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Terrestrial Trunked Radio (TETRA); Conformance testing specification; Part 4: Protocol testing specification for Direct Mode Operation (DMO); Sub-part 7: Test Suite Structure and Test Purposes (TSS&TP) for Mobile Station to GateWay (MS-GW) Air Interface (AI)

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Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Terrestrial Trunked Radio (TETRA) Project of the European Telecommunications Standards Institute (ETSI).

This ETS consists of 4 parts as follows:

Part 1: "Radio";

Part 2: "Protocol testing specification for Voice plus Data (V+D)";

Part 4: "Protocol testing specification for Direct Mode Operation (DMO)";

Part 5: "Security".

Transposition dates	
Date of adoption of this ETS:	4 June 1999
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Date of withdrawal of any conflicting National Standard (dow):	31 March 2000

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1 Scope

This ETS contains the test specifications: Test Suite Structure and Test Purposes (TSS&TPs) and the Abstract Test Suites (ATSs) to test conformity of products to the TETRA Direct Mode Operation (DMO) protocols. This ETS is divided into several parts, each one dealing with one TSS&TP or one ATS for the test of a layer 2 or layer 3 protocol for DMO.

This present sub-part 7 deals with TSS&TP for a Mobile Station (MS) connected to a Gateway (MS-GW).

NOTE: Sub-part 8 deals with TSS&TP for the other part of the DMO Gateway, which is a GateWay (GW) connecting the MS-GW to the Switching and Management Infrastructure (SwMI) of a Voice plus Data (V+D) system.

Testing of security features is outside the scope of this ETS.

The objective of this test specification is to provide a basis for approval tests for TETRA equipment giving a high probability of air interface inter-operability between different manufacturer's TETRA equipment.

The ISO standard for the methodology of conformance testing, ISO/IEC 9646-1 [5] and ISO/IEC 9646-2 [6], as well as the ETSI methodology for conformance testing, ETS 300 406 [7], are used as the basis for the test methodology.

2 References

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] Void.

[2] ETS 300 396-5: "Terrestrial Trunked RAdio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 5: Gateways".

[3] ETS 300 396-8-3: "Terrestrial Trunked RAdio (TETRA); Direct Mode Operation (DMO); Part 8: Protocol Implementation Conformance Statement (PICS) proforma specification; Sub-part 3: Gateway Air Interface (AI)".

[4] ETS 300 394-4-1: "Terrestrial Trunked Radio (TETRA);Conformance testing specification; Part 4: Protocol testing specification for Direct Mode Operation (DMO); Sub-part 1: Test Suite Structure and Test Purposes (TSS&TP) for Mobile Station to Mobile Station (MS-MS) Air Interface (AI)".

[5] ISO/IEC 9646-1 (1994): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 1: General concepts". (See also ITU-T Recommendation X.290 (1991)).

[6] ISO/IEC 9646-2 (1994): "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 2: Abstract Test Suite specification". (See also ITU-T Recommendation X.291 (1991)).

[7] ETS 300 406 (1995): "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

3 Definitions and abbreviations

3.1 TETRA definitions

For the purposes of this ETS, the definitions given in ETS 300 396-5 [2] apply.

3.2 TETRA abbreviations

For the purposes of this ETS the following TETRA abbreviations apply:

CM	Circuit Mode
DMCC	Direct Mode Call Control
DMMM	Direct Mode Mobility Management
DMO	Direct Mode of Operation
FCS	Frame Check Sequence
GW	Gateway
MAC	Medium Access Control
MNI	Mobile Network Identity
MS	Mobile Station
NWK	Network. Layer 3 of the TETRA protocol stack
SDS	Short Data Services
SDU	Service Data Unit
TX	Transmit
RX	Receive

3.3 ISO 9646 definitions

For the purposes of this ETS the following ISO/IEC 9646-1 [5] definitions apply:

Implementation Conformance Statement (ICS)
Implementation Under Test (IUT)
Implementation eXtra Information for Testing (IXIT)
Protocol Implementation Conformance Statement (PICS)
Protocol Implementation eXtra Information for Testing (PIXIT)

3.4 ISO 9646 abbreviations

For the purposes of this ETS the following ISO/IEC 9646-1 [5] abbreviations apply:

IUT	Implementation Under Test
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
TP	Test Purpose
TSS	Test Suite Structure

4 Test Suite Structure (TSS)

This TSS contains several components, some are specific of the gateway functionality and are new, while others are derived or form a subset of other TETRA specifications. TPs are either included in this ETS, or are referenced from another document.

Here is the list of the TSS components for the part dealing with an MS connected to a GateWay (DMO MS-GW):

- at layer 3 also named NWK layer:
  - Direct Mode Call Control (DMCC):
    - Circuit Mode (CM): new component;
    - Short Data Service (SDS): derived from DMO MS-MS TPs in ETS 300 394-4-1 [4].
  - Direct Mode Mobility Management (DMMM): new component.
- at layer 2:
  - MAC layer: derived from DMO MS-MS TPs in ETS 300 394-4-1 [4].

4.1 NWK layer or Layer 3 test groups

The first level separates the NWK layer (or layer 3) in different protocols (Circuit mode, Short Data Service). Next level splits protocol testing into functional test groups according to the type of testing: Capability test (CA), Valid Behaviour (BV) and Timer tests (TI). Further level classifies the possible operations in each protocol condition or state.

The following list defines the NWK layer test group names and identifiers used for those:

MS connected to a gateway GW (DMO_MSGW_NWK):
- Direct Mode Call Control (DMCC):
  - Circuit mode (CM):
    - Capability tests (CA);
    - Valid Behaviour tests (BV):
      - from Idle state(ID);
      - from Idle state, channel busy (IB);
      - from TX occupation State (TXO);
      - from RX occupation State (RO);
      - from TX Reservation (TR);
      - from RX Reservation State (RR).
    - Timer Tests (TI).
  - Short Data Service (SDS):
    - Capability tests (CA);
    - Valid Behaviour tests (BV):
      - from Idle state(ID);
      - from Idle state, channel busy (IB);
      - from RX Occupation State (RO);
      - from TX Reservation State (TR);
      - from RX Reservation State (RR).
    - Timer Tests (TI).
- Direct Mode Mobility Management (DMMM).

4.2 Layer 2 test groups

The first level of the Layer 2 test groups separates the test suite in functional test groups: CA, BV and TI. The second level of the test subgroups is used to form a division of protocol requirements.

In the case of an MS connected to a gateway, layer 2 contains the MAC only and is structured as follows:

MS connected to a gateway MAC layer (DMO_DMO_MSGW_MAC):
- Capability tests (CA);
- Valid behaviour tests (BV):
  - Channel usage (CU);
  - Signalling messages (SM);
  - Traffic mode (TM).
- Timer tests (TI).

4.3 Test group description

Capability (CA) tests provide limited testing that the observable capabilities of the IUT are in accordance with the conformance requirements and the additional capabilities claimed in the PICS/PIXIT.

The Valid Behaviour (BV) group tests an IUT in response to valid behaviour of the test system. "Valid" means that a test event is syntactically and contextually correct. All test cases in the valid behaviour group are intended to verify as thoroughly as possible the various functions of the protocol.

Different timers are defined to supervise the various state transitions. The Timer (TI) test group is intended to verify that the IUT is reacting properly to an expiry of one of the timers or to a counter mismatch.

5 Introduction to Test Purposes (TPs)

The test purposes for each test suite are defined in clause 6 of this ETS for NWK layer and MAC layer.

5.1 Test purpose definition conventions

5.1.1 Text and MSCs

Each TP is described in a table that contains the following information:

Table 0

TP-Name The TP name is a unique identifier, specified according to the TP naming conventions defined in the subclause below. (it is also the name of the corresponding test case)	**Reference**: reference to the paragraph number of specification ETS 300 396-5 [2] stating this conformance requirement. For example: ETS 300 396-5 [2], 6.2.5.1
Purpose	purpose of the test itself, indicating for example the test performed against a requirement of the protocol, described by this test purpose. Example: test of changeover initiated from RX reservation state.
Test description	body of the test
Pass criteria	visible action to be observed at PCO to declare that the IUT passes the test and conforms to the specifications
Selection	expression based on ETS 300 396-8-3 [3] PICS statements, used to select or deselect the corresponding test case according to the options of the implementation.
Preamble	"None" or name of the preamble procedure bringing the IUT from idle state to the state required to run the test. For example: idle_to_RX_reservation.
Postamble	"None" or name of the postamble to bring the IUT back to idle state, for example: RX_occupation_to_idle.

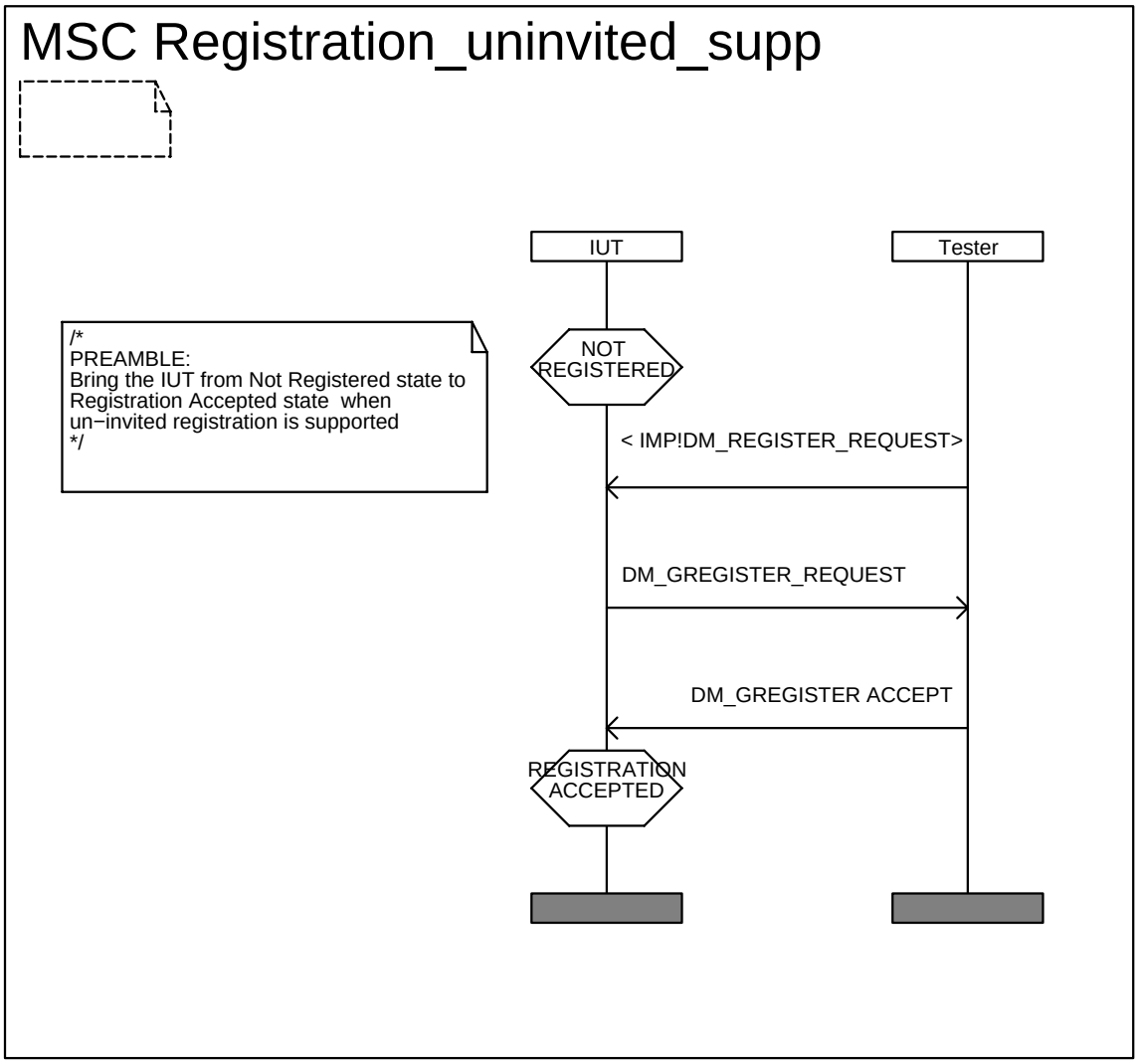
The preambles and postambles are described using MSCs and are shown in the following paragraphs.

