



TECHNICAL SPECIFICATION

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Conformance testing for Mode 1 of
the digital Private Mobile Radio (dPMR™);
Part 3: Interoperability Test Suite Structure and
Test Purposes (TSS&TP) specification**

Reference

RTS/ERM-TGDMM-353

Keywords

digital, interoperability, mobile, radio, testing,
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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 3 of a multi-part deliverable covering the Conformance testing for Modes 1 and 2 of the digital Private Mobile Radio (dPMR™) as identified below:

- Part 1: "Protocol Implementation Conformance Statement (PICS) proforma";
- Part 2: "Test Suite Structure and Test Purposes (TSS&TP) specification";
- Part 3: "Interoperability Test Suite Structure and Test Purposes (TSS&TP) specification".**

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Executive summary

The present document describes the interoperability test requirements for digital Private Mobile Radio compliant to the ETSI TS102 658 standard.

It is intended to be used in conjunction with the Protocol Implementation Conformance standard (PICS) ETSI TS 102 726-1 [i.2] which describes the applicable functions of the equipment being evaluated. The actual test procedure and the required test result for each of those functions can be found in the present document.

1 Scope

The present document specifies the interoperability Test Purposes (TPs) for the Digital Private Mobile Radio (dPMR™) standard, ETSI TS 102 658 [1]. TPs are defined using the TPLan notation described in ETSI ES 202 553 [i.1]. Test purposes have been written based on the test specification framework described in ETSI TS 102 351 [2] and based on the methodology defined in ISO/IEC 9646-2 [3].

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI TS 102 658 : "Digital Private Mobile Radio (dPMR) using FDMA with a channel spacing of 6,25 kHz".
- [2] ETSI TS 102 351 (V2.1.1): "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".
- [3] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".
- [4] ETSI TS 102 587-3: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Peer-to-Peer Digital Private Mobile Radio; Part 3: Requirements catalogue".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI ES 202 553: "Methods for testing and Specification (MTS); TPLan: A notation for expressing test Purposes".
- [i.2] ETSI TS 102 726-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Conformance testing for Mode 1 of the digital Private Mobile Radio (dPMR™); Part 1: Protocol Implementation Conformance Statement (PICS) proforma".

3 Abbreviations

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

BS2L	Mode 2 Repeater using Limited Access Mode
BS2T	Mode 2 Repeater using Transparent Access Mode
CF	(Test) ConFIGuration
dPMR™	digital Private Mobile Radio
EUT	Equipment Under Test
M1	Mode 1
M2	Mode 2
OACSU	Off Air Call Set-Up
QE	Qualified Equipment

NOTE: That complies with TS 102 658 [1].

RC	Requirements Catalogue
RQ	ReQuirement
TP	Test Purpose
TSS	Test Suite Structure

4 Test Suite Structure (TSS)

The Test Suite Structure is based on the dPMR™ Requirements Catalogue [4]. It is defined by the groups within the following TPLan specification of test purposes. The numbering is not contiguous so that new TPs can be added at a later date without the need to completely renumber the TSS groups.

The test purposes have been divided into four groups:

Group 1: Common requirements.

Group 2: Services.

Group 3: Channel access.

Group 4: Addressing

The sub-grouping of these three groups follows the structure of the RC. Some of the sub-groups of the RC contained no testable requirement. Headings for those sub-groups are in this test purpose document in the node group to give a full view on the relation between RQ and TSS&TP.

5.1	Framing
5.1.1	Addressing
5.1.1.1	All Call
5.1.1.2	Dialling Plan
5.1.1.3	Talking Party ID
5.1.2	Base Station framing
5.1.3	Channel Access
5.1.3.0	General
5.1.3.1	OACSU
5.1.3.2	PTT Call
5.1.4	END frame
5.1.5	Message frame
5.1.5.1	Message Information field
5.1.6	Payload
5.1.6.1	Packet data
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5.1.6.3	T1 data
5.1.6.4	T2 data
5.1.6.5	Voice
5.1.6.5.1	Voice and attached data
5.1.6.5.2	Late entry
5.1.6.5.3	Slow user data
5.1.7	Power save
5.1.8	Superframe
5.1.8.1	Traffic channel
5.1.8.2	Voice TCH

5 Test Purposes (TP)

5.0 Preamble

The test purposes have been written in the formal notation TPlan. Configurations that are referenced by test purposes are shown in annex A. TPlan user definitions are listed in annex B.

