AIS Operational and Performance Testing of the SAAB V60 Base Station In accordance with IEC 62320-1 Edition 2.0

Prepared for: SAAB AB
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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorised Signatory	Nic Forsyth	17 April 2020	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be in compliance with IEC 62320-1 Edition 2.0

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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	08 April 2020
2	Removed the word preliminary from the title of the report.	17 April 2020

Table 1

1.2 Introduction

Applicant	Saab AB (publ.) TransponderTech
Manufacturer	Saab AB (publ.) TransponderTech
Model Number(s)	R60 VDES Base Station
Serial Number(s)	100002
Hardware Version(s)	6.0
Software Version(s)	See section 1.7
Number of Samples Tested	1
Test Specification/Issue/Date	IEC 62320-1 Edition 2.0
Test Plan/Issue/Date	None
Order Number Date	4708568 12-September-2019
Date of Receipt of EUT	06-November-2019
Start of Test	09-01-2020
Finish of Test	16-03-2020
Name of Engineer(s)	Finlay Orr

1.3 Brief Summary of Results

Section	Specification Clause	Test Description	Mod State	Result
2.1	10.1.1	Basic Initialisation	0	Pass
2.1	10.1.2	Pre-Setup of Dependent Base Station	0	Pass
2.1	10.1.3	Pre-Setup of Independent Base Station	0	Pass
2.2	10.2.1.1	Base Station Configuration	0	Pass
2.2	10.2.1.2	Base Station Report Information Content and Reporting Rate	0	Pass
2.2	10.2.1.3	Retention of Base Station Report Information Content and Reporting Rate	0	Pass
2.2	10.2.1.4	Configuration of Operating Parameters	0	Pass
2.2	10.2.1.5	FATDMA Configuration	0	Pass
2.2	10.2.1.6	Channel Management	0	Pass
2.2	10.2.1.7	VDM to VDL Processing	0	Pass
2.2	10.2.1.8	TSA and Associated VDM Processing	1	Pass
2.2	10.2.1.9	DGNSS VDM Message 17	0	Pass
2.2	10.2.1.10	Assigned Mode with Message 16	0	Pass
2.2	10.2.1.11	Group Assignment with Message 23	0	Pass
2.2	10.2.1.12	Scheduled Transmission of Message 24A	0	Pass
2.2	10.2.1.13	Scheduled Transmission of Message 26	0	Pass
2.2	10.2.1.13.4	Receive Messages	0	Pass
2.2	10.2.2.1	Normal Operation	0	Pass
2.2	10.2.2.2	Unacknowledged Messaging	0	Pass
2.2	10.2.3.1	Interrogation Transmission	0	Pass
2.2	10.2.3.2	Interrogation Response	0	Pass
2.2	10.2.4	Addressed Operation	0	Pass
2.2	10.2.5.1	UTC Direct	3	Pass
2.2	10.2.5.2	UTC Indirect to a Base Station	3	Pass
2.2	10.2.5.3	Synchronised to Base Station	3	Pass
2.2	10.2.5.4	As Semapore	3	Pass
2.2	10.2.6	Position Source	0	Pass
2.2	10.2.7	Alarm Messages	3	Pass
2.3	10.3.1	RATDMA Transmission	0	Pass
2.3	10.3.2	Intentional Slot Reuse (Link Congestion)	1	Pass
2.4	10.4	Legacy Support	0	Pass
2.5	10.5.2	TAG Block Capabilities	1	Pass
2.5	10.5.3	Activation of Source Identification for Output	1	Pass
2.5	10.5.4	Activation of Destination Identification	2	Pass
2.5	10.5.5	Activation of Source Identification for Input	1	Pass
2.5	10.5.6	Use of Multiple Source Identification for Input	1	Pass
2.5	10.5.7	Test of Grouping by TAG Blocks for Output	3	Pass
2.5	10.5.8	Test of UNIX Time Output	3	Pass
2.5	10.5.9	Test of Line-Count Output	3	Pass
2.6	10.6.1	Test of External Synchronisation Source	3	Pass
2.6	10.6.2	Test of Message 17 based on RTCM 10402 Input	3	Pass

Table 2 - A brief summary of the tests carried out in accordance with IEC 62320-1 Edition 2.0

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	Receiving and transmitting AIS (VDES) messages on the maritime VHF band.
Manufacturer:	Saab AB (publ.) TransponderTech
Model:	R60 VDES Base Station
Part Number:	7000 120-100
Hardware Version:	A
Software Version:	0.9.7

Type of Equipment

<table>
<tr><td rowspan="2">Fixed Station ☒</td><td rowspan="2">Transmitter ☒
Receiver ☒</td><td rowspan="2">Simplex ☒
Duplex ☐</td><td>Integral Antenna ☐</td></tr>
<tr><td>Single Antenna ☒</td></tr>
<tr><td rowspan="2">Mobile Station ☐</td><td colspan="2" rowspan="2">Transceiver ☐</td><td>Two Antenna Connector ☐</td></tr>
<tr><td>Multiple Antenna Connectors ☐
Number:</td></tr>
<tr><td colspan="4">Portable Station ☐</td></tr>
<tr><td>Transponder (Tag) ☐</td><td colspan="3">Active ☐ Passive ☐</td></tr>
</table>

Transmitter Technical Characteristics – Frequency Characteristics

Transmitter frequency alignment range:	155-163MHz
Transmitter channel switching frequency range	25kHz

Transmitter RF Power Characteristics - Maximum rated transmitter output

At transmitter permanent external 50 ΩRF output connector:	12.5	W
Effective radiated power (for equipment with integral antenna)	N/A	W