5.1.2 Preamble descriptions

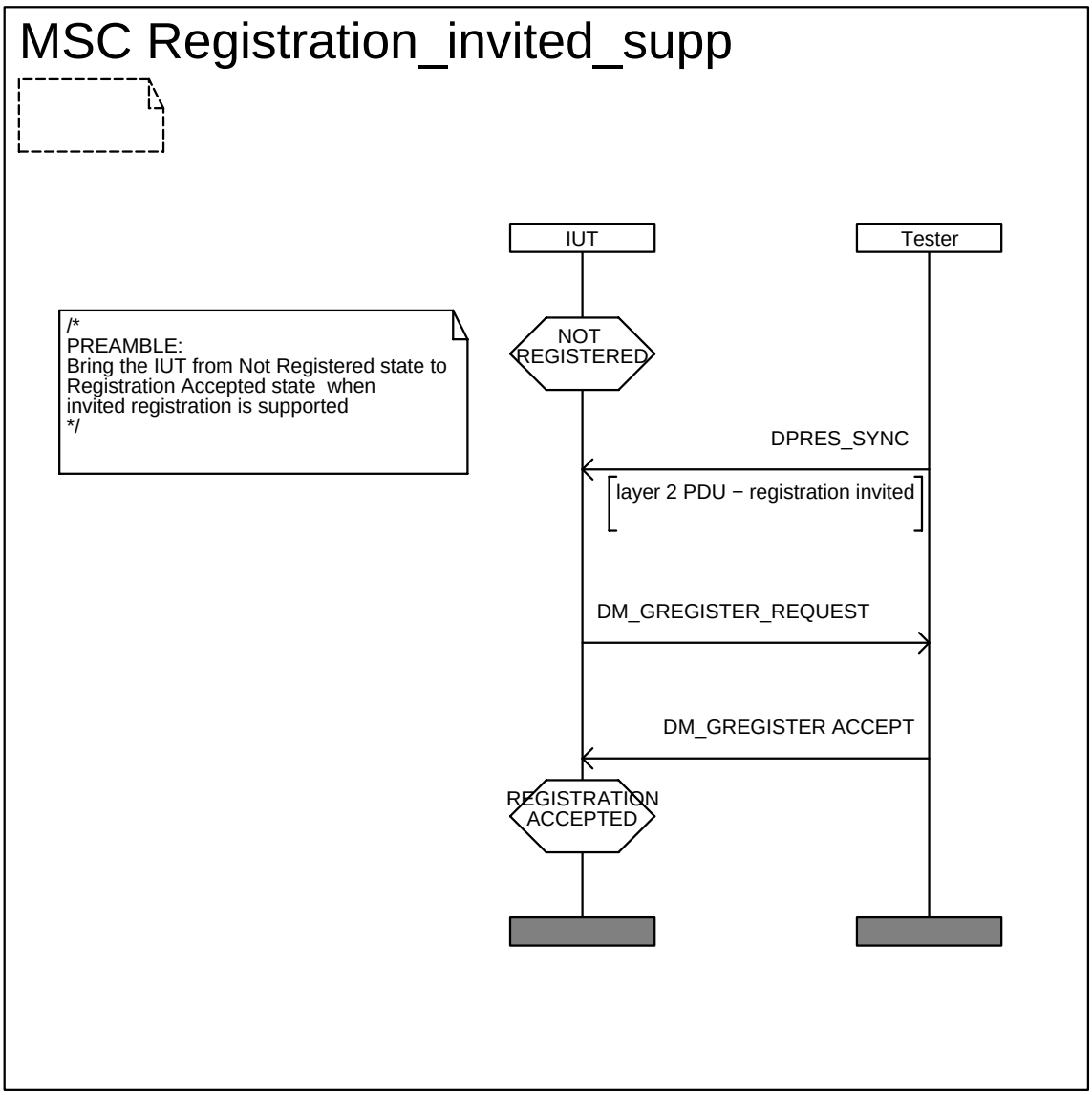
Preambles are used to bring the IUT from the idle state to the state where the test takes place. As the protocol has different options, as for instance the use of presence check or the absence of presence check, there are several ways to reach a given state. The preamble has to be chosen according to the IUT capabilities and the implemented options.

5.1.2.1 Preamble registration

Without registration invitation

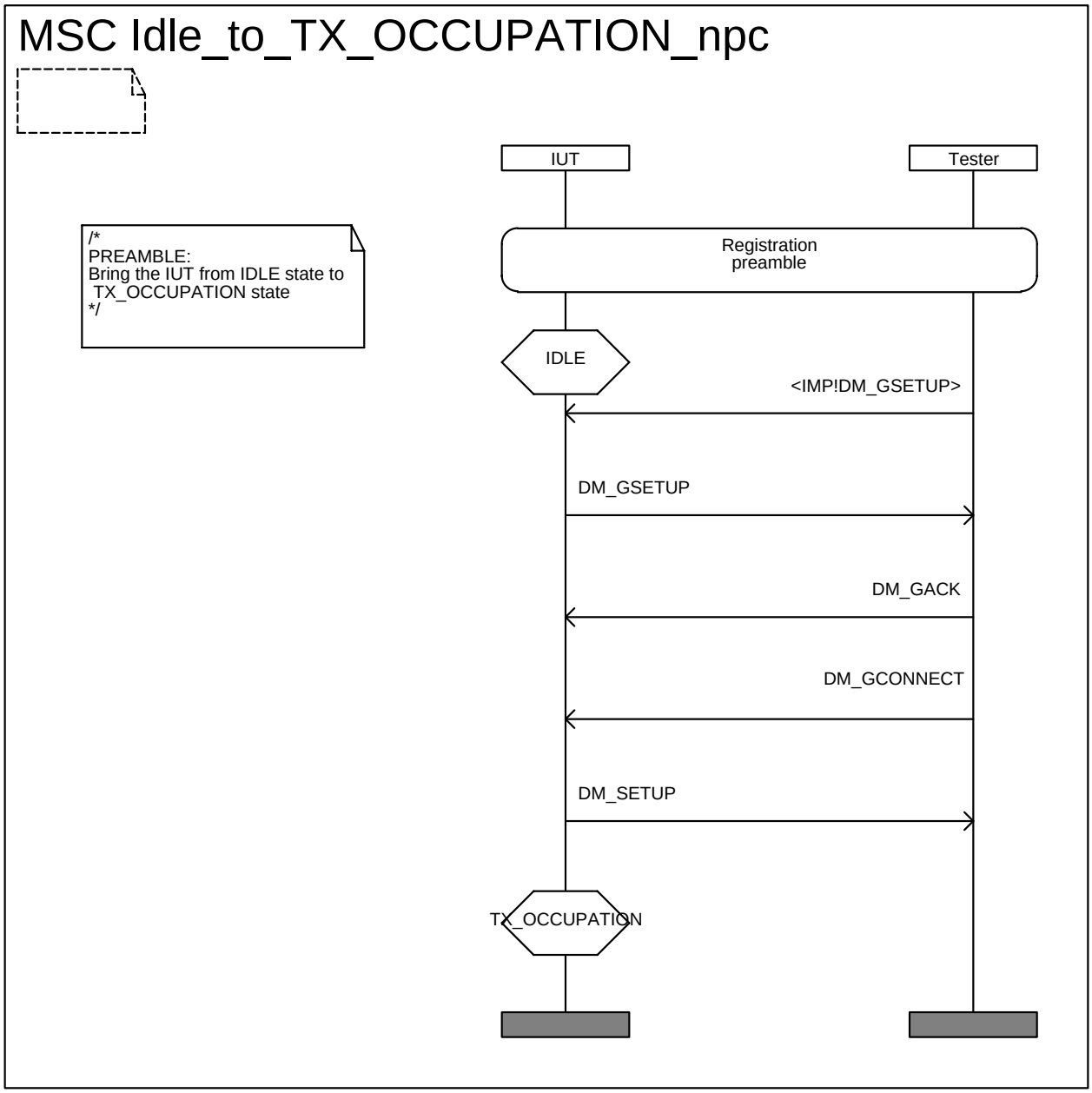


With registration invitation



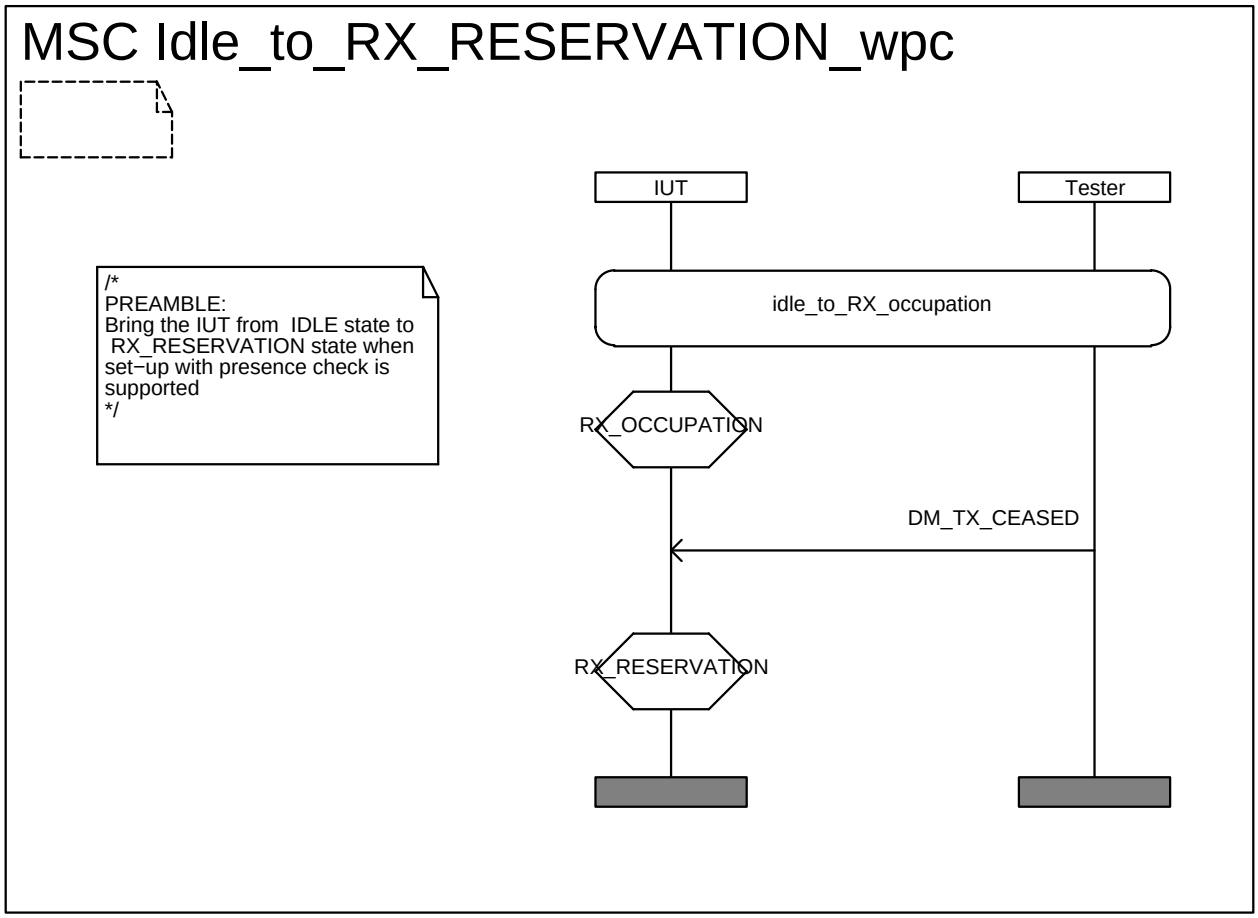
5.1.2.2 Preamble idle_to_TX_occupation: From Idle state to Call Active TX Occupation

