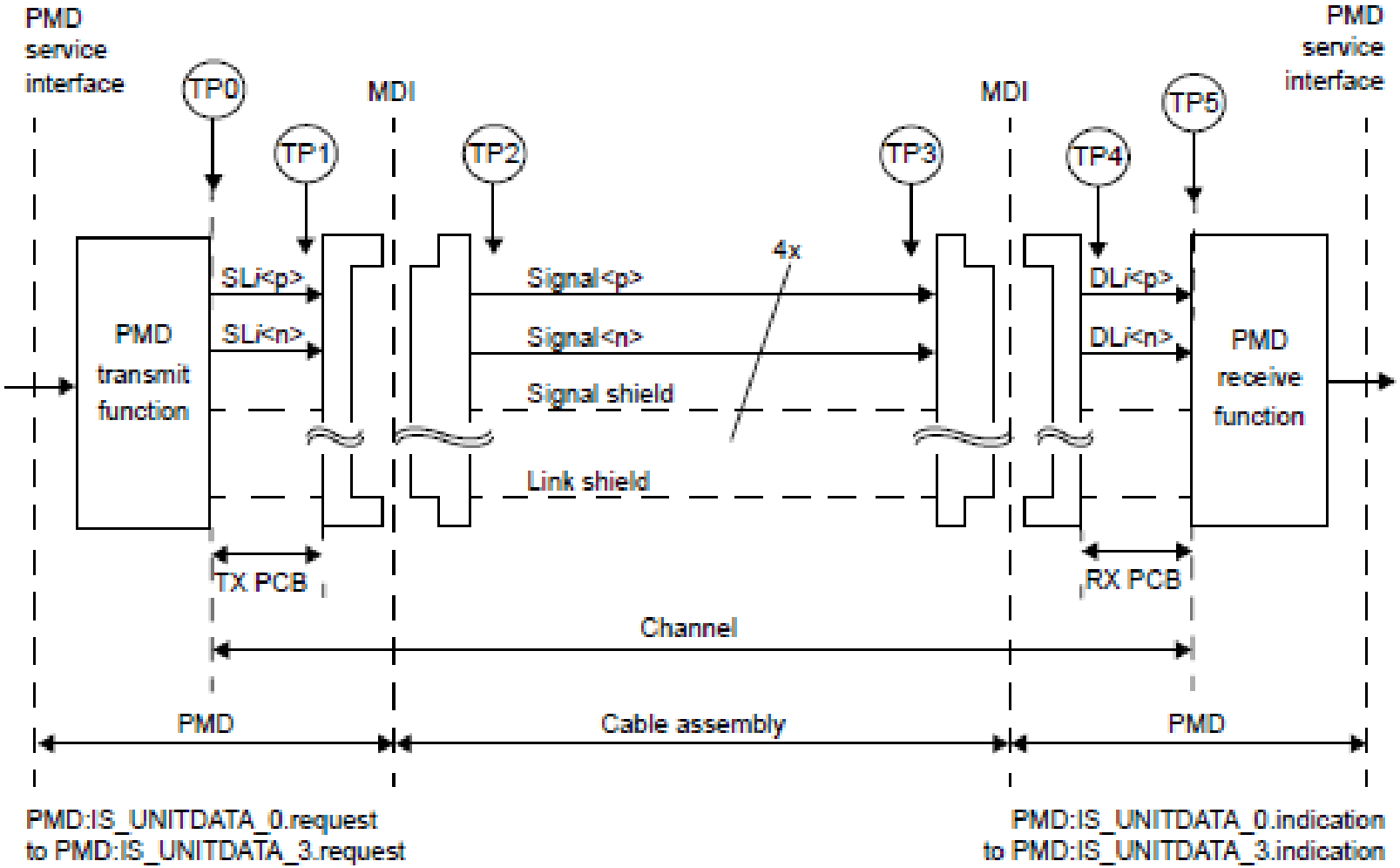


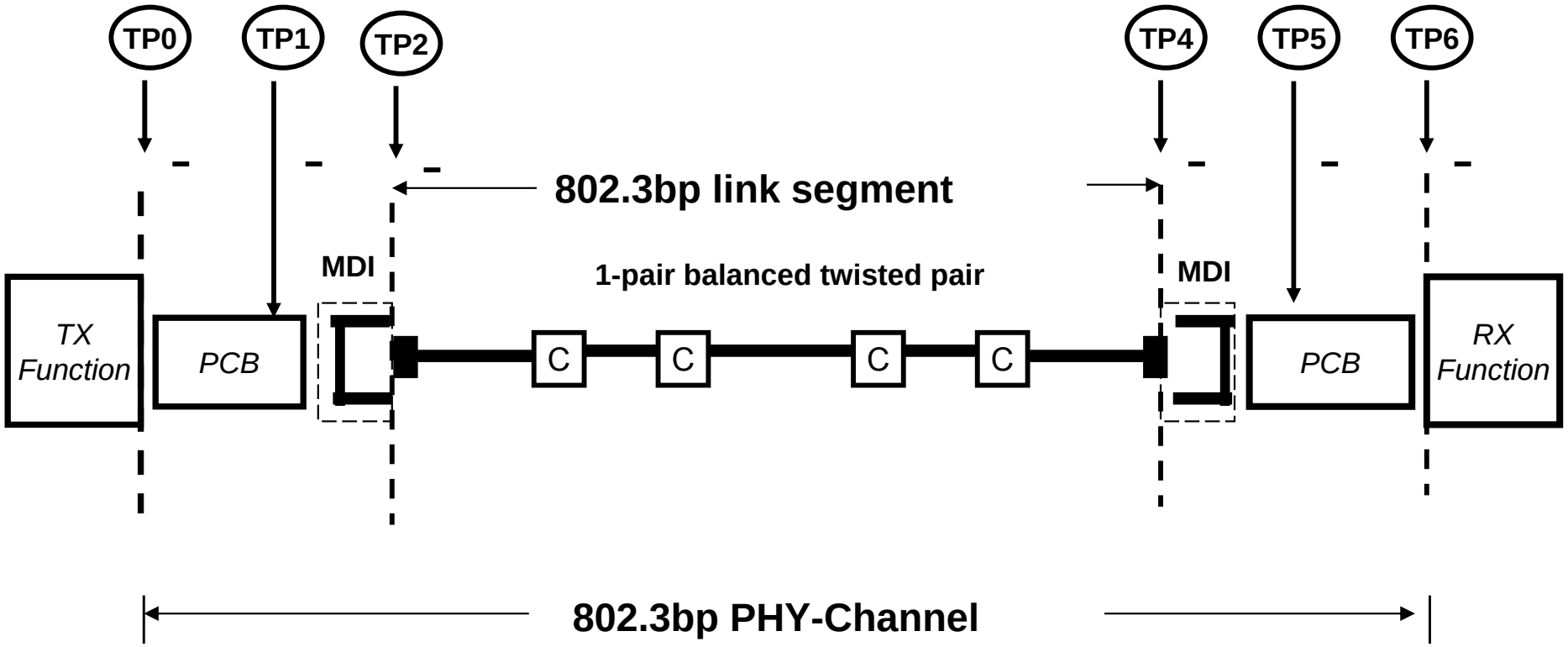
Figure 92–2—100GBASE-CR4 link (one direction is illustrated)