Transmitter RF Power Characteristics - Minimum rated transmitter output

At transmitter permanent external 50 ΩRF output connector:	1	W
Effective radiated power (for equipment with integral antenna)	N/A	W

Transmitter RF Power Characteristics - Other

<table>
<tr><td colspan="4">Antenna Gain:N/A</td><td colspan="2">dBi: N/A</td></tr>
<tr><td colspan="6">Is transmitter intended for:
Continuous duty: Yes ☐ No ☒
Intermittent duty only: Yes ☒ No ☐
If intermittent duty state DUTY CYCLE: (Below is an example. Determined by configuration)</td></tr>
<tr><td>Transmitter ON:</td><td>0,027</td><td>seconds</td><td>Transmitter OFF:</td><td>5</td><td>seconds</td></tr>
</table>

Transmitter Modulation

Amplitude ☐ Frequency ☒ Phase ☐ Other ☐	Please Detail:	GMSK
Channel spacing: 25kHz		
Can the transmitter be operated without modulation? Yes ☐ No ☒		

Receiver Technical Characteristics – Frequency Characteristics

Receiver frequency alignment range:	155-163MHz							
Receiver channel switching frequency:	25kHz							
Channel separation (if applicable):	25kHz							
State the maximum number of channels over which the equipment can operate:	320							
Receiver category:	SDR							
Bottom frequency:	155	MHz	Middle frequency:	159	MHz	Top frequency:	163	MHz

AC Power Source

Supply frequency:	50-60	Hz	100-250	V	Max current:	2	A
Single phase ☒ Three phase ☐							

DC Power Source

Nominal voltage:	12-24 V
Extreme upper voltage:	31.2 V
Extreme lower voltage:	10.8 V
Max current:	15 A

Battery Power Source (Not applicable)

Voltage:		V
End-point voltage:		V *(Point at which the battery will terminate)*
Alkaline ☐ Leclanche ☐ Lithium ☐ Nickel Cadmium ☐ Lead Acid* ☐ **(Vehicle regulated)*		
Other ☐ Please detail:		

Temperature *(over which equipment is to be type tested)*

Not Applicable (no extreme temperature testing required) ☐:	
Category I (General) ☐	-20°C to +55°C
Category II (Portable equipment) ☐	-10°C to +55°C
Other ☒ Please detail:	-15 °C to +55°C

Automatic Equipment Switch Off (Not applicable)

If the equipment is designed to automatically switch off at a predetermined voltage level which is higher or lower in value than the battery minimum and minimum calculated values this shall be clearly stated.
Applies ☐ Cut off voltage: V
Does not apply ☐

Channel Identification

Each equipment, whether one or more submitted for tests shall carry clear identification (such as a serial number), together with the frequencies associated with the channel identification displayed on the equipment.			
Equipment Identification *(eg Serial Number)*	Channel Number	Transmit Nominal Frequency (MHz)	Receive Nominal Frequency (MHz)
100002	2088	162.025	162.025

I hereby declare that the information supplied is correct and complete.

Name: Peter Mattsson
Position held: Product development manager
Date: 2020-03-31

1.5 Product Information

1.5.1 Technical Description

The SAAB R60 is a VHF data exchange system, that can receive data from and transmit data to AIS equipped vessels, travelling within the coverage area of the Base Station. This gives the possibility to monitor and follow ships' movements in an efficient way.

1.6 Deviations from the Standard

The following deviations from the applicable test standard were made during testing, in all cases the deviations were deemed to be acceptable due to suspected mistakes in the test standard.

Clause 10.2.1.2:

The expected Message 20 length is incorrect for the test.

Clause 10.2.1.4:

The provided ECB sentence format does not reserve slots as the test requires

Clause 10.2.1.8:

e): Standard expects TFR with status 1, but this should be 11

f): TSA sentence provided has the wrong priority

h): The VDM's provided will not exceed the 5 slot limit. Instead bit stuffing is required for the worst case scenario.

l) Provided VDM sentence is using the incorrect channel

Clause 10.2.2.1:

h): Message 12 ABM Seq. Msg. ID is changed to be within the range of 0-3 AND different from the number used for the Message 6 SMI.

Clause 10.2.5.3:

d) This appears to be an error in the standard, contradicting ITU-R M.1371-5 Table 11- which states that a base station shall become a semaphore in Sync States 1, 2 and 3.

Clause 10.4:

h [should be g]) This step requires RATDMA to be enabled, and the example ACM sentence contradicts the "without Sentence status flag" requirement.

e) The UI and MMSI should be reset, as the CAB sentence is defined in IEC 62320-1 Ed.1, it is appropriate to implement the same behaviour for the reset by CAB sentence as defined in in IEC 62320-1 Ed.1 even if it is not compatible to the reset by RST sentence.

Clause 10.5.2:

a) Listener function of CPC listed twice in the requirements- tested as CPC and CPD.

Clause 10.5.7:

a) 10.5.7 is listed twice again, should be CPC & CPN.

