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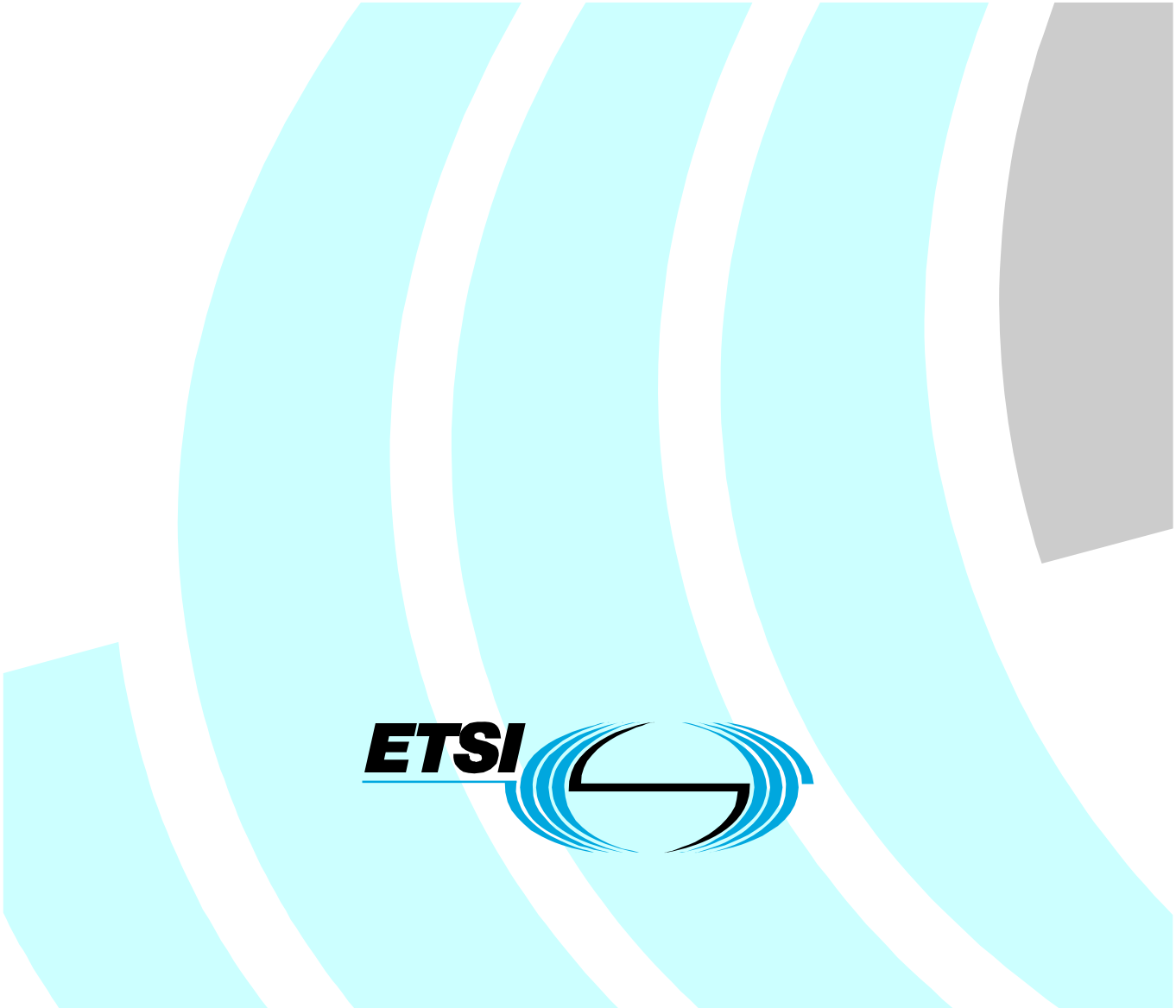
Technical Specification

Electromagnetic compatibility and Radio spectrum Matters (ERM); digital Private Mobile Radio (dPMR); Part 3: Requirements catalogue



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Foreword

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

1 Scope

The present document is to provide a catalogue of requirements extracted from ETSI Specifications. The catalogues has been written based on the test specification framework defined in TS 102 351 [2].

2 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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2.1 Normative references

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

[1] ETSI TS 102 658 (V2.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); 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] ETSI TS 102 490 (V1.3.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Peer-to-Peer Digital Private Mobile Radio using FDMA with a channel spacing of 6,25 kHz with e.r.p. of up to 500 mW".

2.2 Informative references

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 ETS 300 230: "Radio Equipment and Systems (RES); Land mobile service; Binary Interchange of Information and Signalling (BIIS) at 1 200 bit/s (BIIS 1 200)".

[i.2] IEC EN 61162-1: "Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

base station: two frequency duplex equipment with uplink access and downlink re-transmission

conditionally mandatory: requirement that is supported by a standard conformant equipment if and only if the condition(s) stated within its requirement text are met

NOTE: If one of these conditions is not met the requirement is considered to be not applicable.

EXAMPLE: Such a condition may be the support of an optional higher level requirement by the equipment.

conditionally optional: requirement that may be supported by a standard conformant equipment if and only if the condition(s) stated within its requirement text are met

NOTE: If one of these conditions is not met the requirement is considered to be not applicable.

mandatory: requirement that is supported by a standard conformant equipment

Mobile Station (MS): handheld and fixed stations that are not repeaters are included

Mode 1: peer to peer (direct mode) operation without Base Stations or infrastructure

Mode 2: dPMR systems incorporating one or more Base Stations for repeating or providing system gateways

Mode 3: dPMR systems operating under a managed access mode in systems incorporating one or more Base Stations

not applicable: requirement that does not have to be met by a standard conformant equipment

optional: requirement that may be supported by a standard conformant equipment

3.2 Abbreviations

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

ACK	ACKnowledgment
AI	Air Interface
ARQ	Automatic Retransmission reQuest
BS2	Mode 2 Repeater
BS3	Mode 3 Repeater
CC	Colour Code
CCH	Control CHannel
CI	Call Information
Cont	Continuation flag
CRC	Cyclic Redundancy Checksum for data error detection
DP	Data Position
DPMR	Configured Services and Facilities
ET	End Type
FDMA	Frequency Division Multiple Access
FEC	Forward Error Correction
FN	Frame Numbering
HI	Header Information
HT	Header Type
ID	IDentifier
M1	Mode 1 MS
M2	Mode 2 MS
M3	Mode 3 MS
MI	Message Information
MS	Mobile Station

MT	Message Type
NACK	Negative ACKnowledgment
OACSU	Off Air Call Set Up
PAR	PARameter data
PDF	Packet Data Format
RF	Radio Frequency
RSSI	Received Signal Strength Indication
SLD	SLow Data
SYNC	SYNChronization
TCH	Traffic CHannel

4 dPMR requirements catalogue

4.1 Framing

RQ_001_0401 **Framing**

TS 102 658 [1] *Clause:* 4.2.2.2 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **All transmissions are made up from 80 ms (384 bits) frames.**

Normal frames (not packet data) are the concatenation of:
24 bits of either FrameSync or ColourCode
72 bits of Control Channel data
Followed by 4 blocks of 72 bits of payload.

Specification Text: {{**The FDMA transmission is made up of 80 ms payload frames, each comprising 384 bits.**
Payload frame:
a b c d e f

a: 24 bits FrameSync2 (FS2) or ColourCode (CC) bits
b: 72 bits Control Channel (CCH) data
c: 72 bits Traffic channel (TCH)
d: 72 bits TCH
e: 72 bits TCH
f: 72 bits TCH
}}

Family: No Duplicates

Test Purposes: TP_PMR_0401_01 (Conformance), TP_PMR_0401_02 (Conformance), TP_PMR_0401_03 (Conformance)

RQ_001_0402 **Framing**

TS 102 658 [1] *Clause:* 4.2.3.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **All normal (non packet data) transmissions are made up from an integral number of superframes.**

Specification Text: The sequence is illustrated in figure 4.12. These transmissions are always started with a Header frame containing a preamble (for bit synchronization) and a frame synch (for frame synchronization). The Header is followed by a series of Superframes that contain both the payload (voice or data) and the information about the call such that receiving stations can implement late entry. {{**A call always consists of an integral number of superframes** }}and is terminated by an End frame.

Family: No Duplicates

Test Purposes: None

RQ_001_0403 **Framing**

TS 102 658 [1] *Clause:* 4.2.2.2.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each superframe is the concatenation of four 80 ms frames.**

Specification Text: {{**Four 80 ms payload frames illustrated in figure 4.8 are concatenated to form a superframe of 320 ms.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0403_01 (Conformance), TP_PMR_0403_03 (Conformance), TP_PMR_0403_02 (Conformance)

RQ_001_0404 **Framing**

TS 102 658 [1] *Clause:* 4.2.3.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Normal calls with voice or data continuous transmission generated by the radio will start with a Header frame, an integral number of superframes and then terminated by an End frame.**

Specification Text: {{**Voice or data payload continuous transmission:**

These transmissions are always started with a Header frame containing a preamble (for bit synchronisation) and a frame synch (for frame synchronisation). The Header is followed by a series of Superframes that contain both the payload (voice or data) and the information about the call such that receiving stations can implement late entry. A call always consists of an integral number of superframes and is terminated by an End frame.}}

Family: No Duplicates

Test Purposes: TP_PMR_0404_01 (Conformance), TP_PMR_0404_02 (Conformance), TP_PMR_0404_03 (Conformance)

RQ_001_0405 **Framing**

TS 102 658 [1] *Clause:* 4.2.3.2 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Calls generated by the radio for the purposes of call set-up or service request etc will be that of a concatenated Header frame and an End frame.**

Specification Text: {{**The transmission illustrated in figure 4.13 may be sent by Mode 1 and Mode 2 systems on a traffic channel at the start of a call. They are a concatenation of a Header frame and an End frame. Their purpose is to inform the receiving station of the call, type of call or information required.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0405_01 (Conformance), TP_PMR_0405_02 (Conformance)

RQ_001_0406 **Framing**

TS 102 658 [1] *Clause:* 4.2.3.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **Calls generated by the radio for the purposes of acknowledgements will be simply a Header frame.**

Specification Text: {{**Traffic channel acknowledgements are sent in response to applicable messages back to the originator. Acknowledgements are a type of Header that contains information such as confirmation of received data, errors in received data, etc**}}

Family: No Duplicates

Test Purposes: TP_PMR_0406_01 (Conformance), TP_PMR_0406_02 (Conformance), TP_PMR_0406_03 (Conformance), TP_PMR_0406_04 (Conformance)

RQ_001_0407 Framing

TS 102 658 [1] *Clause:* 4.2.3.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio supports disconnection request**

THEN calls generated by the radio for the purposes of confirming the end of the series of exchanges of a call shall be the concatenation of a Header frame and End frame repeated once.

Specification Text: {{**Sending stations can signal that all exchanges of a call have been completed by transmitting a disconnection request. This is a Header + End frame pair that is repeated illustrated in figure 4.16.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0407_01 (Conformance), TP_PMR_0407_02 (Conformance), TP_PMR_0407_03 (Conformance), TP_PMR_0407_04 (Conformance)

RQ_001_0408 Framing

TS 102 658 [1] *Clause:* 4.2.3.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **Calls generated by the radio for the purposes of status request responses will be a Header frame and End frame.**

Specification Text: {{**Traffic channel status request acknowledgements illustrated in figure 4.15 are sent by Mode 1 and Mode 2 systems. As the status information is contained within the End frame then the response of a receiving station to a status request call shall be a Header + End frame pair.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0408_01 (Conformance)

RQ_001_0426 Framing

TS 102 658 [1] *Clause:* 10.2.7 *Type:* Conditionally Mandatory

Applies to: M2

Requirement: **Where a MS is part of a co-channel network and has sent an access header addressed to COCHI0, it shall transmit an ACK in the frame immediately following the final COCHI1 BS response. This ACK is addressed to the BS that is judged to have the best signal.**

Specification Text: c) MS shall determine from any received replies when the final (COCHI = 1) transmission in the sequence will occur, and the downlink channel may be assumed to be free. The BS originated BS_Access Header demands an acknowledgement. {{**The MS selects the COCH BS that will be used for the call and sends a acknowledgement with ID1 + 0 set to the co-channel gateway address that will be used for the call.** }}(In this example BS3 has been selected).

Family: No Duplicates

Test Purposes: None

RQ_001_0428 **Framing**

TS 102 658 [1] *Clause:* 10.2.7.2 *Type:* Conditionally Mandatory

Applies to: M2

Requirement: **Where a MS is part of a co-channel network and receives an individually addressed BS access response, it shall transmit an ACK in the frame immediately following the final COCHI1 BS response. This ACK is addressed to the BS that is judged to have the best signal.**

Specification Text: An individual call to an MS may originate from a line connected source. In this case the network shall determine the best BS for the call by polling the called party from each BS in turn.
Figure 10.20 illustrates a four repeater Mode 2 network.
The repeater with the highest COCHIn shall transmit a BS_Access response +End frame (MI_TYPE = 0002). The other BS shall transmit a BS_Access response after a time delay calculated from its own COCHIn in turn.
{{**MS shall determine from any received replies when the final (COCHI = 1) transmission in the sequence will occur, and the downlink channel may be assumed to be free. The BS originated BS_Access Header demands an acknowledgement.**
The called party MS shall then evaluate the quality of each received response and use the best signal to identify the repeater that it shall use. }}(MS may use RSSI other method to measure the quality of the responses).

Family: No Duplicates

Test Purposes: None

RQ_001_0601 **Framing**

TS 102 658 [1] *Clause:* 6.1.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF an MS has not been programmed with specific colour code(s) THEN it shall determine the correct colour code according to the RF frequency used.**

Specification Text: {{**Where no specific Colour Code has been programmed for a channel, radios shall determine the Colour Code applicable for the frequency by the following algorithm:**
CC number = 64 x (f modulo 0,4) where f is the channel freq in MHz.
}}

Family: No Duplicates

Test Purposes: TP_PMR_0601_01 (Conformance), TP_PMR_0601_02 (Conformance)

4.1.1 Addressing

4.1.1.1 All Call

RQ_001_0838 **All call**

TS 102 490 [3] *Clause:* 8.2 ¶1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **For Voice group calls a dPMR radio may support supplementary service "Broadcast Call".**

Specification Text: {{**Table 8.3**}}

Family: No Duplicates

Test Purposes: TP_PMR_0838_01 (Conformance)

4.1.1.2 Dialling Plan

RQ_001_0814 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.6 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR radio complying to the Standard User Interface shall use a 7 digit addressing scheme that is encoded into the 24 bit address field as defined by the algorithm:**

SUM(K1 * 1464100, K2 * 146410, K3 * 14641, K4 * 1331, K5 * 121, K6 * 11, K7)

where

K1,K2,K3 represent decimal symbols in the range 0 to 9.
K4,K5,K6,K7 represent symbols to base 11 using the digits 0,1,2,3,4,5,6,7,8,9,*.
The "*" is a symbol that has the value of 10.

Specification Text: {{**For equipment compliant with the Standard User Interface radios shall use a 7 digit addressing scheme that is encoded into the 24 bit address field as detailed in annex A.**}}

Family: **RQ_001_1310**, RQ_001_0814, RQ_001_0814, RQ_001_1301, RQ_001_1306, RQ_001_1309

Test Purposes: TP_PMR_1310_01 (Conformance), TP_PMR_1310_02 (Conformance), TP_PMR_1310_03 (Conformance), TP_PMR_1310_04 (Conformance)

RQ_001_1301 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **For a dPMR radio complying with the Standard User Interface, dialled digits that represent a destination address shall be encoded to give the 24 bit content of the Air Interface address field.**

Specification Text: Dialled digits are represented in decimal notation and utilize the numbers "0" to "9" and the keys "*" and "#". For an MS fitted with a keypad, the "#" key may initiate a call (although other initiate methods may be implemented by a manufacturer). {{**Dialled digits that represent a destination address are translated to a form for the Air Interface by a coding algorithm. This is illustrated in figure A.2. (see document)**

Address fields in the Air-Interface domain structure has a length of 24 bits.}}
The content of a 24-bit AI MS address field may represent:
- an MS individual address;
- an MS group address.

The Air Interface provides call services for voice and data. The AI also permits the call services to be modified. The application that converts the User Interface to the Air Interface recognizes the "call modifier" and request the lower layers to set appropriate bits in the PDUs carried between the entities. At the User Interface, the "call modifier" is indicated by preceding the destination address digits with additional "call modifier" digits.

Family: **RQ_001_1310**, RQ_001_0814, RQ_001_0814, RQ_001_1301, RQ_001_1306, RQ_001_1309

Test Purposes: TP_PMR_1310_01 (Conformance), TP_PMR_1310_02 (Conformance), TP_PMR_1310_03 (Conformance), TP_PMR_1310_04 (Conformance)

RQ_001_1302 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **For dPMR radios complying with the Standard User Interface, calls shall be addressed to numeric or non-numeric addresses (i.e., addresses containing "wildcards")**

Specification Text: {{**Each call is made to a numeric or non-numeric address (with "wildcards").** }}The mapping between the User-Interface domain and the Air Interface uses a reversible coding algorithm.
MS will establish the call type from analysis of the decoded Air Interface address. There are a number of methods by which a MS may distinguish between talkgroup and individual calls and these are described in the following clauses.

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1303 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the "wildcard" feature is enabled**
THEN a dPMR radio complying with the Standard User Interface shall identify group calls by analysing the decoded air interface address for "wildcards"

Specification Text: MS will establish the call type from analysis of the decoded Air Interface address. There are a number of methods by which a MS may distinguish between talkgroup and individual calls and these are described in the following clauses.

{{**The MS may discriminate a talkgroup call from an individual call by the use of the "wildcard".**
In the User Interface domain structure, if the dialled string represents an MS address, and contains a "*" in any of the four least significant characters, then that MS address represents a group of MSs. }}The "*" character is the "wildcard" and represents all numeric values in that digit position, as defined in example 1 to 3.
EXAMPLE 1: The user dials "012345*" means that the MS is addressing 10 separate MSs whose
individual addresses are "0123450", "0123451", "0123452", "0123453", "0123454", "0123455",
"0123456", "0123457", "0123458", and "0123459".
EXAMPLE 2: The user dials "01234*6" means the MS is addressing 10 separate MSs whose individual
addresses are "0123406", "0123416", "0123426", "0123436", "0123446", "0123456", "0123466",
"0123476", "0123486", and "0123496".
EXAMPLE 3: Wildcards may be combined. The user dials "01234**" represents 100 MSs in the range "0123400" to "0123499".
For operators who have no interest in this method of defining talkgroups, the "wildcard" feature may be disabled by MS programming.

