ETHERNETS

Clause 9 Repeater Conformance Test Suite

Version 2.0

Technical Document

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MODIFICATION RECORD

- April 4, 2007 - Version 2.0 released
  - Combined Test Suite released

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Adam Healey	University of New Hampshire
Gary Pressler	University of New Hampshire
Pete Scruton	University of New Hampshire

In addition, all contributors to previous Ethernet consortium MAC test suites, as shown in the acknowledgements sections of those test suites.

INTRODUCTION

Overview

The University of New Hampshire's InterOperability Laboratory (IOL) is an institution designed to improve the interoperability of standards based products by providing an environment where a product can be tested against other implementations of a standard. This suite of tests has been developed to help implementers evaluate the functioning of their Annex 4A Simplified Full Duplex MAC based products. The tests do not determine if a product fully conforms to IEEE Std 802.3 2005. Rather, they provide one method to isolate problems within an Annex 4A MAC device.

Note: successful completion of tests contained in this suite does not guarantee that the tested device is fully compliant or that it will interoperate with all other compliant devices.

Organization of Tests

The tests contained in this document are organized to simplify the identification of information related to a test and to facilitate in the actual testing process. Each test contains an identification section that describes the test and provides cross-reference information. The discussion section covers background information and specifies why the test is to be performed. Tests are grouped in order to reduce setup time in the lab environment. Each test contains the following information:

Test Number

The Test Number associated with each test follows a simple grouping structure. Listed first is the Test Group Number followed by the test's number within the group. This allows for the addition of future tests to the appropriate groups of the test suite without requiring the renumbering of the subsequent tests.

Purpose

The purpose is a brief statement outlining what the test attempts to achieve. The test is written at the functional level.

References

The references section lists cross-references to the IEEE 802.3 standards and other documentation that might be helpful in understanding and evaluating the test and results.

Resource Requirements

The requirements section specifies the hardware, and test equipment that will be needed to perform the test. The items contained in this section are special test devices or other facilities, which may not be available on all devices.

Last Modification

This specifies the date of the last modification to this test.

Discussion

The discussion covers the assumptions made in the design or implementation of the test as well as known limitations. Other items specific to the test are covered here.

Test Setup

The setup section describes the configuration of the test environment. Small changes in the configuration should be included in the test procedure.

Procedure

The procedure section of the test description contains the step-by-step instructions for carrying out the test. It provides a cookbook approach to testing, and may be interspersed with observable results.

Observable Results
The observable results section lists specific items that can be examined by the tester to verify that the DUT is operating properly. When multiple values are possible for an observable result, this section provides a short discussion on how to interpret them. The determination of a pass or fail for a certain test is often based on the successful (or unsuccessful) detection of a certain observable result.

Possible Problems
This section contains a description of known issues with the test procedure, which may affect test results in certain situations.

TABLE OF CONTENTS

Test #9.1 - Signal Amplification (Worst-Case Signal Amplitude Acceptance)

Purpose: To verify that the repeater set can receive and decode data from a segment under worst-case amplitude conditions and retransmit to all other segments with amplitude restored.

References: IEEE 802.3 Standard, 1993-07-08: Sections 9.5.2, 14.3.2.1

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1
- Tester MAU 2

Last Modification: September 16, 1995

Discussion: The repeater set shall ensure that the amplitude characteristics of the signals at the MDI output of the repeater are within the tolerance of the specification for the appropriate MAU type as long as the incoming data is within the system specifications.

Test Setup: Set up the devices as shown in Figure 1.9-1. The balun is used to convert the 50 Ω unbalanced AWG output to a 100 Ω balanced UTP output.

