INTERNATIONAL STANDARD

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Information technology –
Fibre distributed data interface (FDDI) –

Part 26:
Media Access Control Conformance Testing (MAC-ATS)

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FOREWORD

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 9314-26 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

International Standards are drafted in accordance with the ISO/IEC Directives, Part 3.

Annex A is for information only.

ISO/IEC 9314 consists of the following parts, under the general title *Information technology – Fibre Distributed Data Interface (FDDI)*:

- *Part 1: Token Ring Physical Layer Protocol (PHY)*
- *Part 2: Token Ring Media Access Control (MAC)*
- *Part 3: Physical Layer Medium Dependent (PMD)*
- *Part 4: Single Mode Fibre Physical Layer Medium Dependent (SMF-PMD)* [1)]
- *Part 5: Hybrid Ring Control (HRC)*
- *Part 6: Station Management (SMT)*
- *Part 7: Physical Layer Protocol (PHY-2)*
- *Part 8: Media Access Control-2 (MAC-2)*
- *Part 9: Low-cost Fibre Physical Layer Medium Dependent (LCF-PMD)* [1)]
- *Part 13: Conformance Test Protocol Implementation – Conformance Statement (CT-PICS) Proforma*
- *Part 20: Abstract Test Suite for FDDI – Physical Medium Dependent Conformance Testing (PMD-ATS)* [1)]
- *Part 21: Abstract Test Suite for FDDI – Physical Layer Protocol Conformance Testing (PHY-ATS)* [1)]
- *Part 25: Abstract test suite for FDDI – Station Management Conformance Testing (SMT-ATS)*

[1)] To be published.

INTRODUCTION

The Fibre Distributed Data Interface (FDDI) is intended for use in a high performance general-purpose multi-station network and is designed for efficient operation with a peak data rate of 100 Mbit/s. It uses a Token Ring Architecture with optical fibre as the transmission medium. FDDI provides for hundreds of stations operating over an extent of tens of kilometers.

The FDDI Media Access Control (MAC) standard, ISO/IEC 9314-2, specifies the lower sub-layer of the Data Link Layer for FDDI. It specifies access to the medium, including addressing, data checking and data framing. ISO/IEC 9314-2 also specifies the receiver and transmitter state machines. This part of ISO/IEC 9314 is an abstract test suite (ATS) conformance test for FDDI MAC. Since MAC is a protocol that deals primarily with complete PDUs, the Tree and Tabular Combined Notation TTCN language specified in ISO/IEC 9646-3[1)] is used to specify MAC protocol tests.

Four other standards, along with this International Standard, provide a complete conformance test of an FDDI station:

a) An ATS for FDDI Physical Medium Dependent (PMD) that provides a conformance test for FDDI PMD, ISO/IEC 9314-3. ISO/IEC 9314-3 specifies the optical interface of FDDI stations. ISO/IEC 9314-3 is not a protocol standard and this ATS requires the measurement of physical quantities such as optical power, wavelength and signal jitter. The PMD ATS differs from the methodology of higher level protocol conformance tests written using the TTCN, because the TTCN notation does not provide a suitable vehicle for Physical Layer testing, where there is no concept of a protocol data unit and where physical quantities must be measured.

b) An ATS for the FDDI Physical Layer Protocol (PHY) that provides a conformance test for FDDI PHY, ISO/IEC 9314-1. ISO/IEC 9314-1 specifies the upper sublayer of the Physical Layer for the FDDI, including the data encode/decode, framing and clocking, as well as the elasticity buffer, smoothing and repeat filter functions. FDDI PHY, however, does contain several state machines and implements a protocol at the level of FDDI code symbols. The only physical quantity that must be measured in this conformance test is frequency. The PHY ATS cannot use the TTCN notation and a notation is developed in the PHY ATS for specifying test patterns and expected results in terms of FDDI code symbol strings.

c) An ATS for FDDI Station Management (SMT), ISO/IEC 9314-6, that provides a conformance test for FDDI SMT. ISO/IEC 9314-6 specifies the local portion of the system management application process for FDDI, including the control required for proper operation of an FDDI station in an FDDI ring. ISO/IEC 9314-6 provides services such as connection management, station insertion and removal, station initialisation, configuration management and fault recovery, communications protocol for external authority, scheduling policies and the collection of statistics. SMT interacts with PMD, PHY and MAC. Therefore, an ATS for portions of SMT that use MAC PDUs can be specified in TTCN, while other portions require other approaches.

d) A Protocol Implementation Conformance Statement (CT-PICS) proforma, ISO/IEC 9314-13, for FDDI that provides a statement of the mandatory and optional requirements of each of the four FDDI base standards. The PICS proforma is used to identify requirements for conformance testing and to specify optional functionality requirements, particularly by workshops for functional standards and profiles.

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1) ISO/IEC 9646-3:1998, *Information technology – Open systems interconnection – Conformance testing methodology and framework – Part 3: The tree and tabular combined notation (TTCN)*

INFORMATION TECHNOLOGY –
FIBRE DISTRIBUTED DATA INTERFACE (FDDI) –
Part 26: Media Access Control Conformance Testing (MAC-ATS)

1 Scope

This part of ISO/IEC 9314 contains the abstract test suite for the Fibre Distributed Data Interface (FDDI) token ring Media Access Control (MAC) layer protocol. This test suite was developed based on the principles defined in OSI Conformance Testing Methodology and Framework (ISO/IEC 9646) and written in Tree and Tabular Combined Notation (TTCN), and intended for testing conformance to the MAC standard (ISO/IEC 9314-2:1989) of any FDDI stations.

The test methodology is the "remote single layer test" as described in ISO/IEC 9646. The abstract test scripts specify the MAC layer Protocol Data Units (PDU) to be exchanged between the two MAC entities, the MAC on the tester and the MAC on the Implementation Under Test (IUT). The tester is called the Lower Tester (LT).

The test suite does not require use of any higher layer protocols, nor does it assume existence of Logical Link Control (LLC) layer implementation on the IUT. It expects, however, that the Station Management (SMT) function is available on the IUT. Since MAC itself does not originate any data frames, the tester uses SMT to test the processing capability of MAC by sending frames to SMT and observing the SMT originated response frames.

The testing is expected to be conducted in a controlled environment with a minimum configuration (figure 1): a token ring with two stations, one being the LT and the other the IUT.

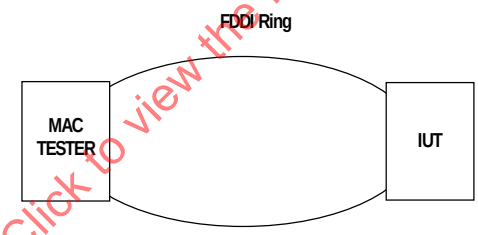

Figure 1 – MAC test configuration

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9314. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 9314 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 9314-1:1989, *Information technology – Fibre Distributed Data Interface (FDDI) – Part 1: Token Ring Physical Layer Protocol (PHY)*

ISO/IEC 9314-2:1989, *Information technology – Fibre Distributed Data Interface (FDDI) – Part 2: Token Ring Media Access Control (MAC)*

ISO/IEC 9314-6:1998, *Information technology – Fibre Distributed Data Interface (FDDI) – Part 6: Station Management (SMT)*

ISO/IEC 9314-13:1998, *Information technology – Fibre Distributed Data Interface (FDDI) – Part 13: Protocol Implementation Conformance Statement (CT-PICS) Proforma*

ISO/IEC 9646-1:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts*

ISO/IEC 9646-2:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract Test Suite specification*

ISO/IEC 9646-3:1998, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 3: The Tree and Tabular Combined Notation (TTCN)*

ISO/IEC 9646-4:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 4: Test realization*

ISO/IEC 9646-5:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 5: Requirements on test laboratories and clients for the conformance assessment process*

ISO/IEC 9646-6:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 6: Protocol profile test specification*

ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements*

3 Abbreviations

The following acronyms are used in the test suite:

– ATS: Abstract Test Suite;
– F: Fail (when used in the verdict column of the Dynamic Behaviour tables);
– I: Inconclusive (when used in the verdict column of the Dynamic Behaviour tables);
– IUT: Implementation Under Test;
– P: Pass (when used in the verdict -column of the Dynamic Behaviour tables);
– PDU: Protocol Data Unit defined in terms of MAC frames;
– PHY: Physical Layer Protocol;
– PICS: Protocol Implementation Conformance Statement;
– PIXIT: Protocol Implementation eXtra Information for Testing;
– TTCN: Tree and Tabular Combined Notation.