5.1 Framing

5.1.1 Addressing

5.1.1.1 All Call

Void.

5.1.1.2 Dialling Plan

```

TP id      : TP_PMR_1403_01
summary    : 'The user should enter or select a string of digits and then press a button to initiate
the call'
RQ ref     : RQ_001_1403
TP type    : interoperability
Role       : M1, M2
config ref: CF_dPMR_01_I -- QE1 and EUT
TD ref     : TBD
with {
    QE1 and EUT in standby and
    EUT Complies_with_Standard_User_Interface
}
ensure that {
    when { EUT_User enters or selects an address of QE1 }
    then { QE1_User does not receive the Call }
}

```

```
-- xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

```

TP id      : TP_PMR_1403_02
summary    : 'The user should enter a string of digits and then press a button to initiate the call'
RQ ref     : RQ_001_1403
TP type    : interoperability
Role       : M1, M2
config ref: CF_dPMR_01_I -- QE1 and EUT
TD ref     : TBD
with {
    QE1 and EUT in standby and
    EUT Complies_with_Standard_User_Interface
}
ensure that {
    when { EUT_User enters or selects an address of QE1 before EUT_User
           presses the hash_key or dedicated_send_key }
    then { QE1_User receives the Call }
}

```

```
-- xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

```

TP id      : TP_PMR_1412_01
summary    : 'Some numeric address are not permitted'
RQ ref     : RQ_001_1409
TP type    : interoperability
Role       : M1, M2
config ref: CF_dPMR_01_I -- QE1 and EUT
TD ref     : TBD
with {
    EUT Complies_with_Standard_User_Interface and
    QE1 and EUT in standby
}
ensure that {
    when { EUT_User enters or selects a non_dialable_address and
           presses dedicated_send_key }
    then { EUT indicates an error } -- audible or visible prompt
}

```

```
-- xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

Annex A (normative): dPMRTM interoperability test configurations

A.1 Generic test configurations

A.1.1 Mode 1 equipment

Mode 1 dPMRTM MS shall be tested between an EUT and Qualified Equipment. One or two QE may be required according to the Test Purpose (TP), in clause 5.

A.1.2 Mode 2 equipment - MS

Mode 2 dPMRTM MS shall be tested in conjunction with a Mode 2 Base Station (BS2) using an EUT and Qualified Equipment. One or two QE may be required according to the Test Purpose (TP), in clause 5.

The BS2 shall be operated in Limited Mode and each QE and EUT shall be configured with the corresponding Channel Code preprogrammed in the BS2.

A.1.3 Mode 2 equipment - BS

A.1.3.1 BS2 general configuration

Mode 2 dPMRTM BS shall be tested in conjunction with Mode 2 MS (M2) using Qualified Equipment. One or two QE may be required according to the Test Purpose (TP), in clause 5.

Mode 2 dPMRTM BS shall be programmed with the maximum value for each call timer, M2_CallV, M2_CallD, M2_CallE.

Where preservation frames are used the Mode 2 dPMRTM BS shall be programmed to use the maximum value available.

A.1.3.2 BS2 Limited Mode

The BS2 shall be operated in Limited Mode and each QE shall be configured with the corresponding Channel Code preprogrammed in the BS2.

A.1.3.3 BS2 Transparent Mode

The BS2 shall be operated in Transparent Mode and each QE shall be configured with a Channel Code that is different to that preprogrammed in the BS2.

Annex B (normative): dPMR™ TPLan interoperability testing user definitions

```

---**Cross references**

xref PICS_doc          {DTS/ERM-TGDMR-nnn-1}

-- Configurations
xref CF_dPMR_01_I {dPMR_IOT_Configurations.ppt} -- QE1, EUT
xref CF_dPMR_02_I {dPMR_IOT_Configurations.ppt} -- QE1, QE2, EUT

---**Definitions**

def header type -- TP type

-- Entities
def entity EUT
def entity QE1
def entity QE2
def entity QE3
def entity BS2L -- Limited Mode BS2
def entity BS2T -- Transparent Mode BS2

-- Note: user could be a human user, machine, or program
def entity QE1_User -- the user operating QE1
def entity QE2_User -- the user operating QE2
def entity QE3_User -- the user operating QE3
def entity EUT_User -- the user operating EUT