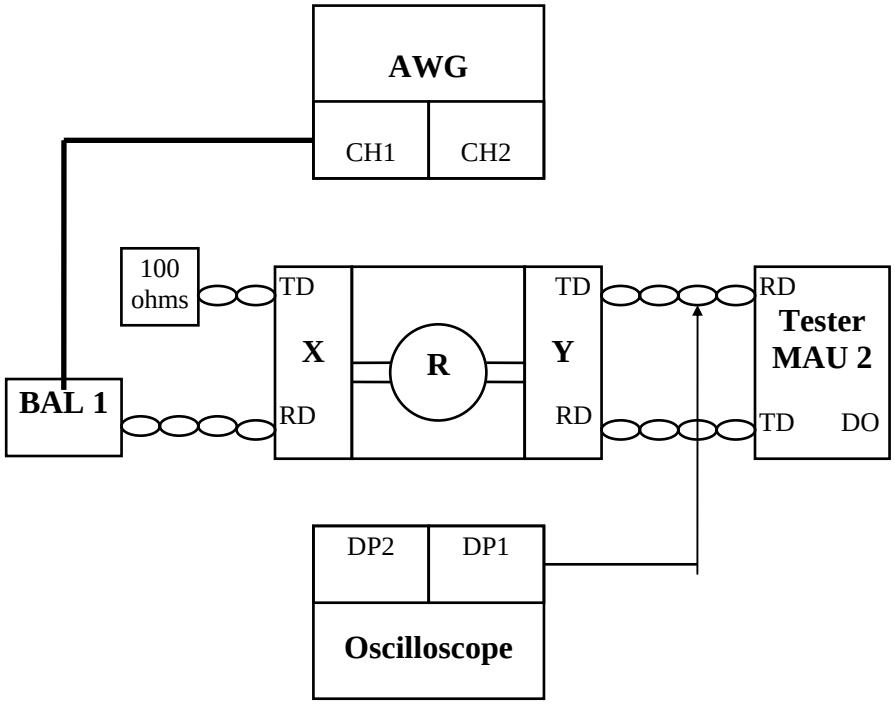

Figure 1.9-1: Test Configuration

Procedure:

1. Apply signal 2-1 with a peak differential voltage of 585 mV to the RD circuit of port X.
2. Monitor the TD circuit of port Y with the differential probe.
3. Apply signal 2-1 with a peak differential voltage of 3.1 V to the RD circuit of port X.
4. Monitor the TD circuit of port Y with the differential probe.

Observable Results:

- Signal 2-1 should be reproduced with a peak differential voltage between 2.2 V and 2.8 V on the TD circuit of port Y after both transmissions.

Test #9.2 - Signal Retiming (Worst-Case Timing Acceptance)

Purpose: To verify that the repeater set can receive and decode data from a segment under worst-case timing conditions and retransmit the data to all other segments with timing restored.

References: IEEE 802.3 Standard, 1993-07-08: Sections 9.5.4, A4.3.3, 14.3.1.2.3

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1
- Tester MAU 2

Last Modification: September 16, 1995

Discussion: The repeater unit shall ensure that the encoded data output from the repeater is within the jitter tolerance of a transmitting DTE. Therefore, the jitter can not accumulate over multiple segments.

Test Setup: See Fig. 1.9-1.

Procedure:

1. Apply signal 2-2 to the RD circuit of port X.
2. Monitor the TD circuit of port Y with the differential probes.
3. Use the oscilloscope to find several zero crossings.
4. Observe the zero crossings at 8 BT and 8.5 BT after the chosen zero crossings from step 3.
5. Apply signal 2-3 to the RD circuit of port X.
6. Repeat steps 3 and 4.

Observable Results:

- Signals 2-2 and 2-3 shall be reproduced on the TD circuit of port Y, but the observed zero crossings shall fall within the time intervals 8.0 BT ±11 ns and 8.5 BT ±11 ns.

Test #9.3 - Start of Packet Propagation Delay

Purpose: To measure the start of packet propagation delay for the repeater set.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.5.5.1

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with two Differential Probe/Amplifiers
- BAL 1
- Tester MAU 1, 2

Last Modification: December 1, 1994

Discussion: The start of packet propagation delay for a repeater set is the time delay between the first edge transition of the packet on its input (repeated from) port to the first edge transition on its output (repeated to) port(s). When the input and output ports are both 10BASE-T MAUs, the maximum start of packet propagation delay is 21 BT.

Test Setup: Set up the devices as shown in Figure 3.9-1.