4 Organization of test suite

The test cases are divided into seven major groups:

– Basic: tests the ability of the IUT to transmit, receive, repeat and strip frames. The transmission tests are further divided into asynchronous and synchronous transmission. In order to test the synchronous transmission, the IUT must be able to be configured and forced to transmit data at test operator's control; otherwise, these tests should not be selected for testing.
– Claim Token: tests the ability of the IUT to participate in the Claim Token process used to initialise the network. The test includes test cases where the IUT should win the claim and cases where it should lose.
– Beaconing: tests IUT's participation in the Beacon process.
– Addressing: tests the IUT's ability to handle short and long addresses, and broadcasting.
– Timer: tests the IUT's response to the expiration of timers TRT and TVX.
– Frame Error: tests the ability of the IUT to detect errors in frames and tokens.

This test suite is applicable only to equipment using 48 bit addresses. The IUT is expected to process and repeat some frames with short addresses it receives, but it will not generate any short address frames.

5 Timer definitions

A set of timers, as described below, is used in the test suite, their values shall be initialised prior to the beginning of testing unless a default value is specified. Even though the minimum timer unit is in microseconds, an actual implementation of the test suite may require a hardware timer with higher resolutions.

T_Req: the target token rotation timer configured in the IUT in unit of microseconds. This value will be converted to units of 80 ns for the claim process.

TVX: the Valid-Transmission Timer configured in the IUT, in microseconds.

T_Max: the maximum token rotation time, in microseconds.

D_Max: the maximum ring latency. The default value is 1 617 µs.

T_Pri: the threshold value of the highest priority level implemented on the IUT. If priority is not supported then the value of the negotiated TRT is used.

Topr: Time required for a test operator to initiate operations on the IUT, for example, starting synchronous mode transmission. This is used in conjunction with the TTCN Implicit Send event for test co-ordination. The test suite uses a default value of 3 min.

Aux_30: Maximum time allowed for SMT to produce a response, per SMT specification, the value of 30 s is used.

6 Tester implementation

Since the abstract test suite specifies the test sequences at the MAC frame level the implementation of the MAC tester shall provide the following functions:

– Support of the MAC and PHY layer interface.

– Translation of 5-bit symbols received from PHY into 4-bit units and assembly of these units into MAC frames. Note that the PDU fields in this ATS are defined in a mixture of 5-bit symbols and 4-bit data, as appropriate. It is up to the tester implementation to select the internal desirable representations.

– Transmission of frames as specified in the TTCN sequence, including translation of symbols and generation of preambles of proper length.

– Automatic transmission of IDLE symbols when there is nothing to transmit from the TTCN sequence.

– Generation of Frame Check Sequences (FCS), and when requested, insertion of incorrect FCS.

7 PICS and PIXIT information

Additional information about the IUT shall be provided in order to perform tests based on this International Standard. Information is needed to: (1) configure the tester and the FDDI ring, (2) select applicable test cases for the IUT, and (3) perform the test cases selected. They are obtained from answers to the Protocol Implementation Conformance Statements (PICS) and Protocol Implementation Extra Information for Testing (PIXIT) proforma. The PICS proforma for the FDDI MAC is specified in ISO/IEC 9314-13:1998, FDDI CT-PICS. The PIXIT proforma for this ATS is specified in annex A.

8 Test specification in TTCN

8.1 Test Suite Overview

Test Suite Overview		
Suite Name	:	FDDI_MAC
Standards reference	:	ISO/IEC 9314-2:1989
PICS proforma reference	:	ISO/IEC 9314-13:1998
PIXIT proforma reference	:	Section 7 of this standard
PICS/PIXIT use	:	Test case selection and test suite parameters
Test Method(s)	:	Remote Single Layer
Comments	:	

Test Case Identifier	Test Case Reference	Description
Usable_asynch	FDDI_MAC/BASIC/TRANS-MIT/Usable_asynch	Verifies that the IUT sends frames when it captures an unrestricted and usable TOKEN, and there is asynchronous data to transmit.
Release_Token	FDDI_MAC/BASIC/TRANS-MIT/Release_Token	Verifies that the IUT, after sending data frames, will release and transmit the token.
Unusable_asynch_-lateTK	FDDI_MAC/BASIC/TRANS-MIT/Unusable_asynch_late-TK	Verify that the IUT does not capture an unrestricted and late TOKEN (LATE_CT=1) , when it has only asynchronous data to transmit.
Unusable_asynch_-restrictTK	FDDI_MAC/BASIC/TRANSMIT/ Unusable_asynch_restrict-TK	Verify that the IUT does not capture a restricted TOKEN not intended for it, when there is asynchronous data to transmit.
Unusable_asynch_-priority	FDDI_MAC/BASIC/TRANS-MIT/Unusable_asynch_-priority	Verify that the IUT does not capture an unrestricted TOKEN, when IUT does not have a priority to use it and there is asynchronous data to transmit.
Unusable_asynch_noda ta	FDDI_MAC/BASIC/TRANS-MIT/Unusable_asynch_no-data	Verify that the IUT does not capture an unrestricted TOKEN when there is no data to transmit.
Usable_synch_early-restrictTK	FDDI_MAC/BASIC/TRANS-MIT/Usable_synch_early-restrictTK	Verify that IUT captures a restricted early TOKEN (LATE_CT=0) and sends a frame, when there is synchronous data to transmit.
Usable_synch_lateTK	FDDI_MAC/BASIC/TRANS-MIT/Usable_synch_lateTK	Verify that IUT captures a restricted late TOKEN (LATE_CT=1) and sends a frame, when there is synchronous data to transmit.

Test Case Identifier	Test Case Reference	Description
Unusable_synch_-restrictTKnodata	FDDI_MAC/BASIC/TRANS-MIT/Unusable_synch_restrict TKnodata	Verify that IUT does not capture a restricted TOKEN, when there is no synchronous data to transmit.
R_Long_Address	FDDI_MAC/BASIC/RECEIVE/ R_Long_Address	Verify that the IUT receives a frame addressed to it (DA=IUT's address) using LONG ADDRESS, and copies and repeats.
R_Group_Address	FDDI_MAC/BASIC/RECEIVE/ R_Group_Address	Verify that the IUT receives a frame addressed to it (DA=My) with a GROUP ADDRESS from others (SA=Others), copies and repeats this frame.
Void_Frame	FDDI_MAC/BASIC/RECEIVE/ Void_Frame	Verify that the IUT repeats a received void frame that is addressed to it without setting the A and C flags.
E_Long_Address	FDDI_MAC/BASIC/ECHO/E_ Long_Address	Verify that the IUT receives a frame not addressed to it (DA = Others) with (SA = Others) and repeats this frame.
E_Group_Address	FDDI_MAC/BASIC/ECHO/E_ Group_Address	Verify that the IUT receives a frame not addressed to it (DA = Others) with a GROUP ADDRESS from others (SA = Others) and repeats this frame.
Extra_Frame_Status	FDDI_MAC/BASIC/ECHO/-Extra_Frame_Status	Verify that the IUT will repeat a frame not addressed to it containing extra frame control symbols at the end of the frame.
Repeat_AC_Set	FDDI_MAC/BASIC/ECHO/-Repeat_AC_Set	Verify that the IUT will repeat a Broadcast frame with the Frame Status A and C indicators SET.
S_Long_Address	FDDI_MAC/BASIC/STRIP/S_ Long_Address	Verify that the IUT strips a frame from the ring, when it receives a frame with SA=IUT's address.
Higher_Claim	FDDI_MAC/CLAIM_TOKEN/ Higher_Claim	Verify that the IUT receives a claim frame with a higher precedence from another station (SA = Others) and then repeats this frame.
Lower_Claim	FDDI_MAC/CLAIM_TOKEN/-Lower_Claim	Verify that the IUT receives a claim frame with a lower precedence from another station (SA = Others) and then sends its own claim frame.
My_Claim	FDDI_MAC/CLAIM_TOKEN/ My_Claim	Verify that the IUT receives its own claim frame (SA=My) and then issues a TOKEN.
Short_Address_-Frame	FDDI_MAC/ADDRESSING/-Short_Address_Frame	Verify that the IUT receives a frame not addressed to it (DA = Others) and repeats this frame.
Short_Beacon	FDDI_MAC/ADDRESSING/-Short_Beacon	Verify that the IUT recognises a ShortAddress Beacon.