100GBASE-CR4 test points

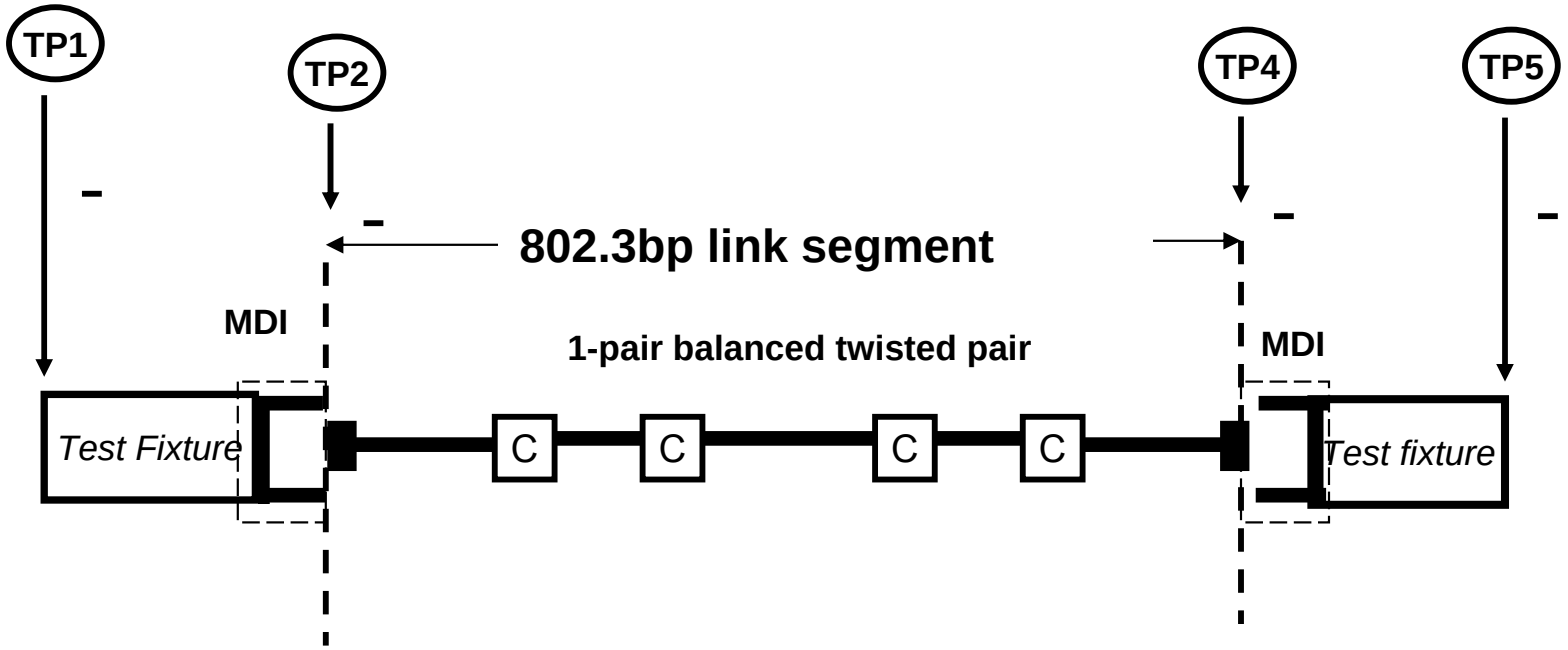
Table 92–4—100GBASE-CR4 test points

Test points	Description
TP0 to TP5	The 100GBASE-CR4 channel including the transmitter and receiver differential controlled impedance printed circuit board insertion loss and the cable assembly insertion loss.
TP1 to TP4	All cable assembly measurements are to be made between TP1 and TP4 as illustrated in Figure 92–2. The cable assembly test fixture of Figure 92–17 or its equivalent, is required for measuring the cable assembly specifications in 92.10 at TP1 and TP4.
TP0 to TP2 TP3 to TP5	A mated connector pair has been included in both the transmitter and receiver specifications defined in 92.8.3 and 92.8.4. The recommended maximum insertion loss from TP0 to TP2 or TP3 to TP5 including the test fixture is specified in 92.8.3.7.
TP2	Unless specified otherwise, all transmitter measurements defined in Table 92–6 are made at TP2 utilizing the test fixture specified in 92.11.1.
TP3	Unless specified otherwise, all receiver measurements and tests defined in 92.8.4 are made at TP3 utilizing the test fixture specified in 92.11.1.