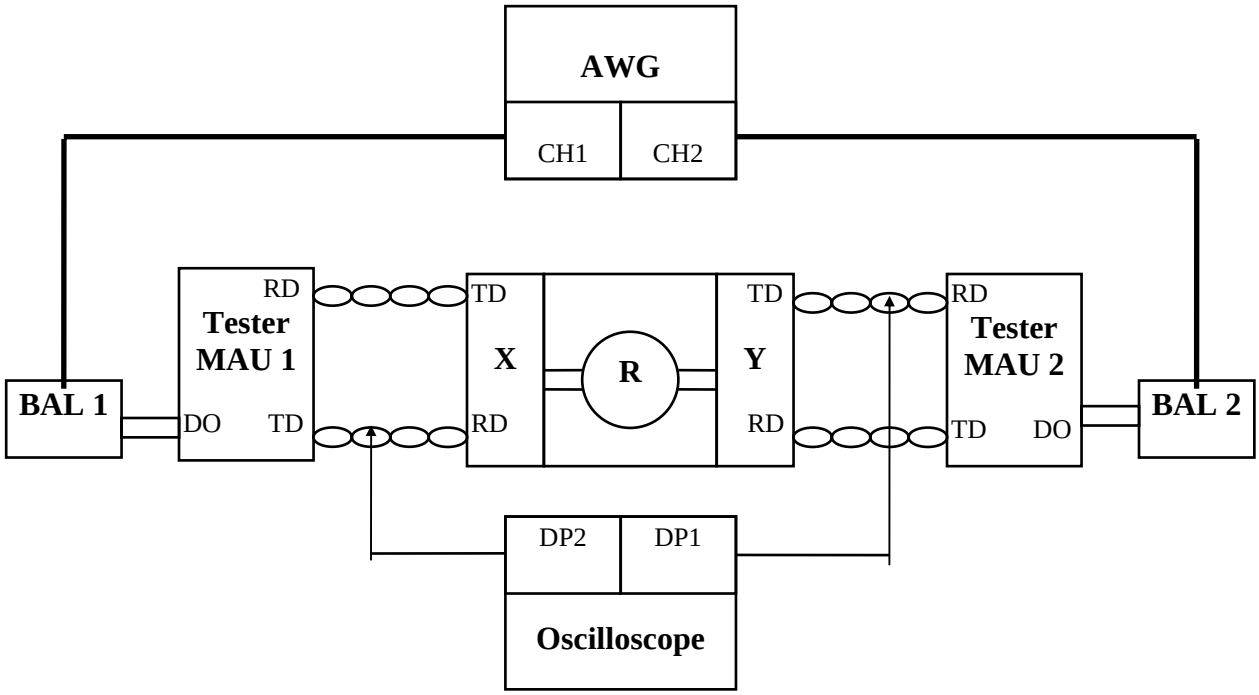

Figure 3.9-1: Test Configuration

Procedure:

1. Apply signal 2-1 to the DO circuit of tester MAU 1.

2. Monitor the RD circuit of port X and the TD circuit of port Y with the differential probes.
3. Observe the first transitions of preamble of both signals on the oscilloscope.

Observable Results:

- The delay between the first transition of preamble on the RD circuit of port X and the first transition of preamble on the TD circuit of port Y must be within 21 BT.

Test #9.4 - DataRdy Inter-Process Flag

Purpose: To verify that the search for the start of frame delimiter does not begin before 15 bits have been received.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.1

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1
- Tester MAU 1, 2

Last Modification: January 14, 1997

Discussion: *DataRdy* indicates that the repeater unit has detected the SFD and is ready to send the received data. The search for the SFD shall not begin before 15 bits have been received.

Test Setup: See Figure 3.9-1

Procedure:

1. Apply signal 2-4 to the DO circuit of tester MAU 1.
2. Monitor the TD circuit of port Y with the differential probe.
3. Observe the data frame sent from the repeater.

Observable Results:

- The data frame generated on the TD circuit of port Y should contain only the 512 pseudo-random bits.