Test Case Identifier	Test Case Reference	Description
Short_Claim	FDDI_MAC/ADDRESSING/-Short_Claim	Verify that the IUT processes a claim frame with a lower precedence and with short addresses. The IUT shall send its own claim frame with long address.
Short_Broadcast	FDDI_MAC/ADDRESSING/-Short_Broadcast	Verify that the IUT accepts a broadcast frame, with short address, and sets the A bit.
Broadcast	FDDI_MAC/ADDRESSING/-Broadcast	Verify that the IUT accepts a broadcast with a long address and sets the A bit.
Others_Beacon	FDDI_MAC/BEACONING/-Others_Beacon	Verify that the IUT receives a BEACON frame from another upstream station (SA = Others) and then repeats this frame.
My_Beacon	FDDI_MAC/BEACONING/My_Beacon	Verify that the IUT receives its own BEACON frame (SA = My) and then sends a claim frame.
TRT	FDDI_MAC/TIMER/TRT	Verify that if TRT expires while the claim is in progress, the IUT will send beacon frame.
TVX	FDDI_MAC/TIMER/TVX	Verify that the IUT will send a claim frame after TVX expires.
Info_Idle	FDDI_MAC/FRAME_ERROR/-Info_Idle	Verify that the IUT strips a frame with an IDLE symbol in the information field.
Info_Invalid_Symbol	FDDI_MAC/FRAME_ERROR/-Info_Invalid_Symbol	Verify that the IUT strips a frame with an invalid symbol in the information field.
FS_Invalid_Symbol	FDDI_MAC/FRAME_ERROR/-FS_Invalid_Symbol	Verify that the IUT strips a frame with an invalid symbol in the Frame Status (FS) field.
SD_JI	FDDI_MAC/FRAME_ERROR/-SD_JI	Verify that the IUT strips a frame with a starting delimiter equal to JI.
FC_Invalid_Symbol	FDDI_MAC/FRAME_ERROR/-FC_Invalid_Symbol	Verify that the IUT strips a frame with an invalid symbol in the Frame Control (FC) field.
FCS_Error_MY_DA	FDDI_MAC/FRAME_ERROR/-FCS_Error_MY_DA	Verify that the IUT does not copy a frame addressed to it (DA = IUT's address) with an error in the FCS field.
FCS_Error_NOT_MY_DA	FDDI_MAC/FRAME_ERROR/-FCS_Error_NOT_MY_DA	Verify that the IUT sets the E indicator in a frame addressed to another station with an error in the FCS field.
FCS_Err_Void	FDDI_MAC/FRAME_ERROR/-FCS_Err_Void	Verify that the IUT strips a void frame addressed to it with an error in the FCS field.
Minimun_Length	FDDI_MAC/FRAME_ERROR/Minimun_Length	Verify that the IUT sets the error indicator in a frame with a length shorter than the minimum length permitted.
ED_Invalid_Symbol	FDDI_MAC/FRAME_ERROR/-ED_Invalid_Symbol	Verify that the IUT strips a TOKEN with an invalid symbol in the Ending Delimiter (ED).

8.2 Test Step Reference

Test Step Identifier	Test Step Reference	Description
INIT_RING	FDDI_MAC/LIBRARY/INIT_-RING	Initiate the ring. At the end of initialisation, the second TOKEN would have circulated back to the tester.
FILTER	FDD_MAC/LIBRARY/FILTER	To filter out all frames (including stripped frames) from the IUT that are to be ignored. Stripped frames are ignored, other frames are repeated.
Send_Echo_Req	FDDI_MAC/LIBRARY/Send_-Echo_Req	To send an echo request frame and wait for the frame to be repeated by the IUT with the A and C flag set.
VERIFICATION	FDDI_MAC/LIBRARY/-VERIFICATION	To verify the that IUT is holding asynchronous data for transmission.

8.3 User Type Definition

User Type Definitions			
Name	**Base Type**	**Definition**	**Comment**
SYMBOL		BITSTRING[5]	

8.4 User Operation Definition

User Operation Definition
Operation Name: TWOS_COM(NUM:INTEGER)
Result Type: INTEGER
Description:
This operator will convert the integer NUM into two's complement format.

8.5 Test Suite Parameters

Test Suite Parameters			
Name	**Type**	**PICS/PIXIT Reference**	**Comments**
IUT_ADDRESS	OCTETSTRING	PIXIT1.1	48-bit address assigned to IUT. MSB on the left.
TESTER_ADDRESS	OCTETSTRING	PIXIT1.2	Address assigned to the tester.
OTHERS_ADDRESS	OCTETSTRING	PIXIT1.3	Address to be used for a station other than the IUT and TESTER.
IUT_GROUP_ADDR	OCTETSTRING	PIXIT2.1	Group address to be used by the IUT, shall include the group address.
OTHERS_GROUP_ADDR	OCTETSTRING	PIXIT2.2	Group address not used by the IUT, shall include the group address.
T_REQ	INTEGER	PIXIT3.1	Value of TTRT on IUT (in microseconds).
T_Max	INTEGER	PIXIT3.2	Maximum TRT value (in microseconds).
TVXvalue	INTEGER	PIXIT3.3	The value of IUT's TVX timer in microseconds.
PRIthreshold	INTEGER	PIXIT 4	The threshold value, T Pri of the lowest priority class. Set to TTRT if no priority class is implemented.

8.6 Test Suite Constants

Test Suite Constants			
Name	**Type**	**Value**	**Comments**
J	SYMBOL	'11000'B	J and K SYMBOLS
JK	SYMBOL[2]	'1100010001'B	J and K SYMBOLS
TT	SYMBOL[2]	'0110101101'B	TOKEN'S ED
T	SYMBOL	'01101'B	T SYMBOL
SET	SYMBOL	'11001'B	SET symbol
RESET	SYMBOL	'00111'B	RESET symbol
M	INTEGER	'1000000'B	Factor of multiplication for timers
ED_TK_INVALID	SYMBOL[2]	'0110100101'B	ED with an invalid symbol
ED_TK_IDLE	SYMBOL[2]	'0110111111'B	ED with an idle symbol
SD_ERROR_JI	SYMBOL[2]	'1100011111'B	SD with JI symbol
SD_ERROR_JX	SYMBOL[2]	'1100001111'B	SD with JX symbol
INVALID	SYMBOL	'00011'B	Invalid symbol
IDLE	SYMBOL	'11111'B	Idle symbol
NUMBER	OCTETSTRING	'07'H	Number 7
DELTA	INTEGER	1000	Timer adjustment factor, in microseconds
FCS_ERROR	OCTETSTRING	'00000000'H	To force an FCS error
SHORT_ADDR_OTHER	OCTETSTRING[2]	'1001'H	Short address for any other stations
SHORT_ADDR_TESTER	OCTETSTRING[2]	'1000'H	Tester's short address
BROADCAST_ADDR	OCTETSTRING[6]	'FFFFFFFFFFFF'H	Broadcast Address
INFO_DATA	OCTETSTRING	'00'H	Data in the info field

8.7 Test Suite Variables

Test Suite Variables			
Name	**Type**	**Value**	**Comments**
HIGHER_T_BID	INTEGER		Bid value higher than IUT's bid, in unit of 80 ns, in 2's complement
LOWER_T_BID	INTEGER		Bid value lower than IUT's bid, in unit of 80 ns, in 2's complement
IUT_T_BID	INTEGER		IUT'S bid, in unit of 80 ns in 2's complement
T_NEG	INTEGER		TRT value in microseconds, after the claim process
T1	INTEGER		Variable for temporary values

8.8 Timer Declarations

Timer Declarations			
Timer Name	**Duration**	**Units**	**Comments**
Timer_TRT	T_REQ	µs	TOKEN ROTATION TIMER (in microseconds)
Timer_TVX	TVXvalue	µs	VALID TRANSMISSION TIMER (in microseconds)
Timer_AUX_30	30	s	30 SECONDS AUXILIARY TIMER
D_Max	1 617	µs	MAXIMUM RING LATENCY TIME (in microseconds)
Topr	180	s	OPERATOR TIMER (in seconds)

8.9 PDU Type Declarations

8.9.1 PDU Type Declaration for TOKEN

PDU Type Declaration		
PDU Name: TOKEN	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
ED	SYMBOL[2]	END DELIMITER

8.9.2 PDU Type Declaration for CLAIM

PDU Type Declaration		
PDU Name: CLAIM	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO	OCTETSTRING[1]	T_BID VALUE
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.3 PDU Type Declaration for Short_CLAIM

PDU Type Declaration		
PDU Name: CLAIM_SHORT	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[2]	DESTINATION ADDRESS
SA	OCTETSTRING[2]	SOURCE ADDRESS
INFO	OCTETSTRING[1]	T_BID VALUE
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.4 PDU Type Declaration for BEACON

PDU Type Declaration		
PDU Name: BEACON	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO1	OCTETSTRING[1]	FIRST BYTE OF INFO
INFO2	OCTETSTRING[3]	LAST THREE BYTES OF INFO
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATORS
FS_T	SYMBOL[1]	SYMBOL T

8.9.5 PDU Type Declaration for Short_BEACON

PDU Type Declaration		
PDU Name: BEACON_SHORT	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[2]	DESTINATION ADDRESS
SA	OCTETSTRING[2]	SOURCE ADDRESS
INFO1	OCTETSTRING[1]	FIRST BYTE OF INFO
INFO2	OCTETSTRING[3]	LAST THREE BYTES OF INFO
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATORS
FS_T	SYMBOL[1]	SYMBOL T