Clause 10.6.2:

d) The EUT does not transmit old DGNSS data for an extra minute, as this correction data would potentially have low accuracy.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Software Version	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	0.5.2	As supplied by the customer	Not Applicable	Not Applicable
1	0.9.5	While operating in dependent mode, EUT now generates a TFR with status 10 instead of 5 in response to a VDM being applied without a TSA sentence. Fix for Alarm Messages being triggered by the start-up routine and adjustments to the transmit timing.	F Orr	24/02/2020
2	0.9.6	Fixes for Alarm Messages and antenna VSWR.	F Orr	28/02/2020
3	0.9.7	Recalibrated mismatched antenna VSWR for the Alarm Messages test.	F Orr	03/03/2020

Table 3 – A record of modifications made by the manufacturer

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Section	Specification Clause	Test Description	Name of Engineer(s)	Accreditation
2.1	10.1.1	Basic Initialisation	F Orr	UKAS
	10.1.2	Pre-Setup of Dependent Base Station	F Orr	UKAS
	10.1.3	Pre-Setup of Independent Base Station	F Orr	UKAS
2.2	10.2.1.1	Base Station Configuration	F Orr	UKAS
	10.2.1.2	Base Station Report Information Content and Reporting Rate	F Orr	UKAS
	10.2.1.3	Retention of Base Station Report Information Content and Reporting Rate	F Orr	UKAS
	10.2.1.4	Configuration of Operating Parameters	F Orr	UKAS
	10.2.1.5	FATDMA Configuration	F Orr	UKAS
	10.2.1.6	Channel Management	F Orr	UKAS
	10.2.1.7	VDM to VDL Processing	F Orr	UKAS
	10.2.1.8	TSA and Associated VDM Processing	F Orr	UKAS
	10.2.1.9	DGNSS VDM Message 17	F Orr	UKAS
	10.2.1.10	Assigned Mode with Message 16	F Orr	UKAS
	10.2.1.11	Group Assignment with Message 23	F Orr	UKAS
	10.2.1.12	Scheduled Transmission of Message 24A	F Orr	UKAS
	10.2.1.13	Scheduled Transmission of Message 26	F Orr	UKAS
	10.2.1.13.4	Receive Messages	F Orr	UKAS
	10.2.2.1	Normal Operation	F Orr	UKAS
	10.2.2.2	Unacknowledged Messaging	F Orr	UKAS
	10.2.3.1	Interrogation Transmission	F Orr	UKAS

Section	Specification Clause	Test Description	Name of Engineer(s)	Accreditation
	10.2.3.2	Interrogation Response	F Orr	UKAS
	10.2.4	Addressed Operation	F Orr	UKAS
	10.2.5.1	UTC Direct	F Orr	UKAS
	10.2.5.2	UTC Indirect to a Base Station	F Orr	UKAS
	10.2.5.3	Synchronised to Base Station	F Orr	UKAS
	10.2.5.4	As Semaphore	F Orr	UKAS
	10.2.6	Position Source	F Orr	UKAS
	10.2.7	Alarm Messages	F Orr	UKAS
2.3	10.3.1	RATDMA Transmission	F Orr	UKAS
	10.3.2	Intentional Slot Reuse (Link Congestion)	F Orr	UKAS
2.4	10.4	Legacy Support	F Orr	UKAS
2.5	10.5.2	TAG Block Capabilities	F Orr	UKAS
	10.5.3	Activation of Source Identification for Output	F Orr	UKAS
	10.5.4	Activation of Destination Identification	F Orr	UKAS
	10.5.5	Activation of Source Identification for Input	F Orr	UKAS
	10.5.6	Use of Multiple Source Identification for Input	F Orr	UKAS
	10.5.7	Test of Grouping by TAG Blocks for Output	F Orr	UKAS
	10.5.8	Test of UNIX Time Output	F Orr	UKAS
	10.5.9	Test of Line-Count Output	F Orr	UKAS
2.6	10.6.1	Test of External Synchronisation Source	F Orr	UKAS
	10.6.2	Test of Message 17 based on RTCM 10402 Input	F Orr	UKAS

Table 4 – Test Engineers and Accreditation of Testing

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Pre-set-up

2.1.1 Specification Reference

IEC 62320-1, Clause 10.1

2.1.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 0

2.1.3 Date of Test

03-January-2020 to 09-January-2020

2.1.4 Test Results and Methods of Measurement

Basic Initialisation – Clause 10.1.1

This basic initialisation has to be performed at the beginning of testing. The set-up can be combined with 10.2.1.

Method of Measurement

For all tests the pre-set-up conditions are:

a) configure the Unique identifier and the MMSI of the base station to known values. Query the EUT to obtain the current unique identifier and MMSI. The received values are used to provide a SID sentence to set the unique identifier and MMSI to a known value;
$xxABQ,SID
$xxSID,<old UI>,<new UI>,<old MMSI>,<new MMSI>,C
b) set the following parameters to valid appropriate values using BCL and BCG sentences:
- BCL sentence (Base station Configuration, Location Command)
  1) position source to surveyed,
  2) LAT/LON position to a known location,
  3) position accuracy to high,
  4) Base Station name to an appropriate value.

- BCG sentence (Base Station configuration, General Command)
  5) channels to 2087 and 2088, or two appropriate test channels,
  6) transmitter power to high,
  7) messages retries to three,
  8) repeat indicator to zero,
  9) RATDMA control to 0 = off,
  10) UTC source to I = internal UTC source,
  11) ADS interval to 60 s,
  12) Assigned talker ID to AB.