Test #9.5 - Preamble Regeneration Algorithm

Purpose: To verify that the repeater unit implements the preamble regeneration algorithm.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.3, figure 9-2

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1
- Tester MAU 1, 2

Last Modification: December 1, 1994

Discussion: The repeater unit shall output at least 56 preamble bits followed by the SFD. When the repeater unit must send more than 56 bits, the maximum length preamble pattern it shall send is the number received plus 6. Also, from figure 9-2:

SEND PREAMBLE PATTERN
if TT(ALLXN)≥62 and DataRdy and CollIn(ALL)=$\overline{SQE}$ and DataIn=$\overline{II}$ then goto **SEND TWO ONES**

Test Setup: See Figure 3.9-1

Procedure:

1. Apply signal 2-5 to the DO circuit of tester MAU 1.
2. Monitor and observe the resulting signal on the TD circuit of port Y.
3. Apply signal 2-6 to the DO circuit of tester MAU 1.
4. Monitor and observe the resulting signal on the TD circuit of port Y.

Observable Results:

- Signal 2-5 must be reproduced with 62 preamble bits.
- Signal 2-6 must be reproduced with no more than 76 and no less than 62 preamble bits.

Test #9.6 - Fragment Extension Algorithm

Purpose: To verify that the repeater implements the fragment extension algorithm.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.4, figure 9.2

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope
- BAL 1, 2
- Tester MAU 1, 2

Last Modification: September 16, 1995

Discussion: If the received bit sequence from CARRIER_ON to CARRIER_OFF is fewer than 96 bits in length, including preamble, the repeater shall extend the output sequence with Jam such that the total number of bits output from the repeater unit shall equal 96. Also, from figure 9-2:

TRANSMIT COLLISION
if CollIn(ONLY1)=SQE and TT(ALL)≥96 and Tw2Done then goto **ONE PORT LEFT**

Test Setup: See Figure 3.9-1

Procedure:

Case 1:

1. Apply signal 2-7 to the DO circuit of tester MAU 1.
2. Monitor and observe the resulting signal on the TD circuit of port Y.

Case 2:

3. Apply signal 2-7 to the DO circuit of tester MAU 1.
4. After a delay t_1, apply signal 2-1 to the DO circuit of tester MAU 2.
5. Monitor and observe the resulting signal on the TD circuit of port Y.

Observable Results:

Case 1:

- Signal 2-7 should be reproduced on the TD circuit of port Y and extended to 96 bits in length with jam.

Case 2:

- The repeater should continue to generate jam until 96 bits have been generated on the TD circuit of port Y.

Test #9.7 - Start of Collision Propagation Delay

Purpose: To measure the start of collision propagation delay for the repeater set.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.5.6.3

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifiers
- BAL 1, 2
- Tester MAU 1, 2

Last Modification: December 2, 1994

Discussion: The start of collision propagation delay for a repeater is the time delay between the first edge transition of the SQE signal on any of its ports to the first edge transition of jam on its output port(s). When both the input and output ports are 10BASE-T MAUs, the start of collision propagation delay is allowed to be as large as 20.5 BT.

Test Setup: See Figure 3.9-1

Procedure:

1. Apply signal 2-1 to the DO circuit of tester MAU 1.
2. After a delay t_1 , apply signal 2-1 to the DO circuit of tester MAU 2. (The delay t_1 will be chosen to make the transition from data to jam clear.)
3. Monitor and observe the signals sent on the TD circuit of port X and on the RD circuit of port Y.

Observable Results:

- The delay between the first edge transition of preamble on the RD circuit of port Y and the first edge transition of jam on the TD circuit of port X must be no greater than 20.5 BT.

Test #9.8 - Contents of Jam

Purpose: To examine the jam pattern.

References: IEEE 802.3 Standard, 1993-07-08: Sections 9.6.5.2, 4.2.3.2.4

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifiers
- BAL 1, 2
- Tester MAU 1,2

Last Modification: December 2, 1994

Discussion: The content of jam is unspecified; it may be any fixed or variable pattern convenient to the media access implementation but not intentionally designed to be the 32-bit CRC value corresponding to the partial frame transmitted prior to the jam. The first 62 bits transmitted to any port shall be a pattern of alternating 1s and 0s with the first bit transmitted as a 1.

Test Setup: See Figure 3.9-1

Procedure:

1. Observe the jam pattern generated through tests 6.9, 7.9, and 9.9.

Observable Results:

- The contents of the jam pattern must meet the above specifications.