8.9.6 PDU Type Declaration for FRAME

PDU Type Declaration		
PDU Name: FRAME	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO	OCTETSTRING[0..4 479]	INFORMATION FIELD
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.7 PDU Type Declaration for FRAME_ERROR_FC

PDU Type Declaration		
PDU Name: FRAME_ERROR_FC	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	SYMBOL[1]	FRAME CONTROL WITH ERROR
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO	OCTETSTRING[1]	INFORMATION FIELD
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.8 PDU Type Declaration for FRAME_ERROR_INFO

PDU Type Declaration		
PDU Name: FRAME_ERROR_INFO	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO	SYMBOL[1]	INFORMATION FIELD WITH ERROR
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.9 PDU Type Declaration for FRAME_SHORT_ADDRESS

PDU Type Declaration		
PDU Name: FRAME_SHORT_ADDRESS	**PCO Type**: L	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[2]	DESTINATION ADDRESS
SA	OCTETSTRING[2]	SOURCE ADDRESS
INFO	OCTETSTRING[1]	INFORMATION FIELD
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.10 PDU Type Declaration for ECHO_FRAME

PDU Type Declaration		
PDU Name: ECHO_FRAME	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO_ECHO	GROUP	
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.11 PDU Type Declaration for SMT_FRAME

PDU Type Declaration		
PDU Name: SMT_FRAME	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[6]	DESTINATION ADDRESS
SA	OCTETSTRING[6]	SOURCE ADDRESS
INFO_SMT	GROUP	TEXT OF A SMT FRAME
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.9.12 PDU Type Declaration for SMT_SHORT

PDU Type Declaration		
PDU Name: SMT_SHORT	**PCO Type**:	**Comments**:
PDU Field Information		
Field Name	**Type**	**Comments**
SD	SYMBOL[2]	START DELIMITER
FC	OCTETSTRING[1]	FRAME CONTROL
DA	OCTETSTRING[2]	DESTINATION ADDRESS
SA	OCTETSTRING[2]	SOURCE ADDRESS
INFO_SMT	GROUP	TEXT OF A SMT FRAME
FCS	OCTETSTRING[4]	FRAME CONTROL SEQUENCE
ED	SYMBOL[1]	END DELIMITER
FS_E	SYMBOL[1]	CONTROL INDICATOR E (error)
FS_A	SYMBOL[1]	CONTROL INDICATOR A (address)
FS_C	SYMBOL[1]	CONTROL INDICATOR C (copy)
FS_2	SYMBOL[0..4]	ADDITIONAL CONTROL INDICATOR
FS_T	SYMBOL[1]	SYMBOL T

8.10 PDU Field Group Type Declarations

8.10.1 PDU Field Group Type Constraint Declaration for Echo Frame

PDU Field Group Type Declaration		
Field Group Name: INFO_ECHO	**Comments**: Text of SMT Echo Frame	
PDU Field Information		
Field Name	**Type**	**Comments**
FRAME_CLASS	OCTETSTRING[1]	ECF-ECHO
FRAME_TYPE	OCTETSTRING[1]	RESP=03, REQ=02
VERSION_ID	OCTETSTRING[2]	
TRANSACTION_ID	OCTETSTRING[4]	
STATION_ID1	OCTETSTRING[2]	
STATION_ID2	OCTETSTRING[6]	
PAD	OCTETSTRING[2]	
INFO_FIELD_LENGTH	OCTETSTRING[2]	
PARAMETER_TYPE	OCTETSTRING[2]	
PARAMETER_11_LEN	OCTETSTRING[2]	
ECHO_DATA	OCTETSTRING[8]	

8.10.2 PDU Field Group Type Constraint Declaration for SMT Frame

PDU Field Group Type Declaration	
Field Group Name: INFO_SMT	**Comments**: Text of SMT Frames

PDU Field Information		
Field Name	**Type**	**Comments**
FRAME_CLASS	OCTETSTRING[1]	
FRAME_TYPE	OCTETSTRING[1]	
VERSION_ID	OCTETSTRING[2]	
TRANSACTION_ID	OCTETSTRING[4]	
STATION_ID1	OCTETSTRING[2]	
STATION_ID2	OCTETSTRING[6]	
PAD	OCTETSTRING[2]	
INFO_FIELD_LENGTH	OCTETSTRING[2]	
PARAMETER_TYPE	OCTETSTRING[2]	
PARAMETER_11_LEN	OCTETSTRING[2]	
SMT_DATA1	OCTETSTRING[2]	
SMT_DATA2	OCTETSTRING[0..32]	

8.11 PDU Constraint Declarations

8.11.1 PDU Constraint Declaration for IUT's CLAIM

PDU Constraint Declaration	
PDU Name: CLAIM	**Constraint Name**: CLAIM_IUT(BID: integer)
Field Name	**Value**
SD	JK
FC	'C3'H
DA	IUT_ADDRESS
SA	IUT_ADDRESS
INFO	BID
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: IUT's CLAIM FRAME, BID contains the value of T req.	

8.11.2 PDU Constraint Declaration for IUT's CLAIM

PDU Constraint Declaration	
PDU Name: CLAIM	**Constraint Name**: CLAIM_TESTER(BID: integer)
Field Name	**Value**
SD	JK
FC	'C3'H
DA	TESTER_ADDRESS
SA	TESTER_ADDRESS
INFO	BID
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: TESTER CLAIM FRAME, BID contains the value of T req.	

8.11.3 PDU Constraint Declaration for Tester's Short_CLAIM

PDU Constraint Declaration	
PDU Name: CLAIM_SHORT	**Constraint Name**: CLAIM_SHORT_ADD(BID: integer)
Field Name	**Value**
SD	JK
FC	'83'H
DA	SHORT_ADDR_TESTER
SA	SHORT_ADDR_TESTER
INFO	BID
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: TESTER CLAIM FRAME, short address, BID contains the value of T req.	

8.11.4 PDU Constraint Declaration for IUT's BEACON

PDU Constraint Declaration	
PDU Name: BEACON	**Constraint Name**: BEACON_IUT
Field Name	**Value**
SD	JK
FC	'C2'H
DA	'000000000000'H
SA	IUT_ADDRESS
INFO1	'00'H
INFO2	'000000'H
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.5 PDU Constraint Declaration for Tester's BEACON

PDU Constraint Declaration	
PDU Name: BEACON	**Constraint Name**: BEACON_TESTER
Field Name	**Value**
SD	JK
FC	'C2'H
DA	'00000000000000'H
SA	TESTER_ADDRESS
INFO1	'00'H
INFO2	'000000'H
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.6 PDU Constraint Declaration for Tester's Short_BEACON

PDU Constraint Declaration	
PDU Name: BEACON_SHORT	**Constraint Name**: BEACON_SHORT_C
Field Name	**Value**
SD	JK
FC	'82'H
DA	'0000'H
SA	SHORT_ADDR_TESTER
INFO1	'00'H
INFO2	'000000'H
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.7 PDU Constraint Declaration for Restricted Token

PDU Constraint Declaration	
PDU Name: TOKEN	**Constraint Name**: TOKEN_R
Value	**Field Name**
SD	JK
FC	'C0'H
ED	TT
Comments: Restricted TOKEN	

8.11.8 PDU Constraint Declaration for Unrestricted Token

PDU Constraint Declaration	
PDU Name: TOKEN	**Constraint Name**: TOKEN_UR
Field Name	**Value**
SD	JK
FC	'80'H
ED	TT
Comments: Unrestricted TOKEN.	

8.11.9 PDU Constraint Declaration for Token_Error1

PDU Constraint Declaration	
PDU Name: TOKEN	**Constraint Name**: TOKEN_E1
Field Name	**Value**
SD	JK
FC	'C0'H
ED	ED_TK_INVALID
Comments:	

8.11.10 PDU Constraint Declaration for Token_Error2

PDU Constraint Declaration	
PDU Name: TOKEN	**Constraint Name**: TOKEN_E2
Field Name	**Value**
SD	JK
FC	'C0'H
ED	ED_TK_IDLE
Comments:	

8.11.11 PDU Constraint Declaration for SMT_Frame1

PDU Constraint Declaration	
PDU Name: SMT_FRAME	**Constraint Name**: SMT1
Field Name	**Value**
SD	JK
FC	'4F'H
DA	?
SA	IUT_ADDRESS
INFO_SMT	?
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	*
FS_T	T
Comments: Need to verify the value of FC.	