Test Results

a)		
Requirement	Result	Verdict
The current UI and MMSI of the EUT are found by querying using the ABQ sentence.	The EUT is queried using $ABABQ,SID*23.	-
The UI and MMSI of the EUT shall be configured using the SID sentence.	The UI and MMSI of the EUT are configured successfully as seen in the table below.	Pass

a)		
Time	Sentence	Comment
17:33:09	$ABABQ,SID*23	The UI and MMSI are queried using the ABQ query.
17:33:09	$ABSID,12345,,002560011,,R*23	The EUT reports the UI as 12345 and MMSI as 2560011.
17:33:40	$ABSID,12345,1234,2560011,2402500,C*07	The UI is changed to 1234 and the MMSI is changed to 2402500.
17:33:40	$ABVER,1,1,AB,SAAB,1234,100002,R40,R60 0.5.2,6.0,*6A	VER sentence output by the EUT when the static data is changed.
17:33:58	$ABABQ,SID*23	SID is queried again.
17:33:58	$ABSID,1234,,002402500,,R*16	EUT has accepted the parameters in the SID sentence.

b)		
Requirement	Result	Verdict
Using a BCL sentence, the position source shall be set to surveyed, the LAT/LON position shall be set to a known location, the position accuracy shall be set to high and the base station name shall be changed to an appropriate name.	The BCL sentence used is: $ABBCL,1234,0,5052.1709,N,00114.6481,W,1,STT LINK,C,1*61 The BCL settings returned from an ABQ query are: $ABABQ,BCL*30 $ABBCL,1234,0,5052.1709,N,00114.6481,W,1,STT LINK,R,1*70	Pass
Using a BCG sentence, the channels A and B shall be set to 2087 and 2088 and the transmitter power to high. The number of messages retries shall be set to three, the repeat indicator to zero, RATDMA control to 0 = off, the UTC source to I = internal UTC source, ADS interval to 60 s and the assigned talker ID to AB.	The BCG sentence applied to the EUT is: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,C*7D The BCG settings returned from an ABQ query are: $ABABQ,BCG*3B $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C	Pass

b) Position Report Transmitted by EUT	
AIVDM,1,1,,B,402B`i1v@DjWiwrCPNM6qKGP0@MG,0*3B	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	1
Day	9
Hour	18
Minute	39
Second	49
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6481 W
Latitude	50 52.1709 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	1 - Class-A station to transmit Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	4
Communication State - Sub Message	Slot Number = 1879

Pre-Setup of Dependent Base Station - Clause 10.1.2

This setup has to be applied at the beginning of each dependent mode test to start the test in a defined state.

Method of Measurement

a) Set the EUT to a normal operation mode with the following settings, using the BCG sentence:
   - RATDMA disabled (0);
   - internal UTC source (I), UTC available;
   - both transmitters enabled;
   - AIS channels set to 2087 and 2088 or appropriate test channel.

b) Disable all autonomous transmissions using an ECB sentence for each Message type 4, 17, 20, 22, 23 and 4 CBR sentences to disable all Message 26 transmissions.
   Example: $xxECB,<UI>,<Message type>,0,-1,,,0,-1,,,C

c) Disable all optional VDL information using the SPO sentence.
   Example: $xxSPO,UI,N,0,0,0,0,0,0,0,0,0,0,0,,C

d) Clear all FATDMA reservations using 20 DLM sentences.
   Example: $xxDLM,<Reservation no (0...9)>,A,C,,,,,C,,,,,C,,,,,C,,,,,C
   $xxDLM,<Reservation no (0...9)>,B,C,,,,,C,,,,,C,,,,,C,,,,,C

e) Clear all area settings using 8 ACA sentences with the “in-use” flag set to 0.

Test Results

a)		
Requirement	Result	Verdict
Set the EUT to a normal operation mode with the following settings, using the BCG sentence: RATMA shall be disabled, the UTC source shall be set to internal, both transmitters shall be enabled and the AIS channels set to 2087 and 2088.	The BCG sentence applied to the EUT is: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,C*7D The BCG settings confirmed by the ABQ query are: $ABABQ,BCG*3B $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C	Pass

b)		
Requirement	Result	Verdict
Disable all autonomous transmissions using an ECB sentence for each Message type 4, 17, 20, 22, 23 and 4 CBR sentences to disable all Message 26 transmissions.	The ECB sentences used are: $ABECB,1234,4,0,-1,,,0,-1,,,C $ABECB,1234,17,0,-1,,,0,-1,,,C $ABECB,1234,20,0,-1,,,0,-1,,,C $ABECB,1234,22,0,-1,,,0,-1,,,C $ABECB,1234,23,0,-1,,,0,-1,,,C The CBR sentences used are: $ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,C $ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,C $ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,C $ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,C	-
The EUT shall cease all autonomous transmissions.	The EUT stops transmitting all autonomous messages.	Pass

c)		
Requirement	Result	Verdict
All optional VDL information shall be disabled using the SPO sentence.	The SPO sentence applied to the PI is: $ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,,C	-
Confirm all optional VDL information is disabled.	An ABQ query confirms that the SPO settings are accepted: $ABABQ,SPO*31 $ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,1,R*7A	Pass

d)		
Requirement	Result	Verdict
Clear all FATDMA reservations using DLM sentences.	The DLM sentences used are: $ABDLM,0,A,C,,,,,C,,,,,C,,,,,C,,,,,C	-