Without presence check

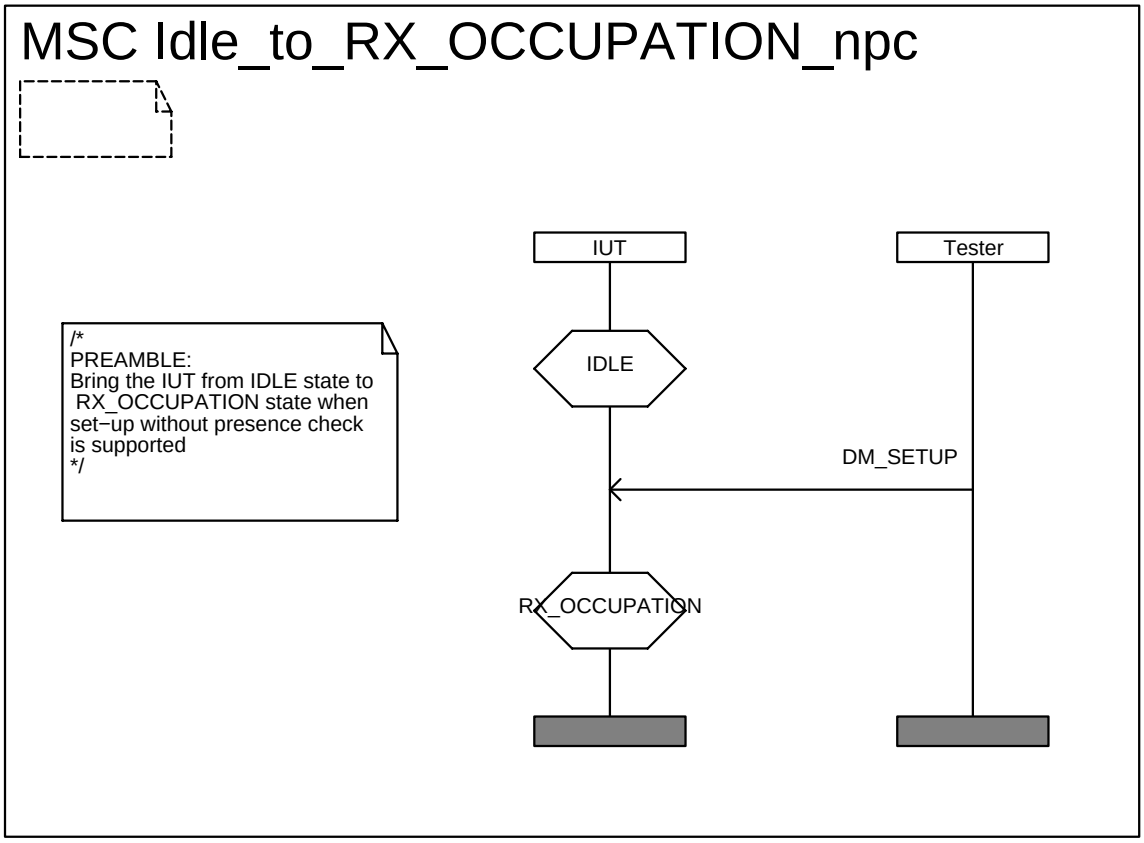


5.1.2.3 Preamble idle_to_RX_occupation: From Idle state to Call Active RX Occupation

With presence check

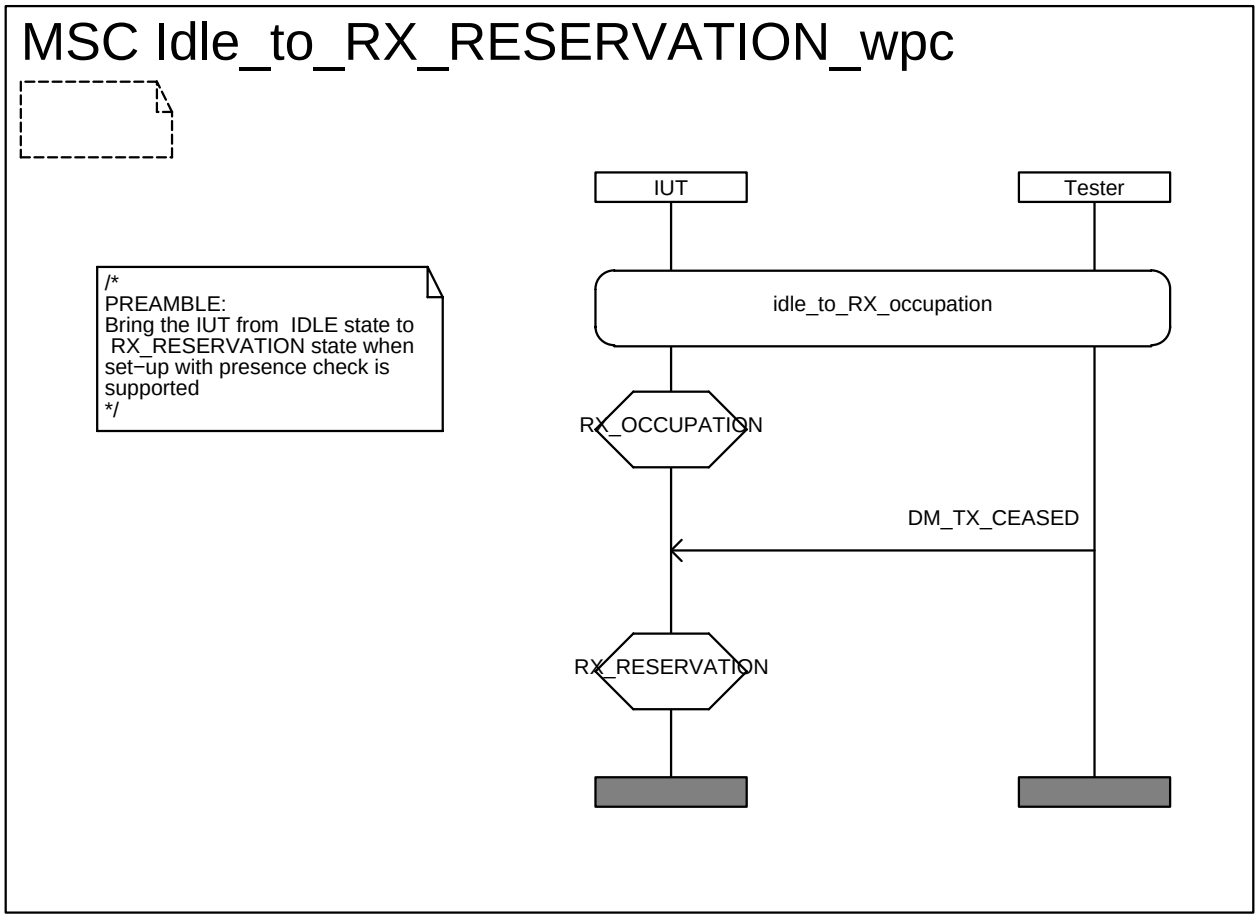


Without presence check

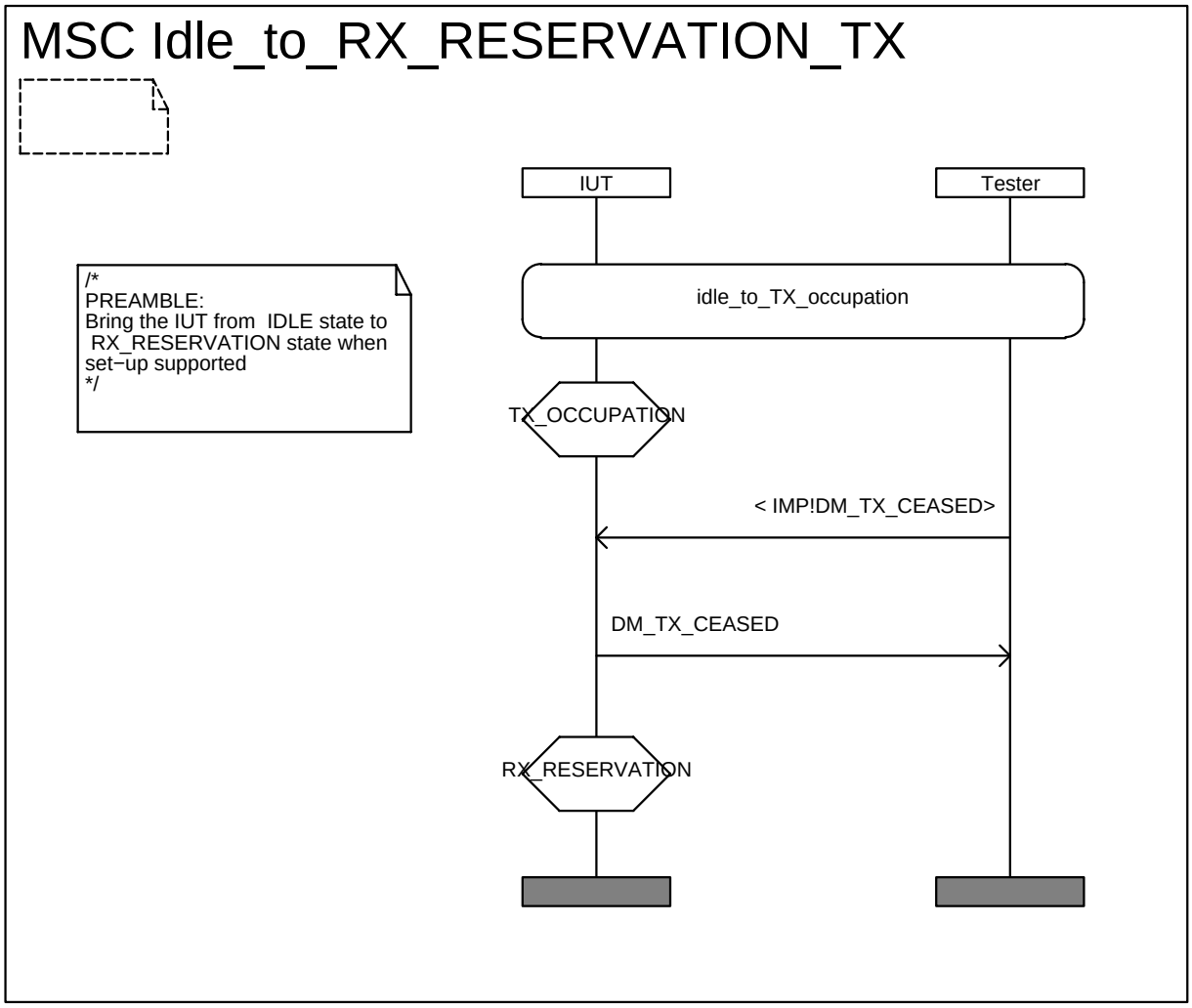


5.1.2.4 Preamble idle_to_RX_reservation

By passing through RX occupation state

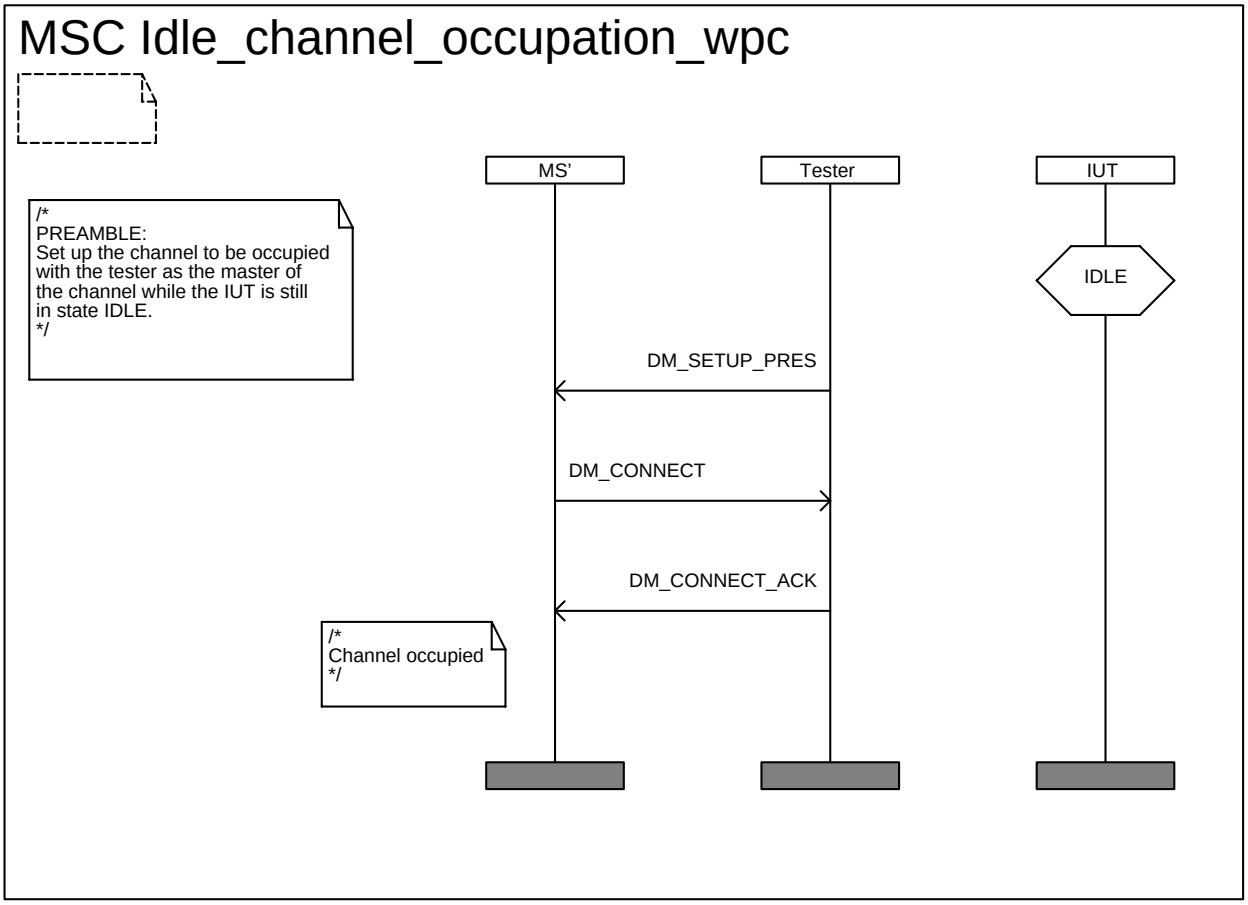