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1304 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.2 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio complying with the Standard User Interface has one or more numeric talk group address stored in memory**

THEN the radio shall identify group calls by analysing the decoded AI address and comparing it to the stored talk group address(es).

Specification Text: MS will establish the call type from analysis of the decoded Air Interface address. There are a number of methods by which a MS may distinguish between talkgroup and individual calls and these are described in the following clauses.

{{**The MS equipment may contain predefined parameters prescribing the MS addresses that will be interpreted as talkgroup addresses. These addresses may be stored as a list programmed during manufacture or before connecting an MS into service.**}}

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1305 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.3 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may use a range of addresses that are all talkgroup addresses.**

Specification Text: {{**The MS equipment may simply rely on a range of addresses that all equipment is known to be talkgroup addresses.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1306 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.4 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR caller radio complying with the Standard User Interface shall encode the dialled user digits to a 24 bit air interface address by using the reversible B2 algorithm.**

Specification Text: {{**The MS codes the dialled user digits to a 24 bit Air Interface address by using the reversible algorithm B2.** }}

Family: **RQ_001_1310**, RQ_001_0814, RQ_001_0814, RQ_001_1301, RQ_001_1306, RQ_001_1309

Test Purposes: TP_PMR_1310_01 (Conformance), TP_PMR_1310_02 (Conformance), TP_PMR_1310_03 (Conformance), TP_PMR_1310_04 (Conformance)

RQ_001_1307 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

A dPMR callee radio complying with the Standard User Interface shall decode the 24 bit air interface address of a received call by using the reverse B2 algorithm to a 7 digit string.

IF this 7 digit string contains a "*" character in any of the 4 least significant characters, the radio shall compare the received string to its individual address for match and ignore any mismatch if there is a "*" character at that position. If all other digits match then the radio is party to this talk group call.

Specification Text:

These rules determine whether a call is to a talkgroup or individual address and will be accepted by a MS.
(All reference to MS in this clause refer to the recipient.)
MS receives a dPMR call.
MS uses the reverse of the B2 function specified in clause A.2.1.2.6 to translate the AI talkgroup address to the User Interface domain.
{{**IF digits (User Interface) contains a "*" in any of the least significant four characters THEN each digit received is compared with each corresponding digit of the MS individual address except where the received digit is a "*". If there is a match on all applicable digits then this MS is party to the talkgroup call.**}}
ELSE
(consists of numeric characters only)
THEN
EITHER
The string of digits received is compared with each corresponding string of talkgroup digits that the MS has stored (specifically indicating a talkgroup).
If there is a match then this MS is party to the talkgroup call.
OR
The string of digits received is compared with each corresponding string of individual address digits that the MS has stored.
If there is a match then this MS is party to the individual call.
ENDIF

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1308 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.5 ¶3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

A dPMR radio complying with the Standard User Interface shall decode the 24 bit air interface address address of a received call by using the reverse B2 algorithm to a 7 digit string.

IF this 7 digit string contains only numerical digits THEN EITHER the radio shall compare the received string to any talk group address programmed in memory and if there is a match then the radio is party to this talk group call.

OR the radio shall compare the received string to any individual address programmed in memory and if there is a match then the radio is party to this individual call.

Specification Text:

These rules determine whether a call is to a talkgroup or individual address and will be accepted by a MS.
(All reference to MS in this clause refer to the recipient.)
MS receives a dPMR call.
MS uses the reverse of the B2 function specified in clause A.2.1.2.6 to translate the AI talkgroup address to the User Interface domain.
IF digits (User Interface)
contains a "*" in any of the least significant four characters
THEN
each digit received is compared with each corresponding digit of the MS individual address except where the received digit is a "*". If there is a match on all applicable digits then this MS is party to the talkgroup call.
{{**ELSE**
(consists of numeric characters only)
THEN
EITHER
The string of digits received is compared with each corresponding string of talkgroup digits that the MS has stored (specifically indicating a talkgroup). If there is a match then this MS is party to the talkgroup call.
OR
The string of digits received is compared with each corresponding string of individual address digits that the MS has stored. If there is a match then this MS is party to the individual call.
ENDI}}F

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1309 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.6 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

A dPMR radio complying with the Standard User Interface shall use the reversible B2 algorithm to convert between 7 digit string and 24 bit air interface addresses and vice-versa.

Specification Text:

{{**A MS address is a 7-character numeric string in the range "0000001" to "999****", these characters are mapped to the Air Interface domain structure bits by the reversible function B2.**}}
Addresses may consist of all numeric characters (but the MS must be able to ascertain the address is a talkgroup address rather than an individual address). Alternatively any of the last four characters may contain one or more "*" characters that explicitly signifies the address is a talkgroup address.

Family: **RQ_001_1310**, RQ_001_0814, RQ_001_0814, RQ_001_1301, RQ_001_1306, RQ_001_1309

Test Purposes: TP_PMR_1310_01 (Conformance), TP_PMR_1310_02 (Conformance), TP_PMR_1310_03 (Conformance), TP_PMR_1310_04 (Conformance)

RQ_001_1310 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.1.1.6.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

A dPMR radio complying with the Standard User Interface shall use the following rules for mapping between 7 digit address field (K1 to K7) at the user level and the 24 bit address field at the Air interface.

K1 is the most significant digit.
K1,K2,K3 represent decimal symbols in the range 0 to 9.
K4,K5,K6,K7 represent symbols to base 11 using the digits 0,1,2,3,4,5,6,7,8,9,*.
The "*" is a symbol that has the value of 10.

The six least significant user dialled digits K2 to K7 in the range "000001" to "999999" are converted to the 20 least significant 20 bits of the AI ID using true decimal to binary conversion. The most significant user dialled digit K1 is converted to the most significant 4 bits of the AI ID using a true decimal to binary conversion.

To following steps are needed to convert the dialled digits to an ID in the AI domain:
c) take the first digit (0 to 9) and multiply by 1 464 100;
d) take the second digit (0 to 9), multiply by 146 410;
e) take the third digit (0 to 9) and multiply by 14 641;
f) take the fourth digit (0 to 9) or * (* has a value of 10) and multiply by 1 331;
g) take the fifth digit (0 to 9) or * (* has a value of 10) and multiply by 121;
h) take the sixth digit (0 to 9) or * (* has a value of 10) and multiply by 11;
i) take the seventh digit (0 to 9) or * (* has a value of 10);
j) add c) to i); and
k) convert the sum to a 24-bit binary number.

Specification Text:

{{**K1,K2,K3 represent decimal symbols in the range 0 to 9.**
K4,K5,K6,K7 represent symbols to base 11 using the digits 0,1,2,3,4,5,6,7,8,9,*.
The "*" is a symbol that has the value of 10.
The six least significant user dialled digits K2 to K7 in the range "000001" to "999999" are converted to the 20 least significant 20 bits of the AI ID using true decimal to binary conversion. The most significant user dialled digit K1 is converted to the most significant 4 bits of the AI ID using a true decimal to binary conversion.

To following steps are needed to convert the dialled digits to an ID in the AI domain:
c) take the first digit (0 to 9) and multiply by 1 464 100;
d) take the second digit (0 to 9), multiply by 146 410;
e) take the third digit (0 to 9) and multiply by 14 641;
f) take the fourth digit (0 to 9) or * (* has a value of 10) and multiply by 1 331;
g) take the fifth digit (0 to 9) or * (* has a value of 10) and multiply by 121;
h) take the sixth digit (0 to 9) or * (* has a value of 10) and multiply by 11;
i)take the seventh digit (0 to 9) or * (* has a value of 10);
j) add c) to i); and
k) convert the sum to a 24-bit binary number.}}

Examples are shown in table A.2.

Table A.2.1.1.5.1.2: Examples of address translation

User-Interface	Air-Interface (Hex)	Air Interface (Binary)
1234567	1B91FD	0001 1011 1001 0001 1111 1101
468956*	68BF08	0110 1000 1011 1111 0000 1000
012345*	02C00A	0000 0010 1100 0000 0000 1010
0123460	02C00B	0000 0010 C000 0000 0000 1011
999****	DF6767	1101 1111 0110 0111 0110 0111

Family: **RQ_001_1310**, RQ_001_0814, RQ_001_0814, RQ_001_1301, RQ_001_1306, RQ_001_1309

Test Purposes: TP_PMR_1310_01 (Conformance), TP_PMR_1310_02 (Conformance), TP_PMR_1310_03 (Conformance), TP_PMR_1310_04 (Conformance)

RQ_001_1311 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.2 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR radio shall have at least one individual address.**

Specification Text: {{**An MS is pre-programmed with at least one individual identity.**}}
An MS is permitted to have multiple individual identities and one or more talkgroup identities.
An MS may contain a list of talkgroup identities, which may be pre-programmed or dynamically updated (manually or over the AI).
The User Interface domain maps to the AI address space by the B2 algorithm.

Family: **RQ_001_1408**, RQ_001_1311, RQ_001_1311

Test Purposes: None

RQ_001_1312 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.2 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may have multiple individual addresses and one or more talk group addresses.**

Specification Text: {{**An MS is permitted to have multiple individual identities and one or more talkgroup identities.**}}
Where an MS has more than one individual identity then one of these shall be assigned as the primary individual identity. This primary individual identity is the one that shall be used for all forms of abbreviated or masked dialling (clauses A.3.4.1.2 and A.3.4.1.3)
An MS may contain a list of talkgroup identities, which may be pre-programmed or dynamically updated (manually or over the AI).

Family: No Duplicates

Test Purposes: None

RQ_001_1313 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.2 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may be programmed with a list of talkgroup identities, which may be pre-programmed or dynamically updated (manually or over the AI).**

Specification Text: An MS is pre-programmed with at least one individual or one talkgroup identity.
An MS is permitted to have multiple individual identities and multiple talkgroup identities.
{{**An MS may contain a list of talkgroup identities, which may be pre-programmed or dynamically updated (manually or over the AI).**}}
The User Interface domain maps to the AI address space by the B2 algorithm.

Family: No Duplicates

Test Purposes: None

RQ_001_1314 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.3.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **For a dPMR radio complying with the Standard User Interface the 7 characters used for individual addresses shall contain only the digits "0" to "9".**

Specification Text: {{**An MS address in the User-Interface structure is defined as 7 characters of which for an individual MS address contain the characters "0" to "9".** }}For a talkgroup address the three most significant contain the characters "0" to "9" and least significant four characters contain the characters "0" to "9" or "*".

Family: No Duplicates

Test Purposes: None

RQ_001_1315 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.3.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **For a dPMR radio complying with the Standard User Interface the 7 characters used for talkgroup addresses shall be as follows:**

The three most significant contain the characters "0" to "9" and least significant four characters contain the characters "0" to "9" or "*".

Specification Text: An MS address in the User-Interface structure is defined as 7 characters of which for an individual MS address contain the characters "0" to "9". {{**For a talkgroup address the three most significant contain the characters "0" to "9" and least significant four characters contain the characters "0" to "9" or "*".**}}

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1316 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.3.2 *Type:* Conditionally Optional

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**

THEN the radio may limit the number of digits that can be changed in any dialled address string, thereby limiting the addressable range from that radio.

Specification Text: {{**The MS equipment may contain predefined parameters prescribing the minimum and maximum length of the user dial string. By limiting the length of the dialled string, the address range that the MS is able to dial is restricted.**}}

Family: **RQ_001_1418**, RQ_001_1316, RQ_001_1316

Test Purposes: TP_PMR_1418_01 (Interoperability), TP_PMR_1418_02 (Interoperability), TP_PMR_1418_01 (Conformance), TP_PMR_1418_02 (Conformance), TP_PMR_1418_03 (Conformance), TP_PMR_1418_04 (Conformance)

RQ_001_1317 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.2.3.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

For a dPMR radio complying with the Standard User Interface the All Call dialled strings shall be dialled and encoded as follows:

The All Call dialled string "n****" (All Call within a prefix)**

User dialled string	Air Interface ID	Remark
"0******"	18 CC 3E	All Talkgroup ID0
"1******"	2F 23 62	All Talkgroup ID1
etc.	etc.	etc.
"9******"	E1 DC 82	All Talkgroup ID9

The All Call dialled string: "****" is mapped to the All Talkgroup ID15 and addresses all MSs irrespective of their prefix.**

User dialled string	Air Interface ID	Remark
"*******"	F8 33 A6	All Talkgroup ID15

Specification Text:

{{**The All Call dialled string "n******" (All Call within a prefix) is mapped as shown in table A.3.**

Table A.2.3.3.1: Mapping of prefixed All Call to the AI

User dialled string	Air Interface ID	Remark
"0******"	18 CC 3E	All Talkgroup ID0
"1******"	2F 23 62	All Talkgroup ID1
etc.	etc.	etc.
"9******"	E1 DC 82	All Talkgroup ID9

The All Call dialled string: "****" is mapped to the All Talkgroup ID15 and addresses all MSs irrespective of their prefix.**

Table A. 2.3.3.2: Mapping of all prefix call to the AI

User dialled string	Air Interface ID	Remark
"*******"	F8 33 A6	All Talkgroup ID15}}

Family: **RQ_001_1317**, RQ_001_1410, RQ_001_1411

Test Purposes: TP_PMR_1317_01 (Conformance), TP_PMR_1317_02 (Conformance), TP_PMR_1317_03 (Conformance), TP_PMR_1317_04 (Conformance)

RQ_001_1401 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.1 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

For a dPMR radio complying with the Standard User Interface dialled addresses are always read and dialled in the sense left to right.

Specification Text:

{{**All dialled strings, as defined in the clause A.3 of the present document, are read from left to right and are dialled in the sequence in which they are read.** }}Throughout this clause all representations of dialled strings are underlined.

MSs may only be required to dial sufficient numbers of characters unambiguously define the destination and service required.

Family: No Duplicates

Test Purposes: None

RQ_001_1402 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.1 ¶2 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio complying with the Standard User Interface may support abbreviated dialling.**

Specification Text: A.3.1 User numbering
All dialled strings, as defined in the clause A.3 of the present document, are read from left to right and are dialled in the sequence in which they are read. Throughout this clause all representations of dialled strings are underlined.
{{**MSs may only be required to dial sufficient numbers of characters unambiguously define the destination and service required.**}}

Family: **RQ_001_1417**, RQ_001_1402, RQ_001_1402, RQ_001_1406

Test Purposes: TP_PMR_1417_01 (Interoperability), TP_PMR_1417_02 (Interoperability), TP_PMR_1417_03 (Interoperability), TP_PMR_1417_01 (Conformance), TP_PMR_1417_02 (Conformance)

RQ_001_1403 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.1.1 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the user has entered or selected the series of digits as required for the dialled address**

THEN a dPMR radio complying with the Standard User Interface shall also require the pressing of the "#" key or other dedicated send key to initiate the call.

Specification Text: {{**To maximize channel utilization, the user should enter a string of digits and then press a button to initiate the call.**
The "#" key or a dedicated "send" key is used to initiate the call. }}The "#" key has an additional purpose of modifying the call type or priority.

Family: No Duplicates

Test Purposes: TP_PMR_1403_01 (Interoperability), TP_PMR_1403_02 (Interoperability), TP_PMR_1403_01 (Conformance), TP_PMR_1403_02 (Conformance), TP_PMR_1416_01 (Conformance)

RQ_001_1404 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.1.2 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR radio complying with the Standard User Interface shall determine the type of call from user dialled string. The user should not have to also select call type.**

Specification Text: {{**Underlying signalling and system functionality is hidden from the user. MSs determine the call type and function from the length and content of the dialled string.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1405 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.1.3 ¶3 *Type:* Conditionally Optional

Applies to: M1, M2, M3

Requirement: **In a dPMR radio complying with the Standard User Interface**

IF the dialled number is preceded by a hash "#"
THEN the dialling function or call type may be modified.

Specification Text: Dialled strings that commence with a hash "#" provide secondary uses for the keypad.
Secondary dialling functions may be as follows:
- status call;
- broadcast call.

{{**Secondary dialling is achieved by the use of call modifier strings in front of the dialled number. These call modifier sequences utilize the "#" and "*" keys.**}}

Family: **RQ_001_1420**, RQ_001_1405, RQ_001_1405

Test Purposes: TP_PMR_1420_01 (Interoperability), TP_PMR_1420_02 (Interoperability), TP_PMR_1420_01 (Conformance), TP_PMR_1420_02 (Conformance), TP_PMR_1420_03 (Conformance), TP_PMR_1420_04 (Conformance), TP_PMR_1420_05 (Conformance), TP_PMR_1420_06 (Conformance), TP_PMR_1420_07 (Conformance)

RQ_001_1406 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.2 ¶3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**

AND abbreviated dialling is available
THEN the abreviated dialling shall operate as follows:

An MS shall construct the called address by adding the most significant digits
of its own ID to the entered digit string to form a complete destination address.

Example

An MS whose individual address is "1234567" (in the user domain), dials "43".

MS own ID	**1234567**
Dialled destination	**43**
Full destination address	**1234543**

Specification Text: In the User-Interface domain structure, if the string represents an MS address, and contains a "*" in any of the four least significant characters, then that MS address represents a group of MSs.

{{**The length of destination MS address dialled digits is in the range from 1 to 7, and is interpreted as the right most digits of the recipient's number. The MSs individual address is used as a base address, and the right-most digits of that number are replaced by the user dialled digits, as shown in example 1 and 2. The resulting number is then converted to the AI ID using the algorithm presented in the annex A.**}}

See example 1 in document.

Family: **RQ_001_1417**, RQ_001_1402, RQ_001_1402, RQ_001_1406

Test Purposes: TP_PMR_1417_01 (Interoperability), TP_PMR_1417_02 (Interoperability), TP_PMR_1417_03 (Interoperability), TP_PMR_1417_01 (Conformance), TP_PMR_1417_02 (Conformance)

RQ_001_1407 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.2 ¶2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio is a dPMR radio**

AND the radio is complying with the Standard User Interface
AND abbreviated dialling is available
THEN the abreviated dialling of a group address shall operate as follows:

An MS shall construct the called address by adding the most significant digits
of its own ID to the entered digit string to form a complete destination address.

Example

An MS whose individual address is "1234567" (in the user domain), dials "*" to place a group call.

MS own ID 1234567
Dialled destination *
Full destination address 123456*

Specification Text: {{**In the User-Interface domain structure, if the string represents an MS address, and contains a "*" in any of the four least significant characters, then that MS address represents a group of MSs.**}}

The length of destination MS address dialled digits is in the range from 1 to 7, and is interpreted as the right most digits of the recipient's number. The MSs individual address is used as a base address, and the right-most digits of that number are replaced by the user dialled digits, as shown in example 1 and 2. The resulting number is then converted to the AI ID using the algorithm presented in the annex A.