d)		
Requirement	Result	Verdict
	$ABDLM,1,A,C,,,,,C,,,,,C,,,,,C $ABDLM,2,A,C,,,,,C,,,,,C,,,,,C $ABDLM,3,A,C,,,,,C,,,,,C,,,,,C $ABDLM,4,A,C,,,,,C,,,,,C,,,,,C $ABDLM,5,A,C,,,,,C,,,,,C,,,,,C $ABDLM,6,A,C,,,,,C,,,,,C,,,,,C $ABDLM,7,A,C,,,,,C,,,,,C,,,,,C $ABDLM,8,A,C,,,,,C,,,,,C,,,,,C $ABDLM,9,A,C,,,,,C,,,,,C,,,,,C $ABDLM,0,B,C,,,,,C,,,,,C,,,,,C $ABDLM,1,B,C,,,,,C,,,,,C,,,,,C $ABDLM,2,B,C,,,,,C,,,,,C,,,,,C $ABDLM,3,B,C,,,,,C,,,,,C,,,,,C $ABDLM,4,B,C,,,,,C,,,,,C,,,,,C $ABDLM,5,B,C,,,,,C,,,,,C,,,,,C $ABDLM,6,B,C,,,,,C,,,,,C,,,,,C $ABDLM,7,B,C,,,,,C,,,,,C,,,,,C $ABDLM,8,B,C,,,,,C,,,,,C,,,,,C $ABDLM,9,B,C,,,,,C,,,,,C,,,,,C	
Confirm all FATDMA reservations are released.	An ABQ query confirms that all FATDMA reservations are cleared: $ABABQ,DLM*38 $ABDLM,0,A,,,,,,,,,,,,,,,,,,R*49 $ABDLM,1,A,,,,,,,,,,,,,,,,,,R*48 $ABDLM,2,A,,,,,,,,,,,,,,,,,,R*4B $ABDLM,3,A,,,,,,,,,,,,,,,,,,R*4A $ABDLM,4,A,,,,,,,,,,,,,,,,,,R*4D $ABDLM,5,A,,,,,,,,,,,,,,,,,,R*4C $ABDLM,6,A,,,,,,,,,,,,,,,,,,R*4F $ABDLM,7,A,,,,,,,,,,,,,,,,,,R*4E $ABDLM,8,A,,,,,,,,,,,,,,,,,,R*41 $ABDLM,9,A,,,,,,,,,,,,,,,,,,R*40 $ABDLM,0,B,,,,,,,,,,,,,,,,,,R*4A $ABDLM,1,B,,,,,,,,,,,,,,,,,,R*4B $ABDLM,2,B,,,,,,,,,,,,,,,,,,R*48 $ABDLM,3,B,,,,,,,,,,,,,,,,,,R*49 $ABDLM,4,B,,,,,,,,,,,,,,,,,,R*4E $ABDLM,5,B,,,,,,,,,,,,,,,,,,R*4F $ABDLM,6,B,,,,,,,,,,,,,,,,,,R*4C $ABDLM,7,B,,,,,,,,,,,,,,,,,,R*4D $ABDLM,8,B,,,,,,,,,,,,,,,,,,R*42 $ABDLM,9,B,,,,,,,,,,,,,,,,,,R*43	Pass

e)		
Requirement	Result	Verdict
Clear all regional operating area setting using 8 ACA settings with the “in-use” flag set to 0.	The ACA sentences used are: $ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53 $ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52 $ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51 $ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50 $ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57 $ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56 $ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55 $ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54	-
Confirm all regional operating settings have been cleared.	An ABQ query confirms that all FATDMA reservations are cleared: $ABABQ,ACA*3E $ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53 $ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52 $ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51 $ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50 $ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57 $ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56 $ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55 $ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54	Pass

Pre-setup for Independent Mode – Clause 10.1.3

This setup has to be applied at the beginning of each independent mode test to start the test in a defined state. It is based on the dependent mode setup. First the dependent setup has to be applied to the EUT.

Method of Measurement

a) apply slot reservations according to the following DLM sentence to the EUT. There are slot reservations for the own transmission of Message 20 and 4 and 2 slots every 2 s on each channel for other purposes:
   $xxDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,C
   $xxDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,C;
b) Activate the transmission of Message 4 every 10s and Message 20 once per frame on both channels according to the following ECB sentence:
   $xxECB,<UI>,4,0,4,750,,0,379,750,,C
   $xxECB,<UI>,20,0,0,0,,0,6,0,,C

Test Results

a)		
Requirement	Result	Verdict
Slot reservations shall be made by applying the provided DLM sentences to the EUT.	The DLM sentences sent to the EUT are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,C*19	-
The slot reservations shall be confirmed by querying the DLM settings.	The ABQ query, $AIABQ,DLM*33, returned the following: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08	Pass

b)		
Requirement	Result	Verdict
The transmission of Message 4 and Message 20 shall be activated using the provided ECB sentences.	The ECB sentences transmitted to the EUT are: $AIECB,1234,4,0,4,750,,0,379,750,,C*1A $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
The ECB settings shall be confirmed as in use by using the ABQ query.	The results of the ABQ query show the EUT accepted both ECB sentences: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass
The EUT shall transmit Message 4 and Message 20 in the correct slots.	The EUT transmits the Message 4 and Message 20 in the correct slots, as seen in the table below.	Pass

b)					
Time	Slot	Channel	MMSI	Msg	Sentence
13:53:00	0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60
13:53:00	4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@GelswrCPNM6qKGP0<00,0*63
13:53:00	6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50
13:53:10	379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@Gem9wrCPNM6qKGP0<00,0*2B
13:53:20	754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@GemCwrCPNM6qKGP0H;j,0*77
13:53:30	1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@GemMwrCPNM6qKGP0L00,0*2F
13:53:40	1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@GemWwrCPNM6qKGP0@GP,0*2D
13:53:50	1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@GemiwrCPNM6qKGP0HMG,0*05
13:54:00	0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60
13:54:00	4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@GemswrCPNM6qKGP0804,0*62
13:54:00	6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50
13:54:10	379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@Gen9wrCPNM6qKGP085s,0*6A
13:54:20	754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@GenCwrCPNM6qKGP0D00,0*29
13:54:30	1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@GenMwrCPNM6qKGP0HAa,0*08
13:54:40	1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@GenWwrCPNM6qKGP0<00,0*45
13:54:50	1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@GeniwrCPNM6qKGP0D00,0*00

2.2 Normal Operation

2.2.1 Specification Reference

IEC 62320-1, Clause 10.2

2.2.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 0

2.2.3 Date of Test

03-January-2020 to 13-March-2020

2.2.4 Test Results and Methods of Measurement

Base Station Configuration and Services – Clause 10.2.1

The purpose of this test is to verify that the Base Station can be configured with an MMSI and unique identifier. This test verifies the EUT's correct response to these two SID data fields.