-- Messages or signals
def event PTT_Call -- user presses PTT button and payload transmisson starts immediately
def event Individual_Call
def event Emergency_Call
def event Group_Call -- call with wilddcard(s)
def event TalkGroup_Call -- call with only numeric address
def event Call -- any dialled call
def event Voice_Transmission -- Group or individual call
def event PTT_Key
def event T1_Transmission -- Type 1 data message call
def event T2_Transmission -- Type 2 data message call
def event T3_Transmission -- Type 3 data message call
def event Individual_SLD_Call -- Individual call including slow user data
def event Group_SLD_Call -- Group call including slow user data
def event Individual_AD_Call -- Individual call including appended data
def event Group_AD_Call -- Group call including appended data
def event SDD_Call -- Short data delivery call
def event Broadcast_Call
def event OACSU_Call -- Individual call using off air call set up
def event acknowledgement
def event Connection_Request -- call set up request
def event Disconnection_Request
def event Status_Call
def event dedicated_send_key
def event hash_key
def event broadcast_command -- same as #1*
def event status_command { code } -- same as #0ss*
def event talkgroup_command -- same as #6*
def event error
def event preservation_frames
def event Call_Divert
def event idle_frames

-- Values

def value Group_ID
def value RF_Channel
def value channel
def value binary -- binary format short data
def value bcd -- bcd format short data
def value ISO7 -- 7 bit ISO format short data
def value ISO8 -- 8 bit ISO format short data
def value NMEA -- NMEA sentence format data

```

```

def value remainder
def value channel_code
def value call_group          -- "call group" means "group" in dPMR sense but needed since "group"
is already predefined TPLan keyword
def value SLD_test_data
def value AD_test_data
def value TOT_value
def value asterisk_symbol
def value dialling_string    -- keypad entry
def value addresses { address }
def value non_dialable_address -- '0000000', '1000000', '2000000', '3000000', '4000000', '5000000',
'6000000', '7000000', '8000000', '9000000'
def value abbreviated_dialling_string    -- address where some of the most signifact digits are
omitted
def value talkgroup_address             -- Group or Talk group address
def value masked_dialling_string        -- digits of an address that are covered by an input
mask
def value abbreviated_masked_dialling_string -- digits of an address that are covered by an input
mask where some of the most significant digits have been omitted
def value downlink
def value Divert_Address

def unit seconds

def condition standby
def condition switched_on
def condition switched_off
def condition powersave_enabled
def condition powersave_disabled
def condition call_timeout_terminated    -- State if radio is that call got terminated by timeout
(after 180 sec)
def condition polite_to_own_CC          -- Channel access policy is "Polite to own Channel Code"
def condition polite_to_own_group      -- Channel access policy is "Polite to own group or
talkgroup"
def condition impolite                  -- Channel access policy is "Impolite"
def condition abbreviated_dialling_available
def condition Complies_with_Standard_User_Interface
def condition OACSU_enabled             -- radio configured for Off Air Call Set-up
def condition preset_with_SLD_test_data -- buffering of slow data etc in the radio
def condition preset_with_AD_test_data  -- buffering of appended data etc in the radio
def condition preset_with_MAX_voice_call_time    -- M2_CallV time for BS2
def condition preset_with_MAX_Emergency_call_time -- M2_CallE time for BS2
def condition using_compatible_vocoders
def condition transparent_mode          -- BS2 accepts any CC
def condition limited_mode              -- BS2 only accepts preprogrammed CC

-- Keywords - (Pre)conditions
def word addressed
def word using
def word transmitting
def word while

-- Keywords - Stimuli
def word uses
def word makes
def word requested
def context {is ~requested to}
def word selects
def word terminates
def word releases
def word released
def context {is ~released}
def word presses
def word enters
def word cancels
def word stops

-- Keywords - Responses
def word receive
def word transmit
def word indicates

-- Keywords - Glue
def word on
def word for
def word both

```

Annex C (informative): Change History

Date	Version	Information about changes
	1.1.1	Mode 1
	2.1.1	Mode 2
April 2015	2.2.1	Including Limited and Transparent mode BS tests

History

Document history		
V1.1.1	October 2009	Publication
V2.1.1	June 2011	Publication
V2.2.1	October 2015	Publication