By passing through TX occupation state

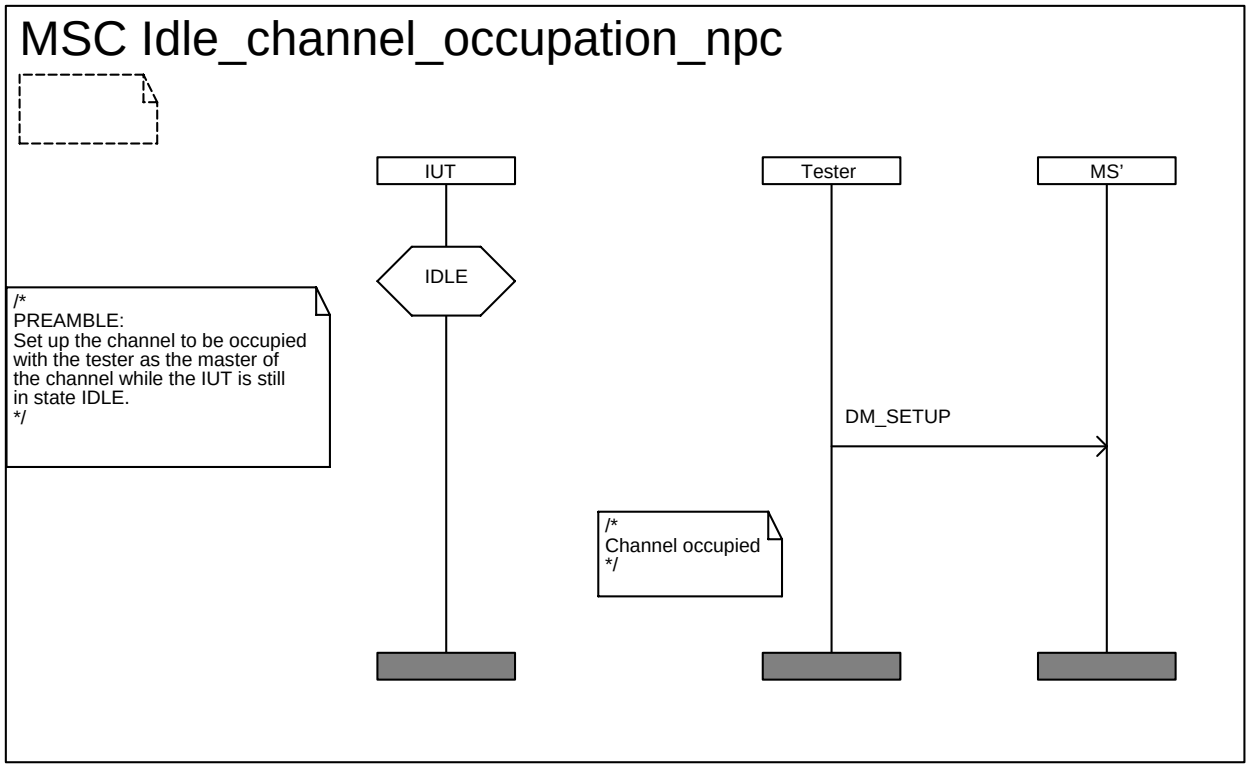


5.1.2.5 Preamble idle_channel_occupation

Without presence check



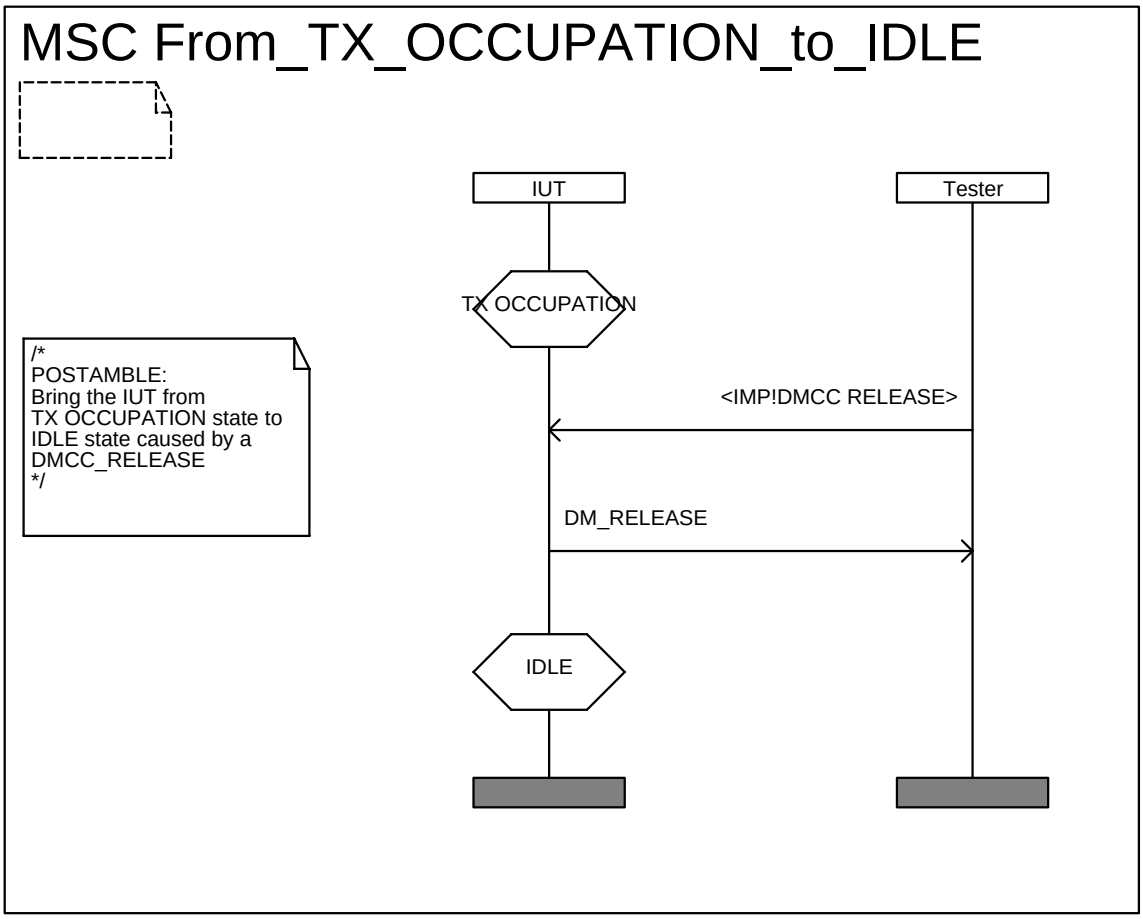
With presence check



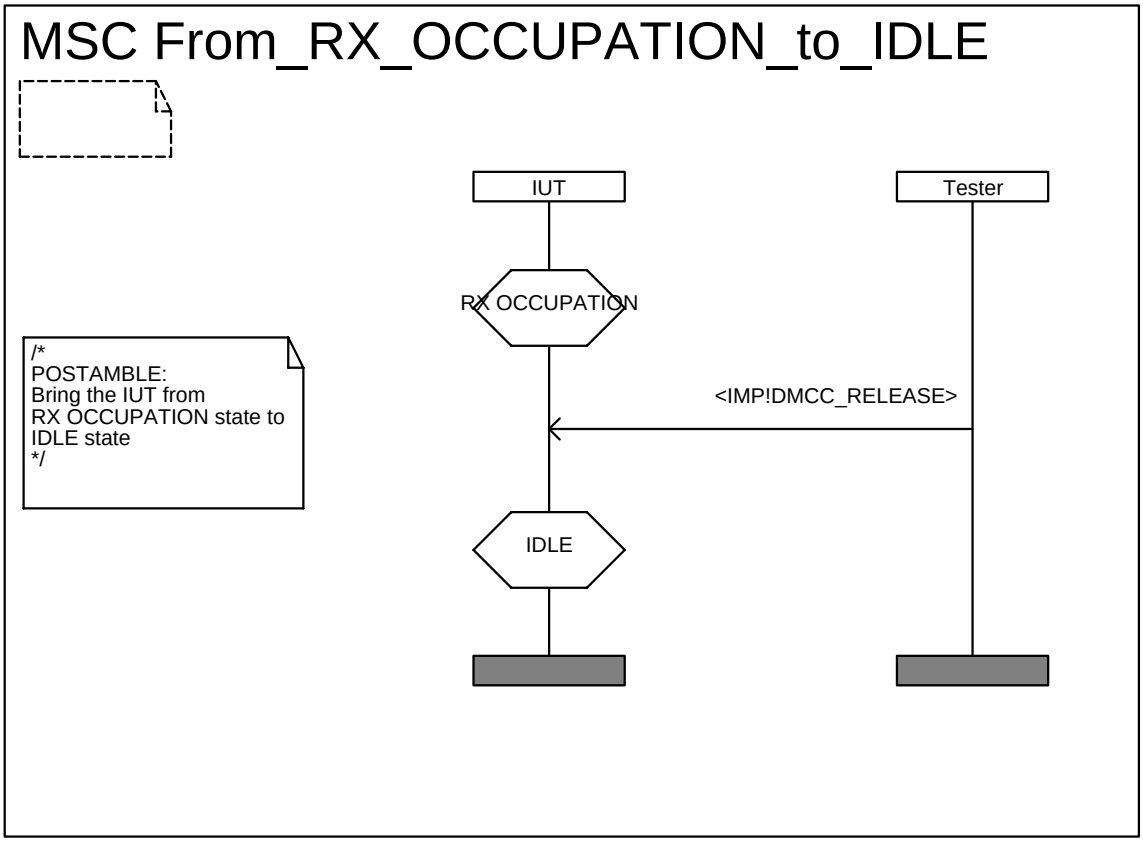
5.1.3 Layer 3 postamble descriptions

Postambles are used to bring the IUT from the state ending the test, to the idle state.