Method of Measurement

The measurement procedure shall be as follows:

a) Apply the following SID sentence using an incorrect unique identifier:
$xxSID, <incorrect UI>,<new UI>,<old MMSI>,<new MMSI>,C
Query the EUT for the SID sentence to get the Unique Identifier and the MMSI;
b) Apply the following SID sentence using the correct unique identifier:
$xxSID, <old UI>,<new UI>,<old MMSI>,<new MMSI>,C
Query the EUT for the SID sentence.

Required Results

Confirm that:

a) the content of the SID sentence and that the correct MMSI and unique identifier has been retained;
b) the content of the SID sentence and that the new MMSI and unique identifier has been configured.

Test Results

a)		
Requirement	Result	Verdict
An SID sentence that references the incorrect UI is applied to the PI.	The SID command applied to the EUT references a unique identifier 102030, which is different to the EUT: $ABSID,102030,112233,002345678,3456789,C*39	-
The EUT shall be queried again using the ABQ sentence.	The EUT outputs the following SID reply: $ABSID,1234,,002345678,,R*1E	-
Verify the UI and MMSI have not changed, according to the SID reply.	The EUT retains the correct MMSI (002345678) and unique identifier (1234), as seen below.	Pass

a) Results		
Time	Sentence	Comment
16:37:36	$ABABQ,SID*23	A query is sent to EUT requesting equipment identification.
16:37:36	$ABSID,1234,,002345678,,R*1E	EUT responds with its UI (1234) and MMSI (002345678).
16:41:47	$ABSID,102030,112233,002345678,3456789,C*39	SID command is applied to the EUT with UI different to the EUT (102030 instead of 1234).

a) Results		
Time	Sentence	Comment
16:44:50	$ABABQ,SID*23	SID is queried again to check if the UI or MMSI have been updated.
16:44:50	$ABSID,1234,,002345678,,R*1E	The EUT response shows the it has correctly rejected the new UI and MMSI, as they were not addressed to it.

b) Valid Unique Identifier and MMSI		
Requirement	Result	Verdict
An SID sentence with the correct UI and MMSI is to be applied to the PI, containing new values for both.	The SID command applied to the EUT commands the EUT to change its UI to 1234 and MMSI to 2402500: $ABSID,12345,1234,001234567,002402500,C*06	-
The EUT shall be queried again using the ABQ sentence.	The EUT outputs the following SID reply: $ABSID,1234,,002402500,,R*16	-
Verify the UI and MMSI have updated successfully, according to the SID reply.	The EUT changes to the correct MMSI (002402500) and unique identifier (1234), as seen below.	Pass

b) Valid Unique Identifier and MMSI - Results		
Time	Sentence	Comment
10:24:19	$ABAIQ,SID*28	EUT is queried for its current UI and MMSI
10:24:19	$ABSID,12345,,001234567,,R*22	EUT returns SID sentence stating its UI = 12345 and MMSI = 1234567
10:26:08	$ABSID,12345,1234,001234567,002402500,C*06	SID sentence commands UI = 1234 and MMSI = 2302500
10:26:27	$ABABQ,SID*23	The SID sentence is queried again to check the UI and MMSI have updated
10:26:27	$ABSID,1234,,002402500,,R*16	The EUT confirms that the UI and MMSI from the previous SID sentence are accepted

Base Station Configuration – Clause 10.2.1.2

This test verifies the basic functionality of a Base Station. This test will verify the “pre-set-up condition” used in subsequent testing.

Method of Measurement

The measurement procedure shall be as follows:
a) set up standard test environment and apply the dependent mode pre-set-up conditions;
b) apply a TSA sentence and a VDM sentence with encapsulated Message 4 to the EUT;
$xxTSA,<UI>,9,A,<HHMM>,1050,2
!xxVDM,1,1,9,A,40C4qnh00041?G1RMfL0tJi004P4,0
c) apply the following BBM sentence to the EUT;
!xxBBM,1,1,0,0,14,D5CDP=5CC175,

The following tests are required for a Base Station operated as an independent unit:
d) apply the independent mode setup to the EUT;
e) apply a BCL sentence with Message 27 control field set to 1;
f) apply the following SPO sentence to the EUT.
$xxSPO,<UI>,A,1,1,1,,1,,,1,1,1,1,C

Required Results

Confirm that:
a) the dependent mode setup has been correctly set;
b) the appropriate TFR sentence is output on the PI. Confirm that the EUT is transmitting Message 4 in the assigned slot and channel. Confirm that the Message 4 contains the same data as defined by the VDM sentence. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
c) the EUT did not transmit Message 14 and issued an ABK type 2.

The following results are required for a Base Station operated as an independent unit:

d) the Independent mode setup has been correctly set. Confirm that the EUT is transmitting Message 4 and Message 20 in the assigned slots, interval, and channels as defined in the ECB sentences. Confirm that the content of Message 20 is as defined by the DLM. Confirm that the length of Message 20 is 104 bit. Confirm that the EUT is transmitting Message 4 with an interval of 10 s, alternating transmission channels A and B. Confirm that the content of Message 4 is as defined by the BCL. Confirm that in the content of Message 4 the UTC/date is provided correctly. Confirm that the communications state for Message 4 is implemented correctly. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
e) the Message 27 control setting is stored by evaluation of BCL query response and that the transmission control for long range broadcast message bit is set in the transmitted Message 4;
f) by query for SPO that the SPO settings are correctly stored. Confirm that the VSI sentence contains the associated information according to Table 9 about each VDM or VDO sentence. Confirm that the FSR sentence contains the associated information according to Table 10 about the conditions for the previous frame. Confirm that the values of the RSSI measurement are within the limits defined in Table 7.