Test #9.9 - Cessation of Jam Propagation Delay

Purpose: To measure the cessation of jam propagation delay.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.5.6.3, figure 9-2

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1, 2
- Tester MAU 1, 2

Last Modification: December 2, 1994

Discussion: The cessation of jam propagation delay for a repeater is the time delay between the input signals at its ports reaching a state such that jam should end at a port and the last transition of jam at the port. When both the input and output ports are 10BASE-T MAUs, the cessation of jam propagation delay is allowed to be as large as 18 BT. Also, from figure 9-2:

TRANSMIT COLLISION
if CollIn(ONLY1)=SQE and TT(ALL)≥96 then goto **ONE PORT LEFT**

ONE PORT LEFT
M ⇐Port(CollIn=SQE)
if DataIn(M) and CollIn(ALL)= $\overline{\text{SQE}}$ and Tw2Done then goto **WAIT**

Test Setup: See Figure 3.9-1

Procedure:

1. Apply signal 2-1 to the DO circuit of tester MAU 1.
2. After a delay t_1, apply signal 2-1 to the DO circuit of tester MAU 2.
3. Monitor and observe the signal on the TD circuit of port Y and the RD circuit on port X.
4. Repeat steps 1 and 2.
5. Monitor and observe the signal on the TD circuit of port X and the RD circuit of port Y.

Observable Results:

- The time from the last transition of data on the TD circuit of port Y to the last transition of jam on the RD circuit of port X must be no greater than 18 BT.
- The time from the last transition of data on the TD circuit of port X to the last transition of jam on the RD circuit of port Y must be no greater than 18 BT.

Test #9.10 - Wait Timer for Length of Continuous Output

Purpose: To measure the wait timer for continuous output.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.5

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1
- Tester MAU 2

Last Modification: December 2, 1994

Discussion: The repeater unit shall interrupt its output if it has transmitted continuously for longer than 40,000 to 75,000 bit times.

Test Setup: See Figure 1.9-1.

Procedure:

1. Apply signal 2-8 to the RD circuit of port X.
2. Monitor and observe the signal on the TD circuit of port Y.

Observable Results:

- No more than 75,000 bits and no less than 40,000 bits should be observed on the TD circuit of port Y.

Test #9.11 - Wait Timer for Time to Disable Output for MAU Jabber Lockup Protection

Purpose: To measure the wait timer for time to disable output for MAU Jabber Lockup Protection.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.5

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifier
- BAL 1
- Tester MAU 2

Last Modification: December 1, 1994

Discussion: The repeater unit shall interrupt its output if it has transmitted continuously for longer than 50,000 BT (-20% +50%). The repeater unit shall then, after 96 to 116 bit times, re-enable transmissions.

Test Setup: See Figure 1.9-1.

Procedure:

1. Apply signal 2-8 to the RD circuit of port X.
2. Monitor and observe the signal on the TD circuit of port Y.

Observable Results:

- No more than 75,000 bits and no less than 40,000 bits should be reproduced on the TD circuit of port Y without interruption.
- Any interruptions must have a duration between 96 and 116 bit times.

Test #9.12 - Collision Count Increment (CCLimit)

Purpose: To verify that the consecutive port collision count is incremented when a collision occurs on a port before a number of bits specified by Tw5 are received. To measure CCLimit.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.6.2, figure 9-6

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- BAL 1, 2
- Tester MAU 1, 2
- Reference Collision Counter

Last Modification: December 2, 1994

Discussion: The algorithm shall isolate a segment from the network when a consecutive collision count has been reached. The number of consecutive collisions that must occur before a segment is partitioned (CCLimit) shall be greater than 30. Also, from figure 9-6:

WATCH FOR COLLISION
StartTw5
if CIPresent(X)=SQE then goto **COLLISION COUNT INCREMENT**

COLLISION COUNT INCREMENT
CC(X)=CC(X)+1
StartTw6

The wait timer for length of packet without collision (Tw5) shall be between 450 and 560 bit times. It is started by StartTw5. Tw5Done is satisfied when the timer has expired.

Test Setup: Set up the devices as shown in Figure 12.9-1.