8.11.12 PDU Constraint Declaration for Echo_Response

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: SMT1_R
Field Name	**Value**
SD	JK
FC	'4F'H
DA	BROADCAST_ADDR
SA	IUT_ADDRESS
INFO_ECHO	INFO_ECHO_RESP
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments:	

8.11.13 PDU Constraint Declaration for Short_NIF_Announce

PDU Constraint Declaration	
PDU Name: SMT_SHORT	**Constraint Name**: SB_NIF_CS
Field Name	**Value**
SD	JK
FC	'0F'H
DA	'FFFF'H[2]
SA	SHORT_ADDR_TESTER[2]
INFO_SMT	NIF_ANNOUNCEMNT
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: NIF Announcement frame using short broadcast address.	

8.11.14 PDU Constraint Declaration for Sort_NIF_Announce_Return

PDU Constraint Declaration	
PDU Name: SMT_SHORT	**Constraint Name**: SB_NIF_CR
Field Name	**Value**
SD	JK
FC	'0F'H
DA	'FFFF'H[2]
SA	SHORT_ADDR_TESTER[2]
INFO_SMT	NIF_ANNOUNCEMNT
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments: Return of NIF Announce frame using short broadcast address.	

8.11.15 PDU Constraint Declaration for NIF_Long_Announce

PDU Constraint Declaration	
PDU Name: SMT_FRAME	**Constraint Name**: B_NIF_CS
Field Name	**Value**
SD	JK
FC	'4F'H
DA	BROADCAST_ADDR
SA	TESTER_ADDRESS
INFO_SMT	NIF_ANNOUNCEMNT
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: NIF Announcement frame using long broadcast address.	

8.11.16 PDU Constraint Declaration for Long_NIF_Announce_Return

PDU Constraint Declaration	
PDU Name: SMT_FRAME	**Constraint Name**: B_NIF_CR
Field Name	**Value**
SD	JK
FC	'4F'H
DA	BROADCAST_ADDR
SA	TESTER_ADDRESS
INFO_SMT	NIF_ANNOUNCEMNT
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments: Return of NIF Announcement frame with long broadcast address.	

8.11.17 PDU Constraint Declaration for NIF_Request

PDU Constraint Declaration	
PDU Name: SMT_FRAME	**Constraint Name**: B_NIF_Req_R
Field Name	**Value**
SD	JK
FC	'4F'H
DA	BROADCAST_ADDR
SA	OTHERS_ADDRESS
INFO_SMT	NIF_REQUEST
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments: This frame simulates the tester repeating a NIF NSA Request frame from its upstream neighbour.	

8.11.18 PDU Constraint Declaration for Echo_Request

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: ECHO_Req
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.19 PDU Constraint Declaration for Echo_Request_AC

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: ECHO_Req_AC
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments:	

8.11.20 PDU Constraint Declaration for Echo_Response

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: ECHO_Resp
Field Name	**Value**
SD	JK
FC	'4F'H
DA	TESTER_ADDRESS
SA	IUT_ADDRESS
INFO_ECHO	INFO_ECHO_RESP
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	*
FS_T	T
Comments: Need to verify the value of FC.	

8.11.21 PDU Constraint Declaration for Group_Echo_Request1

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_CGR
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_GROUP_ADDR
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments:	

8.11.22 PDU Constraint Declaration for Group_Echo_Request2

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_CGS
Field Name	**Value**
SD	JK
FC	'41'H
DA	IUT_GROUP_ADDR
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.23 PDU Constraint Declaration for Frame_DATA

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: DATA
Field Name	**Value**
SD	JK
FC	'D0'H
DA	?
SA	IUT_ADDRESS
INFO	?
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	*
FS_T	T
Comments: This frame is used for synchronous data, therefore is considered as a LLC frame (FC: 11010000)	

8.11.24 PDU Constraint Declaration for Frame_R

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_R
Field Name	**Value**
SD	JK
FC	'D0'H
DA	TESTER_ADDRESS
SA	IUT_ADDRESS
INFO	INFO_DATA [1]
FCS	?
ED	T
FS_E	RESET
FS_A	SET
FS_C	SET
FS_2	–
FS_T	T
Comments: For frame repeat	

8.11.25 PDU Constraint Declaration for Frame_RL

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_RL
Field Name	**Value**
SD	JK
FC	'D0'H
DA	OTHERS_ADDRESS
SA	TESTER_ADDRESS
INFO	INFO_DATA [1]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.26 PDU Constraint Declaration for Frame_RG

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_RG
Field Name	**Value**
SD	JK
FC	'D0'H
DA	OTHERS_GROUP_ADDR
SA	TESTER_ADDRESS
INFO	INFO_DATA [1]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.27 PDU Constraint Declaration for Frame_RS

PDU Constraint Declaration	
PDU Name: FRAME_SHORT_ADDRESS	**Constraint Name**: FRAME_RS
Field Name	**Value**
SD	JK
FC	'90'H
DA	SHORT_ADDR_OTHER
SA	SHORT_ADDR_TESTER
INFO	INFO_DATA [1]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: This is a short address frame (LLC synchronous frame). The IUT should just repeat.	

8.11.28 PDU Constraint Declaration for Frame_XFS

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_XFS
Field Name	**Value**
SD	JK
FC	'D0'H
DA	OTHERS_ADDRESS
SA	TESTER_ADDRESS
INFO	INFO_DATA [1]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	'0011100111111001'B[3]
FS_T	T
Comments:	

8.11.29 PDU Constraint Declaration for Void_LS

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: Void_LS
Field Name	**Value**
SD	JK
FC	'40'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	INFO_DATA[1]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.30 PDU Constraint Declaration for Fill_Frame

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FILL_FRAME
Field Name	**Value**
SD	JK
FC	'C3'H
DA	OTHERS_ADDRESS
SA	TESTER_ADDRESS
INFO	INFO_DATA [1]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.31 PDU Constraint Declaration for Frame_Error1

PDU Constraint Declaration	
PDU Name: FRAME_ERROR_INFO	**Constraint Name**: FRAME_E1
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	IDLE
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: There is an IDLE symbol in INFO field. The frame is a SMT frame.	

8.11.32 PDU Constraint Declaration for Frame Error2

PDU Constraint Declaration	
PDU Name: FRAME_ERROR_INFO	**Constraint Name**: FRAME_E2
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	INVALID
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: There is an INVALID symbol in the INFO field, the frame is a SMT frame.	

8.11.33 PDU Constraint Declaration for Frame_Error4

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_E4
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	INVALID
FS_C	RESET
FS_2	–
FS_T	T
Comments: This frame, FS has an INVALID symbol.	

8.11.34 PDU Constraint Declaration for Frame_Error5

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_E5
Field Name	**Value**
SD	SD_ERROR_JX
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.35 PDU Constraint Declaration for Frame_Error6

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_E6
Field Name	**Value**
SD	SD_ERROR_JI
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.36 PDU Constraint Declaration for Frame_Error8

PDU Constraint Declaration	
PDU Name: FRAME_ERROR_FC	**Constraint Name**: FRAME_E8
Field Name	**Value**
SD	JK
FC	INVALID
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	NUMBER
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.37 PDU Constraint Declaration for Frame_Error9

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_E9
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	FCS_ERROR
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.38 PDU Constraint Declaration for Frame_Error10

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: FRAME_E10
Field Name	**Value**
SD	JK
FC	'4F'H
DA	OTHERS_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	FCS_ERROR
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.39 PDU Constraint Declaration for Frame_Error11

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_E11
Field Name	**Value**
SD	JK
FC	'40'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	INFO_DATA[1]
FCS	FCS_ERROR
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.40 PDU Constraint Declaration for Frame_Error12

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_E12
Field Name	**Value**
SD	JK
FC	'C3'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	'00'H [3]
FCS	?
ED	T
FS_E	RESET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments: Minimum length frame (for a MAC frame, INFO ≥ 4 octets).	

8.11.41 PDU Constraint Declaration for Frame_Strip

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: FRAME_Strip
Field Name	**Value**
SD	JK
FC	?
DA	?
SA	*
INFO	*
FCS	–
ED	–
FS_E	–
FS_A	–
FS_C	–
FS_2	–
FS_T	–
Comments: This frame represents all frames stripped by the IUT. SA & part of INFO may also be repeated. If SA is stripped, so should be INFO.	

8.11.42 PDU Constraint Declaration for Frame_Strip1

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: STRIP_1
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	–
FCS	–
ED	–
FS_E	–
FS_A	–
FS_C	–
FS_2	–
FS_T	–
Comments: The error is in the first symbol of the INFO FIELD.	

8.11.43 PDU Constraint Declaration for Frame_Strip2

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: STRIP_2
Field Name	**Value**
SD	JK
FC	'4F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	RESET
FS_A	–
FS_C	–
FS_2	–
FS_T	–
Comments: The error is in the A FLAG.	