Test Results

a) Apply the Dependent Mode Pre-Set-Up Conditions		
Requirement	Result	Verdict
The EUT shall be set to operate in dependent mode.	The EUT is successfully configured to operate in dependent mode, following the procedure described in §10.1.2.	Pass

b) Apply a TSA Sentence and a VDM Sentence		
Requirement	Result	Verdict

Apply a TSA sentence and a VDM sentence with encapsulated Message 4 to the EUT.	The TSA sentence sent to the EUT is: $ABTSA,1234,9,A,0959,1050,2*0A The VDM sentence applied to the EUT is: !AIVDM,1,1,9,A,40C4qnh00041?G1RMfL0tJi004P4,0*65	-
The Message 4 shall be transmitted in the correct slot and channel.	The TSA sentence defines a transmission slot of 1050, while the VDM sentence defines channel A as the transmission channel. The EUT transmits in slot 1050 and channel A, as seen below.	Pass
Confirm that the Message 4 contains the same data as defined by the VDM sentence.	The contents of the Message 4 transmitted by the EUT are the same as the contents of the VDM Message applied.	Pass
Confirm the appropriate VDO sentence is output on the PI when a message is transmitted.	The following message is transmitted on the PI, with contents that match the Message 4 transmitted on the VDL: !ABVDO,1,1,,A,40C4qnh00041?G1RMfL0tJi004P4,0*55	Pass

b) Message 4 Transmission Result					
Time	Slot	Chan	MMSI	Msg	Sentence
09:59:28	1050	A	20003291	4	!AIVDM,1,1,,A,40C4qnh00041?G1RMfL0tJi004P4,0*5C

Parameter	VDM Message Applied to EUT	VDM Message Transmitted by EUT
Sentence	!AIVDM,1,1,9,A,40C4qnh00041?G1RMfL0tJi004P4,0*65	!AIVDM,1,1,,A,40C4qnh00041?G1RMfL0tJi004P4,0*5C
Message ID	4 - Base station report	4 - Base station report
Repeat Indicator	0	0
MMSI	20003291	20003291
Year	0	0
Month	0	0
Day	0	0
Hour	4	4
Minute	1	1
Second	15	15
Position Accuracy	0 - low (>10 m)	0 - low (>10 m)
Longitude	125 29.5817 W	125 29.5817 W
Latitude	48 57.5595 N	48 57.5595 N
Type of EPFS	1 - GPS	1 - GPS
Long-range transmission control	0	0
Spare	0	0
RAIM Flag	0 - RAIM not in use	0 - RAIM not in use
Communication State - Sync State	0	0
Communication State - Slot Timeout	1	1
Communication State - Sub Message	UTC Hour and Minute = 04:01	UTC Hour and Minute = 04:01

c) Apply Message 14 to the EUT		
Requirement	Result	Verdict
Apply the BBM sentence to the EUT with Message type 14.	The sentence applied to the EUT is: !ABBBM,1,1,0,0,14,D5CDP=5CC175,0*4A	-
The EUT shall not transmit the Message 14 and shall return a NAK sentence with reason code 2.	The EUT does not transmit the message, instead returning a NAK sentence, with reason code 2: $ABABK,,A,14,0,2*21	Pass

d) Apply the Independent Mode Setup Procedure		
Requirement	Result	Verdict
The EUT shall be set to operate in independent mode.	The EUT is configured to operate in independent mode, following the procedure described in §10.1.3.	-
The EUT shall transmit Message 4 and Message 20 in the assigned slots, interval and channels defined by the ECB sentences.	The EUT successfully transmits Message 4 in slot 4 with an interval of 750 on channel A, and in slot 379 with an interval of 750 on channel B. Message 20 transmits in slots 0 and 6 on channels A and B respectively, with an interval of 2250.	Pass
Confirm the content of Message 20 is as defined by the DLM sentence.	The contents of the Message 20 are correct, as seen in the channel A and B decodes below.	Pass
The length of the Message 20 shall be 104 bits.	As the DLM defined in this standard has 3 parameters, the Message 20 consists of 138 bits. The 104 bit requirement would only be valid if the DLM sentence defined 2 parameters.	Pass
Confirm the UTC/date contained in the Message 4 is provided correctly.	The UTC time contained within the sub message field of Message 4 is confirmed as correct.	Pass
The communications state for Message 4 shall be implemented correctly.	The Message 4 is transmitted using FATDMA, maintain the slot reservations made by the DLM sentences.	Pass

d) Apply the Independent Mode Setup Procedure		
Requirement	Result	Verdict
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	For each Message 4 and Message 20, the appropriate VDO sentence is output to the PI.	Pass

Channel A $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 !AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60		
Parameter	Expected Value	Decoded Value
Message ID	20	20
Repeat indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Offset number 1	4	4
Number of slots 1	1	1
Time out 1	7	7
Increment 1	250	250
Offset number 2	0	0
Number of slots 2	1	1
Time out 2	7	7
Increment 2	0	0
Offset number 3	10	10
Number of slots 3	2	2
Time out 3	7	7
Increment 3	75	75
Offset number 4	0	0
Number of slots 4	0	0
Time out 4	0	0
Increment 4	0	0
Spare	0	0