See example 2 in document

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1408 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.3.1 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR radio complying with the Standard User Interface shall have at least one individual numeric address in the range 0000001 to 9999999 with the exception of the following:**

"1000000", "2000000", "3000000", "4000000", "5000000", "6000000", "7000000", "8000000", and "9000000".

Specification Text: {{**An MS is allocated a numeric address in the range in the range "0000001" to "9999999", see note. MSs may be programmed with more than one individual address.**
NOTE: The addresses "1000000", "2000000", "3000000", "4000000", "5000000", "6000000",
"7000000", "8000000", and "9000000" are not valid.
}}

Family: **RQ_001_1408**, RQ_001_1311, RQ_001_1311

Test Purposes: None

RQ_001_1409 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.3.2 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio complying with the Standard User Interface is programmed with more than one numeric address**

THEN any additional address may be a talkgroup address in the range 0000001 to 9999999 with the exception of the following: "1000000", "2000000", "3000000", "4000000", "5000000", "6000000", "7000000", "8000000", and "9000000".

Specification Text: {{**Talkgroups may be both all numeric numbers**}}, or contain a "*" in any of the least significant four digits.

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1410 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.3.3 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR radio complying with the Standard User Interface shall always respond to call that has an all 'wild card' address, "*******"**

Specification Text: {{**All units respond to All MSs address "*******#".**}}

Family: **RQ_001_1317**, RQ_001_1410, RQ_001_1411

Test Purposes: TP_PMR_1317_01 (Conformance), TP_PMR_1317_02 (Conformance), TP_PMR_1317_03 (Conformance), TP_PMR_1317_04 (Conformance)

RQ_001_1411 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.3.3 ¶2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **Every dPMR radio complying with the Standard User Interface with the prefix (most significant digit) n shall respond to call that has an "n" prefix and 6 'wild cards', "n******". Where n can be 0 to 9.**

i.e. any radios with an address "2nnnnnn" will respond to a call addressed to "2****".**

Specification Text: {{**All units with prefix "n" respond to the prefixed All MS address "n******#" with n=0 to 9.**}}

Family: **RQ_001_1317**, RQ_001_1410, RQ_001_1411

Test Purposes: TP_PMR_1317_01 (Conformance), TP_PMR_1317_02 (Conformance), TP_PMR_1317_03 (Conformance), TP_PMR_1317_04 (Conformance)

RQ_001_1412 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.3.4 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**
THEN it shall not be possible for the radio to compose or send a non-diallable number.
These numbers are: "0000000", "1000000", "200000", "300000", "4000000", "5000000", "6000000", "7000000", "8000000", "9000000".

If a user enters any of these addresses the radio shall not send the call and give an appropriate error indication to the user.

Specification Text: {{**MS addresses' "0000000", "1000000", "200000", "300000", "4000000", "5000000", "6000000", "7000000", "8000000", "9000000" are not dialable. If the user inputs a dialled string of digits that is not assigned to any of the dialling algorithms, then the MS should not try to establish the call and appropriate feedback given to the user.**}}

Family: No Duplicates

Test Purposes: TP_PMR_1412_01 (Interoperability)

RQ_001_1413 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.3.5.1 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**
AND all numeric talk groups are programmed
AND a callee address has been entered
THEN the MS shall be able to compare this address with its own talkgroup memory table and establish if the call is a talkgroup call.

Specification Text: {{**Each MS has storage allocated for numeric talkgroup addresses. The table is populated during MS personalization by the user. The sender (MS) may use entries in this table to establish that the destination address is a talkgroup rather than an individual address.**}}
The talkgroup table contains entries consisting of the full talkgroup address consisting of 7 characters as shown in the example.
EXAMPLE: The sender (MS) whose individual address is "1234561" has the destination "1234567" stored in its talkgroup table. The user enters a single digit "7" as the destination address.
The full destination address is formed from the dialled digit(s) and the MS own individual address.

MS source address	1234561
Dialled destination	7
Full (Talkgroup), see note	1234567

NOTE: Destination address after processing.

The talkgroup table is searched for a match. In this example there is a match so the destination address is a talkgroup addresses

Family: No Duplicates

Test Purposes: None

RQ_001_1414 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.3.5.2 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface AND a callee address containing a wilcard is entered THEN the MS shall recognise that the call is a talkgroup call.**

Specification Text: {{**The dialled string is examined by the initiating MS. If the destination is identified as a talkgroup because the address contains a "wildcard" character in one of the four least significant digits then call set-up procedure is to a talkgroup as shown in the example.** }}Abbreviated dialling minimizes the number of dialled digits. An advantage of using "wildcard" to define talkgroups is that no pre-arrangement is necessary, i.e. there is no need for a talkgroup table or other MS configuration to recognize an address as a talkgroup.
EXAMPLE:

MS source address	1234561
Dialled destination	*
Full destination address, see note	123456*

NOTE: Destination address after processing.

Family: No Duplicates

Test Purposes: None

RQ_001_1415 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.3.5.3 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **Upon receiving a call a dPMR radio complying with the Standard User Interface shall decode the 24 bit address field using the reverse B2 algorithm to recover the dialled digits.**

A: If the received digits contain a "*" in the digits K4 to K7 then each digit is compared in turn with the corresponding digit of the MS individual identity looking for a match. If an "*" is encountered then a match for that digit is assumed.

B: If the received digits are all numeric then the digits K1 to K7 are compared with each of the entries in the talkgroup table looking for a match.

If either A or B result in a match being found the radio will respond to the call as a talk group call.

Specification Text: {{**The recipient MS applies the reverse B2 to recover the dialled digits K1 to K7.**
• If the received digits contain a "*" in the digits K4 to K7 then:
- each digit is compared in turn with the corresponding digit of the MS individual identity looking for a match. If an "*" is encountered then a match for that digit is assumed.
• If the received digits are all numeric then:
- the digits K1 to K7 are compared with each of the entries in the talkgroup table looking for a match (after each entry in the table has been expanded to the full 7 address digits as described in clause A.3.3.5.1).
A match must exist for the MS to respond to the talkgroup call.
}}

Family: **RQ_001_1415**, RQ_001_1302, RQ_001_1302, RQ_001_1303, RQ_001_1304, RQ_001_1307, RQ_001_1308, RQ_001_1315, RQ_001_1407, RQ_001_1409

Test Purposes: TP_PMR_1415_01 (Interoperability), TP_PMR_1415_02 (Interoperability)

RQ_001_1416 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.4.1.1 ¶1 *Type:* Conditionally Optional

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**
The user may enter the full 7 digit address of the radio to be called.

Specification Text: {{**A.3.4.1.1 Seven digit dialling**
The user may enter the whole seven digit address to complete the dialled string prior to transmission.
These seven digits may also contain wildcards.
}}

Family: No Duplicates

Test Purposes: TP_PMR_1416_01 (Conformance)

RQ_001_1417 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.4.1.2 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**
AND abbreviated dialling is available
THEN User entered digits shall be used as the least significant digits and the radio will use its own ID as the base number for any unentered digits.

Specification Text: {{**Where abbreviated keypad dialling is used in the MS, the MS should insert the more significant characters from the MS individual address to complete the dialled string prior to transmission.**
Those digits entered may also include wildcards.
If all digits are not dialled the more significant digits from the MS individual address are copied to the dialled string to build a seven digit address as follows:
for the MS individual address "2112345":
• if the user dials 6#, the destination address shall be 2112346;
• if the user dials 56#, the destination address shall be 2112356;
• if the user dials 958#, the destination address shall be 2112958;
• if the user dials 1385#, the destination address shall be 2111385;
• if the user dials 13*5#, the destination address shall be 21113*5 (talkgroup).
NOTE:}} The double underlined characters represent those that have been copied from the MS individual address.
At the Air Interface the calling party address is transferred to the called party. The abbreviated dialling may be applied to display only an abbreviated calling party address on the display of the called party.
l) The calling party dials a single digit "2".
m) The MS inserts the more significant digits from its individual address to complete the dialled string prior to transmission - i.e. the destination address becomes "1234562".
n) The called and calling party addresses are passed across the Air Interface.
o) The "B" party decodes the called party address and there is a match and the "B" party receives the call.
p) The "B" party decodes the calling party address and may display only an abbreviated digit(s). In this case a single digit "1".
The abbreviated display is sufficient for the "B" party to know who has called because the "B" party could call the "A" party by the same abbreviated dialling.
By using abbreviated dialling, the dPMR dialling plan is appropriate for the smallest and largest fleets.

Family: **RQ_001_1417**, RQ_001_1402, RQ_001_1402, RQ_001_1406

Test Purposes: TP_PMR_1417_01 (Interoperability), TP_PMR_1417_02 (Interoperability), TP_PMR_1417_03 (Interoperability), TP_PMR_1417_01 (Conformance), TP_PMR_1417_02 (Conformance)

RQ_001_1418 **Dialling Plan**

TS 102 658 [1] *Clause:* A.1.3.4.1.3 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**

The radio may use a mask to limit the number of digits to be entered to be less than 7.
Masked dialling may also be used in conjunction with abbreviated dialling.

Specification Text: {{**The number of digits of a dialling string that can be entered may be restricted by MS programming to restrict the number range accessible from the user interface. For example the user interface could mask the most significant digit of an address to prevent the MS from reaching other MSs outside its own prefix.**
Where masked dialling is used in the MS, the MS shall insert the characters from its own individual address that correspond to the each of the blocked positions to complete the dialled string prior to transmission.
Masked dialling may also be used in conjunction with abbreviated dialling.
Those digits entered may also include wildcards.
Example:
For the MS individual address of 3456789.
The dialling string entry mask is [X] [X] [X] [X] [ ] [ ] [ ]
The user may only enter digits in those positions not marked with an X.
- If the user enters 888# then the resulting dialling string will be 3456888.
- If the user enters 8# then the resulting dialling string will be 3456788
- If the user enters 88*# then the resulting dialling string will be 345688* (Talkgroup call)
}}

Family: **RQ_001_1418**, RQ_001_1316, RQ_001_1316

Test Purposes: TP_PMR_1418_01 (Interoperability), TP_PMR_1418_02 (Interoperability), TP_PMR_1418_01 (Conformance), TP_PMR_1418_02 (Conformance), TP_PMR_1418_03 (Conformance), TP_PMR_1418_04 (Conformance)

RQ_001_1420 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.4.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface AND the user keys in a call modifier prefix of #1*..... AND the dialled digits after this prefix correspond to a talk group address in the radio's memory THEN the radio shall set up a broadcast talk group call to that address.**

Specification Text:

Functions such as the modification of call requests to change to type of service request, and the implementation of other facilities (status, broadcast, etc), are initiated using the syntax in the following clauses. The call modifier is defined by the dialled string by adding extra digits to the dialled destination in the form.
<call modifier code> * destination as defined in clauses A.3.4.3.1 to A.3.4.3.7

Table A.5: Summary of call modifiers

Dialled Digits	Call Modifier
#1*nn…#	Broadcast call, clause A.3.4.2.1
#0ss*nn…#	Status call, clause A.3.4.2.2
#6*nnn..#	Force talkgroup service, clause A.3.4.2.3

{{**A.3.4.2.1 Broadcast call**
The MS shall set-up a broadcast call to the destination talkgroup nn by dialling "#1*nn#".
The broadcast call shall be a normal group call but with the Communications Format set to 'Call All' (Broadcast).
EXAMPLE 1: "#1*112345*#" should make a broadcast talkgroup call to MS address "112345*".
NOTE: The dialled string "#1*nnn". "#" should generate an error if the address is not a talkgroup address.
EXAMPLE 2: If the MS calling party address is "1234567". "#1#" should make a broadcast talkgroup call to "123456*" (i.e. to "1234560", "1234561", etc., "1234569")**}}.

Family: **RQ_001_1420**, RQ_001_1405, RQ_001_1405

Test Purposes: TP_PMR_1420_01 (Interoperability), TP_PMR_1420_02 (Interoperability), TP_PMR_1420_01 (Conformance), TP_PMR_1420_02 (Conformance), TP_PMR_1420_03 (Conformance), TP_PMR_1420_04 (Conformance), TP_PMR_1420_05 (Conformance), TP_PMR_1420_06 (Conformance), TP_PMR_1420_07 (Conformance)

RQ_001_1421 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.4.3.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface**

AND the user keys in a call modifier prefix of #0ss*.....
AND the ss digits have a value of 0 to 31
THEN the radio shall send a status call to the address specified after the call modifier with the status bits set to the value entered.

Entering a status value greater than 31 shall generate an error warning.

Specification Text:

Functions such as the modification of call requests to change to type of service request, and the implementation of other facilities (status, broadcast etc.), are initiated using the syntax in the following clauses. The call modifier is defined by the dialled string by adding extra digits to the dialled destination in the form.
<call modifier code> * destination as defined in clauses A.3.4.3.1 to A.3.4.3.7.
Table A.3.4.2: Summary of call modifiers

Dialled Digits	Call Modifier
#1*nn…#	Broadcast call, clause A.3.4.2.1
#0ss*nn…#	Status call, clause A.3.4.2.2
#6*nnn..#	Force talkgroup service, clause A.3.4.2.3

A.3.4.2.2 Status call
{{**The string "#0ss*nnn#" causes the MS to set up a status call to the destination address nnn. The status digits "ss" are numeric in the range 0 to 31**}}.
The status call shall have the Header frame + End frame format of a status response call.

Entry of a status value greater than 31 shall generate an error warning to the user.

Family: No Duplicates

Test Purposes: TP_PMR_1421_01 (Interoperability), TP_PMR_1421_02 (Interoperability), TP_PMR_1421_01 (Conformance)

RQ_001_1423 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.4.3.7 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface AND the user enters a call modifier prefix of #6*..... AND the dialled digits after this prefix correspond to a talk group address in the radio's memory THEN the radio shall set up a talk group call to that address.**

Specification Text:

Functions such as the modification of call requests to change to type of service request, and the implementation of other facilities (status, broadcast, etc.), are initiated using the syntax in the following clauses. The call modifier is defined by the dialled string by adding extra digits to the dialled destination in the form.
<call modifier code> * destination as defined in clauses A.3.4.3.1 to A.3.4.3.7.
Table A.3.4.2: Summary of call modifiers

Dialled Digits	Call Modifier
#1*nn…#	Broadcast call, clause A.3.4.2.1
#0ss*nn…#	Status call, clause A.3.4.2.2
#6*nnn..#	Force talkgroup service, clause A.3.4.2.3

A.3.4.2.3 Force talkgroup service
{{**The string "#6*nnn..#" causes the MS to set up a talkgroup call to destination talkgroup nnn. where nnn. is a numeric string of length from 1 to 7 digits.**
EXAMPLE: To make a talkgroup call from MS 1122345 to talkgroup MSs 1122356 dial "#6*1122356#". In this case dialling "#6*56#" would achieve the same result.}}

Family: No Duplicates

Test Purposes: TP_PMR_1423_01 (Interoperability), TP_PMR_1423_02 (Interoperability), TP_PMR_1423_01 (Conformance)

RQ_001_1424 Dialling Plan

TS 102 658 [1] *Clause:* A.1.3.4.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio is complying with the Standard User Interface AND the user keys "##" following dialling an address and "#" terminator, AND the radio has not yet transmitted the call, THEN the radio shall not initiate the call.**

Specification Text: {{**"##" may be dialled after digits and a terminator have been entered on the keyboard. If the radio unit has not transmitted a call request, it shall abandon the call.**}}

Family: **RQ_001_1424**, RQ_001_0841, RQ_001_0841

Test Purposes: TP_PMR_1424_01 (Interoperability), TP_PMR_1424_01 (Conformance)

4.1.1.3 TPID

RQ_001_0803 TPID

TS 102 658 [1] *Clause:* 8.1, 8.2 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may support "Talking Party Identification".**

Specification Text: {{**Table 8.1 and Table 8.2**}}

Family: **RQ_001_0803**, RQ_001_0845

Test Purposes: TP_PMR_0803_01 (Interoperability), TP_PMR_0803_02 (Interoperability), TP_PMR_0803_01 (Conformance)

4.1.2 Base Station framing

RQ_001_0409	**Base Station framing**
TS 102 658 [1]	*Clause:* 10.2.1 *Type:* Conditionally Mandatory
Applies to:	BS2
Requirement:	**Where a BS receives a MS to MS call request AND the MS placing the call has a valid calling station ID for that BS** **THEN the BS shall retransmit the call request on the downlink and shall append preservation frames to the call request.**
Specification Text:	{{**Individual Mode 2 calls may be preceded by a called party check. The called party check consists of a Connection_Request Header + End_Message pair illustrated in table 10.14.** **Figure 10.14a: MS to MS call set up sequence** **.**}}
Family:	No Duplicates
Test Purposes:	TP_PMR_0409_01 (Interoperability), TP_PMR_0409_02 (Interoperability), TP_PMR_0409_01 (Conformance),

RQ_001_0410	**Base Station framing**
TS 102 658 [1]	*Clause:* 10.2.1 *Type:* Conditionally Mandatory
Applies to:	BS2
Requirement:	**Where a BS receives an ACK to a MS to MS call request the BS shall retransmit the ACK on the downlink in place of a preservation frame so that a seamless framing sequence is maintained.**
Specification Text:	{{**The BS stores any T_ACK response on the uplink until the end of the current Preservation_Frame when BS is able to seamlessly insert the T_ACK frame, then transmit the remaining hangtime Preservation_Frames.**}}
Family:	No Duplicates
Test Purposes:	TP_PMR_0410_01 (Interoperability), TP_PMR_0410_01 (Conformance),

RQ_001_0411	**Base Station framing**
TS 102 658 [1]	*Clause:* 10.2.2 *Type:* Conditionally Mandatory
Applies to:	BS2
Requirement:	**Where a BS receives a MS to MS call and the MS placing the call has a valid calling station ID for that BS** **THEN the BS shall retransmit the call on the downlink and shall append preservation frames to the end of the transmitted item.**
Specification Text:	Figure 10.11 illustrates a Mode 2 repeater system at the start of a call. The BS is initially idle. (In this particular example, when the BS is idle the BS carrier drops). The MS seizes the BS by transmitting the first item. {{**The BS becomes active and the item is retransmitted by the BS with a delay that permits the BS to apply FEC on this uplink item. At the end of the item the BS echo's the End_Frame then starts to transmit Preservation_Frames.** }}The Preservation_Frames contain the ID of the called and calling party.
Family:	No Duplicates
Test Purposes:	TP_PMR_0411_01 (Interoperability), TP_PMR_0411_01 (Conformance),

RQ_001_0412 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.2 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where an active BS receives a transmitted item during a MS to MS call the BS shall complete the transmission of the current preservation frame before retransmitting the item so that a seamless framing sequence is maintained.**

Specification Text: Figure 10.12 illustrates the MS behaviour at the start of new MS transmission item when the BS is active transmitting Preservation_Frames from a previous transmission item. {{**The BS buffers MS uplink bits until the end of the current Preservation_Frame when BS is able to seamlessly transmit the new Payload_Header_Frame for the new item.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0412_01 (Conformance),

RQ_001_0413 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.2 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where an active BS receives a disconnect request during a MS to MS call the BS shall complete the transmission of the current preservation frame before retransmitting the disconnect request and reverting to idle.**

Specification Text: Figure 10.13 illustrates the behaviour at the end of the call. {{**If the MS chooses to send a disconnect, the BS buffers MS uplink bits until the end of the current Preservation_Frame when BS is able to seamlessly transmit the Header + End, Header +_End sequence. The BS then reverts to idle.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0413_01 (Interoperability), TP_PMR_0413_01 (Conformance),

RQ_001_0414 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.3.3 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a MS to MS status request and the MS placing the call has a valid calling station ID for that BS**

THEN the BS shall retransmit the status request on the downkink qnd shall append preservation frames.