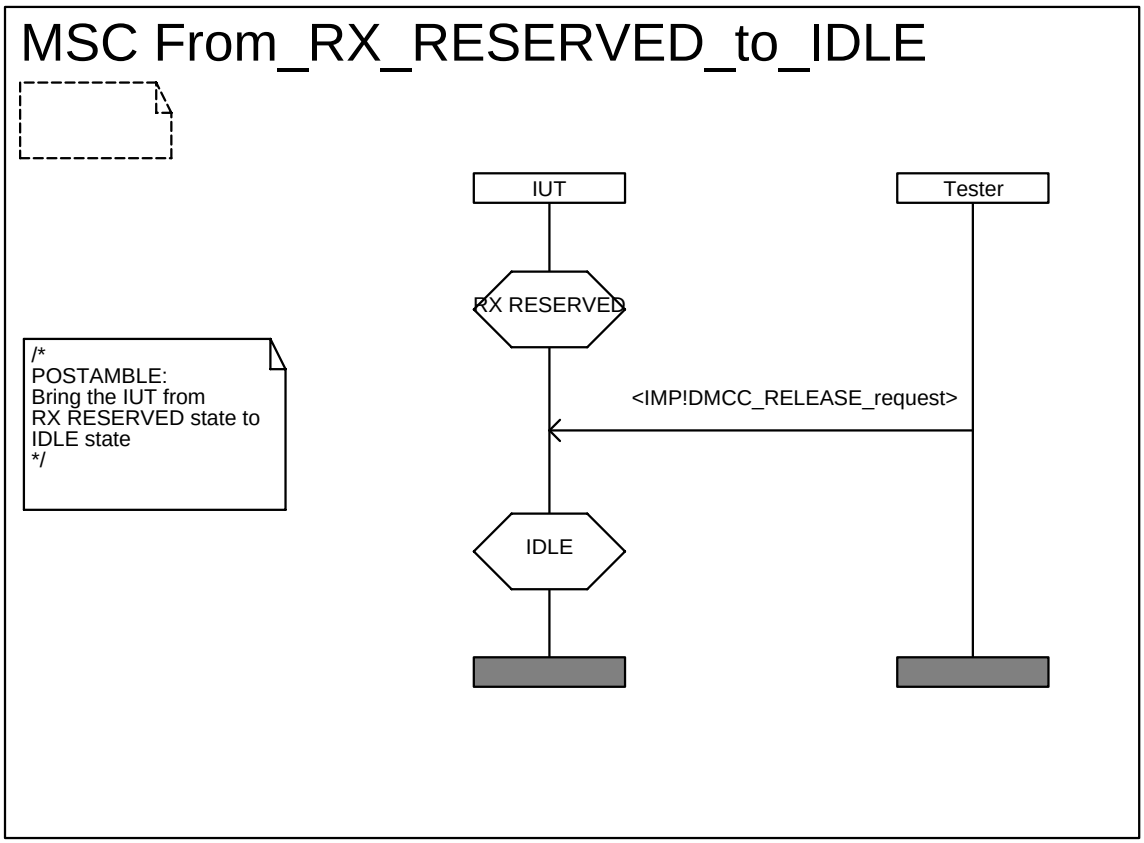
5.1.3.1 Postamble TX_occupation_to_idle: From Call Active TX Occupation state to Idle



5.1.3.2 Postamble RX_occupation_to_idle: From Call Active RX Occupation state to Idle



5.1.3.3 Postamble RX_reservation_to_idle: From Call Active RX Reserved state to Idle



5.2 Test purpose naming conventions

The identifier of the test purpose is built according to table 1:

Table 1: Test purpose naming convention

DMO/<ts>/<fm>/<ss>/<tt>/<uu>/<nn>		
<ts> = test suite type	MSMS	MS to MS (see ETS 300 394-4-1 [4])
	MSGW	MS connected to a gateway
	GATE	Gateway
	REPx	Repeater type x (see ETS 300 394-4-4 [**4**])
<fm> = functional entity in a layer	DMCC	Direct Mode Call Control (layer 3)
	MAC	Upper MAC (layer 2)
<ss> = test group	letters such as:	abbreviation of the group name (optional)
	CM	Circuit Mode (layer 3)
	SDS	Short Data Service (layer 3)
tt = Type of testing	CA	Capability Tests
	BV	Valid Behaviour Tests
	BI	Invalid Behaviour Tests
	TI	Timer expiry and counter mismatch tests
<uu> = test subgroup	letters	abbreviation of the subgroup name (optional)
<nn> = sequential number	01-99	Test Purpose Number

6 Test Purposes for the DMCC protocols of a DMO MS-GW

In this clause, the IUT is an MS connected to a gateway. The tester is a gateway. The interface between the MS and the gateway is being tested.

6.1 DMCC Circuit Mode (CM) tests

Test group objective: To test the behaviour of the DMCC CM entity of the IUT.

Condition: IUT implements the CM.

6.1.1 MS-GW CM capability tests

To test the basic capabilities of the CM module of the IUT, when operating in group address mode (without presence check) or in individual address mode (with or without presence check).

DMO_MSGW_DMCC_CM_CA_01	**Reference:** ETS 300 396-5 [2], 6.2.1.1, 6.2.4.1
Purpose	Set-up and release a group call.
Test description	The tester issues an implicit send to cause the IUT to initiate a group call.
Pass criteria 1	The IUT sends DM-GSETUP to the tester.
Test description	The tester sends back a DM-GACK followed by DM-GCONNECT.
Pass criteria 2	The IUT sends DM-SETUP PDU to the tester.
Test description	The tester issues an implicit send to cause the IUT to initiate a call release.
Pass criteria 3	The IUT sends DM-RELEASE PDU to the tester.
Selection ETS 300 396-8-3 [3]	A.7/1 Initiate call set-up on group address.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_CM_CA_02	**Reference:** ETS 300 396-5 [2], 6.2.1.1, 6.2.4.1
Purpose	Establish and terminate an individual call
Test description	The tester issues an implicit send to cause the IUT to initiate an individual call.
Pass criteria 1	The IUT sends DM-GSETUP to the tester.
Test description	The tester sends back a DM-GACK followed by DM-GCONNECT.
Pass criteria 2	The IUT sends DM-SETUP PDU to the tester.
Test description	The tester issues an implicit send to cause the IUT to initiate a call release.
Pass criteria 3	The IUT sends DM-RELEASE PDU to the tester.
Selection ETS 300 396-8-3 [3]	A.7/3 Initiate call set-up on individual address.
Preamble	None.
Postamble	None.

6.1.2 MS-GW CM valid behaviour tests

6.1.2.1 The IUT is in IDLE state, DMO channel is free

DMO_MSGW_DMCC_CM_BV_ID_01	**Reference:** ETS 300 396-5 [2], 6.2.2.1
Purpose	Receive an incoming group call without presence check.
Test description	The tester sends DM-SETUP PDU to the IUT, which brings the IUT to CALL ACTIVE RX OCCUPATION state.
Pass criteria	To check that IUT reaches CALL ACTIVE RX OCCUPATION state, the tester sends DM-TX CEASED which brings the IUT to CALL ACTIVE RX RESERVATION state. Then, during the reservation period, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.8/1 Accept call without presence check.
Preamble	None.
Postamble	Tester issues a DM-GREJECT followed by RX_Reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_ID_02	**Reference:** ETS 300 396-5 [2], 6.2.2.2
Purpose	Receive an incoming individual call with presence check.
Test description	The tester sends DM-SETUP PRES to the IUT which sends back DM-CONNECT. The tester responds with DM-CONNECT ACK. This brings the IUT to CALL ACTIVE RX OCCUPATION state.
Pass criteria	To check that IUT reaches CALL ACTIVE RX OCCUPATION state, the tester sends DM-TX CEASED which brings the IUT to "call active RX reservation" state. Then, during the reservation period, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.8/2 Accept call with presence check.
Preamble	None.
Postamble	Tester issues a DM-REJECT followed by RX_Reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_ID_03	**Reference:** ETS 300 396-5 [2], 6.2.1.1
Purpose	Release a call set-up attempt when the offered Quality of Service is not acceptable to the DMCC.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. Then the IUT sends DM-GSETUP to the tester. The tester sends DM-GCONNECT to the IUT with an unacceptable QOS.
Pass criteria	The QOS being not acceptable, the IUT sends DM-RELEASE to the tester and returns to idle.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_CM_BV_ID_04	**Reference:** ETS 300 396-5 [2], 6.2.1.1, 8.5.7.2.1
Purpose	Pre-emption flags in DM-SETUP and DM-TX-CEASED PDU.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT initiates the call (DM-GSETUP PDU).
Pass criteria 1	after receiving DM-GCONNECT from tester, verify that IUT sends the DM-SETUP PDU with the pre-emption flag set to 1 and the timing flag set to 0.
Test description	The tester issues an implicit send to cause the IUT to terminate the call.
Pass criteria 2	Verify that the IUT sends the DM-TX CEASED PDU with the request and changeover flags set to 0.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	None.
Postamble	RX_Reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_ID_05	**Reference:** ETS 300 396-5 [2], 6.2.1.1
Purpose	Error after DM-GSETUP.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends the DM-GSETUP PDU. The tester answers with a DM-GACK PDU indicating 'message not fully received'.
Pass criteria	Verify that IUT sends again the DM-GSETUP PDU.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	None.
Postamble	Tester sends the DM-RELEASE PDU.

DMO_MSGW_DMCC_CM_BV_ID_06	**Reference:** ETS 300 396-5 [2], 6.2.1.1
Purpose	Error after DM-GCONNECT.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends the DM-GSETUP PDU. The tester answers with DM-GCONNECT containing a 'request label' not equal to the value used in DM-GSETUP.
Pass criteria	Verify that the IUT sends the DM-RELEASE PDU.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_CM_BV_ID_07	**Reference:** ETS 300 396-5 [2], 6.2.1.1, 6.2.2.1
Purpose	Collision call.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT initiates the call (DM-GSETUP PDU). The tester simulates a collision and answers with DM-SETUP PRES PDU.
Pass criteria	Check that the IUT accepts the incoming call and proceeds as usual by issuing a D-CONNECT PDU to the tester.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up And A.8/2 Accept call with presence check.
Preamble	None.
Postamble	RX_Occupation_to_idle.

6.1.2.2 IUT is in idle state, DMO channel is busy

DMO_MSGW_DMCC_CM_BV_IB_01	**Reference:** ETS 300 396-5 [2], 6.2.6
Purpose	Initiate call pre-emption, to establish a new CM call, from an MS not involved in the current call.
Test description	The tester issues an implicit send to cause the IUT a call set-up. As the channel is busy, the IUT initially sends a DM-PREEMPT PDU to the tester, addressed to a master MS, which responds by sending a DM-PRE_ACCEPT PDU.
Pass criteria	The IUT sends DM-GSETUP PDU to the tester, addressed to the gateway
Selection ETS 300 396-8-3 [3]	A.6/11 Initiate pre-emption for a new call.
Preamble	idle_channel_occupation.
Postamble	Tester issues a DM-RELEASE followed by RX_Occupation_to_idle.

6.1.2.3 IUT is in TX occupation state

DMO_MSGW_DMCC_CM_BV_TXO_01	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Initiate the release of a call.
Test description	The tester issues an implicit to cause the IUT to release a call.
Pass criteria	The IUT sends DM-RELEASE to the tester and returns to IDLE, state observable by the channel being free.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	idle_to_TX_occupation.
Postamble	None.

DMO_MSGW_DMCC_CM_BV_TXO_02	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Initiate end of transmission (DM-TX CEASED).
Test description	The tester issues an implicit send to cause the IUT to end the call transmission. The IUT sends DM-TX CEASED PDU to the tester and moves to state RX reservation.
Pass criteria	Verify that the IUT is in RX reservation state. To do it, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	idle_to_TX_occupation.
Postamble	RX_reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_TXO_03	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Reception of pre-emption for an ongoing individual call.
Test description	The tester sends a DM-PREEMPT PDU to the IUT, containing the address of the master. The IUT sends back DM-PRE ACCEPT PDU and moves to CALL ACTIVE RX RESERVATION state.
Pass criteria	Verify that the IUT is in RX reservation state. To do it, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	idle_to_TX_occupation.
Postamble	RX_Reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_TXO_04	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Accept pre-emption for an ongoing individual call without a pre-emptive priority.
Test description	The tester sends a DM-PREEMPT PDU with a normal priority to the IUT, containing the address of the master. The IUT sends back DM-PRE ACCEPT PDU and moves to CALL ACTIVE RX RESERVATION state.
Pass criteria	Verify that the IUT is in RX reservation state. To do it, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	idle_to_TX_occupation.
Postamble	RX_Reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_TXO_05	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Receive pre-emption for a new individual call.
Test description	The tester sends a DM-PREEMPT PDU to the IUT.
Pass criteria	The IUT sends back DM-PRE ACCEPT PDU to the pre-empter, followed by a DM-RELEASE to the slave and moves to idle (observable by the channel being free).
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	idle_to_TX_occupation.
Postamble	None.

DMO_MSGW_DMCC_CM_BV_TXO_06	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Receive pre-emption for a new individual call without a pre-emptive priority.
Test description	The tester sends a DM-PREEMPT PDU with a normal priority to the IUT.
Pass criteria	The IUT sends back DM-PRE ACCEPT PDU to the pre-empter, followed by a DM-RELEASE to the slave and moves to idle (observable by the channel being free).
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up.
Preamble	idle_to_TX_occupation.
Postamble	None.