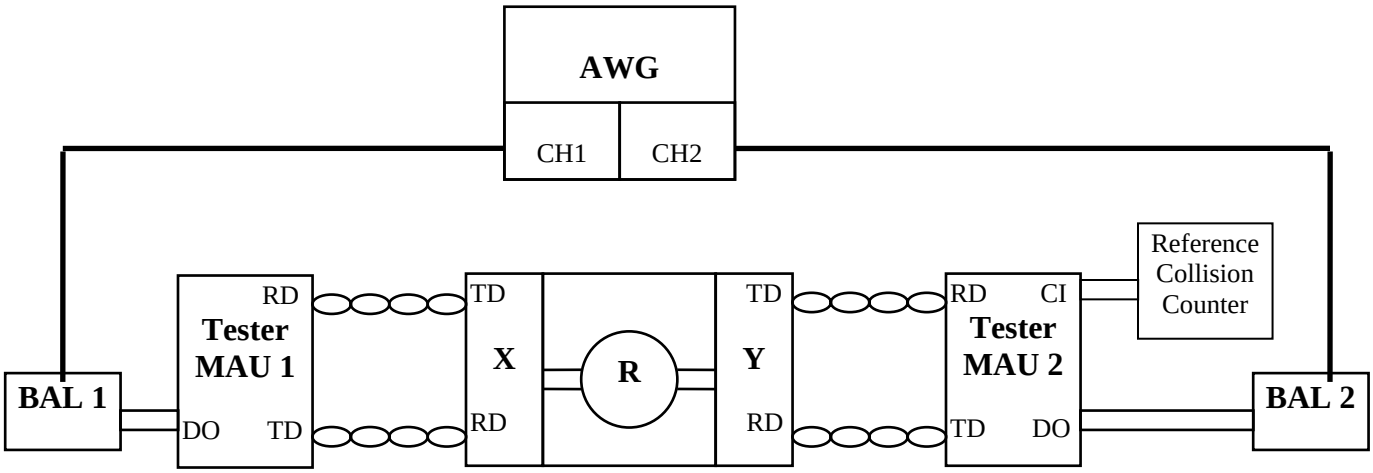

Figure 12.9-1: Test Configuration

Procedure:

1. Power cycle the repeater set and initialize the reference collision counter.
2. Apply signal 2-1 to the DO circuit of tester MAU 1.
3. 445 bit times after the first transition of preamble on the TD circuit of port Y, apply signal 2-1 to the DO circuit of tester MAU 2.
4. The resulting collision should increment the reference collision counter and the collision counter of the repeater set under test.
5. Repeat steps 1-4 until the reference collision counter stops counting.
6. Record the terminal value of the reference collision counter; this is CCLimit.

Observable Results:

- The value of CCLimit shall be greater than 30.

Test #9.13 - Count Clear

Purpose: To verify that the consecutive port collision count is cleared when a number of bits specified by Tw5 are received without incurring collision.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.6.2, figure 9-6

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- BAL 1, 2
- Tester MAU 1, 2
- Reference Collision Counter

Last Modification: December 2, 1994

Discussion: From figure 9-6:

WATCH FOR COLLISION
StartTw5
if Tw5Done and DIPresent(X)=II and CIPresent(X)=SQE then goto **COUNT CLEAR**

The wait timer for length of packet without collision (Tw5) shall be expired between 450 and 560 bit times. It is started by StartTw5. Tw5Done is satisfied when the timer has expired.

Test Setup: See Figure 12.9-1

Procedure:

1. Power cycle the repeater under test and reset the reference collision counter.
2. Apply signal 2-1 to the DO circuit of tester MAU 1.
3. 445 bit times after the first transition of preamble on the TD circuit of port Y, apply signal 2-1 to the DO circuit of tester MAU 2. This should increment the reference collision counter and the collision counter of the repeater set under test.
4. Repeat steps 2 and 3 thirty times.
5. Apply signal 2-1 to the DO circuit of tester MAU 1.
6. 560 bit times after the first transition of preamble on the TD circuit of port Y, apply signal 2-1 to the DO circuit of tester MAU 2. This should increment the reference collision counter and clear the collision counter of the repeater set under test.
7. Reset the reference collision counter.
8. Repeat steps 2 and 3 until the reference collision counter stops counting. This terminal count shall be CCLimit.

Observable Results:

- The value of CCLimit should match the value found for CCLimit found in test #12.9.