Specification Text: These consist of a Status_Request + End frame pair. Called parties receiving a status request shall reply with a Status_Response message. {{**The BS shall insert preservation frames immediately after the Status_Request + End frame pair has been re-transmitted on the downlink preserving the channel for the polled party acknowledgement.** }}The BS buffers any status response from the polled party until the end of the current Preservation_Frame when BS is able to seamlessly transmit the H+E frame pair of the status response. At the end of the transaction the BS shall return to idle.

Family: No Duplicates

Test Purposes: TP_PMR_0414_01 (Interoperability), TP_PMR_0414_01 (Conformance),

RQ_001_0415 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.3.3 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a status response the BS shall complete the transmission of the current preservation frame before retransmitting the status response on the downlink and reverting to idle.**

Specification Text: These consist of a Status_Request + End frame pair. Called parties receiving a status request shall reply with a Status_Response message.
The BS shall insert preservation frames immediately after the Status_Request + End frame pair has been re-transmitted on the downlink preserving the channel for the polled party acknowledgement. {{**The BS buffers any status response from the polled party until the end of the current Preservation_Frame when BS is able to seamlessly transmit the H+E frame pair of the status response. At the end of the transaction the BS shall return to idle.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0415_01 (Interoperability), TP_PMR_0415_01 (Conformance),

RQ_001_0416 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.3.4 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a MS to MS short data transmission the BS shall start transmitting preservation frames on the downlink while buffering the UDT frames. When the BS has received the complete data it shall complete the transmission of the current preservation frame before retransmitting the short data transmission on the downlink and reverting to idle.**

Specification Text: The Connection_Request from the calling MS is coded as table 10.15. {{**The BS shall transmit the burst on the downlink substituting F = 11b for the downlink. The BS shall insert preservation frames on the downlink until the transaction is complete then the BS shall revert to idle.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0416_01 (Conformance),

RQ_001_0417 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.4 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS has an active diversion for an individual MS ID it shall transpose the MS ID with the diverted MS ID between uplink and downlink.**

Specification Text: {{**If the MS has an active diversion for a particular MS, the BS shall transpose the MS ID with the diverted MSID between the uplink and downlink messages.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0417_01 (Interoperability), TP_PMR_0417_01 (Conformance),

RQ_001_0418 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.3.4 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS has an active diversion for an individual MS ID it shall it shall only accept cancellation of the diversion via the air interface from the same MS ID.**

Specification Text: {{**The BS shall only accept a diversion to an individual MS ID. Only the MS that set the diversion shall be permitted to clear it using the AI.** }}The BS may clear the diversion at any time. The method and reason is outside the scope of the present document.

Family: No Duplicates

Test Purposes: TP_PMR_0418_01 (Interoperability), TP_PMR_0418_02 (Interoperability), TP_PMR_0418_01 (Conformance),

RQ_001_0419 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.5 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a MS to line connected call request the BS shall transmit preservation frames on the downlink until the connection is established. The BS shall then transmit the ACK (or NACK if the connection is not established) on the downlink in the place of a preservation frame so that a seamless framing sequence is maintained.**

Specification Text: {{**When the BS receives the connection request it shall protect the channel by transmitting Preservation frames on the downlink. When the BS has processed the uplink burst, the BS shall acknowledge the call by transmitting an appropriate acknowledgement. If the BS is able to connect the call requested, the acknowledgement shall be ACK.** }}If the BS is unable to connect the call the acknowledgement shall be a NACK and the BS shall enter the idle state.

Family: No Duplicates

Test Purposes: TP_PMR_0419_01 (Conformance), TP_PMR_0419_02 (Conformance), TP_PMR_0419_03 (Conformance),

RQ_001_0420 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.5 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **During a MS to line connected call the BS shall continuously transmit the line source on the downlink until the connection is cleared.**

Specification Text: {{**figure 10.17a** }}

Family: No Duplicates

Test Purposes: TP_PMR_0420_01 (Conformance),

RQ_001_0421 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.6 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a line connection to MS call request the BS may transmit a called party check and append preservation frames on the downlink until an ACK is received from the called party.**

Specification Text: {{**Individual Mode 2 calls may be preceded by a called party check.** }}For a line originated call the calling party type is set to the gateway ID. If the full address of the calling party is required (for instance the CLI of an inbound PSTN call), the extended address may be passed to the called party MS or talkgroup. Figure 10.18 illustrates such a call to an individual MS ID. If extended addressing is used to inform the MS the full called party address, the Connection_Request header is the header to a UDT Appended_Data message. The Appended_Data messages are described in clause 5.6. The same downlink burst may be used for a call to a talkgroup but the called party check would not be acknowledged.

Family: No Duplicates

Test Purposes: TP_PMR_0421_01 (Conformance),

RQ_001_0422 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.7 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS is part of a co-channel network and receives an access header addressed to COCHI0, it shall transmit an access response in the appropriate frame pair.**

Specification Text: a) {{**MS shall transmit a BS_Access H + End frame (Message type = 10102, MI_TYPE=0002) to Gateway ID COCHI0. Each repeater receiving this call shall respond in sequence with a BS_Access response (MI_TYPE = 0002) + End that is transmitted after a time delay calculated from its own COCHIn. The MS with the highest COCHIn shall transmit its polling response first, then the other repeaters counting down in turn.**
}}

Family: No Duplicates

Test Purposes: TP_PMR_0422_01 (Conformance),

RQ_001_0423 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.7 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS is part of a co-channel network and receives an ACK addressed to its own COCHI, it shall transmit preservation frames on the downlink until it receives a further transaction from the MS that sent the ACK.**

Specification Text: c) MS shall determine from any received replies when the final (COCHI = 1) transmission in the sequence will occur, and the downlink channel may be assumed to be free. The BS originated BS_Access Header demands an acknowledgement. {{**The MS selects the COCH BS that will be used for the call and sends a acknowledgement with ID1 + 0 set to the co-channel gateway address that will be used for the call. (In this example BS3 has been selected).**
d) The selected BS then asserts its carrier and transmits preservation frames until the MS makes its call set-up or payload transmission. (or the BS hang timer expires).
}}

Family: No Duplicates

Test Purposes: TP_PMR_0423_01 (Conformance),

RQ_001_0424 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.7.1 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS is part of a co-channel network and has responded to an ACK addressed to its own COCHI**

AND subsequently receives an access header addressed to COCHI0 from the same MS ID that sent the ACK, it shall assume that it is no longer the selected gateway and shall revert to polled access mode.

Specification Text:
As MS have the possibility to re-vote at any time, BS shall resolve the revised signalling as follows:
- {{**If the selected BS subsequently receives an access header addressed to the Gateway ID COCHI0 it shall assume that the MS has initiated a new vote and shall revert to the polled access mode.**}}
- If the selected BS subsequently receives a transmitted item addressed to a different Gateway ID it shall assume that it is no longer the selected gateway and shall revert to idle.

Family: No Duplicates

Test Purposes: TP_PMR_0424_01 (Conformance),

RQ_001_0425 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.7.1 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS is part of a co-channel network and has responded to an ACK addressed to its own COCHI**

AND subsequently receives a transmission addressed to a different COCHI from the same MS ID that sent the ACK, it shall assume that it is no longer the selected gateway and shall revert to idle until it receives an access header addressed to COCHI0.

Specification Text:
As MS have the possibility to re-vote at any time, BS shall resolve the revised signalling as follows:
- If the selected BS subsequently receives an access header addressed to the Gateway ID COCHI0 it shall assume that the MS has initiated a new vote and shall revert to the polled access mode.
- {{**If the selected BS subsequently receives a transmitted item addressed to a different Gateway ID it shall assume that it is no longer the selected gateway and shall revert to idle.**
}}

Family: No Duplicates

Test Purposes: TP_PMR_0425_01 (Conformance),

RQ_001_0427 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.7.2 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS is part of a co-channel network and receives a line connection to MS call request, it shall transmit an individually addressed BS access response to the MS.**

Specification Text: {{**An individual call to an MS may originate from a line connected source. In this case the network shall determine the best BS for the call by polling the called party from each BS in turn.**}}
Figure 10.20 illustrates a four repeater Mode 2 network.
The repeater with the highest COCHIn shall transmit a BS_Access response +End frame (MI_TYPE = 0002). The other BS shall transmit a BS_Access response after a time delay calculated from its own COCHIn in turn.
MS shall determine from any received replies when the final (COCHI = 1) transmission in the sequence will occur, and the downlink channel may be assumed to be free. The BS originated BS_Access Header demands an acknowledgement.
The called party MS shall then evaluate the quality of each received response and use the best signal to identify the repeater that it shall use. (MS may use RSSI other method to measure the quality of the responses).

Family: No Duplicates

Test Purposes: TP_PMR_0427_01 (Conformance),

RQ_001_0429 **Base Station framing**

TS 102 658 [1] *Clause:* 5.2.5.1 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **When a call is completed or disconneted a BS may signal this to other MS by the transmission of idle frames on the downlink.**

Specification Text: {{**An idle message illustrated in table 5.16 may be transmitted by a Mode 2 BS when there are no calls active on the channel** }}(the BS may also elect to de-key its transmitter when idle).

Family: No Duplicates

Test Purposes: TP_PMR_0429_01 (Conformance),

RQ_001_0430 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.3.4 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a MS to MS data transmission the BS shall start transmitting preservation frames on the downlink while processing the received data. When the BS has processed enough data to start retransmission it shall complete the current preservation frame before appending the data transmission on the downlink. IF the END frame of the received data requests an ACK the BS shall append preservation frames to the end of the retransmission, otherwise it shall revert to idle.**

Specification Text: b) {{**The BS protects the channel by transmitting preservation frames when the uplink burst is first detected. The BS retransmits the burst (substituting the Comms format = downlink). If the ARQ field in the END frame is not set to 002 the BS then resumes preservation frames to protect the channel for the acknowledgement;**}}

Family: No Duplicates

Test Purposes: TP_PMR_0430_01 (Conformance), TP_PMR_0430_02 (Conformance),

RQ_001_0431 **Base Station framing**

TS 102 658 [1] *Clause:* 10.2.2 *Type:* Conditionally Mandatory

Applies to: BS2

Requirement: **Where a BS receives a call set up request from a MS AND subsequently a call set up cancel from the same MS THEN:**

The BS shall send a disconnect request to the MS addressed in the call set up and revert to idle.

Specification Text: Figure 10.14 illustrates the behaviour at the end of the call. {{**If the MS chooses to send a disconnect, the BS buffers MS uplink bits until the end of the current Preservation_Frame when BS is able to seamlessly transmit the Header + End, Header +_End sequence. The BS then reverts to idle.**}}

Family: No Duplicates

Test Purposes: None

4.1.3 Channel Access

RQ_001_1001 **Channel access**

TS 102 658 [1] *Clause:* 12.1.1 *Type:* Mandatory

Applies to: M1, M2

Requirement: **A caller radio shall listen before transmit. When the received signal level has not exceeded -105 dBm for the duration of the T_ch_chk timer then the radio shall assume the channel to be free.**

Specification Text: When determining whether activity is present on a channel, the radio shall monitor the RSSI level. {{**If after a maximum period of time (T_ch_chk) the RSSI level has not exceeded a configurable (within a predefined range) threshold RSSI_LO, then the radio shall assume that activity is not present on the channel.**}}
RSSI_LO shall be set to -105 dBm ± 3 dB.

Family: No Duplicates

Test Purposes: None

RQ_001_1002 **Channel access**

TS 102 658 [1] *Clause:* 12.1.1 ¶5 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **A radio shall listen before transmitting.**

IF the received signal level is equal or above -105 dBm AND the radio can synchronize on the channel. THEN the radio shall assume that there is dPMR activity on the channel.

Specification Text: {{**If the RSSI level does exceed the RSSI_LO threshold, then the MS shall assume that activity is present on the channel and it shall attempt to identify that it is compliant with the present document.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1003 **Channel access**

TS 102 490 [3] *Clause:* 12.1.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **A radio shall listen before transmitting.**

IF the received signal level is above -105 dBm AND the radio can not synchronize to the channel for the duration of the T_ch_free timer THEN it shall assume the activity is not dPMR.

Specification Text: {{**If the RSSI level does exceed the RSSI_LO threshold, then the MS shall assume that activity is present on the channel and it shall attempt to identify that it is compliant with the present document.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1004 **Channel access**

TS 102 658 [1] *Clause:* 12.1.1 *Type:* Mandatory

Applies to: M1, M2

Requirement: **A radio shall listen before transmitting. When the received signal level is above -105 dBm and the radio manages to synchronize to the channel but the color code is incorrect then it shall assume the activity is interference.**

Specification Text: {{**If the MS does identify the channel as compliant with this document, the MS shall attempt to identify the Colour Code. If the Colour Code received differs from that personalised in the MS then the MS shall assume that the activity is not applicable to this MS.** }}

Family: No Duplicates

Test Purposes: TP_PMR_1004_01 (Conformance)

RQ_001_1005 **Channel access**

TS 102 658 [1] *Clause:* 12.1.2.2 *Type:* Mandatory

Applies to: M1, M2

Requirement: **IF a transmitting radio announces a non zero Tx WAIT time then other radios shall not commence any PTT activated transmissions during this Tx WAIT period.**

Specification Text:

{{**When a transmitting radio announces a non zero Tx WAIT time then PTT activated transmissions shall not be permitted to start during this Tx WAIT time irrespective of any polite or impolite criteria employed.**}}

Family: No Duplicates

Test Purposes: TP_PMR_1005_01 (Conformance)

RQ_001_1007 **Channel access**

TS 102 490 [3] *Clause:* 10.4.1 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **When an acknowledgement is required in response to a received call the callee may transmit this acknowledgement irrespective of whether the RF channel is busy during a defined period after the call has been received.**

Specification Text: {{**Where a radio has been solicited to transmit a response, it may transmit the response within response time [T_ack] irrespective of whether the channel is "Idle" or "Busy".** }}

Family: No Duplicates

Test Purposes: TP_PMR_1007_01 (Conformance), TP_PMR_1007_02 (Conformance)

RQ_001_1008 **Channel access**

TS 102 658 [1] *Clause:* 12.1.3.1 *Type:* Optional

Applies to: M1, M2

Requirement: **When a radio is involved in a voice call it may transmit even if another party to the same call is transmitting on the RF channel.**

Specification Text: {{**While an MS is party to a voice call, it may transmit irrespective of whether the channel is "Idle" or "Busy" with 6,25 kHz FDMA activity pertaining to the same voice call but may not transmit if a Tx_Wait time has been invoked and the timer is running.** }}

Family: No Duplicates

Test Purposes: TP_PMR_1008_01 (Interoperability), TP_PMR_1008_02 (Interoperability), TP_PMR_1008_01 (Conformance)

RQ_001_1009 **Channel access**

TS 102 658 [1] *Clause:* 12.1.3.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio has polite to own Colour Code enabled**

THEN the radio shall not transmit when the RF channel is occupied by a transmission using the same Colour Code.

Specification Text: {{**Polite to own Colour Code: The radio shall refrain from transmitting on a channel while the channel is "Busy" with other 6,25 kHz FDMA activity from radios using the same Colour Code.**}}

Family: No Duplicates

Test Purposes: TP_PMR_1009_01 (Interoperability), TP_PMR_1009_01 (Conformance)

RQ_001_1010 **Channel access**

TS 102 658 [1] *Clause:* 12.1.3.1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **IF an dPMR radio has impolite channel access enabled**

THEN it may transmit if the RF channel is occupied by any other signal.

Specification Text: {{**Impolite: The radio shall transmit on a channel regardless of any other activity (either 6,25 kHz FDMA or otherwise) already present on the channel.**}}

Family: No Duplicates

Test Purposes: TP_PMR_1010_01 (Interoperability), TP_PMR_1010_01 (Conformance)

RQ_001_1011 **Channel access**

TS 102 658 [1] *Clause:* 12.1.3.1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF a dPMR radio has polite to own Group or Talkgroup enabled**

THEN the radio shall not transmit while the RF channel is occupied by transmissions by members of its own group or talkgroup.

Specification Text: Polite to own Group or Talkgroup: {{**The radio shall refrain from transmitting on a channel while the channel is "Busy" with other 6,25 kHz FDMA activity from radios within its own group or talkgroup.** }}For all other types of activity already present on the channel, the radio shall transmit regardless.

Family: No Duplicates

Test Purposes: TP_PMR_1011_01 (Interoperability), TP_PMR_1011_01 (Conformance)

RQ_001_1012 **Channel access**

TS 102 658 [1] *Clause:* 12.1.3.3 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **Certain received calls require acknowledgement responses. When these acknowledgements are lost because of interference etc they may be repeated.**

IF these acknowledgements are repeated THEN they shall be limited to a maximum number of 4 times with 300-500ms time intervals between each repeat.