DMO_MSGW_DMCC_CM_BV_TXO_07	**Reference:** ETS 300 396-5 [2], 6.2.4.1 e)
Purpose	Reception of the release of a call.
Test description	The tester sends a DM GRELEASE PDU to the IUT.
Pass criteria	The IUT sends DM-RELEASE to the tester and returns to idle, state observable by the channel being free.
Selection ETS 300 396-8-3 [3]	A.5/1 Circuit mode call.
Preamble	idle_to_TX_occupation.
Postamble	None.

6.1.2.4 IUT is in RX occupation state

DMO_MSGW_DMCC_CM_BV_RO_01	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Receive normal end of transmission (DM-TX CEASED).
Test description	The tester sends DM-TX CEASED PDU to the IUT. The IUT moves to CALL ACTIVE RX RESERVATION state.
Pass criteria	Verify that the IUT is in RX reservation state. To do it, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.5/1 Circuit mode call.
Preamble	idle_to_RX_occupation.
Postamble	RX_Reservation_to_idle.

DMO_MSGW_DMCC_CM_BV_RO_02	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Initiate pre-emption to establish ongoing call (master = MS).
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-PREEMPT PDU (address = master MS) to the tester, which accepts it by answering DM-PRE ACCEPT.
Pass criteria	The IUT sends DM-GTX REQUEST PDU.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	Tester issues a DM-GTX ACCEPT followed by DM-RELEASE.

DMO_MSGW_DMCC_CM_BV_RO_03	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Initiate pre-emption to establish ongoing call (master = Gateway).
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-GPREEMPT PDU (address = master GW) to the tester, which accepts it by answering DM-GPRE ACCEPT.
Pass criteria	The IUT sends DM-SETUP PDU.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call
Preamble	idle_to_RX_occupation.
Postamble	TX_Occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RO_04	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Handle the rejection of a pre-emption.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-PREEMPT PDU (address = master MS) to the tester, which does not accept it and answers DM-REJECT. The IUT stays in state "call active RX occupation".
Pass criteria	To check that IUT remains in "call active RX occupation" state, the tester sends DM-TX CEASED which brings the IUT to "call active RX reservation" state. Then, during the reservation period, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation
Postamble	Tester sends DM-GREJECT PDU and RX_Occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RO_05	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Handle the reject of a pre-emption (master = gateway).
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-GPREEMPT (address = master GW) to the tester, which does not accept it and answers DM-GREJECT. The IUT stays in state "call active RX occupation".
Pass criteria	To check that IUT remains in "call active RX occupation" state, the tester sends DM-TX CEASED which brings the IUT to "call active RX reservation" state. Then, during the reservation period, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	RX_Occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RO_06	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Handle the gateway rejection of a pre-emption. (master = MS).
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-PREEMPT (address = master MS) to the tester, which accepts it and answers DM-PRE ACCEPT. IUT sends DM-GTX REQUEST, which is not accepted and tester sends back DM-GREJECT. The IUT stays in state "call active RX occupation".
Pass criteria	To check that IUT remains in "call active RX occupation" state, the tester sends DM-TX CEASED which brings the IUT to "call active RX reservation" state. Then, during the reservation period, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	RX_Occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RO_07	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	Reception of the ongoing call set-up with presence check.
Test description	The tester sends a DM-SETUP PRES PDU related to the ongoing call.
Pass criteria	Verify that the IUT sends the DM-CONNECT PDU.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	Tester sends the DM-CONNECT ACK PDU and then the postamble RX_occupation_to_idle is used to clear the call.

6.1.2.5 IUT is in RX reservation state

DMO_MSGW_DMCC_CM_BV_RR_01	**Reference:** ETS 300 396-5 [2], 6.2.5.2
Purpose	Receive an incoming CM call.
Test description	The tester sends DM-SETUP PRES PDU to the IUT.
Pass criteria	The IUT sends DM-CONNECT to the tester, as the set-up request was accepted by the IUT.
Selection ETS 300 396-8-3 [3]	A.5/1 Circuit mode call.
Preamble	idle_to_RX_reservation.
Postamble	DM-CONNECT-ACK PDU then RX_occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RR_02	**Reference:** ETS 300 396-5 [2], 6.2.6
Purpose	Initiate pre-emption to establish a new CM call.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-PREEMPT PDU to the tester (address = master MS), which is accepted by the tester (DM-PRE ACCEPT PDU sent back by the tester).
Pass criteria	Check that the IUT sends DM-GSETUP PDU to the tester
Selection ETS 300 396-8-3 [3]	A.6/11 Initiate pre-emption for a new call.
Preamble	idle_to_RX_reservation.
Postamble	TX_occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RR_03	**Reference:** ETS 300 396-5 [2], 6.2.5.2
Purpose	Initiate changeover to establish ongoing CM call.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-GTX REQUEST PDU to the tester, which accept it (DM-GTX ACCEPT PDU sent back by the tester).
Pass criteria	Check that the IUT sends DM-SETUP request to the tester.
Selection ETS 300 396-8-3 [3]	A.6/12 Initiate call change-over.
Preamble	idle_to_RX_reservation.
Postamble	TX_occupation_to_idle.

DMO_MSGW_DMCC_CM_BV_RR_04	**Reference:** ETS 300 396-5 [2], 6.2.5.2
Purpose	Handle the rejection of a changeover request.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. The IUT sends DM-GTX REQUEST to the tester, which is rejected by the tester (DM-GREJECT sent back by the tester).
Pass criteria	The IUT remains in the same state "call active RX reservation". To test it, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/12 Initiate call change-over.
Preamble	idle_to_RX_reservation.
Postamble	The tester sends DM-DISCONNECT to return the IUT to idle.

6.1.3 MS-GW CM timer tests

6.1.3.1 DT301 Response to DM-GSETUP timer

DMO_MSGW_DMCC_CM_TI_01	**Reference:** ETS 300 396-5 [2], 6.2.1.1
Purpose	Time-out of DT301 for response to DM-GSETUP.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. Then the IUT sends DM-GSETUP to the tester. The tester does not answer within DT301 time.
Pass criteria	After DT301 time out, the IUT sends the DM-RELEASE PDU or the DM-GSETUP PDU again to the tester, up to a maximum of DN301 attempts.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check.
Preamble	None.
Postamble	None.

6.1.3.2 DT302 Response DM-GCONNECT to DM-GSETUP timer

DMO_MSGW_DMCC_CM_TI_02	**Reference:** ETS 300 396-5 [2], 6.2.1.1
Purpose	Time out DT302 for response DM-GCONNECT after receiving DM-GACK.
Test description	The tester issues an implicit send to cause the IUT to initiate a call set-up. Then the IUT sends DM-GSETUP to the tester which replies with DM-GACK PDU. The tester does not answer within DT302 time.
Pass criteria	After DT302 time out, the IUT sends the DM-RELEASE PDU or the DM-GSETUP PDU again to the tester, until DN302 attempts are made.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check.
Preamble	None.
Postamble	None.

6.1.3.3 DT311 Call transaction timer

DMO_MSGW_DMCC_CM_TI_03	**Reference:** ETS 300 396-5 [2], 6.2.4.1
Purpose	Initiate end of transmission after time out of DT311 call transaction timer.
Test description	after time out on DT311, the IUT sends DM-TX CEASED PDU and enters Call Active RX Reservation state.
Pass criteria	The DM-TX CEASED PDU is received by the tester.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check.
Preamble	idle_to_TX_occupation.
Postamble	RX_reservation_to_idle.

6.1.3.4 DT308 Response DM-GPRE ACCEPT after receiving DM-GACK

DMO_MSGW_DMCC_CM_TI_04	**Reference:** ETS 300 396-5 [2], 6.2.4.2
Purpose	verify timer DT 308.
Test description	The tester issues an implicit send to cause the IUT to initiate a call. Then the IUT sends DM-GPREEMPT to the tester, The tester sends DM-GACK back but does not answer DM-GPRE ACCEPT within DT308 time.
Pass criteria	The IUT comes back to CALL ACTIVE RX OCCUPATION state. To check it, the tester sends DM-TX CEASED which brings the IUT to CALL ACTIVE RX RESERVATION state. Then, during the reservation period, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	DM-GREJECT then RX_reservation_to_idle.

6.1.3.5 DT309 Response DM-GTX ACCEPT after receiving DM-GACK

DMO_MSGW_DMCC_CM_TI_05	**Reference:** ETS 300 396-5 [2], 6.2.5.2
Purpose	verify timer DT 309.
Test description	The tester issues an implicit send to cause the IUT to initiate a call. Then the IUT sends DM-GTX REQUEST to the tester which does not answer DM-GTX ACCEPT within DT309 time.
Pass criteria	The IUT comes back to "call active RX reservation" state. To check it, the tester issues an implicit send to cause the IUT to issue a call set-up. Verify that before attempting the call set-up, the IUT issues a DM-GTX REQUEST to initiate a changeover.
Selection ETS 300 396-8-3 [3]	A.6/12 Initiate call change-over.
Preamble	idle_to_RX_reservation.
Postamble	RX_occupation_to_idle.

6.2 DMCC Short data service (SDS)

Test group objective: To test the behaviour of the DMCC SDS entity of the IUT.

Condition: IUT supports Short Data Service and for some TPs, together with CM calls.

6.2.1 MS-GW SDS Capability tests

To test the basic capabilities of the SDS module of the IUT, when operating in unacknowledged service.

DMO_MSGW_DMCC_SDS_CA_01	**Reference:** ETS 300 396-5 [2], 6.3.1.1.1
Purpose	Establish a SDS with unacknowledged service.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-UDATA. with the selection of data types appropriate to the IUT capabilities.
Pass criteria	The IUT sends DM-SDS-UDATA to the tester, up to DN314 times.
Selection ETS 300 396-8-3 [3]	A.12/1 Send unacknowledged SDS, group or individual address OR A.13/1.
Preamble	None.
Postamble	None.

6.2.2 MS-GW SDS Valid behaviour tests

6.2.2.1 IUT is in idle state, channel is free

DMO_MSGW_DMCC_SDS_BV_ID_01	**Reference:** ETS 300 396-5 [2], 6.3.1.1.2
Purpose	Establish an SDS with acknowledged service
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. When the tester receives DM-SDS DATA, it sends back DM-SDS ACK to the IUT.
Pass criteria	The IUT comes back to idle, and no new DM-SDS DATA is sent by the IUT within a given time (greater than DT316) meaning the SDS call was successful.
Selection ETS 300 396-8-3 [3]	A.12/2 Send acknowledged SDS group or individual address OR A.13/2.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_ID_02	**Reference:** ETS 300 396-5 [2], 6.3.1.1.2
Purpose	Handle the reject of an outgoing SDS with acknowledged service
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. When the tester receives DM-SDS DATA, it sends back DM-REJECT to the IUT.
Pass criteria	The IUT comes back to idle, and no new DM-SDS DATA is sent by the IUT within a given time (greater than DT316) meaning the SDS call was properly aborted.
Selection ETS 300 396-8-3 [3]	A.12/2 Send acknowledged SDS group or individual address OR A.13/2.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_ID_03	**Reference:** ETS 300 396-5 [2], 6.3.2.2
Purpose	Receive an incoming SDS with acknowledged service.
Test description	The tester sends DM-SDS DATA containing the appropriate data for the IUT capabilities, to the IUT.
Pass criteria	The IUT sends back to the tester DM-SDS ACK containing data or not, according to the IUT capabilities.
Selection ETS 300 396-8-3 [3]	A.15/2 Receive acknowledged SDS without or with data in ACK OR A.15/3.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_ID_04	**Reference:** ETS 300 396-5 [2], 6.3.2.2
Purpose	Receive an incoming SDS with acknowledged service and with FCS.
Test description	The tester sends the DM-SDS DATA PDU containing the appropriate data depending on the IUT capabilities and including FCS.
Pass criteria	Verify that the IUT sends the DM-SDS ACK PDU containing or not data.
Selection ETS 300 396-8-3 [3]	A.15/2 Receive acknowledged SDS without or with data in ACK OR A.15/3.
Preamble	None.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_ID_05	**Reference:** ETS 300 396-5 [2], 6.3.1.1.2
Purpose	Establish an SDS with acknowledged service using the FCS.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA with the selection of data types appropriate to the IUT capabilities. When the tester receives the DM-SDS DATA PDU with FCS, it sends back the DM-SDS ACK PDU.
Pass criteria	Verify that the SDS call was successful, i.e. the IUT does not send any DM-SDS DATA PDU again.
Selection ETS 300 396-8-3 [3]	A.12/2 Send acknowledged SDS group or individual address OR A.13/2.
Preamble	None.
Postamble	None.