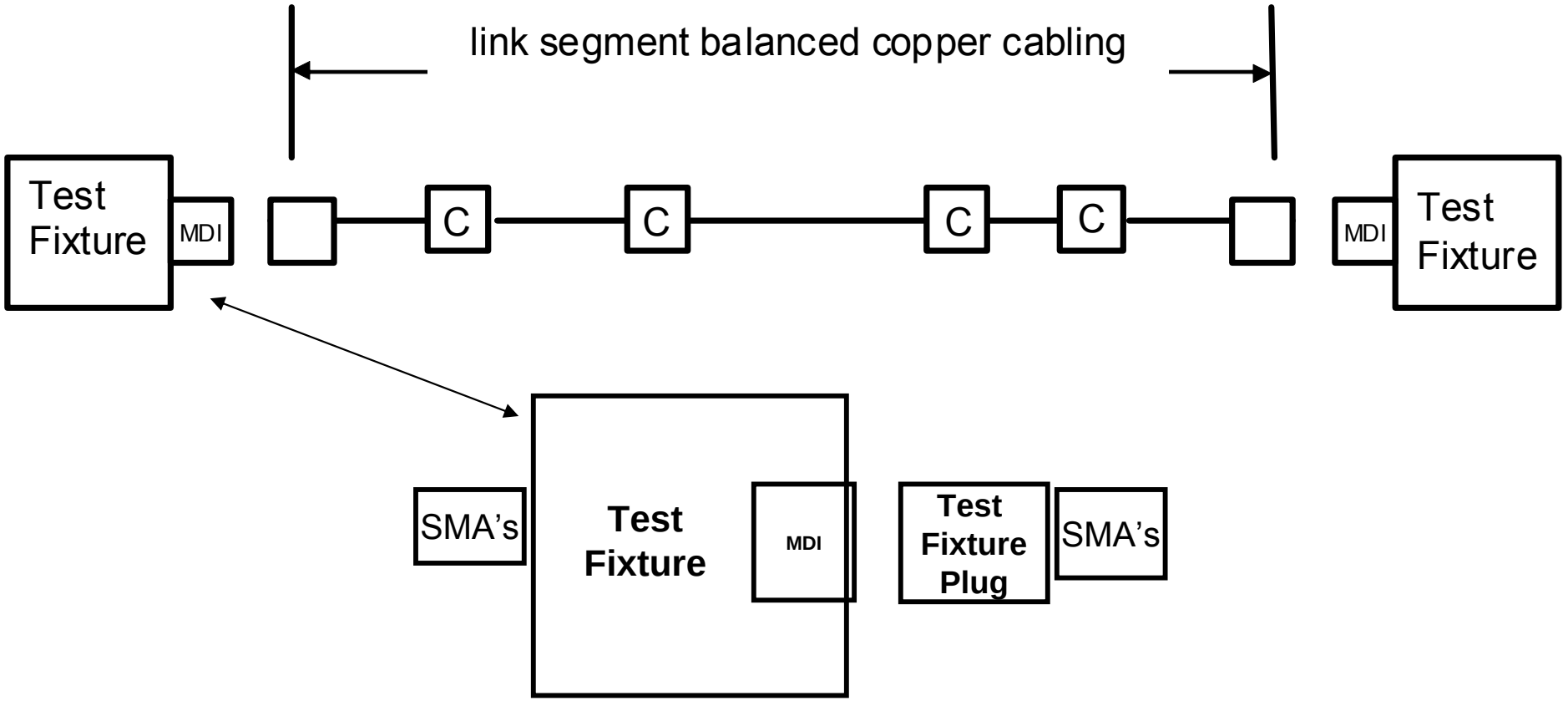
802.3bp PHY- Channel



802.3bp link segment



RTPGE Test Fixtures



Specified in a mated state

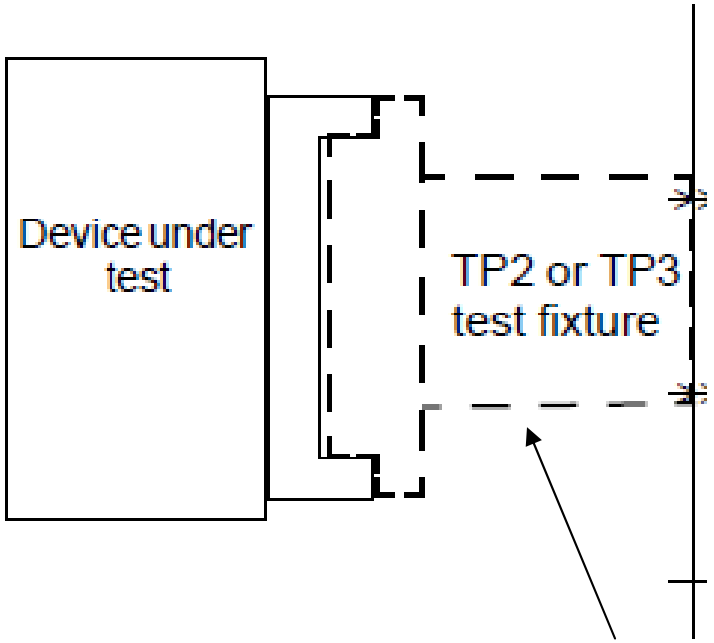
RTPGE Test Fixture Specifications

Purpose