Specification Text: {{**Certain transmissions solicit responses and where these responses are not received (e.g. due to collisions, interference etc.) the transmitting entity may repeat the original transmission NM1_Rep times.**}}

Family: No Duplicates

Test Purposes: TP_PMR_1012_01 (Interoperability), TP_PMR_1012_01 (Conformance), TP_PMR_1012_02 (Conformance)

RQ_001_1017 **Channel access**

TS 102 658 [1] *Clause:* 12.1.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Before transmitting, radios shall observe certain minimum times in assessing whether an RF channel is busy (T_ch_chk : 100 ms) .**

Specification Text: {{**T_ch_chk: Channel check timer: 100 ms.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1020 **Channel access**

TS 102 658 [1] *Clause:* 12.1.1 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Before transmitting, radios shall observe certain minimum times for trying to synchronise to any activity found on the channel (T_ch_free : 200 ms).**

Specification Text:

{{**T_ch_free: Unsynchronizable activity timer: 200 ms.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1021 **Channel access**

TS 102 658 [1] *Clause:* 12 *Type:* Conditionally Optional

Applies to: M1, M2, M3

Requirement: **Where a radio has been solicited to transmit a response, it may transmit the response within the T_ack response time irrespective of whether the channel is "Idle" or "Busy".**

Specification Text: {{**The response shall be sent irrespective of whether the channel is "Idle" or "Busy".**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1023 **Channel access**

TS 102 658 [1] *Clause:* 12.1.2.2 *Type:* Mandatory

Applies to: M1, M2

Requirement: **IF a MS receives a break-in request during an announced Tx_Wait period it shall audibly prompt the user.**

Specification Text: {{**Where an MS receives an emergency break-in request during the announced Tx_Wait time then the MS shall generate a suitable audible prompt to the user to leave the channel free for the station that has requested the channel.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1024 **Channel access**

TS 102 658 [1] *Clause:* 12.1.2.3.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **A voice transmission shall be automatically terminated if it exceeds the preset time limit.**

Specification Text: {{**For a voice call, MSs shall maintain a traffic channel transmit TimeOut timer (TV_Item) which limits the time of a single voice transmission item. This timer shall be set to the value of TV_Item seconds whenever the PTT key is pressed and counts down to zero.**
If the transmit TimeOut timer expires, then the MS shall complete the current superframe, transmit an END frame then stop transmitting. The MS may not re-transmit until PTT has been released and pressed again.}}

Family: No Duplicates

Test Purposes: TP_PMR_1024_01 (Interoperability), TP_PMR_1024_02 (Interoperability),

RQ_001_1025 **Channel access**

TS 102 658 [1] *Clause:* 12.2.3.1 *Type:* Conditionally Mandatory

Applies to: M2

Requirement: **IF a MS does not have impolite channel access enabled**
AND the RF channel is occupied by a transmission of idle frames
THEN the MS may transmit.

Specification Text:
- Polite to own Colour Code:

The MS shall refrain from transmitting on a channel while the channel is "Busy" with other 6,25 kHz FDMA activity from MSs using the same Colour Code.
{{**If the transmission is idle frames from a BS the MS may transmit.** }}
If the transmission is guard frames from a BS containing the individual ID of the MS, that MS may transmit.
For all other types of activity already present on the channel, the MS shall transmit regardless.

Family: No Duplicates

Test Purposes: None

RQ_001_1026 **Channel access**

TS 102 658 [1] *Clause:* 12.2.3.1 *Type:* Conditionally Mandatory

Applies to: M2

Requirement: **IF a MS does not have impolite channel access enabled AND the RF channel is occupied by a transmission of guard frames addressed to the MS THEN the MS may transmit.**

Specification Text:
- Polite to own Colour Code:

The MS shall refrain from transmitting on a channel while the channel is "Busy" with other 6,25 kHz FDMA activity from MSs using the same Colour Code.
If the transmission is idle frames from a BS the MS may transmit.
{{**If the transmission is guard frames from a BS containing the individual ID of the MS, that MS may transmit.**}}
For all other types of activity already present on the channel, the MS shall transmit regardless.

Family: No Duplicates

Test Purposes: None

RQ_001_1027 **Channel access**

TS 102 658 [1] *Clause:* 12.2.3.1 *Type:* Conditionally Optional

Applies to: M2

Requirement: **IF a MS does not have impolite channel access enabled AND the RF channel is occupied by a transmission of preservation frames addressed to the MS THEN the MS may transmit.**

Specification Text:
- Polite to own Colour Code:

The MS shall refrain from transmitting on a channel while the channel is "Busy" with other 6,25 kHz FDMA activity from MSs using the same Colour Code.
If the transmission is idle frames from a BS the MS may transmit.
If the transmission is guard frames from a BS containing the individual ID of the MS, that MS may transmit.
{{**If the transmission is preservation frames from a BS containing the individual ID of the MS, that MS may transmit.**}}
For all other types of activity already present on the channel, the MS shall transmit regardless.

Family: No Duplicates

Test Purposes: None

RQ_001_1028 **Channel access**

TS 102 658 [1] *Clause:* 12.1.2.3.2 *Type:* Mandatory

Applies to: M1, M2

Requirement: **A data transmission shall be automatically terminated if it exceeds the preset time limit.**

Specification Text: {{ **MSs shall maintain a data maximum item duration timer TD_Item. If the MS reaches the maximum item duration TD_Item, the MS shall discontinue the item immediately and indicate to the application layer that the item was not successfully transmitted.**}}

Family: No Duplicates

Test Purposes: None

4.1.3.1 OACSU

RQ_001_0840 **OACSU**

TS 102 658 [1] *Clause:* 8.1 ¶1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **For Voice individual calls a dPMR radio may support supplementary service "Off Air Call Set Up (OACSU)".**

Specification Text: {{**Table 8.1**}}

Family: No Duplicates

Test Purposes: TP_PMR_0840_01 (Interoperability), TP_PMR_0840_02 (Interoperability), TP_PMR_0840_01 (Conformance), TP_PMR_0840_02 (Conformance), TP_PMR_0840_03 (Conformance)

RQ_001_0841 **OACSU**

TS 102 658 [1] *Clause:* 8.1 ¶1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **For Voice individual calls a dPMR radio may support supplementary service "Cancel call set-up".**

Specification Text: {{**Table 8.1**}}

Family: **RQ_001_1424**, RQ_001_0841, RQ_001_0841

Test Purposes: TP_PMR_0841_01 (Interoperability), TP_PMR_1424_01 (Conformance)

4.1.3.2 PTT Call

RQ_001_0801 **PTT Call**

TS 102 658 [1] *Clause:* 8.1 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **A dPMR radio shall support PTT calls.**

Specification Text: See {{**tables 8.1** }}

Family: No Duplicates

Test Purposes: TP_PMR_0801_01 (Interoperability), TP_PMR_0801_02 (Interoperability), TP_PMR_0801_01 (Conformance)

4.1.4 End Frame

RQ_001_0913 **End frame**

TS 102 490 [3] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **In each End frame the End Data shall be sent in duplicate.**

Specification Text: These 24 bits are now separated into 3 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 3 x 12 bit blocks. {{**These 36 bits are now repeated** }}and the total 72 bits are scrambled using the polynomial given in clause 7.3. For each scrambler block the scrambler is re-initialised therefore the two scrambled END DATA blocks are bit exact copies.

Family: No Duplicates

Test Purposes: TP_PMR_0913_01 (Conformance)

RQ_001_0984 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each End frame shall start with a Frame syncronisation sequence 3, 24 bits long.**

Frame syncronisation sequence 3 is made by following 3 bytes: 7D DF F5 (all in HEX).

Specification Text: {{**Finally the 24 bit FS3 synchronization sequence is prefixed to these end data bits.**}}

{{**Clause 6.1.3 FS3**}}
The Frame sync 3 sequence contained in the End frame is a 24 bit sequence that shall have the following value:
Binary: 011111011101111111110101.
Hex: 7D DF F5.

Family: No Duplicates

Test Purposes: TP_PMR_0984_01 (Conformance)

RQ_001_0985 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each END field shall have a two bits long End Type (ET) field using the values :**

00 Normal end frame
01 End frame with status message
10 Reserved
11 Reserved

Specification Text: {{**The end data starts with the End Type (ET) which is either 002 (normal end frame) or 012 (end frame with status message).**}}

Family: No Duplicates

Test Purposes: TP_PMR_0985_01 (Conformance)

RQ_001_0986 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each END field shall have a two bits long acknowledgement request (ARQ) field using the values :**

00 No ACK request to called station
01 ACK request to called station
10 Reserved
11 Reserved

Specification Text: {{**The next 2 bit are the acknowledgement request (ARQ). 00 signifies that no acknowledgement is requested and 01 requires an acknowledgement.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0986_01 (Conformance)

RQ_001_0987 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each END field shall have a four bits long Tx wait time (WAIT) field using the values:**

0000 No specified time
0001 40 ms (half a frame)
0010 80 ms (one frame)
0011 160 ms (two frames)
0100 320 ms (one superframe)
Other Reserved

Specification Text: {{**The next 4 bits define any Tx_Wait time (WAIT) using the values given in clause 5.5.34.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0987_01 (Conformance)

RQ_001_0988 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each END field shall have a five bits long status message field using the values 0 to 31.**

When End Type (ET) field vaue has been set to 00 (binary) these bits shall be considered as dummy data.

Specification Text: 5 bit of status message will then follow if ET has been set to 01 (or 5 bits of dummy data if ET = 00).

{{**Clause 5.5.30 Status**}}
Frame used END Frame.
Data length 5 bits.
Definition:
0 to 31 Status message

Family: No Duplicates

Test Purposes: None

RQ_001_0989 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each END field shall have a four bits long reserved field and shall always contain a 0.**

Specification Text: {{**Finally the 4 reserved bits are set to 0000.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0990 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **In each End frame the End Information (EI) field shall be used to calculate a 7 bit checksum, generated by the X^7 + X^3 + 1 polynomial.The checksum shall be appended, giving a 24 bits field referred as END DATA)**

Specification Text: {{**The 7 bit CRC checksum is added using the polynomial given in clause 7.1 giving a total of 24 bits.**}}

{{**These 24 bits are now separated into 3 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 3 x 12 bit blocks. These 36 bits are now repeated and the total 72 bits are scrambled using the polynomial given in clause 7.3.**}}

Clause 7.1
Frame (CCH) CRC7 X^7 + X^3 + 1

Family: No Duplicates

Test Purposes: None

RQ_001_0991 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **In each End frame the END DATA field shall be separated into 3 bytes. Each of these bytes shall be coded by shortened 12,8 Hamming code**

X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit)
C3,C2,C1,C0 is parity bit (4 bit)

The Generator matrix is as follows:

	12	11	10	9	8	7	6	5	4	3	2	1
	X7	X6	X5	X4	X3	X2	X1	1	C3	C2	C1	C0
1	1	0	0	0	0	0	0	0	1	1	1	0
2	0	1	0	0	0	0	0	0	0	1	1	1
3	0	0	1	0	0	0	0	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	1	0	1
5	0	0	0	0	1	0	0	0	1	0	1	1
6	0	0	0	0	0	1	0	0	1	1	0	0
7	0	0	0	0	0	0	1	0	0	1	1	0
8	0	0	0	0	0	0	0	1	0	0	1	1

The Shortened Hamming code (12,8) Polynomial is X^4 + X + 1.
This gives the Shortened Hamming END DATA.

See Figure 10.

Specification Text: {{**These 24 bits are now separated into 3 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 3 x 12 bit blocks.**}} These 36 bits are now repeated and the total 72 bits are scrambled using the polynomial given in clause 7.3.

Clause 7.2 Hamming code
A shortened Hamming code (12,8) is employed and the generator matrix is shown below:
X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit): C3,C2,C1,C0 is Parity bit (4 bit).

Shortened Hamming code (12,8) Polynomial: X^4 + X + 1.

Family: No Duplicates

Test Purposes: None

RQ_001_0994 **End frame**

TS 102 658 [1] *Clause:* 11.6 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **In each End frame the concatenation of Shortened Hamming END DATA with itself shall be scrambled using the polynomial X^9 + X^5 + 1 with an initial preset value of all "1"s.**

Specification Text: These 24 bits are now separated into 3 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 3 x 12 bit blocks. {{**These 36 bits are now repeated and the total 72 bits are scrambled using the polynomial given in clause 7.3. For each scrambler block the scrambler is re-initialised therefore the two scrambled END DATA blocks are bit exact copies.**}}

Family: No Duplicates

Test Purposes: None

4.1.5 Message Frame

RQ_001_0901 **Message frames**

TS 102 490 [3] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3, BS2

Requirement: **Each header shall have a single bit Preservation field (PM).**

0 BS is idle
1 BS is reserved

Specification Text: {{**The next bit is the Preservation message according to clause 5.5.23. This bit will be used by BS downlinks only and MS shall set this to 0.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0901_01 (Conformance)

RQ_001_0902 **Message frames**

TS 102 490 [3] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each header shall have an eleven bits long Message Information field (MI).**

Specification Text: {{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI_Detail bits as described in clause 5.5.19 (see Table 11.1).**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0911 **Message frames**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3, BS2

Requirement:

```
Each Header shall have a two bits long Communication format field
(F).

This shall be as follows:


Values shall be as follows:
00   Call ALL
01   Peer-to-peer communication
10    BS uplink
11    BS downlink
```

Specification Text: {{The communications format bits are now added according to clause 5.5.6. Generally these will be set to 0001(peer-to-peer call). Occasionally they may be set to 00 (all call) but this is a special case, similar to a broadcast.}}

{{Table 5.47}}

Family: No Duplicates

Test Purposes: TP_PMR_0911_01 (Conformance), TP_PMR_0911_02 (Conformance), TP_PMR_0911_03 (Conformance)

RQ_001_0912 **Message frames**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

```
Each Header shall have a single bit Priority field (EP).


0  Normal priority
1  Emergency priority
```

Specification Text: {{The next bit is the Emergency Priority according to clause 5.5.12}}

Family: No Duplicates

Test Purposes: None

RQ_001_0916 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

```
Each Header shall state the type of the call through a three bits
long communication mode field  as follows:


000   Voice communication (no user data in SLD field)
001   Voice + slow data (user data in SLD field)
010   Data communication type 1 (Payload is user data Without FEC)
011   Data communication type 2 (Payload is user data with FEC)
100   Data Communication Type 3 (Packet Data, ARQ method)
101   Voice and appended data (Type 2)
110   Service request (as defined by MI type)
111   Reserved
```

Specification Text: {{The communications mode value is added according to the table in clause 5.5.7}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0959 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each Header frame shall start with a preamble field, at least 72 bits long, composed by a repetition of a byte containing the value 5F (HEX). If more than 72 bits are sent then the same 5F (HEX) data shall be used.**

Specification Text: {{**The header is completed by prefixing with the 48 bit FS1 synchronization sequence (see note 2) and then prefixing the synchronization sequence with a minimum of 72 bits of preamble**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0960 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **If the Header frame is not a Packet data header**

THEN the Frame syncronisation sequence field shall be made by following 6 bytes: 57 FF 5F 75 D5 77 (all in HEX). This is referred as Frame syncronisation sequence 1.

Specification Text: {{**The header is completed by prefixing with the 48 bit FS1 synchronization sequence and then prefixing FS1 with a minimum of 72 bits of preamble**}}

Family: No Duplicates

Test Purposes: TP_PMR_0960_01 (Conformance)

RQ_001_0961 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **If the Header frame is a Packet data header**

THEN the Frame syncronisation sequence field shall be made by following 6 bytes: FD 55 F5 DF 7F DD (all in HEX). This is referred as Frame syncronisation sequence 4.

Specification Text: NOTE 2: {{**In the case where this is a Packet Data Header, the 48 bit FS4 synchronization sequence shall be used.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0961_01 (Conformance)

RQ_001_0962 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each Message shall be identified by the Message Type (MT) field. This shall have a length of four bits and it's value shall be as follows:**

0000 Communication start Header (a superframe follows)
0001 Connection request Header (an END frame follows)
0010 Unconnect request Header (an END frame follows)
0011 ACK (this a single frame, ACK or NACK is differentiated by the CI bits setting)
0100 System request Header (an END frame follows)
0101 ACK Header reply to a system request (a superframe follows)
0110 System delivery Header (a superframe follows)
0111 Status polling response Header
1000 Status polling request Header
1001 BS command/response header
1010 BS access header
1011 Broadcast
1100 Beacon ahoy/random access request
1101 Reserved
1110 UDT header
1111 UDT appended data

Specification Text: {{**First there are 4 bits allocated to Message Type (MT) which is selected according to clause 5.5.20.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0963 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each Header shall have a 24 bit long field containing the called station ID.**

Specification Text: {{**HT is followed by the 24 bits of the called station ID.**}} To this the 24 bits of the own ID is added.

Family: No Duplicates

Test Purposes: None

RQ_001_0964 **Message frames**

TS 102 658 [1] *Clause:* 9.5 ¶3 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each Header shall have a 24 bit long field containing the own ID.**

Specification Text: HT is followed by the 24 bits of the called station ID. {{**To this the 24 bits of the own ID is added.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0965 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

```
Each Header shall state the type of the call through a three bits
long communications mode field, as follows:

000   Voice communication (no user data in SLD field)
001   Voice + slow data (user data in SLD field)
010   Data communication type 1 (Payload is user data without FEC)
011   Data communication type 2 (Payload is user data with FEC)
100   Data communication type 3 (Packet data, ARQ method)
101   Voice and appended data (Type 2)
Other Reserved
```

Specification Text: {{The Communications Mode value is added according to the table in clause 5.5.7.}}

Family: No Duplicates

Test Purposes: None

RQ_001_0974 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

```
The 72 bits of MI data shall be used to calculate an 8 bit
checksum, generated by the X^8 + X^2 + X^1 + 1 polynomial. This 8
bits are added, giving a total of 80 bits.
```

Specification Text: {{The 8 bit CRC checksum is added using the polynomial given in clause 7.1 giving a total of 80 bits.}}

Family: No Duplicates

Test Purposes: None

RQ_001_0975 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

```
This 80 bits shall be separated into 10 bytes. Each of these bytes
shall be coded by shortened 12,8 Hamming code:

X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit)
C3,C2,C1,C0 is parity bit (4 bit)

The Generator matrix is as follows:
  12 11 10  9  8  7  6  5  4  3  2  1
  X7 X6 X5 X4 X3 X2 X1  1 C3 C2 C1 C0
1  1  0  0  0  0  0  0  0  1  1  1  0
2  0  1  0  0  0  0  0  0  0  1  1  1
3  0  0  1  0  0  0  0  0  1  0  1  0
4  0  0  0  1  0  0  0  0  0  1  0  1
5  0  0  0  0  1  0  0  0  1  0  1  1
6  0  0  0  0  0  1  0  0  1  1  0  0
7  0  0  0  0  0  0  1  0  0  1  1  0
8  0  0  0  0  0  0  0  1  0  0  1  1

The Shortened Hamming code (12,8) Polynomial is  X^4 + X + 1.
This will generate a 12x10 bit blocks.
```

Specification Text: {{These 80 bits are now separated into 10 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 10 x 12 bit blocks.}}

Family: No Duplicates

Test Purposes: None

RQ_001_0976 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **The 12x10 bit blocks shall be interleaved using the following 12x10 interleaving matrix:**

	1	2	3	4	5	6	7	8	9	10
1	1	13	25	37	49	61	73	85	97	109
2	2	14	26	38	50	62	74	86	98	110
3	3	15	27	39	51	63	75	87	99	111
4	4	16	28	40	52	64	76	88	100	112
5	5	17	29	41	53	65	77	89	101	113
6	6	18	30	42	54	66	78	90	102	114
7	7	19	31	43	55	67	79	91	103	115
8	8	20	32	44	56	68	80	92	104	116
9	9	21	33	45	57	69	81	93	105	117
10	10	22	34	46	58	70	82	94	106	118
11	11	23	35	47	59	71	83	95	107	119
12	12	24	36	48	60	72	84	96	108	120

This gives the interleaved MI data.