6.2.2.2 IUT is in idle state, channel is busy

DMO_MSGW_DMCC_SDS_BV_IB_01	**Reference:** ETS 300 396-5 [2], 6.3.1.2
Purpose	Initiate pre-emption then establish a new SDS with acknowledged service.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. As the channel is busy, the IUT sends a DM-PREEMPT to the tester which accepts it by answering DM-PRE ACCEPT.
Pass criteria	The IUT sends DM-SDS DATA to the tester after Pre-emption of CM call.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and send acknowledged SDS, group or individual addr. (A.12/2 OR A.13/2).
Preamble	idle_channel_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_IB_02	**Reference:** ETS 300 396-5 [2], 6.3.1.2
Purpose	Initiate pre-emption the establish a new SDS with unacknowledged service.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which accepts it by answering the DM-PRE ACCEPT PDU.
Pass criteria	Verify that the IUT sends the DM-SDS UDATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and send unacknowledged SDS, group or individual (A.12/1 OR A.13/1) address.
Preamble	idle_channel_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_IB_03	**Reference:** ETS 300 396-5 [2], 6.3.1.2
Purpose	Handle the reject of pre-emption for acknowledged SDS.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. As the channel is busy, the IUT sends a DM-PREEMPT to the tester which does not accept it and answers with DM-REJECT PDU.
Pass criteria	The IUT comes back to idle, and no new DM-SDS DATA is sent by the IUT within a given time (greater than DT316) meaning the SDS call was properly aborted.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and sends acknowledged SDS, group or individual addr. (A.12/2 OR A.13/2).
Preamble	idle_channel_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_IB_04	**Reference:** ETS 300 396-5 [2], 6.3.1.2
Purpose	Handle the rejection of pre-emption for SDS with unacknowledged service.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which does not accept it and answers with DM-REJECT PDU.
Pass criteria	Verify that the IUT does not send the DM-SDS UDATA PDU within a time greater than DT316, meaning that the SDS call was properly aborted.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and send unacknowledged SDS, group or individual (A.12/1 OR A.13/1) address.
Preamble	idle_channel_occupation.
Postamble	None.

6.2.2.3 IUT is in state TX occupation

No TPs are possible from this state because though it is an optional feature, the wording of the specifications, using many times the word "may" does not oblige all implementations to behave as described here. See ETS 300 396-5 [2], 6.3.1.3 as example.

6.2.2.4 IUT is in RX occupation state

DMO_MSGW_DMCC_SDS_BV_RO_01	**Reference:** ETS 300 396-5 [2], 6.3.1.4.1
Purpose	Initiate pre-emption then establish ongoing SDS.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends a DM-PREEMPT to the tester which accepts it by answering DM-PRE_ACCEPT.
Pass criteria	The IUT sends DM-SDS DATA to the tester when pre-emption is accepted.
Selection ETS 300 396-8-3 [3]	A.16/4 Send short data after pre-emption of a CM call (ongoing AND and send acknowledged SDS, group or individual addr (A.12/2 OR A.13/2).
Preamble	idle_to_RX_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_RO_02	**Reference:** ETS 300 396-5 [2], 6.3.1.4.1
Purpose	Initiate pre-emption to establish ongoing unacknowledged SDS.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which accepts it by answering the DM-PRE ACCEPT PDU.
Pass criteria	Verify that the IUT sends the DM-SDS UDATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/4 Send short data after pre-emption of a CM call (ongoing AND and send unacknowledged SDS, group or individual (A.12/1 OR A.13/1) address.
Preamble	idle_to_RX_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_RO_03	**Reference:** ETS 300 396-5 [2], 6.3.1.1.4.1
Purpose	Initiate pre-emption then establish new acknowledged SDS.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends a DM-PREEMPT to the tester which accepts it by answering DM-PRE_ACCEPT.
Pass criteria	The IUT sends DM-SDS DATA to the tester when Pre-emption is accepted.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and sends acknowledged SDS, group or individual addr. (A.12/2 OR A.13/2).
Preamble	idle_to_RX_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_RO_04	**Reference:** ETS 300 396-5 [2], 6.3.1.1.4.1
Purpose	Initiate pre-emption to establish new unacknowledged SDS.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which accepts it by answering the DM-PRE ACCEPT PDU.
Pass criteria	Verify that the IUT sends the DM-SDS UDATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and send unacknowledged SDS, group or individual (A.12/1 OR A.13/1) address.
Preamble	idle_to_RX_occupation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_RO_05	**Reference:** ETS 300 396-5 [2], 6.3.1.4.1
Purpose	Handle the rejection of pre-emption to establish ongoing acknowledged SDS.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which does not accept it and answers with DM-REJECT PDU.
Pass criteria	Verify that the IUT does not send the DM-SDS DATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and sends acknowledged SDS, group or individual addr. (A.12/2 OR A.13/2).
Preamble	idle_to_RX_occupation.
Postamble	RX_occupation_to_idle.

DMO_MSGW_DMCC_SDS_BV_RO_06	**Reference:** ETS 300 396-5 [2], 6.3.1.4.1
Purpose	Handle the rejection of pre-emption to establish ongoing unacknowledged SDS.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which does not accept it and answers with DM-REJECT PDU.
Pass criteria	Verify that the IUT does not send the DM-SDS UDATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) AND and send unacknowledged SDS, group or individual (A.12/1 OR A.13/1) address.
Preamble	idle_to_RX_occupation.
Postamble	RX_occupation_to_idle.

DMO_MSGW_DMCC_SDS_BV_RO_07	**Reference:** ETS 300 396-5 [2], 6.3.1.4.1
Purpose	Handle the rejection of pre-emption to establish new acknowledged SDS.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which does not accept it and answers with DM-REJECT PDU.
Pass criteria	Verify that the IUT does not send the DM-SDS DATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/4 Send short data after pre-emption of a CM call (ongoing and send acknowledged SDS, group or individual addr. AND (A.12/2 OR A.13/2).
Preamble	idle_to_RX_occupation.
Postamble	RX_occupation_to_idle.

DMO_MSGW_DMCC_SDS_BV_RO_08	**Reference:** ETS 300 396-5 [2], 6.3.1.4.1
Purpose	Handle the rejection of pre-emption to establish new unacknowledged SDS.
Test description	The tester is in the call active TX OCCUPATION state with another MS. The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends the DM-PREEMPT PDU to the tester which rejects it by answering the DM-PRE REJECT PDU.
Pass criteria	Verify that the IUT does not send the DM-SDS UDATA PDU.
Selection ETS 300 396-8-3 [3]	A.16/2 Send short data after pre-emption of a CM call (new call) and send unacknowledged SDS, group or individual address. AND (A.12/1 OR A.13/1)
Preamble	idle_to_RX_occupation.
Postamble	RX_occupation_to_idle.

6.2.2.5 IUT is in RX reservation state

DMO_MSGW_DMCC_SDS_BV_RR_01	**Reference:** ETS 300 396-5 [2], 6.3.2.2
Purpose	Receive incoming acknowledged SDS.
Test description	The tester sends DM-SDS DATA to the IUT.
Pass criteria	The IUT sends DM-SDS ACK to the tester, meaning that the request was accepted by the IUT.
Selection ETS 300 396-8-3 [3]	A.15/2 Receive acknowledged SDS without or with data in ACK OR A.15/3.
Preamble	idle_to_RX_reservation.
Postamble	None.

DMO_MSGW_DMCC_SDS_BV_RR_02	**Reference:** ETS 300 396-5 [2], 6.3.2.2
Purpose	Receive incoming acknowledged SDS within the CM call.
Test description	The tester sends the DM-SDS DATA PDU to the IUT. The SDS are sent as a transaction within the CM call.
Pass criteria	Verify that the IUT sends back the DM-SDS ACK PDU. Verify that the IUT stays in the RX reservation state.
Selection ETS 300 396-8-3 [3]	A.15/2 Receive acknowledged SDS without or with data in ACK OR A.15/3.
Preamble	idle_to_RX_reservation.
Postamble	RX_Reservation_to_idle.

DMO_MSGW_DMCC_SDS_BV_RR_03	**Reference:** ETS 300 396-5 [2], 6.3.1.4.2
Purpose	Initiate changeover then establish ongoing SDS.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities.. As the channel is busy, the IUT sends a DM-TX REQUEST to the tester which accepts it by answering DM-TX ACCEPT.
Pass criteria	The IUT sends DM-SDS DATA to the tester when changeover is accepted.
Selection ETS 300 396-8-3 [3]	A.16/5 Send acknowledged SDS after changeover, individual or group address AND (A.12/2 OR A.13/2).
Preamble	idle_to_RX_reservation.
Postamble	Tester sends the DM-SDS ACK PDU and RX_Reservation_to_idle.

DMO_MSGW_DMCC_SDS_BV_RR_04	**Reference:** ETS 300 396-5 [2], 6.3.1.4.2
Purpose	Initiate changeover then establish ongoing unacknowledged SDS.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. As the channel is busy, the IUT sends a DM-TX REQUEST to the tester which accepts it by answering DM-TX ACCEPT.
Pass criteria	The IUT sends DM-SDS UDATA to the tester when changeover is accepted.
Selection ETS 300 396-8-3 [3]	A.16/5 Send unacknowledged SDS after changeover, individual or group address AND (A.12/1 OR A.13/1).
Preamble	idle_to_RX_reservation.
Postamble	Tester sends the DM-SDS ACK PDU and RX_Reservation_to_idle.

6.2.3 MS-GW SDS Timer tests

6.2.3.1 DT316 Response to DM-SDS DATA timer

DMO_MSGW_DMCC_SDS_TI_01	**Reference:** ETS 300 396-5 [2], 6.3.1.1.2
Purpose	Time out on DT316 timer and retry an SDS DATA with acknowledged service.
Test description	The tester issues an implicit send to cause the IUT to initiate an SDS-DATA. with the selection of data types appropriate to the IUT capabilities. When the tester receives DM-SDS DATA, it waits and DOES NOT send back DM-SDS ACK to the IUT within DT316.
Pass criteria	The IUT sends a new DM-SDS DATA within a given time (greater than DT316) and for a number of times less than DN316 attempt number, meaning the time out for SDS response was successful.
Selection ETS 300 396-8-3 [3]	A.12/2 Send acknowledged SDS on group or individual address OR A.13/2.
Preamble	None.
Postamble	The tester sends back DM-SDS ACK to the IUT.

7 Test Purposes for the DMMM protocol of a DMO MS-GW

In this clause, the IUT is an MS connected to a gateway. The tester is a gateway. The interface between the MS and the gateway is being tested.

DMO_MSGW_DMMM_01	**Reference:** ETS 300 396-5 [2], 6.4.1
Purpose	Registration by invitation.
Test description	The tester send the layer 2 DPRES SYNC signal indicating invitation for registration.
Pass criteria	Verify that the IUT sends the DM-GREGISTER REQUEST PDU.
Selection ETS 300 396-8-3 [3]	A.4/2 Direct mode mobility management (then mandatory to support invited registration).
Preamble	None.
Postamble	None.

DMO_MSGW_DMMM_02	**Reference:** ETS 300 396-5 [2], 6.4.2
Purpose	Un-invited registration.
Test description	The tester send an implicit send to cause the IUT to send the DM-GREGISTER REQUEST PDU.
Pass criteria	Verify that the IUT sends the DM-GREGISTER REQUEST PDU.
Selection ETS 300 396-8-3 [3]	A.20/2 un-invited registration.
Preamble	None.
Postamble	None.

DMO_MSGW_DMMM_03	**Reference:** ETS 300 396-5 [2], 6.4.3
Purpose	Registration cancellation.
Test description	The tester send the DM-GREGISTER CANCEL PDU.
Pass criteria	Verify that upon receipt of the DM-GREGISTER CANCEL PDU, the IUT sends back the DM-GCANCEL ACK PDU.
Selection ETS 300 396-8-3 [3]	A.4/2 Direct mode mobility management (then mandatory to support invited registration).
Preamble	Registration.
Postamble	None.