Test #9.14 - Collision Count Idle

Purpose: To verify that the consecutive port collision count remains idle when a bit stream with fewer than Tw5 bits is received on port Y.

References: IEEE 802.3 Standard, 1993-07-08: figure 9-6

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- BAL 1, 2
- Tester MAU 1, 2
- Reference Collision Counter

Last Modification: December 2, 1994

Discussion: From figure 9-6:

WATCH FOR COLLISION
StartTw5
if DIPresent=II and CIPresent=SQE then goto **COLLISION COUNT IDLE**

The wait timer for length of packet without collision (Tw5) shall be between 450 and 560 bit times. It is started by StartTw5. Tw5Done is satisfied when the timer has expired.

Test Setup: See Figure 12.9-1

Procedure:

1. Power cycle the repeater under test and reset the reference collision counter.
2. Apply signal 2-1 to the DO circuit of tester MAU 1.
3. 445 bit times after the first transition of preamble on the TD circuit of port Y, apply signal 2-1 to the DO circuit of tester MAU 2. This should increment the reference collision counter and the collision counter of the repeater set under test.
4. Repeat steps 2 and 3 thirty times.
5. Apply signal 2-9 to the DO circuit of tester MAU 1. This should increment neither the reference collision counter nor the collision counter of the repeater set under test.
6. Repeat step 5 ten times.
7. Repeat steps 2 and 3 until the reference collision counter stops counting. This terminal count shall be CCLimit.

Observable Results:

- The value of CCLimit should match the value found for CCLimit found in test #12.9.

Test #9.15 - Wait Timer for Excessive Length of Collision (Tw6)

Purpose: To measure the wait timer for excessive length of collision.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.6.2, figure 9-6

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifiers
- BAL 1, 2
- Tester MAU 1, 2

Last Modification: December 2, 1994

Discussion: The algorithm shall isolate a segment from the network when a single collision duration has exceeded a specific amount of time. Tw6 shall be between 1,000 and 30,000 bit times. It is started by StartTw6. Tw6Done is satisfied when the timer has expired.

Test Setup: See Figure 3.9-1

Procedure:

1. Apply signal 2-10 to the DO circuit of tester MAU 1.
2. After a delay t_1, apply signal 2-10 to the DO circuit of tester MAU 2.
3. Monitor the RD circuit of port Y and the TD circuit of port X with the differential probes.
4. Observe the delay between the first transition of preamble on the RD circuit on port Y and the last transition of data on the TD circuit of port X. This is the value of the wait timer for excessive length of collision.

Observable Results:

- The wait timer for excessive length of collision shall be between 1,000 and 30,000 bit times.

Test #9.16 - Effects of Partition

Purpose: To verify that activity from a partitioned segment to the repeater is blocked but output from the repeater to that segment is not blocked.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.6.2

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifiers
- BAL 1, 2
- Tester MAU 1, 2

Last Modification: December 2, 1994

Discussion: When a segment is partitioned , CollIn(X) and DataIn(X) are forced to $\overline{SQE}$ (no collision) and II (input idle) respectively, so that activity on the port will not affect the repeater unit. Output from the repeater to the segment is not blocked.

Test Setup: Set up the devices as shown in Figure 16.9-1.