Specification Text: {{**To protect against burst interference, these 10 x 12 bit blocks are now interleaved using the 12 x 10 HI interleaving matrix given in clause 7.4.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0977 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **The interleaved MI data shall be scrambled using the polynomial X^9 + X^5 + 1 with an initial preset value of all "1"s.**

This scrambled data shall be referred as MI0 data.

Specification Text: {{**Then the interleaved MI data is scrambled using the polynomial given in clause 7.3.**}}

{{**Clause 7.3 Scrambling**}}
The scrambling polynomial is X^9 + X^5 + 1 with an initial preset value of all "1"s.

Family: No Duplicates

Test Purposes: None

RQ_001_0983 **Message frames**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each Header shall be made up of the concatenation of Preamble, Frame Sync, MI data, Colour Code data and MI data.**

Specification Text: {{**The 24 bit Colour Code is concatenated to the MI data and then the MI data is repeated after the CC.**}}See figure 11.8.

Family: No Duplicates

Test Purposes: None

4.1.5.1 Message Information field

RQ_001_0968 **Message Information field**

TS 102 658 [1] *Clause:* 11.5 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

Each Header shall contain the Message Information (MI) field, formed by 3 bits of data type and 8 bits of detail.

The information contained in this field is depending on the Message type:

Message Information is used to give supplementary data about the call. It has different content and purpose depending on the call type:

Use	Purpose
Powersave	Indicate normal or extended header type
T1 or T2 Data	Indicate the type of data (supplementary service)
T3 Data (Packet)	Indicate data frame size and number of frames
Acknowledgements	Indicate ACK or NACK and reason
System request	MI Type defines the purpose
System response	MI Type defines the purpose
Delivery Header	MI Type defines the purpose

BS Commands

Ahoys	(additional services)

Specification Text:

{{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI information bits as described in clauses 5.5.19 (see Table 11.1).**

Table 5.63 : Use of Message Information

Use	Purpose	Clause
Powersave	Indicate normal or extended header type	5.5.19.1
T1 or T2 Data	Indicate the type of data (supplementary service)	5.5.19.2
T3 Data (Packet)	Indicate data frame size and number of frames	5.5.19.3
Acknowledgements	Indicate ACK or NACK and reason	5.5.19.5
Broadcast		5.1.19.6
System request	MI Type defines the purpose	5.5.19.4
System response	MI Type defines the purpose	5.5.19.4
Delivery Header	MI Type defines the purpose	5.5.19.4
BS commands		5.5.19.7
Ahoys		5.5.19.8}}

NOTE: In the case where this is a Packet Data header, the 48 bit FS4 synchronization sequence shall be used. Normally receiving stations determine the call type from the Header Information but techniques such as determination by FS type (as used by ETS 300 230 [i.1], MPT1327 and others) can be equally valid.

Family: No Duplicates

Test Purposes: None

RQ_001_0969 **Message Information field**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF the content of message information type field is 111 (binary)**

THEN this is an extended wake-up header for traffic channel powersave
AND the MI information field contains the number of Headers that follow the current one. This value must be at maximum 0000 1111 (binary).

Specification Text: {{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI detail bits as described in clause 5.5.19 (see Table 11.1).**}}

Table 5.63 : Use of Message Information

Use	Purpose	Clause
Powersave	Indicate normal or extended header type	5.5.19.1
T1 or T2 Data	Indicate the type of data (supplementary service)	5.5.19.2
T3 Data (Packet)	Indicate data frame size and number of frames	5.5.19.3
Acknowledgements	Indicate ACK or NACK and reason	5.5.19.5
Broadcast		5.1.19.6
System request	MI Type defines the purpose	5.5.19.4
System response	MI Type defines the purpose	5.5.19.4
Delivery Header	MI Type defines the purpose	5.5.19.4
BS commands		5.5.19.7

Ahoys

Family: No Duplicates

Test Purposes: None

RQ_001_0970 **Message Information field**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF Message type field is either 0000 or 0001 (binary) - Comm. start or Conn. request -

AND the Header is for a Data communication type 1 or 2 transmission
THEN
- **the 3 MI type field bits shall set to 001 (binary)**
- **first 4 bits of the detail field shall be set as follows:**
  0000 Status message
  0001 Precoded message
  0010 Free text message (radio generated data)
  0011 Short file transfer
  0100 User defined data 1
  0101 User defined data 2
  0110 User defined data 3
  0111 User defined data 4
  Other Reserved
- **last 4 bits of the information field shall be set to 0**

Specification Text: {{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI detail bits as described in clause 5.5.19 (see Table 11.1).**}}

Table 5.63 : Use of Message Information

Use	Purpose	Clause
Powersave	Indicate normal or extended header type	5.5.19.1
T1 or T2 Data	Indicate the type of data (supplementary service)	5.5.19.2
T3 Data (Packet)	Indicate data frame size and number of frames	5.5.19.3
Acknowledgements	Indicate ACK or NACK and reason	5.5.19.5
Broadcast		5.1.19.6
System request	MI Type defines the purpose	5.5.19.4
System response	MI Type defines the purpose	5.5.19.4
Delivery Header	MI Type defines the purpose	5.5.19.4
BS commands		5.5.19.7
Ahoys		5.5.19.8

5.10.4

Family: No Duplicates

Test Purposes: None

RQ_001_0971 **Message Information field**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF Header type field is either 0000 or 0001 (binary) - Comm. start or Conn. request -

AND the Header is for a Packet data communication type 3 transmission
THEN
- the 3 MI type field bits shall set to 011 (binary)
- first 4 bits of the information field shall be the Packet data frame size, set as follows:

pdS	Frame time (ms)	Data size bits
0	80	288
1	160	672
2	240	1 056
3	320	1 440
Other	Reserved	Reserved

- last 4 bits of the information field shall be the Packet data frame number, set as follows:

pdM	Number of Data frames
0	1 frame
1	2 frames
2	3 frames
3	4 frames
4	5 frames
5	6 frames
6	7 frames
7	8 frames
Other	Reserved

Specification Text: {{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI detail bits as described in clause 5.5.19 (see Table 11.1).**}}

Table 5.63 : Use of Message Information

Use	Purpose	Clause
Powersave	Indicate normal or extended header type	5.5.19.1
T1 or T2 Data	Indicate the type of data (supplementary service)	5.5.19.2
T3 Data (Packet)	Indicate data frame size and number of frames	5.5.19.3
Acknowledgements	Indicate ACK or NACK and reason	5.5.19.5
Broadcast		5.1.19.6
System request	MI Type defines the purpose	5.5.19.4
System response	MI Type defines the purpose	5.5.19.4
Delivery Header	MI Type defines the purpose	5.5.19.4
BS commands		5.5.19.7
Ahoys		5.5.19.8

Family: No Duplicates

Test Purposes: None

RQ_001_0972 **Message Information field**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M2, M3

Requirement:

IF Message is a system transaction header -

THEN
- the 3 MI type field bits shall be set as follows:
000 to 110 according to use
111 Reserved
- the 8 information bits shall all set to 0

Specification Text: {{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI detail bits as described in clause 5.5.19. (see Table 11.1).**}}

Table 5.63 : Use of Message Information

Use	Purpose	Clause
Powersave	Indicate normal or extended header type	5.5.19.1
T1 or T2 Data	Indicate the type of data (supplementary service)	5.5.19.2
T3 Data (Packet)	Indicate data frame size and number of frames	5.5.19.3
Acknowledgements	Indicate ACK or NACK and reason	5.5.19.5
Broadcast		5.1.19.6
System request	MI Type defines the purpose	5.5.19.4
System response	MI Type defines the purpose	5.5.19.4
Delivery Header	MI Type defines the purpose	5.5.19.4
BS commands		5.5.19.7
Ahoys		5.5.19.8

}}

Family: No Duplicates

Test Purposes: None

RQ_001_0973 **Message Information field**

TS 102 658 [1] *Clause:* 11.5 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF Header type field is 0101 (bin) - Acknowledgement -

THEN

- the 3 MI type field bits shall be set as follows:
000
001 ACK (Rx OK)
010 NACK (data error, resend request)
011 NACK (request denied)
Other Reserved
- the 8 information bits shall be set as follows:

0

1 to 255 ACK / NACK status (rejection reason defined by user)

Specification Text: {{**Finally there are the 11 bits of Message Information (MI) that are made up of 3 MI Type bits and 8 MI_Detail bits as described in clause 5.5.19 (see Table 11.1).**}}

Family: No Duplicates

Test Purposes: None

4.1.6 Payload

4.1.6.1 Packet data

RQ_001_0808 **Packet data**

TS 102 658 [1] *Clause:* 8.1, 8.2 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may support Individual Short Data Message service (Type 3, Packet data)**

Specification Text: {{**Table 8.1 and Table 8.2**}}.

Family: No Duplicates

Test Purposes: TP_PMR_0808_01 (Interoperability), TP_PMR_0808_02 (Interoperability), TP_PMR_0808_01 (Conformance)

RQ_001_0816 **Packet data**

TS 102 658 [1] *Clause:* 8.3.1 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **If the transmission is a type 3 data**
THEN A dPMR radio shall use frame sync 4 (FS4) in the header.

Specification Text: {{**Packet data uses a different format to the normal communications frame format. The use of frame sync 4 (FS4) indicates that the frames following will be in PDF format**}}.

Family: No Duplicates

Test Purposes: TP_PMR_0816_01 (Conformance)

RQ_001_0817 **Packet data**

TS 102 658 [1] *Clause:* 9.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **When a Type 3 packet data transmission has been received without error the receiving MS shall send an ACK to the sender.**

Specification Text: {{**For an individual call, the receiving party shall signal to the transmitting party whether the data has been received without errors.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0817_01 (Conformance)

RQ_001_0818 **Packet data**

TS 102 658 [1] *Clause:* 9.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio supports Packet Data message service (Type 3)**
THEN receiving a packet data message (type 3) it shall send a negative acknowlegdement message
NACK when there is an error in the decoded data. The NACk message shall indicate the packet data frame number from which to re-transmit the last communication frame.

Specification Text: {{**Where errors are detected in any of the received packet frames, the response shall be an ACK frame with the Acknowledgement type (in the CI data) set to 010. This is a NACK frame. The information bits in the CI data will denote the number of the last packet frame received without error. The NACK retransmit values are given in Table 8.4**}}

Family: No Duplicates

Test Purposes: TP_PMR_0818_01 (Conformance)

RQ_001_0819 **Packet data**

TS 102 658 [1] *Clause:* 9.7 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio supports Packet Data message service (Type 3)**
THEN it shall indicate the completion of a packet data call by sending a disconnect request consisting of two consecutive Header frame, End frame pairs.

Specification Text: See {{**Figure 9.3** }}in document

Family: No Duplicates

Test Purposes: TP_PMR_0819_01 (Conformance)

RQ_001_0820 **Packet data**

TS 102 658 [1] *Clause:* 9.7 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio supports Packet Data message service (Type 3)**
AND it receives a negative acknowledgement message (NACK) after a packet data message transmission
THEN it shall re-transmit the frames from the frame number indicated in the NACK message.

Specification Text: {{**Figure 9.4**}}

Family: No Duplicates

Test Purposes: TP_PMR_0820_01 (Conformance)

RQ_001_0821 **Packet data**

TS 102 658 [1] *Clause:* 9.5 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF a dPMR radio supports Packet Data message service (Type 3)**
THEN it shall set unused bytes in the DATA information element in the last Data Packet Frame to "0" when transmitting Packet data messages. The unused bytes are those bytes (if any) exceeding the specified data length up to the DATA information element length.

Specification Text: {{**The transmitting party will signal the actual length of the valid data contained in each packet using the LEN parameter. Any unused bytes of each packet shall be completed with null data (all zeroes).**}}

Family: No Duplicates

Test Purposes: TP_PMR_0821_01 (Conformance)

RQ_001_0822 **Packet data**

TS 102 658 [1] *Clause:* 9.6 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF dPMR radio supports Packet Data message service (Type 3)**
THEN it shall in each packet data frame include a 16 bit CRC field (CRC_D) for the DATA information element using the Generated Polynomial X^16 + X^12 + X^5 + 1 when transmitting a Packet Data message.

Specification Text: {{**A 16 bit CRC checksum is calculated from the contents of the data field in each packet frame, CRC-D.**
The Generated Polynomial uses X^16 + X^12 + X^5 + 1.
This CRC-D checksum is used in the parameter field (PAR) of the packet data frame.
}}

Family: No Duplicates

Test Purposes: TP_PMR_0822_01 (Conformance)

RQ_001_0914 **Packet data**

TS 102 490 [3] *Clause:* 9.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **If the transmission is a type 3 data**

THEN A dPMR radio shall use frame sync 4 (FS4) in the header.

Specification Text: {{**Packet data uses a different format to the normal communications frame format. The use of frame sync 4 (FS4) indicates that the frames following will be in PDF format**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0948 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Packet data**

THEN each packet data burst shall consist of up to 8 data frames.

Specification Text: {{**The packet burst can consist of up to 8 data frames.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0949 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Packet data**

THEN each Type 3 Packet data burst frame shall start with a 24 bits long field, containing the

Colour Code (CC).

Specification Text: {{**The frame is completed by prefixing the 24 bits of Colour Code.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0949_01 (Conformance)

RQ_001_0950 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Packet data**

THEN each frame is numbered in the three bits long data frame number (N) field. It's value shall be from 000 to 111 (binary).

Specification Text: {{**The current data frame number (N) is from 000 to 111.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0950_01 (Conformance)

RQ_001_0951 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Packet data**
THEN each frame shall have an 8 bits long field Data lenght (LEN), giving the number of data bytes contained in the current burst.

Specification Text: {{**N is followed by 8 bits that give the total number of data bytes contained in the current burst.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0951_01 (Conformance)

RQ_001_0952 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Packet data**
THEN the 14 bits long field (DUMMY) shall always set to 0.

Specification Text: {{**This is followed by 14 dummy bits that are set to zero.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0953 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Packet data**
THEN the 16 bits long field, CRC for DATA field (CRC-D) of the current frame shall be calculated with the polinomial X^16 + X^12 + X^5 + 1.

Specification Text: {{**The next 16 bits are the CRC for the data field contained in this burst.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0953_01 (Conformance)

RQ_001_0954 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Packet data

THEN a 7 bit CRC checksum shall be calculated on the above 41 bits, using the X^7 + X^3 + 1 polinomial.
The concatenation of above 48 bits shall be defined and referred as the parameter data (PAR)

Specification Text: {{**The 7 bit CRC checksum is added to these 41 bits using the polynomial given in clause 7.2 giving a total of 48 bits.**}}

Clause 7.2 CRC addition

Use	CRC	Polynomial
Frame (CCH)	CRC7	X^7 + X^3 + 1

Family: No Duplicates

Test Purposes: None

RQ_001_0955 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Packet data

THEN each data burst frame the 48 bits referred as parameter data (PAR) shall be separated into 6 bytes. Each of these bytes shall be coded by shortened 12,8 Hamming code where
X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit):
C3,C2,C1,C0 is parity bit (4 bit).

The generator matrix is:

	12	11	10	9	8	7	6	5	4	3	2	1
	X7	X6	X5	X4	X3	X2	X1	1	C3	C2	C1	C0
1	1	0	0	0	0	0	0	0	1	1	1	0
2	0	1	0	0	0	0	0	0	0	1	1	1
3	0	0	1	0	0	0	0	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	1	0	1
5	0	0	0	0	1	0	0	0	1	0	1	1
6	0	0	0	0	0	1	0	0	1	1	0	0
7	0	0	0	0	0	0	1	0	0	1	1	0
8	0	0	0	0	0	0	0	1	0	0	1	1

The Shortened Hamming code (12,8) Polynomial is X^4 + X + 1.
This will generate a 6x12 bit Packet data blocks

Specification Text: {{**These 48 data bits are now separated into 6 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 6 x 12 bit blocks.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0956 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

```
IF the radio offers Packet data

THEN the 6x12 bit Packet data blocks shall be interleaved using the
following 12x6 interleaving matrix:
   1  2  3  4  5  6
1  1  13 25 37 49 61
2  2  14 26 38 50 62
3  3  15 27 39 51 63
4  4  16 28 40 52 64
5  5  17 29 41 53 65
6  6  18 30 42 54 66
7  7  19 31 43 55 67
8  8  20 32 44 56 68
9  9  21 33 45 57 69
10 10 22 34 46 58 70
11 11 23 35 47 59 71
12 12 24 36 48 60 72

This 72 generated bit shall be referred as the interleaved PAR
DATA.
```

Specification Text: {{**To protect against burst interference, these 6 x 12 bit blocks are now interleaved using the 12 x 6 TCH interleaving matrix given in clause 7.4.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0958 **Packet data**

TS 102 658 [1] *Clause:* 11.4 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

```
IF the radio offers Packet data

THEN the interleaved PAR DATA and the DATA frames are scrambled
using the polinomial X^9 + X^5 + 1 with an initial preset value of
all "1"s.
```

Specification Text: {{**Next the associated data frames are concatenated to the interleaved PAR data and scrambled using the polynomial given in clause 7.3.**}}

Family: No Duplicates

Test Purposes: None

4.1.6.2 Short data

RQ_001_0501 **Short data**

TS 102 658 [1] *Clause:* 5.6.1 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Each appended data frame shall contain 72 bits**

Specification Text: {{**Figure 5.9**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0502 **Short data**

TS 102 658 [1] *Clause:* 5.6.2 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **If the appended data is binary format the first octet of the appended data frame shall be 11110001.**

Specification Text: {{**Figure 5.10**}}

Family: No Duplicates

Test Purposes: TP_PMR_0502_01 (Interoperability), TP_PMR_0502_02 (Interoperability),

RQ_001_0503 **Short data**

TS 102 658 [1] *Clause:* 5.6.3 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **If the appended data is BCD format the first octet of the appended data frame shall be 11110010.**

Specification Text: {{**Figure 5.11**}}

Family: No Duplicates

Test Purposes: TP_PMR_0503_01 (Interoperability), TP_PMR_0503_02 (Interoperability),

RQ_001_0504 **Short data**

TS 102 658 [1] *Clause:* 5.6.4 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **If the appended data is 7 bit ISO format the first octet of the appended data frame shall be 11110011.**

Specification Text: {{**Figure 5.12**}}

Family: No Duplicates

Test Purposes: TP_PMR_0504_01 (Interoperability), TP_PMR_0504_02 (Interoperability),

RQ_001_0505 **Short data**

TS 102 658 [1] *Clause:* 5.6.5 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **If the appended data is 8 bit ISO format the first octet of the appended data frame shall be 11110100.**

Specification Text: {{**Figure 5.13**}}

Family: No Duplicates

Test Purposes: TP_PMR_0505_01 (Interoperability), TP_PMR_0505_02 (Interoperability),

RQ_001_0506 **Short data**

TS 102 658 [1] *Clause:* 5.6.6 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **If the appended data is encoded NMEA data the first octet of the appended data frame shall be 11110101.**

Specification Text: {{**Figure 5.14**}}

Family: No Duplicates

Test Purposes: TP_PMR_0506_01 (Interoperability), TP_PMR_0506_02 (Interoperability),

RQ_001_0815 **Short data**

TS 102 658 [1] *Clause:* 8.1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **A dPMR radio may support supplementary service "Short data delivery".**

Specification Text: {{**Table 8.1**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0995 **Short data**

TS 102 658 [1] *Clause:* 10.1.3.4 *Type:* Mandatory

Applies to: M1, M2

Requirement:

Each Message shall be identified by the Message Type (MT) field. This shall have a length of four bits and it's value shall be 0001.