8.11.44 PDU Constraint Declaration for Frame_Strip3

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: STRIP_3
Field Name	**Value**
SD	J
FC	–
DA	–
SA	–
INFO_ECHO	–
FCS	–
ED	–
FS_E	–
FS_A	–
FS_C	–
FS_2	–
FS_T	–
Comments:	

8.11.45 PDU Constraint Declaration for Frame_Strip4

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: STRIP_4
Field Name	**Value**
SD	JK
FC	–
DA	–
SA	–
INFO	–
FCS	–
ED	–
FS_E	–
FS_A	–
FS_C	–
FS_2	–
FS_T	–
Comments:	

8.11.46 PDU Constraint Declaration for Frame_Strip5

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: STRIP_5
Field Name	**Value**
SD	JK
FC	'8F'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	SET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.47 PDU Constraint Declaration for Frame_Strip6

PDU Constraint Declaration	
PDU Name: ECHO_FRAME	**Constraint Name**: STRIP_6
Field Name	**Value**
SD	JK
FC	'4F'H
DA	OTHERS_ADDRESS
SA	TESTER_ADDRESS
INFO_ECHO	INFO_ECHO_REQ
FCS	?
ED	T
FS_E	SET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.48 PDU Constraint Declaration for Frame_Strip7

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: STRIP_7
Field Name	**Value**
SD	JK
FC	'C3'H
DA	OTHERS_ADDRESS
SA	TESTER_ADDRESS
INFO	'00'H[3]
FCS	?
ED	T
FS_E	SET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.11.49 PDU Constraint Declaration for Frame_Strip8

PDU Constraint Declaration	
PDU Name: FRAME	**Constraint Name**: STRIP_8
Field Name	**Value**
SD	JK
FC	'40'H
DA	IUT_ADDRESS
SA	TESTER_ADDRESS
INFO	INFO_DATA[1]
FCS	FCS_ERROR
ED	T
FS_E	SET
FS_A	RESET
FS_C	RESET
FS_2	–
FS_T	T
Comments:	

8.12 PDU Field Group Constraint Declarations

8.12.1 PDU Field Group Constraint Declaration for Echo Request

PDU Field Group Constraint Declaration	
Field Group Name: INFO_ECHO	**Constraint Name**: INFO_ECHO_REQ
Field Name	**Value**
FRAME_CLASS	'04'H
FRAME_TYPE	'02'H
VERSION_ID	'0001'H
TRANSACTION_ID	'00000001'H
STATION_ID1	'0000'H
STATION_ID2	TESTER_ADDRESS
PAD	'0000'H
INFO_FIELD_LENGTH	'000C'H
PARAMETER_TYPE	'0011'H
PARAMETER_11_LEN	'0008'H
ECHO_DATA	'0123456789ABCDEF'H
Comments:	

8.12.2 PDU Field Group Constraint Declaration for Echo Response

PDU Field Group Constraint Declaration	
Field Group Name: INFO_ECHO	**Constraint Name**: INFO_ECHO_RESP
Field Name	**Value**
FRAME_CLASS	'04'H
FRAME_TYPE	'03'H
VERSION_ID	'0000'H
TRANSACTION_ID	'00000001'H
STATION_ID1	'0000'H
STATION_ID2	IUT_ADDRESS
PAD	'0000'H
INFO_FIELD_LENGTH	'000C'H
PARAMETER_TYPE	'0011'H
PARAMETER_11_LEN	'0008'H
ECHO_DATA	'0123456789ABCDEF'H
Comments:	

8.12.3 PDU Field Group Constraint Declaration for NIF Announcement

PDU Field Group Constraint Declaration	
Field Group Name: INFO_SMT	**Constraint Name**: NIF_ANNOUNCEMNT
Field Name	**Value**
FRAME_CLASS	'01'H
FRAME_TYPE	'01'H
VERSION_ID	'0001'H
TRANSACTION_ID	'00000002'H
STATION_ID1	'0000'H
STATION_ID2	TESTER_ADDRESS
PAD	'0000'H
INFO_FIELD_LENGTH	'000C'H
PARAMETER_TYPE	'0001'H
PARAMETER_11_LEN	'0008'H
SMT_DATA1	'0000'H
SMT_DATA2	TESTER_ADDRESS[6]
Comments:	

8.12.4 PDU Field Group Constraint Declaration for NIF Request

PDU Field Group Constraint Declaration	
Field Group Name: INFO_SMT	**Constraint Name**: NIF_REQUEST
Field Name	**Value**
FRAME_CLASS	'01'H
FRAME_TYPE	'02'H
VERSION_ID	'0001'H
TRANSACTION_ID	'00000003'H
STATION_ID1	'0000'H
STATION_ID2	TESTER_ADDRESS
PAD	'0000'H
INFO_FIELD_LENGTH	'000C'H
PARAMETER_TYPE	'0001'H
PARAMETER_11_LEN	'0008'H
SMT_DATA1	'0000'H
SMT_DATA2	TESTER_ADDRESS[6]
Comments:	

8.13 Test Case Dynamic Behaviour

8.13.1 Usable_asynch

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Usable_asynch				
Identifier : Usable_asynch				
Purpose : Verifies that the IUT sends frames when it captures an unrestricted and usable TOKEN, and there is asynchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
+Send_Echo_Req				(1)
START Timer_AUX_30				(2)
!TOKEN	L0	TOKEN_UR		
?ECHO_FRAME	L1	ECHO_Resp	P	
+FILTER				
GOTO L1				
?TOKEN		TOKEN_UR		(3)
GOTO L0				
?OTHERWISE			F	
?TIMEOUT Timer_AUX_30			F	
Extended Comments:				
(1) Force IUT to have asynchronous data to transmit.				
(2) Wait for data.				
(3) Repeat.				
The IUT shall be configured to use asynchronous transmission only. See 5.4.1: T(02) and 5.4.2: T(10a) in ISO/IEC 9314-2:1989.				

8.13.2 Release_Token

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Release_Token				
Identifier : Release_Token				
Purpose : Verifies that the IUT, after sending data frames, will release and transmit the token.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
+Send_Echo_Req				(1)
START Timer_AUX_30				(2)
!TOKEN	L0	TOKEN_UR		
?ECHO_FRAME START Timer_TRT	L1	ECHO_Resp		
?TOKEN	L2	TOKEN_UR	P	
+FILTER				
GOTO L2				
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
+FILTER				
GOTO L1				
?TOKEN		TOKEN_UR		(3)
GOTO L0				
?OTHERWISE			F	
?TIMEOUT Timer_AUX_30			F	

Extended Comments:

(1) Force IUT to have asynchronous data to transmit.

(2) Wait for data.

(3) Repeat.

The IUT shall be configured to use asynchronous transmission only. See 5.4.4: T(23) in ISO/IEC 9314-2:1989.

8.13.3 Unusable_asynch_lateTK

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Unusable_asynch_lateTK				
Identifier : Unusable_asynch_lateTK				
Purpose : Verify that the IUT does not capture an unrestricted and late TOKEN (LATE_CT=1), when it has only asynchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
+Send_Echo_Req				(1)
START Timer_AUX_30,START Timer_TVX				(2)
(TVXvalue-DELTA)				
START Timer_TRT	L0			(3)
?TIMEOUT Timer_TRT	L1			
!TOKEN		TOKEN_UR		
?TIMEOUT Timer_AUX_30	L2		P	
+VERIFICATION				(4)
?TOKEN		TOKEN_UR		
GOTO L0				
?FRAME		FILL_FRAME		(5)
GOTO L0				
?OTHERWISE			F	
?FRAME		FILL_FRAME		(5)
GOTO L1				
?TIMEOUT Timer_TVX				
!FRAME START Timer_TVX		FILL_FRAME		(6)
(TVXvalue-DELTA)				
GOTO L1				
?OTHERWISE			F	

Extended Comments:

(1) Force IUT to have asynchronous data to transmit.

(2) Wait for data.

(3) Send late TK.

(4) Verify there was data queued.

(5) Fill frame repeated.

(6) Send fill frame to keep TVX from expiring.

The IUT shall be configured to use asynchronous data only. See 5.4.1: T(02) and 5.1.4.2: in ISO/IEC 9314-2:1989.

8.13.4 Unusable_asynch_restrictTK

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Unusable_asynch_restrictTK				
Identifier : Unusable_asynch_restrictTK				
Purpose : Verify that the IUT does not capture a restricted TOKEN not intended for it, when there is asynchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
+Send_Echo_Req				(1)
START Timer_AUX_30				(2)
!TOKEN START Timer_TRT (T_NEG*2)	L0	TOKEN_R		(3)
?TOKEN	L1	TOKEN_R		
?TIMEOUT Timer_AUX_30			P	(4)
+VERIFICATION				
GOTO L0				
?ECHO_FRAME		ECHO_Resp	F	
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	(5)

Extended Comments:

(1) Force IUT to have asynchronous data.

