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Terrestrial Trunked Radio (TETRA); Conformance testing specification; Part 4: Protocol testing specification for Direct Mode Operation (DMO); Sub-part 3: Test Suite Structure and Test Purposes (TSS&TP) for Mobile Station (MS) Repeater type 1

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Terrestrial Trunked Radio (TETRA);
Conformance testing specification;
Part 4: Protocol testing specification for
Direct Mode Operation (DMO);
Sub-part 3: Test Suite Structure
and Test Purposes (TSS&TP)
for Mobile Station (MS) Repeater type 1

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Terrestrial Trunked Radio (TETRA).

The present document had been submitted to Public Enquiry as ETS 300 394-4-3. During the processing for Vote it was converted into an EN.

The present document consists of 5 parts as follows:

Part 1:   "Radio";

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

Part 3:   "Protocol testing specification for Packet Data Optimized (PDO)";

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

Part 5:   "Security".

National transposition dates	
Date of adoption of this EN:	29 December 2000
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1 Scope

The present document contains the Test Suite Structure (TSS) and Test Purposes (TPs) to test the TETRA Direct Mode Operation (DMO) protocols. The present document is divided into several parts, each one dealing with a stack of protocols which includes layer 3 and layer 2 protocols. The present document deals with TSS&TP for a Direct Mode MS operating with a type 1 Repeater (MS-REP1) Air Interface protocol, while part 4, sub-part 1 deals with TSS&TP for DM MS to MS protocol and part 4, sub-part 4 deals with type 1 Repeater (DM-REP1) Air Interface protocol.

Testing of security features is outside the scope of the present document.

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 [3] and ISO/IEC 9646-2 [4], as well as the ETSI methodology for conformance testing, ETS 300 406 [5], are used as the basis for the test methodology.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

[1]   ETSI EN 300 396-4: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 4: Type 1 repeater air interface".

[2]   ETSI EN 300 396-8-2: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 8: Protocol Implementation Conformance Statement (PICS) proforma specification; Sub-part 2: Type 1 repeater Air Interface (AI)".

[3]   ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General Concepts".

[4]   ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".

[5]   ETSI ETS 300 406: "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 the present document, the terms and definitions given in EN 300 396-4 [1] apply.

3.2   TETRA abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Circuit Mode
DMCC	Direct Mode Call Control
DMO	Direct Mode of Operation
FCS	Frame Check Sequence
MAC	Medium Access Control
MNI	Mobile Network Identity
MS	Mobile Station
RX	Receiver
SDS	Short Data Services
SDU	Service Data Unit
TX	Transmitter

3.3   ISO 9646 abbreviations

For the purposes of the present document the following ISO 9646-1 abbreviations apply:

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

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4   Test Suite Structure (TSS)

4.1   DMCC layer test groups

The first level separates the DMCC 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);

- Timer tests (TI).

Further level classifies the possible operations in each protocol condition or state.

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

MS-REP1 Direct Mode Call Control (DMO_MSREP1_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 (TR)

from RX Reservation State (RR)

Timer Tests (TI)

4.2   MAC layer test groups

The first level of the MAC test groups separates the MAC test suite in functional test groups: CA, BV and TI. The second level of the test subgroups is a division of protocol requirements into functional entities.

The following list defines the MAC layer test group names and identifiers:

MS-REP1 MAC layer (DMO_MSREP1_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 DMCC layer and MAC layer are defined in clause 6 of the present document. Each layer leads to a different test suite.

5.1 Test purpose definition conventions

5.1.1 TPs descriptions

Each TP is described using text presented in a table.

The table contains the following information:

Table 1

TP-Name The TP name is a unique identifier, specified according to the TP naming conventions defined in the clause below. (it is also the name of the corresponding test case).		Reference: Reference to the clause number of specification EN 300 396-4 [1] stating this conformance requirement. EXAMPLE: EN 300 396-4 [1], 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 EN 300 396-8-2 [2] 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. EXAMPLE: Idle_to_RX_reservation.
Postamble		"None" or name of the postamble to bring the IUT back to idle state, EXAMPLE: RX_occupation_to_idle.