Specification Text: {{ **Table 10.11.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0996 **Short data**

TS 102 658 [1] *Clause:* 10.1.3.4 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Each Message shall have a Communications Mode (M) field. This shall have a length of three bits and it's value shall be 110.**

Specification Text: {{ **Table 10.11.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0997 **Short data**

TS 102 658 [1] *Clause:* 10.1.3.4 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Each Message shall have a Message Information Type (MI_Type) field. This shall have a length of three bits and it's value shall be 000.**

Specification Text: {{ **Table 10.11.**}}

<Family: No Duplicates

Test Purposes: None

RQ_001_0998 **Short data**

TS 102 658 [1] *Clause:* 10.1.3.4 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Each Message shall have a Message Information Detail (MI_Det) field. The first 2 bits shall correspond to the number of appended UDT frames.**

Specification Text: {{ **Table 10.11.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0999 **Short data**

TS 102 658 [1] *Clause:* 10.1.3.4 *Type:* Mandatory

Applies to: M1, M2

Requirement: **Each Message shall have a Message Information Detail (MI_Det) field. The last 6 bits shall correspond to the number of symbols contained in the UDT frames.**

Specification Text: {{ **Table 10.11.**}}

NOTE: The field UAD defines the number of UDT Appended_Data messages concatenated to the Short_Data header (002 to 112 represents one to four Appended_Data messages). The SYMB field is applicable for BCD, 7 bit text and 8 bit octet formatted data. If address, binary, EN 61162-1 [i.2] or IP address is transported SYMB = 00 00002. For BCD, 7 bit, 8 bit data format, SYMB is coded to the number of symbols to be transmitted unless the number of symbols is 64 when SYMB = 00 00002.

Family: No Duplicates

Test Purposes: None

4.1.6.3 T1 data

RQ_001_0807 **T1 data**

TS 102 658 [1] *Clause:* 8.1, 8.2 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may support Type 1 Group Short Data Message.**

Specification Text: {{**Table 8.1 and Table 8.2**}}

Family: No Duplicates

Test Purposes: TP_PMR_0807_01 (Interoperability), TP_PMR_0807_02 (Interoperability), TP_PMR_0807_04 (Interoperability), TP_PMR_0807_01 (Conformance)

RQ_001_0810 **T1 data**

TS 102 658 [1] *Clause:* 8.1, 8.2 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may support Type 1 Individual Short Data Message service.**

Specification Text: {{**Table 8.1 and Table 8.2**}}.

Family: No Duplicates

Test Purposes: TP_PMR_0810_01 (Interoperability), TP_PMR_0810_02 (Interoperability)

RQ_001_0934 **T1 data**

TS 102 658 [1] *Clause:* 11.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Type 1 data**

THEN the communications mode (M) field in the header frame shall be set to 010 (binary).

Specification Text: {{**The communications mode, 010 is added (clause 5.5.7).**}}

{{**Table 5.48.**}}
000 Voice communication (no user data in SLD field)
001 Voice + slow data (user data in SLD field)
010 Data communication type 1 (Payload is user data without FEC)
011 Data communication type 2 (Payload is user data with FEC)
100 Data communication type 3 (Packet data, ARQ method)
101 Voice and appended data (Type 2)
Other Reserved

Family: No Duplicates

Test Purposes: TP_PMR_0934_01 (Conformance)

RQ_001_0935 **T1 data**

TS 102 658 [1] *Clause:* 11.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Type 1 data

THEN the Slow data field (SLD) shall be used to convey information of data format, position and continuation, etc.
Data shall be formatted as follows:

Reserved	DP	Format	Cont.	Data length (bytes)
5 bits	2 bits	4 bits	1 bit	6 bits

Data Position (DP):
00 There is no data in this frame
01 Reserved
10 Reserved
11 This frame is the data frame

Format:
0000 Status message
0001 Precoded message
0010 Free text message (radio generated data)
0011 Short file transfer
0100 User defined data 1
0101 User defined data 2
0110 User defined data 3
0111 User defined data 4

Other Reserved

Continuation flag:
0 Data continues after this frame.
1 Data finishes at this frame.

Specification Text: {{**Then there are the 18 bits of the slow user data field (SLD)**}}. These bits are set according to clause 5.5.29.2 depending on the data to be transmitted.

{{**Clause 5.5.29.2 Slow data field use with Type 1 or 2 data**}}.
When Type 1 or 2 data is transmitted, the SLD field is used to convey information of data format, position and continuation, etc. The SLD field is also used when a voice transmission has data appended to the end of the transmission.

{{**Table 5.87:** }}

Family: No Duplicates

Test Purposes: None

RQ_001_0936 **T1 data**

TS 102 658 [1] *Clause:* 11.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Type 1 data

THEN the Control CHannel (CCH) field shall be separated into 6 bytes. Each of these bytes shall be coded by shortened 12,8 Hamming code, as shown in clause 7.3
X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit): C3,C2,C1,C0 is parity bit (4 bit).
The Generator matrix is as follows:

	12	11	10	9	8	7	6	5	4	3	2	1
	X7	X6	X5	X4	X3	X2	X1	1	C3	C2	C1	C0
1	1	0	0	0	0	0	0	0	1	1	1	0
2	0	1	0	0	0	0	0	0	0	1	1	1
3	0	0	1	0	0	0	0	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	1	0	1
5	0	0	0	0	1	0	0	0	1	0	1	1
6	0	0	0	0	0	1	0	0	1	1	0	0
7	0	0	0	0	0	0	1	0	0	1	1	0
8	0	0	0	0	0	0	0	1	0	0	1	1

The Shortened Hamming code (12,8) Polynomial is X^4 + X + 1.
This gives the 6x12 Type 1 data CCH bit blocks.

Specification Text: {{**These 48 bits are now separated into 6 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 6 x 12 bit blocks.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0937 **T1 data**

TS 102 658 [1] *Clause:* 11.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

The 6x12 Type 1 data CCH shall be interleaved using the following 12x6 interleaving matrix:

	1	2	3	4	5	6
1	1	13	25	37	49	61
2	2	14	26	38	50	62
3	3	15	27	39	51	63
4	4	16	28	40	52	64
5	5	17	29	41	53	65
6	6	18	30	42	54	66
7	7	19	31	43	55	67
8	8	20	32	44	56	68
9	9	21	33	45	57	69
10	10	22	34	46	58	70
11	11	23	35	47	59	71
12	12	24	36	48	60	72.

This gives the Type 1 interleaved CCH data.
Then a 288 bit block of uncorrected user data is added

Specification Text: {{**To protect against burst interference, these 6 x 12 bit blocks are now interleaved using the 12 x 6 TCH interleaving matrix given in table 7.4.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0938 **T1 data**

TS 102 658 [1] *Clause:* 11.2 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **The Type 1 interleaved CCH data bits and appended data blocks will be scrambled using the polinomial ^9 + X^5 + 1 with an initial preset value of all "1"s.**

Specification Text: {{**Finally the interleaved TCH data and appended data blocks are scrambled using the polynomial given in clause 7.3**}}

Family: No Duplicates

Test Purposes: None

4.1.6.4 T2 data

RQ_001_0806 **T2 data**

TS 102 658 [1] *Clause:* 8.1, 8.2 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may support type 2 Group short Data Message**

Specification Text: {{**Table 8.1 and Table 8.2**}}

Family: No Duplicates

Test Purposes: TP_PMR_0806_01 (Interoperability), TP_PMR_0806_02 (Interoperability), TP_PMR_0806_04 (Interoperability), TP_PMR_0806_01 (Conformance)

RQ_001_0809 **T2 data**

TS 102 658 [1] *Clause:* 8.1, 8.2 ¶1 *Type:* Optional

Applies to: M1, M2, M3

Requirement: **A dPMR radio may support Type 2 Individual Short data message.**

Specification Text: {{**Table 8.1 and Table 8.2**}}.

Family: No Duplicates

Test Purposes: TP_PMR_0809_01 (Interoperability), TP_PMR_0809_02 (Interoperability)

RQ_001_0939 **T2 data**

TS 102 658 [1] *Clause:* 11.3 ¶9 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF radio offers Type 2 data**
THEN the communications mode (M) field shall be 011 (binary).

Specification Text: {{**The Communications Mode, 0112 is added (clause 5.5.7).**}}

Family: No Duplicates

Test Purposes: TP_PMR_0939_01 (Conformance)

RQ_001_0940 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

```
IF the radio offers Type 2 data

THEN the Slow data field (SLD) shall be used to convey information
of data format, position and continuation, etc.
Data shall be formatted as follows:


Reserved DP     Format Cont. Data length (bytes)
5 bits   2 bits 4 bits 1 bit 6 bits


Data Position (DP):
00 There is no data in this frame
01 Reserved
10 Reserved
11 This frame is the data frame


Format:
0000  Status message
0001  Precoded message
0010  Free text message (radio generated data)
0011  Short file transfer
0100  User defined data 1
0101  User defined data 2
0110  User defined data 3
0111  User defined data 4

Other Reserved


Continuation flag:
0 Data continues after this frame.
1 Data finishes at this frame.
```

Specification Text: {{**Finally there are the 18 bits of the slow user data field (SLD). These bits are set according to clause 5.5.29.2 depending on the data to be transmitted.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0941 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Type 2 data

THEN the Control CHannel (CCH) field shall be separated into 6 bytes. Each of these bytes shall be coded by shortened 12,8 Hamming code:
X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit)
C3,C2,C1,C0 is parity bit (4 bit).

The generator matrix is as follows:

	12	11	10	9	8	7	6	5	4	3	2	1
	X7	X6	X5	X4	X3	X2	X1	1	C3	C2	C1	C0
1	1	0	0	0	0	0	0	0	1	1	1	0
2	0	1	0	0	0	0	0	0	0	1	1	1
3	0	0	1	0	0	0	0	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	1	0	1
5	0	0	0	0	1	0	0	0	1	0	1	1
6	0	0	0	0	0	1	0	0	1	1	0	0
7	0	0	0	0	0	0	1	0	0	1	1	0
8	0	0	0	0	0	0	0	1	0	0	1	1

The Shortened Hamming code (12,8) Polynomial is X^4 + X + 1.
This will give the 6x12 bit blocks Type data 2 bits.

Specification Text: {{**These 48 bits are now separated into 6 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 6 x 12 bit blocks.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0942 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

The 6x12 bit blocks Type data 2 shall be interleaved using the following 12x6 interleaving matrix:

	1	2	3	4	5	6
1	1	13	25	37	49	61
2	2	14	26	38	50	62
3	3	15	27	39	51	63
4	4	16	28	40	52	64
5	5	17	29	41	53	65
6	6	18	30	42	54	66
7	7	19	31	43	55	67
8	8	20	32	44	56	68
9	9	21	33	45	57	69
10	10	22	34	46	58	70
11	11	23	35	47	59	71
12	12	24	36	48	60	72.

This will generate the 72 CCH interleaved Type 2 data bits.

Specification Text: {{**To protect against burst interference, these 6 x 12 bit blocks are now interleaved using the 12 x 6 TCH interleaving matrix given in clause 7.4.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0943 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Type 2 data**

THEN user data shall be broken down into 5 byte blocks (40 bits) to which 1 bit of null data (i.e. set to 0) shall be appended. Four of these 41 bit blocks will be allocated to each frame of the Type 2 Superframe.
For each 4 of these 41 bit block the next three reqirements in sequence will be applied.

Specification Text: {{**The user data is broken down into 5 byte blocks (40 bits) to which 1 bit of null data (i.e. set to 02) is attached. Four of these 41 bit blocks shall be allocated to each frame.**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0944 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement: **IF the radio offers Type 2 data**

THEN a 7 bit CRC shall be applied using the polynomial X^7 + X^3 + 1.
This will give a total of 48 bits.

Specification Text: {{**The 7 bit CRC checksum is added to each 41 bit block using the polynomial given in clause 7.1 giving a total of 48 data bits.**}}
See {{**figure 8**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0945 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Type 2 data

THEN the 48 bits shall be separated into 6 bytes. Each of these bytes shall be coded by shortened 12,8 Hamming code, as shown in clause 7.3
X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit): C3,C2,C1,C0 is parity bit (4 bit).
The Generator matrix is as follows:

	12	11	10	9	8	7	6	5	4	3	2	1
	X7	X6	X5	X4	X3	X2	X1	1	C3	C2	C1	C0
1	1	0	0	0	0	0	0	0	1	1	1	0
2	0	1	0	0	0	0	0	0	0	1	1	1
3	0	0	1	0	0	0	0	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	1	0	1
5	0	0	0	0	1	0	0	0	1	0	1	1
6	0	0	0	0	0	1	0	0	1	1	0	0
7	0	0	0	0	0	0	1	0	0	1	1	0
8	0	0	0	0	0	0	0	1	0	0	1	1

Shortened Hamming code (12,8) Polynomial: X^4 + X + 1.
This will generate a 6x12 bit blocks.

Specification Text: {{**These 48 data bits are now separated into 6 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2)** }}giving 6 x 12 bit blocks.
See {{**figure 8**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0946 **T2 data**

TS 102 658 [1] *Clause:* 11.3 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

IF the radio offers Type 2 data

THEN the generated 6x12 bit blocks shall be interleaved using the following 12x6 interleaving matrix

	1	2	3	4	5	6
1	1	13	25	37	49	61
2	2	14	26	38	50	62
3	3	15	27	39	51	63
4	4	16	28	40	52	64
5	5	17	29	41	53	65
6	6	18	30	42	54	66
7	7	19	31	43	55	67
8	8	20	32	44	56	68
9	9	21	33	45	57	69
10	10	22	34	46	58	70
11	11	23	35	47	59	71
12	12	24	36	48	60	72.

This will generate the 4x72 coded data blocks.

Specification Text: To protect against burst interference, {{**these 6 x 12 bit blocks are now interleaved using the 12 x 6 TCH interleaving matrix given in table 7.4.**}}
See {{**figure 8**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0947 **T2 data**

TS 102 658 [1] *Clause:* 9.3 ¶21 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:
```
IF the radio offers Type 2 data
THEN data composed by the concatenation of following bits:

72 TCH interleaved bits and
4x72 bits coded data blocks

shall be scrambled using the polinomial X^9 + X^5 + 1 with an
initial preset value of all "1"s.
```

Specification Text: {{**Next four of the 72 bit coded data blocks are concatenated to the interleaved CCH data and scrambled using the polynomial given in clause 7.3.**}}

Family: No Duplicates

Test Purposes: None

4.1.6.5 Voice

4.1.6.5.1 Attached data

RQ_001_0837 **Attached data**

TS 102 658 [1] *Clause:* 8.2 ¶1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement:
```
For Voice group calls a dPMR radio may support supplementary
service "Short appended data".
```

Specification Text: {{**Table 8.1**}}

Family: No Duplicates

Test Purposes: TP_PMR_0837_01 (Interoperability), TP_PMR_0837_02 (Interoperability), TP_PMR_0837_01 (Conformance)

RQ_001_0844 **Attached data**

TS 102 658 [1] *Clause:* 8.1 ¶1 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement:
```
For Voice individual calls a dPMR radio may support supplementary
service "Short appended data".
```

Specification Text: {{**Table 8.1**}}

Family: No Duplicates

Test Purposes: TP_PMR_0844_01 (Interoperability), TP_PMR_0844_02 (Interoperability), TP_PMR_0844_01 (Conformance)

RQ_001_0932 **Attached data**

TS 102 658 [1] *Clause:* 11.1.1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF radio is a dPMR radio and current transmission is voice plus appended data AND the PTT key is released before the end of the current Superframe**

THEN the current frame shall be completed using silence data for the Traffic Channel field and subsequent frames shall be coded as Type 2 data frames.

Specification Text: {{**In the case of a voice + data and the voice transmission ends before the end of the current superframe, the current frame shall be completed using silence data for the TCH ("silence data" is the vocoder output data when no sound is input). After completion of the current frame, subsequent frames in the superframe are available for data and coded according to clause 11.3. DP in the SLD field shall indicate if the frame contains voice or data information (clause 5.5.29.1).**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0933 **Attached data**

TS 102 658 [1] *Clause:* 11.1.1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF radio is a dPMR radio AND current transmission is voice plus appended data AND the PTT key is released before the end of the current Superframe**

THEN Data Position (DP) in the Slow Data (SLD) field shall indicate if the frame contains voice or data information as follows:

Cont. User data Cont. User data
1 bit 8 bits 1 bit 8 bits

Continuation Flag:
0 User data continues after the following byte.
1 User data is terminated by the following byte.