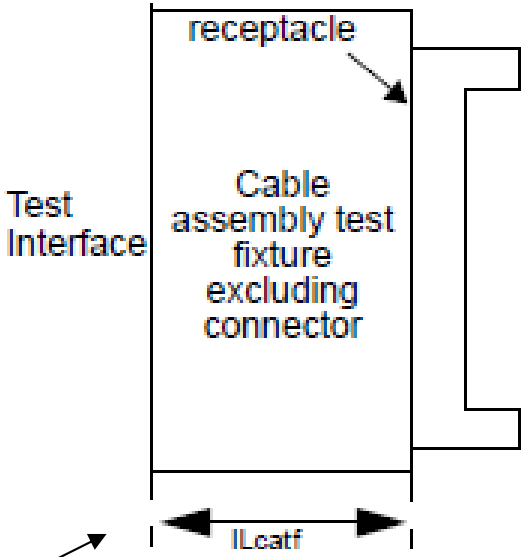
- RTPGE Test fixture specifications
  - MDI Test Fixture
  - Link Segment Test Fixture

802.3bj Test fixtures

TP2/TP3 Test fixture (HCB)

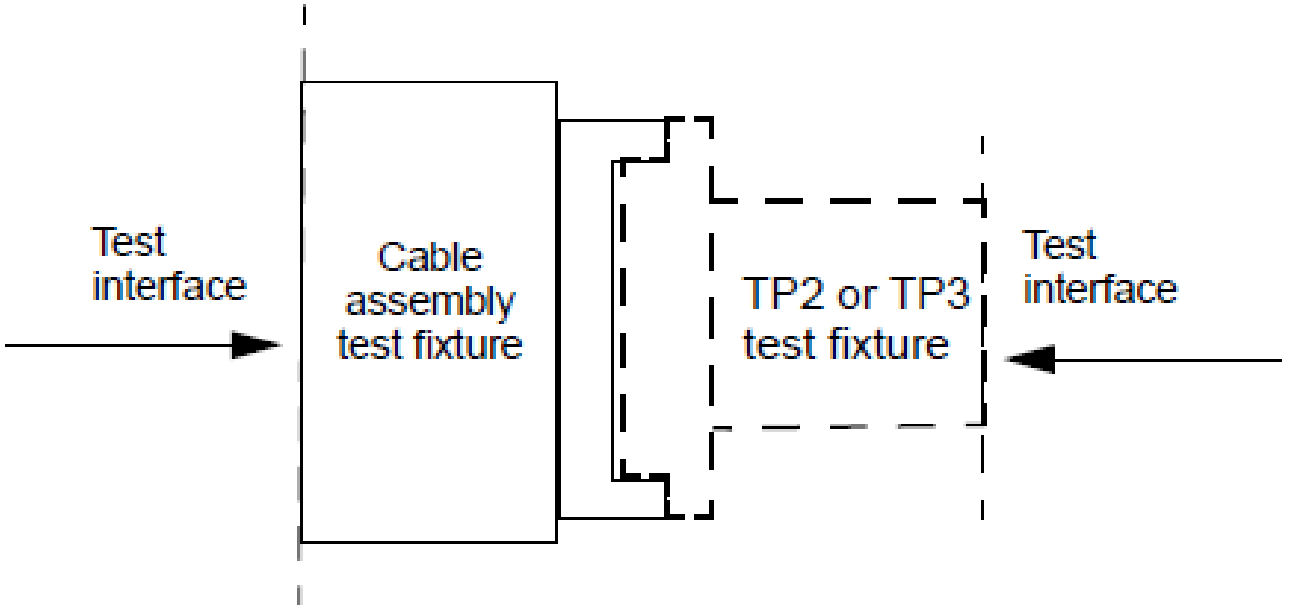


Cable assembly test fixture (MCB)