8 Test Purposes for the MAC protocol of a DMO MS-GW

In this clause, the IUT is an MS connected to a gateway. The tester is a gateway. The interface between the MS and the gateway is being tested.

8.1 MS-GW MAC capability tests

Test group objective: To test DM-MAC basic capability: fill bit mechanism.

DMO_MSGW_MAC_CA_01	**Reference:** ETS 300 396-5 [2], 8.5.5.1
Purpose	Fill bit addition mechanism in sending mode.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM or SDS call. The IUT sends a DMAC-SYNC containing DM-GSETUP or DM-SDS DATA or DM-SDS UDATA SDU.
Pass criteria	Check that DMAC-SYNC PDU sent by the IUT is correct, meaning that the IUT fill bit addition mechanism works properly.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check or A.10/1 Send data (SDS).
Preamble	None.
Postamble	In the case of CM call: 1) terminate to establish the call if CM call with presence check 2) then TX_occupation_to_idle.

DMO_MSGW_MAC_CA_02	**Reference:** ETS 300 396-5 [2], 8.5.5.2
Purpose	Fill bit deletion mechanism in sending mode.
Test description	The tester initiates a CM call by transmitting to the IUT a DMAC-SYNC PDU containing DM-SETUP PRES SDU.
Pass criteria	Check that the IUT sends back the DMAC-SYNC PDU containing the DM-CONNECT SDU, meaning that the IUT fill bit deletion mechanism works properly.
Selection ETS 300 396-8-3 [3]	A.8/2 Accept Circuit Mode call with presence check.
Preamble	None.
Postamble	RX_occupation_to_idle.

8.2 MS-GW MAC valid behaviour tests

8.2.1 DM channel usage procedures

Test group objective: To test DM channel usage procedures of the DM-MAC entity.

DMO_MSGW_MAC_BV_CU_01	**Reference:** ETS 300 396-5 [2], 8.4.5.1
Purpose	Initiation of CM or SDS call in DSB.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM or SDS call.
Pass criteria	Verify that the IUT sends the DM-GSETUP or DM-SDS DATA or DM-SDS UDATA SDU in DSB.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check or A.10/1 Send data (SDS).
Preamble	None
Postamble	In the case of CM call: 1) terminate to establish the call if CM call with presence check 2) then TX_occupation_to_idle.

DMO_MSGW_MAC_BV_CU_02	**Reference:** ETS 300 396-5 [2], 8.5.1, 8.4.5.1.7
Purpose	Transmission of the DM-OCCUPIED SDU when the channel is busy.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM call with or without presence check.
Pass criteria	Verify that once the channel is occupied, the IUT generates the DM-OCCUPIED SDU in timeslot 3 of frames 6, 12 and 18.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check.
Preamble	Idle_to_TX_occupation.
Postamble	TX_occupation_to_idle.

DMO_MSGW_MAC_BV_CU_03	**Reference:** ETS 300 396-5 [2], 8.4.6.2
Purpose	Transmission of DM-SDS OCCUPIED SDU when transmitting SDS data.
Test description	The tester issues an implicit to cause the IUT to initiate a SDS call. Then the IUT sends the DMAC-SYNC PDU containing the DM-SDS DATA or DM-SDS UDATA SDU.
Pass criteria	During the transmission of the SDS data, the IUT issues DMAC-SYNC containing DM-SDS OCCUPIED SDU. It is transmitted in DSB in timeslot 3 of frames 6 and 12 and in timeslots 1 and 3 of frame 18. In addition, SDS time remaining is set to "0000".
Selection ETS 300 396-8-3 [3]	A.10./1 Short Data Service send data.
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_CU_04	**Reference:** ETS 300 396-5 [2], 8.4.7.1, 8.4.7.2, 8.5.6.1
Purpose	Specified number of re-transmission is fulfilled with respect to the frame count down element.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM or SDS call. The IUT is transmitting a DMAC-SYNC PDU containing DM-GSETUP or DM-SDS DATA or DM-SDS UDATA SDU, repeated in the number of frames indicated by the frame count down element.
Pass criteria	The number of repeated transmissions in consecutive frames corresponds to the value provided in the frame count down element, and the PDU is not repeated after the one with frame count down element value 0 (absence observed during a period of time).
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check or A.10/1 Send data (SDS).
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_CU_05	**Reference:** ETS 300 396-5 [2], 8.4.7.5, 8.5.4
Purpose	Fragmentation.
Test description	The tester issues an implicit send such that the IUT initiates a SDS by transmitting DM-SDS DATA or DM-SDS UDATA PDU with data type 2, 3 or 4 in order to receive a fragmented message.
Pass criteria	DMAC-SYNC with Fragmentation flag set to value 1, followed by n times DMAC-FRAG then ending with DMAC-END.
Selection ETS 300 396-8-3 [3]	A.27/6 Fragmentation started by DMAC-SYNC.
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_CU_06	**Reference:** ETS 300 396-5 [2], 8.4.7.12
Purpose	Channel A usage.
Test description	The tester issues an implicit send such that the IUT initiates a CM or SDS call. The IUT sends a DMAC-SYNC containing a DM-GSETUP or DM-SDS DATA or DM-SDS UDATA PDU according to the IUT capabilities.
Pass criteria	The A/B channel usage in DMAC-SYNC is set to value 00, meaning A channel usage.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check or A.10/1 Send data (SDS).
Preamble	None.
Postamble	None.

8.2.2 Signalling messages procedures

Test group objective: To test the signalling procedures of the DM-MAC entity.

DMO_MSGW_MAC_BV_SM_01	**Reference:** ETS 300 396-5 [2], 8.5.2.1.1
Purpose	Addressing in synchronization burst carrying gateway specific message.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM call. The IUT sends a DMAC-SYNC PDU containing a DM-GSETUP SDU.
Pass criteria	Verify the ISSI and MNI source elements in the DMAC-SYNC header and verify that the source address type is set to '00', and destination address type set to '10'.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check.
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_SM_02	**Reference:** ETS 300 396-5 [2], 8.5.2.1.2
Purpose	Addressing in synchronization burst carrying non gateway specific message.
Test description	The tester issues an implicit send to cause the IUT to initiate a SDS call. The IUT sends a DMAC-SYNC PDU containing a DM-SDS DATA or DM-SDS UDATA SDU.
Pass criteria	Verify that the SSI and MNI destination elements in the DMAC-SYNC header are set to the TSI of called party and verify that the destination address type is set to '00'.
Selection ETS 300 396-8-3 [3]	A.10/1 Send data (SDS).
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_SM_03	**Reference:** ETS 300 396-5 [2], 8.5.2.1.2
Purpose	Addressing in synchronization burst for a random access message.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM call. The IUT sends DM-PREEMPT (address = master) to the tester.
Pass criteria	The destination address of the DMAC-SYNC containing DM-PREEMPT sent by the IUT is the current master DM-MS layer 2 address.
Selection ETS 300 396-8-3 [3]	A.27/2 Addressing in Synchronization burst for non gateway specific message AND A.6/10 Initiate pre-emption in ongoing call AND A.6/3 initiate call set-up without presence check.
Preamble	idle_to_RX_occupation.
Postamble	Tester issues a DM-REJECT followed by RX_occupation_to_idle.

DMO_MSGW_MAC_BV_SM_04	**Reference:** ETS 300 396-5 [2], 8.5.2.1.2
Purpose	Addressing in synchronization burst in the DM-OCCUPIED PDU.
Test description	The tester issues an implicit send to cause the IUT to initiate a CM call. The IUT sends the DMAC-SYNC PDU containing the DM-GSETUP SDU. Once the call is established (the channel is busy), the IUT sends the DMAC-SYNC PDU containing the DM-OCCUPIED SDU.
Pass criteria	The MNI and source address elements in a DMAC-SYNC containing DM-OCCUPIED SDU are the same as the ones used in the DM-SETUP.
Selection ETS 300 396-8-3 [3]	A.27/2 Addressing in Synchronization burst for non gateway specific message AND A.6/3 initiate call set-up without presence check.
Preamble	None.
Postamble	TX_occupation_to_idle.

DMO_MSGW_MAC_BV_SM_05	**Reference:** ETS 300 396-5 [2], 8.4.7.5, 8.5.4.1
Purpose	Fragmentation PDUs are sent in consecutive frames.
Test description	The tester issues an implicit send to cause the IUT to initiate a SDS call with fragmentation.
Pass criteria	Verify that the DMAC-FRAG PDUs and DMAC-END PDU are sent in consecutive frames.
Selection ETS 300 396-8-3 [3]:	A.27/6 Fragmentation started by DMAC-SYNC.
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_SM_06	**Reference:** ETS 300 396-5 [2], 8.4.7.5, 8.5.4.1
Purpose	For acknowledged data message sent using fragmentation, if the acknowledge is sent to the IUT then no re-transmission takes place.
Test description	The tester issues an implicit send to cause the IUT to initiate a SDS call with fragmentation. The IUT sends the DMAC-SYNC, DMAC FRAG and DMAC END PDUs.
Pass criteria	Verify that after receipt of the acknowledge SDU, the IUT does not re-transmit the SDS data.
Selection ETS 300 396-8-3 [3]:	A.27/6 Fragmentation started by DMAC-SYNC.
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_SM_07	**Reference:** ETS 300 396-5 [2], 8.5.4.2
Purpose	Reconstruction procedure for acknowledged SDS data messages.
Test description	The tester sends a fragmented SDS data type 2 3 or 4 message.
Pass criteria	Check that the IUT sends back a DMAC-SYNC containing SDS-DATA ACK, indicating that the message was received without error.
Selection ETS 300 396-8-3 [3]	A.27/7 Reconstruction started by DMAC-SYNC.
Preamble	None.
Postamble	None.

DMO_MSGW_MAC_BV_SM_08	**Reference:** ETS 300 396-5 [2], 8.5.7.3.6
Purpose	Abandoning random access attempt. (DN213).
Test description	The tester issues an implicit send to cause the IUT to initiate pre-emption. The IUT sends DM-PREEMPT request (address = master) to the tester. The tester does not answer the request.
Pass criteria	The IUT stops sending DMAC-SYNC containing DM-PREEMPT after DN213 times for a non emergency message and 2*DN213 for an emergency message.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	None.

DMO_MSGW_MAC_BV_SM_09	**Reference:** ETS 300 396-5 [2], 8.5.7.3.6
Purpose	Abandoning random access attempt. (DN213)
Test description	The tester issues an implicit send to cause the IUT to initiate pre-emption. The IUT sends DM-GPREEMPT request (address = gateway) to the tester. The tester does not answer the request.
Pass criteria	The IUT stops sending DMAC-SYNC containing DM-GPREEMPT after DN213 times for a non emergency message and 2*DN213 for an emergency message.
Selection ETS 300 396-8-3 [3]	A.6/10 Initiate pre-emption in ongoing call.
Preamble	idle_to_RX_occupation.
Postamble	None.

DMO_MSGW_MAC_BV_SM_10	**Reference:** ETS 300 396-5 [2], 8.5.7.2.1
Purpose	Pre-emption flag in the DM-OCCUPIED SDU.
Test description	In TX occupation state, the IUT generates and sends the DMAC-SYNC PDU containing the DM-OCCUPIED SDU.
Pass criteria	Verify that when generating the DM-OCCUPIED SDU, the IUT set the pre-emption request flag to 1 and timing flag to 0.
Selection ETS 300 396-8-3 [3]	A.6/3 Initiate call set-up without presence check.
Preamble	idle_to_TX_occupation.
Postamble	TX_occupation_to_idle.

8.3 MS-GW MAC timer tests

DMO_MSGW_MAC_BV_TI_01	**Reference:** ETS 300 396-5 [2], 8.5.7.2.3
Purpose	Response to a pre-emption request within time DT211.
Test description	The tester sends a DM-PREEMPT to the IUT, containing the address of the master. The IUT sends back DM-PRE ACCEPT.
Pass criteria	check that the IUT MAC sends back DMAC-SYNC containing DM-PRE ACCEPT within time DT211, and that it repeats the same DM-PRE ACCEPT SDU the number of frames specified.
Selection ETS 300 396-8-3 [3]	A.6/9 Accept call pre-emption.
Preamble	idle_to_TX_occupation.
Postamble	RX_Reservation_to_idle.

Annex A (informative): Bibliography

- ETS 300 396-1: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 1: General network design".

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