Specification Text: {{**Figure 11.3**}}

Family: No Duplicates

Test Purposes: None

4.1.6.5.2 Late entry

RQ_001_0802 **Late entry**

TS 102 658 [1] *Clause:* 8.1, 8.2 ¶1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **A dPMR radio shall support late entry for all Voice calls**

Specification Text: See {{**tables 8.1 and 8.2** }}in document.

Family: **RQ_001_0802**, RQ_001_0839

Test Purposes: TP_PMR_0802_01 (Interoperability), TP_PMR_0802_02 (Interoperability), TP_PMR_0802_03 (Interoperability), TP_PMR_0802_01 (Conformance), TP_PMR_0802_02 (Conformance), TP_PMR_0802_03 (Conformance), TP_PMR_0802_04 (Conformance)

RQ_001_0839	**Late entry**	
TS 102 490 [3]	*Clause:* 8.2 ¶1	*Type:* Conditionally Mandatory
Applies to:	M1, M2, M3	
Requirement:	**For Voice individual calls a dPMR radio shall support supplementary service "Late Entry".**	
Specification Text:	{{**Table 8.3**}}	
Family:	**RQ_001_0802**, RQ_001_0839	
Test Purposes:	TP_PMR_0802_01 (Interoperability), TP_PMR_0802_02 (Interoperability), TP_PMR_0802_03 (Interoperability), TP_PMR_0802_04 (Interoperability), TP_PMR_0802_01 (Conformance), TP_PMR_0802_02 (Conformance), TP_PMR_0802_03 (Conformance), TP_PMR_0802_04 (Conformance)	

4.1.6.5.3 Slow user data

RQ_001_0836	**Slow user data**	
TS 102 658 [1]	*Clause:* 8.1 ¶1	*Type:* Conditionally Optional
Applies to:	M1, M2, M3	
Requirement:	**For Voice group calls a radio may support supplementary service "Slow user data".**	
Specification Text:	{{**Table 8.1**}} {{**Table 8.3**}}	
Family:	No Duplicates	
Test Purposes:	TP_PMR_0836_01 (Interoperability), TP_PMR_0836_02 (Interoperability), TP_PMR_0836_01 (Conformance)	

RQ_001_0843	**Slow user data**	
TS 102 658 [1]	*Clause:* 8.1 ¶1	*Type:* Conditionally Optional
Applies to:	M1, M2, M3	
Requirement:	**For Voice individual calls a dPMR radio may support supplementary service "Slow user data".**	
Specification Text:	{{**Table 8.1**}}	
Family:	No Duplicates	
Test Purposes:	TP_PMR_0843_01 (Interoperability), TP_PMR_0843_02 (Interoperability), TP_PMR_0843_01 (Conformance)	

RQ_001_0921 **Slow user data**

TS 102 658 [1] *Clause:* 11.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

Each frame of a Superframe shall contain an eighteen bits long Slow data field (SLD).

It's contents depends on the Communication mode field (M) value.

IF the Communications mode is set to 001 (binary)
THEN the Slow user data field shall be assembled as follows:

```
Cont.  User data  Cont.  User data
1 bit  8 bits      1 bit  8 bits
Continuation Flag:
0 User data continues after the following byte.
1 User data is terminated by the following byte.
```

Specification Text:

{{**If the communications mode is set to 001 the 18 bits of slow user data (SLD) field is assembled according to clause 5.9.1**}}.

{{**Clause 5.9.1 Slow data in the voice superframe**}}.
Each byte of user data is preceded by a continuation flag (Cont.) to inform the receiving party if the subsequent byte is the last.

```
Cont.  User data  Cont.  User data
1 bit  8 bits      1 bit  8 bits
Continuation Flag:
0 User data continues after the following byte.
1 User data is terminated by the following byte.
```

Family: No Duplicates

Test Purposes: TP_PMR_0921_01 (Conformance), TP_PMR_0921_02 (Conformance)

4.1.7 Powersave

RQ_001_1101 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement:

IF powersave is supported

AND repeated headers are used for powersave
THEN the preamble by each header shall be fixed at 72 bits.

Specification Text:

{{**In the case of repeated Headers for powersave use, the preamble used by each Header shall be fixed at 72 bits**}}.

Family: No Duplicates

Test Purposes: TP_PMR_1101_01 (Conformance)

RQ_001_1102 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement:

IF powersave supported

THEN when transmitting extended wake-up headers the first 3 bits (Call Information Type) of the 11 bits of the Call Information (CI) field shall be set to '111' in these headers.

Specification Text:

These extended wake-up Headers shall be coded according to clauses 5.2 and 5.10.
The 11 bits of Call Information (CI) are used as follows:
{{**CI Type = 111 (extended wake-up Header)**}}.

Family: No Duplicates

Test Purposes: TP_PMR_1102_01 (Conformance)

RQ_001_1103 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF powersave supported**

THEN when transmitting extended wake-up headers the last 4 bits of the 11 bits of the Call Information (CI) field shall indicate the number of Header frames to follow.

Specification Text: {{**Table 10.12**}}

Family: No Duplicates

Test Purposes: TP_PMR_1103_01 (Conformance)

RQ_001_1104 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.1 ¶7 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF powersave is supported**

THEN the calling radio can be programmed to use up to 15 extended wake-up headers for extended wake-up purposes.

Specification Text: {{**Radios can be programmed to use up to 15 extended header frames for wake-up purposes. This will give a maximum response time of 1,2 seconds**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_1105 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.1 ¶7 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF powersave supported**

THEN a caller using the wake-up procedure shall end the sequence of extended wake-up header sending a normal header, indicating the call type in the Call Information (CI) field.

Specification Text: See {{**Table 10.13**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_1106 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.2 ¶1 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF powersave supported**

THEN the wake-up periods of a radio in standby (sleep mode) shall have a duration of at least T_ch_chk.

Specification Text: Radio in standby (sleep) will be programmed to wake-up and monitor the channel at regular intervals. {{**Each wake-up shall have a minimum duration of T_ch_chk (clause 13.1)**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_1107 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.2 ¶2 *Type:* Conditionally Mandatory

Applies to: M1, M2

Requirement: **IF powersave supported**
THEN the maximum sampling interval between wake-up periods shall be (n-1) x 80ms, where n is the number of extended wake-up headers used.

Specification Text: {{**The maximum sampling interval between wake-ups shall be T_sam = (n - 1) x 80 ms where T_sam is the sampling interval and n is the number of powersave wake-up headers. (see clause 13.1 for the T_sam value).**}}

Family: No Duplicates

Test Purposes: None

RQ_001_1108 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.2 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **IF powersave supported**
AND the radio is awaken
THEN it may return to sleep mode if there is no activity on the channel for the duration of T_ch_chk.

Specification Text: {{**If the radio wakes and there is no activity on the channel for the duration of T_ch_chk it may return to sleep**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_1109 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.2 ¶5 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **IF powersave supported**
AND the radio is awaken by activity on the channel
THEN the radio return to sleep mode if the called address in received and decoded traffic does not match it own.

Specification Text: {{**If the radio wakes and decodes the dPMR activity but the called station ID does not match it may return to sleep**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_1110 **Powersave**

TS 102 658 [1] *Clause:* 10.1.4.2 *Type:* Conditionally Optional

Applies to: M1, M2

Requirement: **IF powersave supported**
AND has completed payload or signalling reception
THEN it may return to sleep.

Specification Text: If the radio wakes and decodes the dPMR activity and the called station ID matches, it shall then be able to calculate from the CI information bits when the payload item or signalling will commence. {{**Upon completion of the payload item or signalling the radio may return to sleep again.**}}

Family: No Duplicates

Test Purposes: None

4.1.8 Superframe

4.1.8.1 Traffic Channel

RQ_001_0904 **Traffic Channel**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each 2nd and 4th frame of the superframe shall start with a 24 bit field containing the Colour Code**

Specification Text: {{**The frame is completed by prefixing with either the 24 bits of FS2 (frame numbers 002 or 102) or the 24 bits of Colour Code (frame numbers 012 or 112).**}}

Family: No Duplicates

Test Purposes: TP_PMR_0904_01 (Conformance)

RQ_001_0905 **Traffic Channel**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **After the Priority field there shall be a one bit Preservation field (PM).**

All entities other than BS shall set this to 0.

Specification Text: {{**The next bit is the Preservation message according to clause 5.5.23. This bit will be used by BS downlinks only and MS shall set this to 0.**}}

Family: No Duplicates

Test Purposes: TP_PMR_0905_01 (Conformance)

RQ_001_0906 **Traffic Channel**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each frame of the superframe shall have a Version field (V).**

This 2 bit field shall be as follows:

00 Standard TCH content
Other reserved

Specification Text: {{**The 2 version bits are added according to clause 5.5.37**}}

Family: No Duplicates

Test Purposes: TP_PMR_0906_01 (Conformance)

RQ_001_0908 **Traffic Channel**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

Each frame of the Voice Superframe shall state the type of the call through the communications mode field (M). This shall have a length of three bits and it's value shall be as follows:

Values shall be as follows:
000 Voice communication (no user data in SLD field)
001 Voice + slow data (user data in SLD field)
101 Voice and attached data (Type 2)
Other Reserved

Specification Text:

{{**The communications mode value is added according to the table in clause 5.5.7**}}.For example, if slow data (SLD) is being included within the voice superframe then communications mode value is set to 001.
Table 5.48.
000 Voice communication (no user data in SLD field)
001 Voice + slow data (user data in SLD field)
010 Data communication type 1 (Payload is user data without FEC)
011 Data communication type 2 (Payload is user data with FEC)
100 Data communication type 3 (Packet data, ARQ method)
101 Voice and attached data (Type 2)
Other Reserved

Family: No Duplicates

Test Purposes: None

RQ_001_0909 **Traffic Channel**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

Each frame of a Superframe shall have a Communication format field (F).

This field must be two bits long.

Values shall be as follows:
00 Call ALL
01 Peer-to-peer communication
10 BS uplink
11 BS downlink

Specification Text:

{{**The communications format bits are now added according to clause 5.5.6. Generally these will be set to 0001 (peer-to-peer call). O**}}occasionally they may be set to 00 (all call) but this is a special case, similar to a broadcast.

See also {{**Table 5.47**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0910 **Traffic Channel**

TS 102 490 [3] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **After the Communications Format field there shall be the one bit Priority field (EP).**

Normal priority calls shall set this to 0.
Emergency priority calls shall set this to 1.

Specification Text: {{**The next bit is the Emergency Priority according to clause 5.5.12**}}

Family: No Duplicates

Test Purposes: TP_PMR_0910_01 (Conformance), TP_PMR_0910_02 (Conformance)

RQ_001_0915 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 ¶2 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **The Frame Number (FN) field of each Superframe shall be two bits long. It's value shall be from 00 to 11 (binary).**

Specification Text: {{**Frame Numbering (FN) is from 00 to 11 (1 to 4)**}}.

Family: No Duplicates

Test Purposes: TP_PMR_0915_01 (Conformance)

RQ_001_0919 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each frame in a Superframe shall have a field containing called or own ID.**

This field shall be 12 bits long and the data it shall contain depends on the Frame Numbering field.
- **Frame Numbering 0 will include the upper 12 bits of the called station ID. (ID0)**
- **Frame Numbering 1 will include the lower 12 bits of the called station ID. (ID1)**
- **Frame Numbering 2 will include the upper 12 bits of the own ID. (ID2)**
- **Frame Numbering 3 will include the lower 12 bits of the own ID. (ID3)**

Specification Text: {{**FN is followed by 12 bits of the called station address or own ID**}} as follows:
The called station ID and own ID make a total of 48 bits. These bits are split into 12 bit blocks and one block is included in each of the 4 frames of the superframe.
- FN 00 will include the upper 12 bits of the called station ID.
- FN 01 will include the lower 12 bits of the called station ID.
- FN 10 will include the upper 12 bits of the own ID.
- FN 11 will include the lower 12 bits of the own ID.

Family: No Duplicates

Test Purposes: None

RQ_001_0920 **Traffic Channel**

TS 102 658 [1] *Clause:* 9.1 ¶12 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

```
Each frame of a Superframe shall contain an eighteen bits long Slow
data field (SLD).
It's contents depends on the Communication mode field (M) value.

IF the Communications mode is set to 000 (binary)
THEN the 18 bits of slow user data field are set to zero.
```

Specification Text: {{If the communications mode is set to 000 the 18 bits of slow user data (SLD) field are set to zero}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0922 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Conditionally Mandatory

Applies to: M1, M2, M3

Requirement:

```
Each frame of a Superframe shall contain an eighteen bits long Slow
data field (SLD).
It's contents depends on the Communication mode field (M) value.

IF the Communications mode is set to 101 (binary)
THEN the Slow user data field shall be assembled as follows:

Reserved   DP      Format  Cont.  Data length (bytes)
5 bits     2 bits  4 bits  1 bit  6 bits

Data Position (DP):
DP coding
00 There is no data in this frame
01 Reserved
10 Reserved
11 This frame is the data frame

Format:
 Format coding
0000  Status message
0001  Precoded message
0010  Free text message (radio generated data)
0011  Short file transfer
0100  User defined data 1
0101  User defined data 2
0110  User defined data 3
0111  User defined data 4
Other Reserved

Continuation flag:
0 Data continues after this frame.
1 Data finishes at this frame.
```

Specification Text: {{If the communications mode is set to 101 the slow user data (SLD) field is assembled according to clause 5.5.29.2}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0923 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

Each frame of a Traffic channel Superframe shall contain a 7 bit CRC field.

Involved bits for CRC calculation shall be the ones in fields: Frame Number, Called/Own ID, communication mode, communication format, reserved and Slow data. (CCH data).

The polynomial to generate them is X^7 + X^3 + 1.

Specification Text:

{{**The 7 bit CRC checksum is added using the polynomial given in clause 7.2**}} giving a total of 48 bits

{{**Clause 7.2 CRC addition**}}

Use	CRC	Polynomial
Frame (CCH)	CRC7	X^7 + X^3 + 1

Family: No Duplicates

Test Purposes: None

RQ_001_0926 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement:

The Control CHannel (CCH) field shall be separated into 6 bytes. Each of these bytes shall be coded by shortened 12,8 Hamming code with

X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit)
C3,C2,C1,C0 is parity bit (4 bit)

The Generator matrix is as follows:

	12	11	10	9	8	7	6	5	4	3	2	1
	X7	X6	X5	X4	X3	X2	X1	1	C3	C2	C1	C0
1	1	0	0	0	0	0	0	0	1	1	1	0
2	0	1	0	0	0	0	0	0	0	1	1	1
3	0	0	1	0	0	0	0	0	1	0	1	0
4	0	0	0	1	0	0	0	0	0	1	0	1
5	0	0	0	0	1	0	0	0	1	0	1	1
6	0	0	0	0	0	1	0	0	1	1	0	0
7	0	0	0	0	0	0	1	0	0	1	1	0
8	0	0	0	0	0	0	0	1	0	0	1	1

The Shortened Hamming code (12,8) Polynomial is X^4 + X + 1.
This gives the 6x12 CCH bit blocks.

See figure 6.

Specification Text:

{{**These 48 bits are now separated into 6 bytes. Each byte is now coded by a shortened 12,8 Hamming Code (clause 7.2) giving 6 x 12 bit blocks.**}}

{{**Clause 7.2 Hamming code**}}
A shortened Hamming code (12,8) is employed and the generator matrix is shown below:
X7,X6,X5,X4,X3,X2,X1,1 is Identity bit (8 bit): C3,C2,C1,C0 is Parity bit (4 bit).
{{**Table 7.3: Generator matrix**}}
Shortened Hamming code (12,8) Polynomial: X^4 + X + 1.

Family: No Duplicates

Test Purposes: None

RQ_001_0927 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **The 6x12 CCH bit blocks shall be interleaved using the following 12x6 interleaving matrix:**

	1	2	3	4	5	6
1	1	13	25	37	49	61
2	2	14	26	38	50	62
3	3	15	27	39	51	63
4	4	16	28	40	52	64
5	5	17	29	41	53	65
6	6	18	30	42	54	66
7	7	19	31	43	55	67
8	8	20	32	44	56	68
9	9	21	33	45	57	69
10	10	22	34	46	58	70
11	11	23	35	47	59	71
12	12	24	36	48	60	72.

This gives the interleaved CCH data.

Specification Text: {{**To protect against burst interference, these 6 x 12 bit blocks are now interleaved using the 12x6 TCH interleaving matrix given in table 7.2**}}

{{**Table 7.4: TCH Interleaving matrix**}}

Family: No Duplicates

Test Purposes: None

RQ_001_0928 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **The interleaved CCH data shall be scrambled using the polinomial X^9 + X^5 + 1 with an initial preset value of all "1"s.**

Specification Text: {{**Then the interleaved CCH data is scrambled using the polynomial given in clause 7.3.**}}

{{**Clause 7.3 Scrambling**}}
The scrambling polynomial is X^9 + X^5 + 1 with an initial preset value of all "1"s.

Family: No Duplicates

Test Purposes: None

RQ_001_0929 **Traffic Channel**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each 1st and 3rd frame of the Superframe shall start with 24 bit field containing the Frame Sync 2 data, as follows:**

Binary: 010111111111011101111101

Hex: 5F F7 7D

Specification Text: {{**The frame is completed by prefixing with either the 24 bits of FS2 (frame numbers 00 or 10) or the 24 bits of Colour Code (frame numbers 01 or 11)**}}.

{{**6.1.2**}}
The Frame sync 2 sequence contained in the superframe (frames 1 and 3) is a 24 bit sequence that shall have the following value:
Binary: 010111111111011101111101.
Hex: 5F F7 7D.

Family: No Duplicates

Test Purposes: TP_PMR_0929_01 (Conformance)

4.1.8.2 Voice Traffic Channel

RQ_001_0930 **Voice TCH**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **Each frame of the voice Superframe shall end with four 72 bits long Traffic Channel (TCH) fields. Each field shall contain the 72 bit block of Forward Error corrected vocoder data.**

Specification Text: {{**Finally the 4 x 72 bit blocks of Forward Error corrected vocoder data (TCH) are appended**}}.

Family: No Duplicates

Test Purposes: None

RQ_001_0931 **Voice TCH**

TS 102 658 [1] *Clause:* 11.1 *Type:* Mandatory

Applies to: M1, M2, M3

Requirement: **In a voice transmission, when the PTT is released before the end of the current Superframe the current frame and the subsequents frames until the end of the Superframe shall be completed using silence data for the Traffic Channel field.**

Specification Text: {{**If the PTT is released before the end of the current superframe, then the superframe will be completed using silence data for the TCH ("silence data" is the vocoder output data when no sound is input)**}}.

Family: No Duplicates

Test Purposes: None

History

Document history		
V1.1.1	October 2009	Publication
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