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

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.
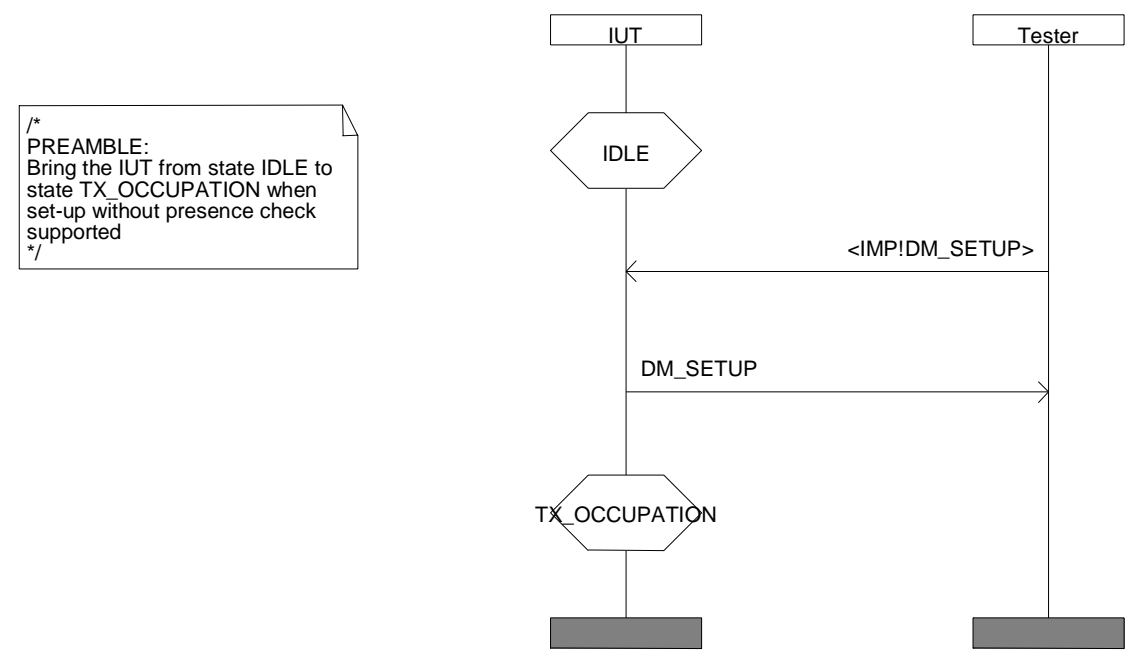
5.1.2.1 Preamble idle_to_TX_occupation: From Idle state to Call Active TX Occupation
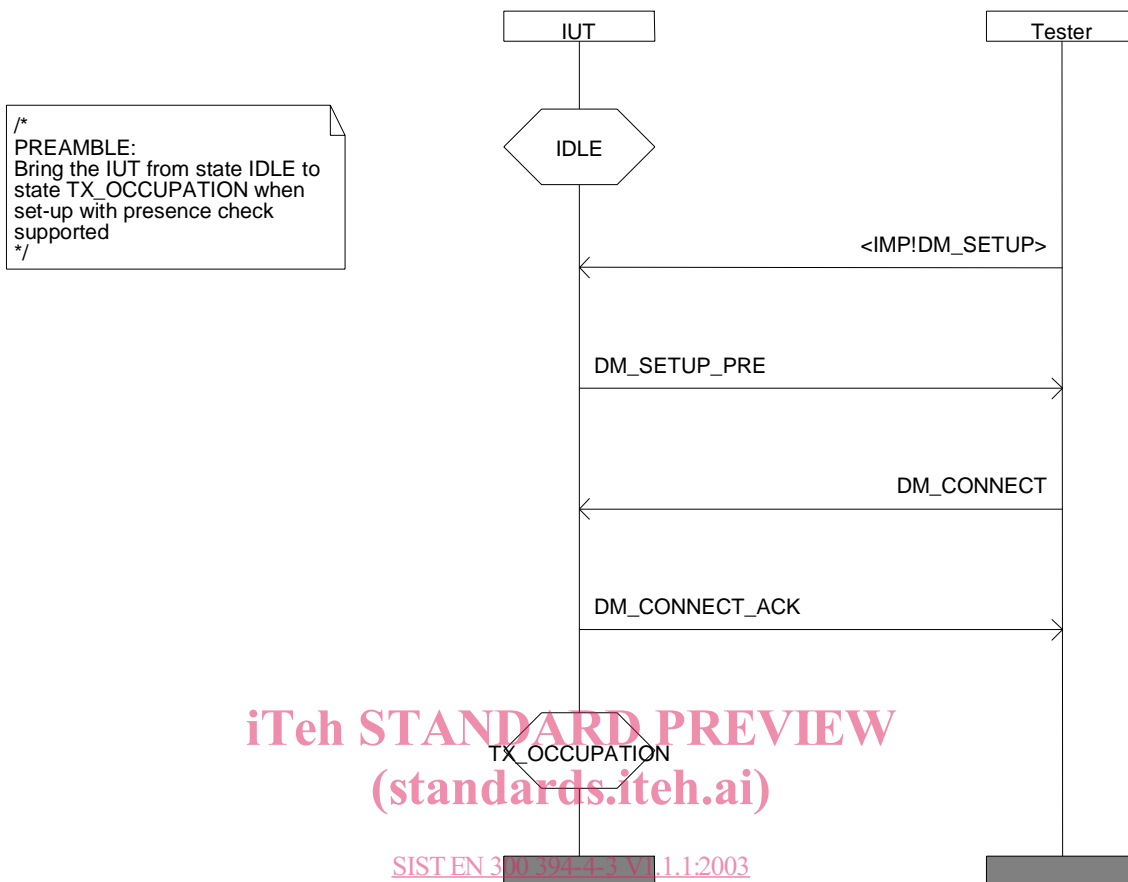

```
/*
PREAMBLE:
Bring the IUT from state IDLE to
state TX_OCCUPATION when
set-up with presence check
supported
*/
```

Figure 1: With presence check


```
/*
PREAMBLE:
Bring the IUT from state IDLE to
state TX_OCCUPATION when
set-up without presence check
supported
*/
```

Figure 2: Without presence check

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