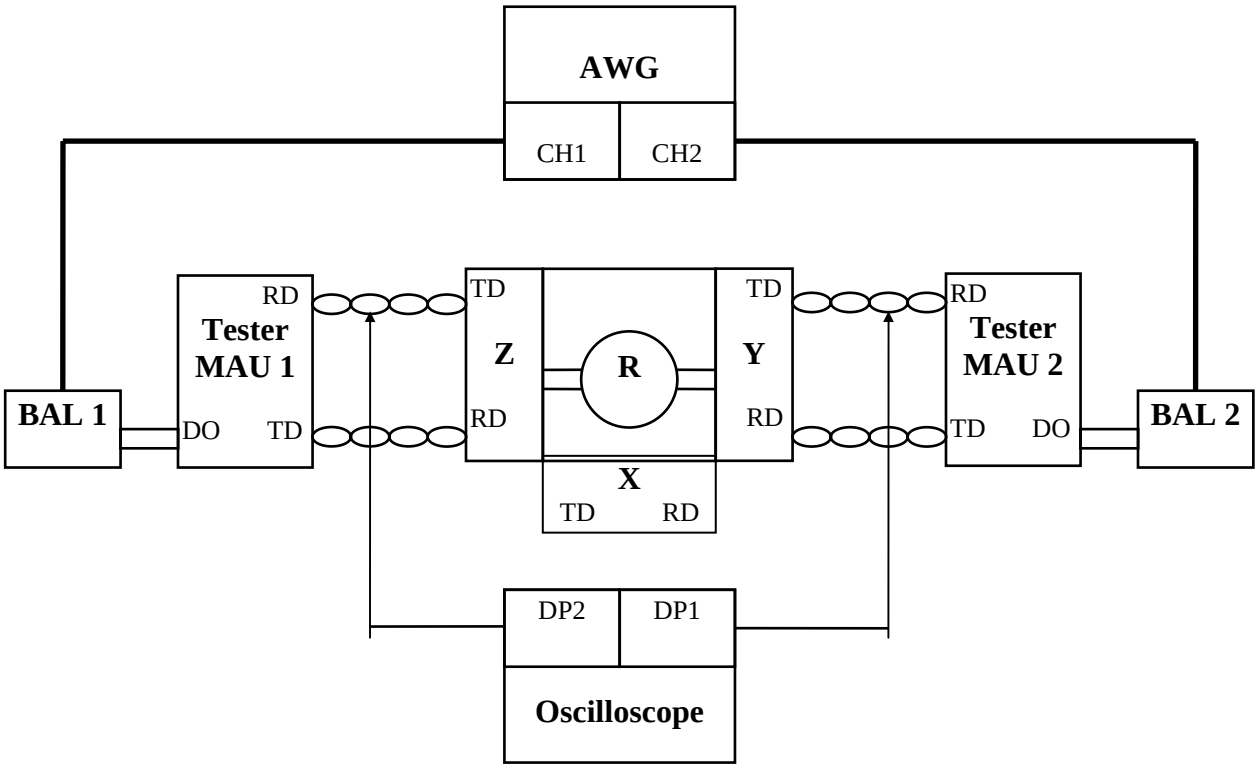

Figure 16.9-1: Test Configuration

Procedure:

1. Successfully complete test #12.9, #13.9, #14.9, or #15.9. The repeater set under test has partitioned port X and port Y.
2. Apply signal 2-9 to the DO circuit of tester MAU 1.
3. Monitor the TD circuit of port Y.
4. Apply signal 2-9 to the DO circuit of tester MAU 2.
5. Monitor the TD circuit of port Z.

Observable Results:

- Signal 2-9 shall be reproduced on port Y.
- Signal 2-9 shall not be reproduced on port Z.

Test #9.17 - Auto-Reconnection

Purpose: To verify that a partitioned segment is reinstated when the repeater has detected activity on the segment for more than the number of bits specified by Tw5 without incurring a collision.

References: IEEE 802.3 Standard, 1993-07-08: Section 9.6.6.2, figure 6-2

Resource Requirements:

- Arbitrary Waveform Generator (AWG)
- Oscilloscope with Differential Probe/Amplifiers
- BAL 1, 2
- Tester MAU 1, 2

Last Modification: December 2, 1994

Discussion: From figure 9-6:

PARTITION COLLISION WATCH
StartTw5
if DIPresent(X)=II and CIPresent(X)=SQE then goto **PARTITION HOLD**
if CIPresent(X)=SQE then goto **PARTITION WAIT**
if Tw5Done and DIPresent(X)=II and CIPresent=SQE

WAIT TO RESTORE PORT
CC(X)=0

Test Setup: See Figure 16.9-1

Procedure:

1. Successfully complete test #12.9, #13.9, #14.9, or #15.9. The repeater set under test has partitioned port X and port Y.
2. Apply signal 2-1 to the DO circuit of tester MAU 2.
3. Monitor the TD circuit of port Z.
4. Apply signal 2-1 to the DO circuit of tester MAU 2 again.
5. Monitor the TD circuit of port Z.

Observable Results:

- The first signal 2-1 should not be reproduced on the TD circuit of port Z.
- The second signal 2-1 shall be reproduced on the TD circuit of port Z.