(2) Wait for IUT to react.

(3) Wait two TRT periods for TOKEN to return.

(4) 30 s have elapsed, now check if data was queued.

(5) TK Token should have been returned before TRT times out.

The IUT shall be configured to use asynchronous data only. See 5.4.1: T(02) (b), T(03), 5.4.2: T(10a) (2) (b), 5.4.3: T(22) (2) (a), and 5.1.4.2: in ISO/IEC 9314-2:1989.

8.13.5 Unusable_asynch_priority

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Unusable_asynch_priority				
Identifier : Unusable_asynch_priority				
Purpose : Verify that the IUT does not capture an unrestricted TOKEN, when IUT does not have a priority to use it and there is asynchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
+Send_Echo_Req				(1)
START Timer_AUX_30,START Timer_TVX				(2)
(TVXvalue-DELTA)				
START Timer_TRT (PRIthreshold)	L0			(3)
?TIMEOUT Timer_TRT	L1			
!TOKEN START Timer_TRT		TOKEN_UR		
?TOKEN	L2	TOKEN_UR		
?TIMEOUT Timer_AUX_30			P	
+VERIFICATION				(4)
GOTO L0				
?ECHO_FRAME		ECHO_Resp	F	
?FRAME		FILL_FRAME		(5)
GOTO L2				
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
?TIMEOUT Timer_TVX				
!FRAME START Timer_TVX		FILL_FRAME		(6)
(TVXvalue-DELTA)				
GOTO L1				
?FRAME		FILL_FRAME		(5)
GOTO L1				
?OTHERWISE			F	

Extended Comments:

(1) Force IUT to have an asynchronous data.

(2) Wait for IUT to react.

(3) Force IUT's TRT > T_Pri (highest priority).

(4) Verify data was queued.

(5) Fill frame repeated by IUT.

(6) Send fill frame to keep TVX from expiring. Execute only if priority is implemented (see PIXIT question 4).

The IUT shall be configured for asynchronous transmission only. See 5.4.1: T(02)(c), T(03), and 5.1.4.2: in ISO/IEC 9314-2:1989.

8.13.6 Unusable_asynch_nodata

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Unusable_asynch_nodata				
Identifier : Unusable_asynch_nodata				
Purpose : Verify that the IUT does not capture an unrestricted TOKEN when there is no data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!TOKEN		TOKEN_UR		
START Timer_TRT				(1)
?TOKEN	L0	TOKEN_UR	P	
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
Extended Comments:				
(1) Wait for IUT to return TK.				
The IUT shall be configured for asynchronous transmission only. See 5.4.1: T(02) (a), T(03), and 5.1.4.2: in ISO/IEC 9314-2:1989.				

8.13.7 Usable_synch_earlyrestrictTK

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Usable_synch_earlyrestrictTK				
Identifier : Usable_synch_earlyrestrictTK				
Purpose : Verify that IUT captures a restricted early TOKEN (LATE_CT=0) and sends a frame, when there is synchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
<IUT!FRAME>				(1)
START Topr				(2)
!TOKEN	L0	TOKEN_R		
?FRAME	L1	DATA	P	
?TOKEN		TOKEN_R		(3)
GOTO L0				
?OTHERWISE			F	
?TIMEOUT Topr			I	
Extended Comments: IUT shall be configured to use synchronous transmission before this test case is run. See 5.4.1: T(02), 5.4.2: T(10a), and 5.1.4.1: in ISO/IEC 9314-2:1989.				
(1) Force IUT to send synchronous data.				
(2) Wait for operator to send data.				
(3) Keep sending TK.				

8.13.8 Usable_synch_lateTK

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Usable_synch_lateTK				
Identifier : Usable_synch_lateTK				
Purpose : Verify that IUT captures a restricted late TOKEN (LATE_CT=1) and sends a frame, when there is synchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints reference**	**V**	**Comments**
+INIT_RING				
<IUT!FRAME>				(1)
START Topr,START Timer_TVX				(2)
(TVXvalue-DELTA)				
START Timer_TRT	L0			(3)
?TIMEOUT Timer_TRT	L1			
!TOKEN		TOKEN_R		
?FRAME	L2	DATA	P	
?TOKEN		TOKEN_R		(4)
GOTO L0				
?FRAME		FILL_FRAME		(5)
GOTO L2				
?OTHERWISE			F	
?TIMEOUT Topr			I	
?TIMEOUT Timer_TVX				
!FRAME START Timer_TVX		FILL_FRAME		
(TVXvalue-DELTA)				
GOTO L1				
?FRAME		FILL_FRAME		(5)
GOTO L1				
?OTHERWISE			F	

Extended Comments:

(1) Force IUT to send synchronous data.

(2) Wait for operator to send data.

(3) Send a late TK.

(4) Keep sending TK.

(5) Fill frame repeated.

The IUT shall be configured for synchronous transmission before this test case is run.
See 5.4.2: T(10b) in ISO/IEC 9314-2:1989.

8.13.9 Unusable_synch_restrictTKnodata

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/TRANSMIT/Unusable_synch_restrictTKnodata				
Identifier : Unusable_synch_restrictTKnodata				
Purpose : Verify that IUT does not capture a restricted TOKEN, when there is no synchronous data to transmit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!TOKEN		TOKEN_R		(1)
START Timer_TRT				(2)
?TOKEN	L0	TOKEN_R	P	
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
Extended Comments: (1) Send a TK. (2) Wait for TK to come back. The IUT shall be configured for synchronous transmission before this test case is run. See 5.4.1: T(02)(1), T(03), and 5.1.4.1: in ISO/IEC 9314-2:1989.				

8.13.10 R_Long_Address

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/RECEIVE/R_Long_Address				
Identifier : R_Long_Address				
Purpose : Verify that the IUT receives a frame addressed to it (DA = IUT's address) using LONG ADDRESS, and copies and repeats.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!ECHO_FRAME		ECHO_Req		(1)
START D_Max				(2)
?ECHO_FRAME	L0	ECHO_Req_AC	P	(3)
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: (1) Send a frame with DA equal IUT's address and long address format. (2) Waiting time for returning time. (3) Frame with Copy flag set. See 5.4.2: T(10e) in ISO/IEC 9314-2:1989.				

8.13.11 R_Group_Address

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/RECEIVE/R_Group_Address				
Identifier : R_Group_Address				
Purpose : Verify that the IUT receives a frame addressed to it (DA = My) with a GROUP ADDRESS from others (SA = Others), copies and repeats this frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!ECHO_FRAME		FRAME_CGS		(1)
START D_Max				(2)
?ECHO_FRAME	L0	FRAME_CGR	P	(3)
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: (1) Frame with IUT's group address. (2) Waiting time for frame to return. (3) Frame with copy flag set. See 5.4.2: T(10e) in ISO/IEC 9314-2:1989.				

8.13.12 Void_Frame

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/RECEIVE/Void_Frame				
Identifier : Void_Frame				
Purpose : Verify that the IUT repeats a received Void frame that is addressed to it without setting the A and C flags.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!FRAME		Void_LS		
START D_Max				
?FRAME	L0	Void_LS	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments:				

8.13.13 E_Long_Address

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/ECHO/E_Long_Address				
Identifier : E_Long_Address				
Purpose : Verify that the IUT receives a frame not addressed to it (DA = Others) with a GROUP ADDRESS with (SA = Others) and repeats this frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!FRAME		FRAME_RL		(1)
START D_Max				(2)
?FRAME	L0	FRAME_RL	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: (1) Send frame DA<>IUT's address and SA<>IUT's address. (2) Wait for frame. See 5.4.2: T(10e) in ISO/IEC 9314-2:1989.				

8.13.14 E_Group_Address

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/ECHO/E_Group_Address				
Identifier : E_Group_Address				
Purpose : Verify that the IUT receives a frame not addressed to it (DA = Others) with a GROUP ADDRESS from others (SA = Others) and repeats this frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!FRAME		FRAME_RG		(1)
START D_Max				(2)
?FRAME	L0	FRAME_RG	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: (1) Send frame DA<>IUT's group address and SA<>IUT's address. (2) Wait for frame. See 5.4.2: T(10e) in ISO/IEC 9314-2:1989.				

8.13.15 Extra_Frame_Status

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/ECHO/Extra_Frame_Status				
Identifier : Extra_Frame_Status				
Purpose : Verify that the IUT will repeat a frame not addressed to it containing extra frame control symbols at the end of the frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!FRAME		FRAME_XFS		
START D_Max				
?FRAME	L0	FRAME_XFS	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: See 5.4.2: T1 in ISO/IEC 9314-2:1989.				