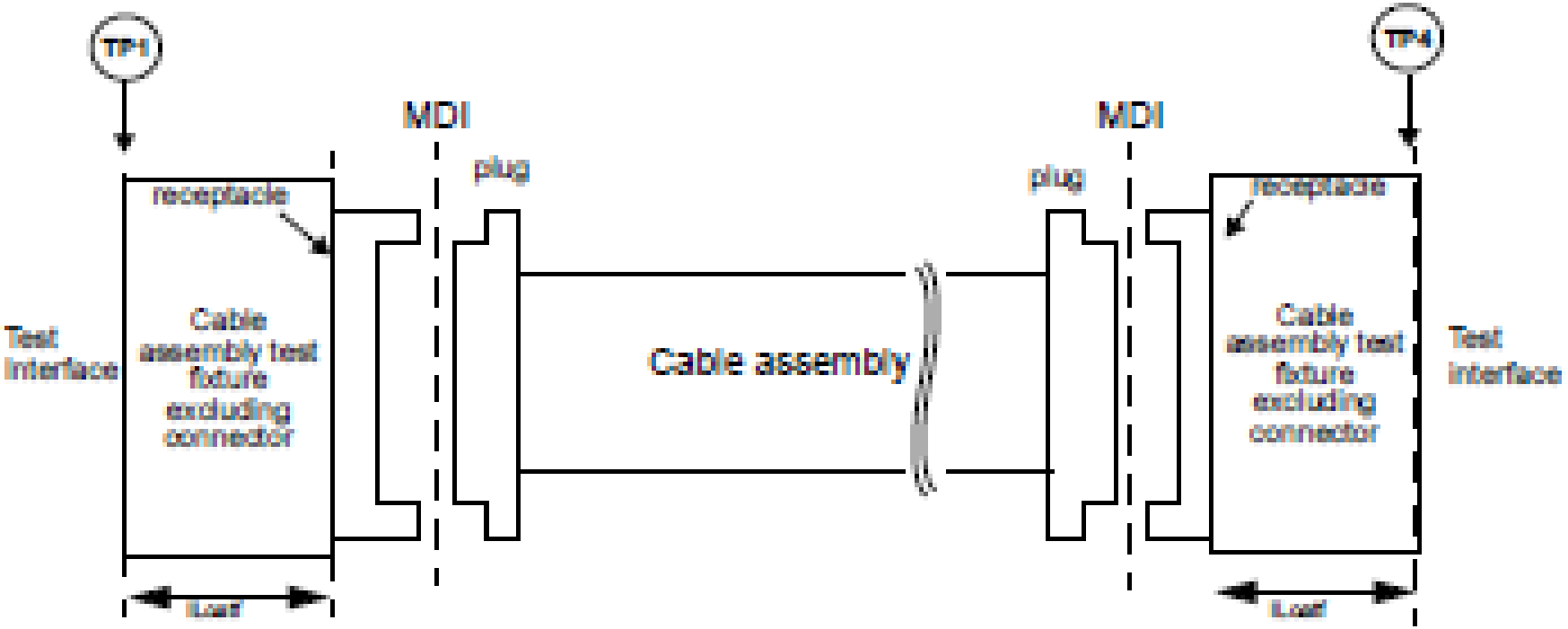
- **PCB reference IL specified**

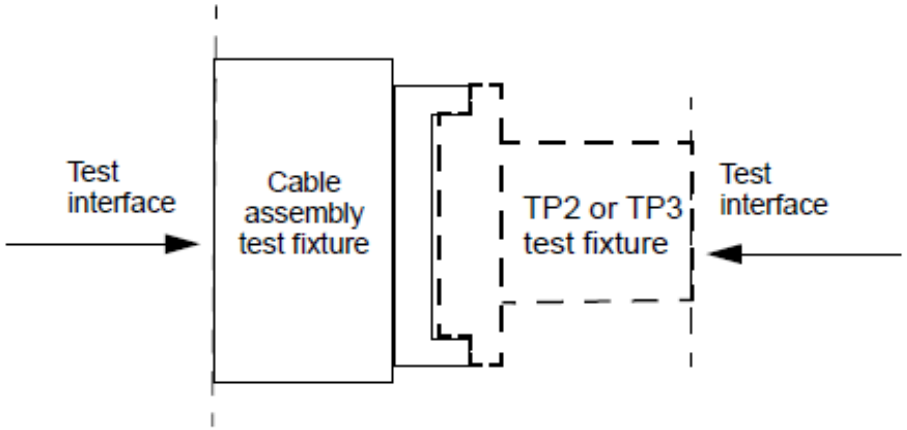
802.3bj Test Fixtures



- **Specified in mated state**
  - **Insertion loss**
  - **Differential return loss**
  - **Common mode return loss**
  - **Common to differential mode conversion loss**
  - **Common to differential mode return loss**
  - **Integrated crosstalk noise (ICN)**

802.3bj Test Fixtures





802.3bp PMD test points

Backup

Link segment transmission parameters (UTP)

Link segment transmission and coupling parameters (UTP)

- Insertion loss
- Return loss
- Alien Crosstalk
  - PSANEXT, PSAACRF
- Common to differential conversion loss (SDC12/SDC21)

•Insertion loss

•Amended Motion #2 - Move that The IEEE P802.3bp Task Force affirms the proposed
•Baseline IL Channel Performance for link segment insertion to establish the absolute
•value across the frequency range through 600MHz. (herman_3bp_01_0913.pdf)
•Technical 75%
•Vote
•Y: 25 N: 0 A: 4
•MOTION: Passes

$$IL = .4927\sqrt{f} + 0.0023f + (0.0639 / \sqrt{f}) + 0.08\sqrt{f} + 0.018\sqrt{f}$$

where

f := frequency_in_MHz

Link segment transmission parameters (UTP)

- Alien Crosstalk -PSANEXT, PSAACRF

Motion #8 - Move that The IEEE P802.3bp Task Force affirms the proposed Baseline PSANEXT (in slide 11 in herman_3bp_01_0913.pdf) and PSAACRF (in slide 13 in herman_3bp_01_0913.pdf) for link segment specification over frequency range 1MHz - 600MHz. (alien crosstalk configuration in http://www.ieee802.org/3/bp/public/jul13/moffitt_3bp_01_0713.pdf)
M: Todd Herman S: Xiaofeng Wang
Technical 75%
Vote
Y: 18 N: 1 A: 10
MOTION: Passes

PSANEXT

from 1 to 100 MHz

$$PSANEXT := 60 - 10\cdot\log\left(\frac{f}{100}\right)$$

from 100 to 500 MHz

$$PSANEXT := 60 - 15\cdot\log\left(\frac{f}{100}\right) - 6\cdot\left[\frac{(f - 100)}{400}\right]$$

PSAACRF

$$PSAACRF := -20\cdot\log\left(10^{\frac{-10\cdot\log\left(\frac{15}{100}\right)+38.2-20\cdot\log\left(\frac{f}{100}\right)}{-20}} + 4\cdot 10^{\frac{67-20\cdot\log\left(\frac{f}{100}\right)}{-20}}\right)$$

where

f := frequency_in_MHz

D test points

Link segment transmission parameters (UTP)

- Return Loss

Frequency range	Requirement
1-10 MHz	19 dB
10-40 MHz	24-5log(f) dB
40-130 MHz	16 dB
130-400 MHz	37-10log(f) dB
400-600 MHz	11 dB

Motion #2: Move that the IEEE P802.3bp Task Force affirms that proposed RL specifications for the automotive link segment in herman_3bp_01_1113.pdf for inclusion in the 802.3bp baseline specification.

Moved by: Xiaofeng Wang

Seconded by: Mehmet Tazebay

Technical 75%

Link segment transmission parameters (UTP)

- Mode conversion

Frequency, MHz

-50_{dB}	$10 < f_{MHz} < 80$
$[\,5 \log_n (f_{MHz}) - 72\,]_{dB}$	$80 < f_{MHz} < 600$

Motion #3: Move that The IEEE P802.3bp Task Force affirms the proposed Mode Conversion limit line for the automotive link segment in Slide # 13 of tazebay_3bp_01a_0913.pdf for inclusion in 802.3bp baseline specification.
Moved by: Mehmet Tazebay
Seconded by: Gary Yurko
Technical 75%
Y: 33 N: 0 A: 5
MOTION: Passes