8.13.16 Repeat_AC_Set

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/ECHO/Repeat_AC_Set				
Identifier : Repeat_AC_Set				
Purpose : Verify that the IUT will repeat a Broadcast frame with the Frame Status A and C indicators SET.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!SMT_FRAME		B_NIF_Req_R		
START D_Max				
?SMT_FRAME	L0	B_NIF_Req_R	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: See 5.4.2: T1 in ISO/IEC 9314-2:1989.				

8.13.17 S_Long_Address

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BASIC/STRIP/S_Long_Address				
Identifier : S_Long_Address				
Purpose : Verify that the IUT strips a frame from the ring, when it receives a frame with SA = IUT's address.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!FRAME		FRAME_R		(1)
START D_Max				(2)
?FRAME	L0	FRAME_Strip	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments:				
(1) Send frame DA<>IUT's address and SA = IUT's address.				
(2) Wait for frame.				
See 5.4.2: T(10c) in ISO/IEC 9314-2:1989.				

8.13.18 Higher_Claim

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/CLAIM_TOKEN/Higher_Claim				
Identifier : Higher_Claim				
Purpose : Verify that the IUT receives a CLAIM frame with a higher precedence from another station (SA = Others) and then repeats this frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!CLAIM		CLAIM_TESTER(HIGHER_T_BID)		(1)
START Timer_TRT	L0			
?CLAIM		CLAIM_TESTER(HIGHER_T_BID)	P	(2)
?TIMEOUT Timer_TRT			F	
?OTHERWISE			F	
Extended Comments:				
(1) Tester sends a higher precedence CLAIM.				
(2) IUT repeats the CLAIM with higher precedence.				
(3) Prevent IUT's TVX from expiring.				
See 5.4.1: T(00)(2), 5.4.2: T(10d)(2), 5.4.3: T(20)(2), 5.4.4: T(30a)(2), and 5.4.5: T(40)(2) in ISO/IEC 9314-2:1989.				

8.13.19 Lower_Claim

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/CLAIM_TOKEN/Lower_Claim				
Identifier : Lower_Claim				
Purpose : Verify that the IUT receives a CLAIM frame with a lower precedence from another station (SA = Others) and then sends its own CLAIM frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!CLAIM		CLAIM_TESTER(LOWER_T_BID)		(1)
START Timer_TRT				
?CLAIM	L0	CLAIM_IUT(IUT_T_BID)	P	(2)
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
Extended Comments:				
(1) Tester sends a CLAIM with lower precedence.				
(2) IUT responds with its own CLAIM.				
See 5.4.1: T(04)(4), 5.4.2: T(14)(4), 5.4. 3: T(24)(4), and 5.4.4: T(34)(4) in ISO/IEC 9314-2:1989.				

8.13.20 My_Claim

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/CLAIM_TOKEN/My_Claim				
Identifier : My_Claim				
Purpose : Verify that the IUT receives its own CLAIMframe (SA = My) and then issues a TOKEN.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!CLAIM		CLAIM_TESTER(LOWER_T_BID)		(1)
START Timer_TRT				
?CLAIM	L0	CLAIM_IUT(IUT_T_BID)		(2)
!CLAIM START Timer_TRT		CLAIM_IUT(IUT_T_BID)		(3)
?TOKEN	L1	TOKEN_UR	P	(4)
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
Extended Comments:				
(1) Tester send a lower precedence CLAIM.				
(2) IUT sends its own CLAIM.				
(3) Tester repeats IUT's CLAIM.				
(4) IUT wins the Claim process and issues the first TOKEN.				
See 5.4.5: T(43) in ISO/IEC 9314-2:1989.				

8.13.21 Short_Address_Frame

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/ADDRESSING/Short_Address_Frame				
Identifier : Short_Address_Frame				
Purpose : Verify that the IUT receives a frame not addressed to it (DA = Others) with a SHORT ADDRESS from others (SA = Others) and repeats this frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!FRAME_SHORT_ADDRESS		FRAME_RS		(1)
START D_Max				(2)
?FRAME_SHORT_ADDRESS	L0	FRAME_RS	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments:				
(1) Send a frame DA<> IUT's address SA<>IUT's address.				
(2) Wait for IUT to repeat frame. (3) Keep waiting for frame.				
See 5.4.2: T(10e) in ISO/IEC 9314-2:1989.				

8.13.22 Short_Beacon

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/ADDRESSING/Short_Beacon				
Identifier : Short_Beacon				
Purpose : Verify that the IUT recognises a Short Address Beacon.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!BEACON_SHORT		BEACON_SHORT_C		(1)
START Timer_TRT (T_Max)				
?BEACON_SHORT	L2	BEACON_SHORT_C	P	(2)
?TIMEOUT Timer_TRT			F	
?OTHERWISE			F	
Extended Comments:				
(1) Send a SHORT BEACON. (2) IUT should repeat the SHORT BEACON.				
See 4.3.4 in ISO/IEC 9314-2:1989.				

8.13.23 Short_Claim

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/ADDRESSING/Short_Claim				
Identifier : Short_Claim				
Purpose : Verify that the IUT processes a CLAIMframe with a lower precedence and with short addresses. The IUT shall send its own CLAIMframe with long addresses.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!CLAIM_SHORT		CLAIM_SHORT_ADD(LOWER_T_BID)		(1)
START Timer_TRT (T_Max)				
?CLAIM	L0	CLAIM_IUT(IUT_T_BID)	P	(2)
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
Extended Comments:				
(1) Tester sends a Short address CLAIM, with lower precedence.				
(2) IUT responses with its own CLAIM.				
See 4.3.4 in ISO/IEC 9314-2:1989.				

8.13.24 Short_Broadcast

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/ADDRESSING/Short_Broadcast				
Identifier : Short_Broadcast				
Purpose : Verify that the IUT accepts a broadcast frame, with short address, and sets the A bit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!SMT_FRAME		SB_NIF_CS		(1)
START D_Max				(2)
?SMT_FRAME	L0	SB_NIF_CR	P	(3)
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments:				
(1) Tester sends a broadcast frame (Short Address).				
(2) Wait for IUT to repeat frame.				
(3) IUT responses with the A bit set.				
See 5.4.2: T(10e) in ISO/IEC 9314-2:1989.				

8.13.25 Broadcast

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/ADDRESSING/Broadcast				
Identifier : Broadcast				
Purpose : Verify that the IUT accepts a broadcast with a long address, and sets the A bit.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!SMT_FRAME		B_NIF_CS		
START D_Max				
?SMT_FRAME	L0	B_NIF_CR	P	
?OTHERWISE			F	
?TIMEOUT D_Max			F	
Extended Comments: See 4.3.8.2 in ISO/IEC 9314-2:1989.				

8.13.26 Others_Beacon

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BEACONING/Others_Beacon				
Identifier : Others_Beacon				
Purpose : Verify that the IUT receives a BEACON frame from another upstream station (SA = Others) and then repeats this frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
!BEACON		BEACON_TESTER		(1)
START Timer_TRT (T_Max)				
?BEACON	L1	BEACON_TESTER	P	(2)
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
Extended Comments: (1) Send tester's BEACON. (2) IUT should repeat tester's BEACON. See 5.4.1: T(00)(3), 5.4.2: T(10d)(3), 5.4.3: T(20)(3), 5.4.4: T(30a)(3), 5.4.5: T(40)(3), and 5.4.6: T(50)(2) in ISO/IEC 9314-2:1989.				

8.13.27 My_Beacon

Test Case Dynamic Behaviour				
Reference : FDDI_MAC/BEACONING/My_Beacon				
Identifier : My_Beacon				
Purpose : Verify that the IUT receives its own BEACON frame (SA = My) and then sends a CLAIM frame.				
Default :				
Behaviour Description	**Label**	**Constraints Reference**	**V**	**Comments**
+INIT_RING				
START Timer_TVX				(1)
?TIMEOUT Timer_TVX				
START Timer_TRT (T_Max)				
?CLAIM	L0	CLAIM_IUT(IUT_T_BID)		
GOTO L0				
?BEACON		BEACON_IUT		(2)
!BEACON		BEACON_IUT		(3)
?BEACON	L1	BEACON_IUT		
GOTO L1				
?CLAIM		CLAIM_IUT(IUT_T_BID)	P	
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	
?OTHERWISE			F	
?TIMEOUT Timer_TRT			F	

Extended Comments:
(1) Force IUT into CLAIM & BEACON process.
(2) IUT now in BEACON process.
(3) Repeat IUT's BEACON.
See 5.4.1: T(04)(5), 5.4.2: T(14)(5), 5.4.3: T(24)(5), 5.4.4: T(34)(5), and 5.4.6: T(54) in ISO/IEC 9314-2:1989.