Channel B $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 !AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50			
Parameter	Expected Value	Decoded Value	Comment
Message ID	20	20	
Repeat indicator	0	0	
MMSI	2402500	2402500	
Spare	0	0	
Offset number 1	123	123	The offset has a value of 129 in the DLM sentence, but the message is being transmitted in slot 6. The offset to the reserved slot is then: 129 – 6 = 123.
Number of slots 1	1	1	
Time out 1	7	7	
Increment 1	250	250	
Offset number 2	0	0	As before, the offset value in the DLM sentence is 6, however this VDL message is being transmitted in slot 6. As 6-6 = 0, the decode is correct.
Number of slots 2	1	1	
Time out 2	7	7	
Increment 2	0	0	
Offset number 3	14	14	
Number of slots 3	2	2	
Time out 3	7	7	
Increment 3	75	75	
Offset number 4	0	0	
Number of slots 4	0	0	
Time out 4	0	0	
Increment 4	0	0	
Spare	0	0	

e) Apply a BCL Sentence with Message 27 Control Bit set to 1		
Requirement	Result	Verdict
A BCL sentence with Message 27 control field set to 1 is applied to the EUT.	The sentence applied to the EUT enables the long-range control bit, as the last field in the BCL sentence is set to 1: $ABBCL,1234,0,5052.1709,N,00114.6481,W,1,STT LINK,C,1*61	Pass
The Message 27 control field shall be set to 1 in the Message 4.	The long-range broadcast control bit is successfully set to 0, as seen in the message decode below.	Pass

The Message 27 control field shall be set to 1 when the BCL settings are queried using an ABQ query.	The Message 27 control field is confirmed as set to 1, as seen in the final field of the sentence returned by the ABQ query: $ABBCL,1234,0,5052.1709,N,00114.6481,W,1,STT LINK,R,1*70	Pass

!AIVDM,1,1,,A,402B`i1v@G>GswrCPNM6qKGP0D00,0*6B	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	1
Day	14
Hour	14
Minute	23
Second	59
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6481 W
Latitude	50 52.1709 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	1 - Class-A station to transmit Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	5
Communication State - Sub Message	Received Stations = 0

f) Apply an SPO Sentence to the EUT		
Requirement	Result	
A predefined SPO sentence shall be applied to the EUT.	The SPO sentence sent to the EUT is: $ABSPO,1234,A,1,1,1,,1,,,,1,1,1,1,1,C*65	-
Querying the SPO settings shall show the settings from the previous sentence are correctly stored.	The SPO settings are queried using: $ABABQ,SPO*31 The settings returned show that the settings were accepted: $ABSPO,1234,A,1,1,1,0,1,0,0,0,1,1,1,1,R*74	Pass
The FSR sentence shall contain the hour, minute and second of the report generation.	The FSR sentence contains the hour, minute and second of the report generation: $ABFSR,1234,**095200.00**,A,6,4,,,,,14*26	Pass
Confirm the FSR contains the channel being reported.	The FSR sentence contains the channel being reported: $ABFSR,1234,095200.00,**A**,6,4,,,,,14*26	Pass
The FSR shall contain the total number of slots occupied by valid messages received in the previous frame.	The FSR sentence contains the total number of slots occupied by valid received messages in the last frame: $ABFSR,1234,095200.00,A,**6**,4,,,,,14*26	Pass
The FSR shall contain the number of slots with received signal strength (at least 10 dB over average noise level). This includes slots with valid messages.	The FSR sentence contains the number of slots with received signal strength at least 10 dB over average noise: $ABFSR,1234,095200.00,A,6,4,,,,,14*26	Pass
The VSI sentence shall contain the hour, minute, second and fractional-second of the received message.	The VSI sentence contains the hour, minute, second and fractional-second measurement: $ABVSI,1234,3,**095004.003343**,150,-67,*41	Pass
The VSI sentence shall contain the first slot number of the message.	The VSI sentence contains the first slot number: $ABVSI,1234,3,095004.003343,**150**,-67,*41	Pass
The VSI sentence shall contain the signal strength (dBm) of the received VDL message.	The VSI sentence contains the signal strength in dBm of the received VDL message: $ABVSI,1234,3,095004.003343,150,**-67**,*41	Pass

Retention of Base Station Report Information Content and Reporting Rate - Clause 10.2.1.3

This test will verify that a Base Station retains all of its configuration settings upon restart. There are two methods of restart, a physical restart of the Base Station and a restart using the RST sentence. This test will verify that the Base Station retains its last configuration after these restarts. The test will also verify that the Base Station sets its configuration to "undefined" after reset.

Method of Measurement

Set up standard test environment and operate the EUT as defined in the dependent mode pre-setup conditions.

a) Remove power from the EUT for 2 s and then re-apply power to the EUT.
b) Restart the EUT using the following RST sentence:
   $xxRST,<UI>,1,,C

The following tests are required for a Base Station operated as an independent unit.

c) Apply the independent mode set-up to the EUT.
d) Remove power from the EUT for 2 s and then re-apply power to the EUT.
e) Restart the EUT using the following RST sentence:
   $xxRST,<UI>,1,,C
f) Reset the EUT using the following RST sentence:
   $xxRST,<UI>,2,,C

Required Results

Confirm that:

a) the dependent mode setup was retained correctly, as defined by the pre-set-up conditions, by the EUT using query for the sentences used for the set-up. Confirm that the EUT is receiving position reports on both A and B channels from 5 test targets. These results shall occur within 2 min;
b) the dependent mode setup was retained correctly, as defined by the pre-set-up conditions, by the EUT using query for the sentences used for the set-up. Confirm that the EUT is receiving position reports on both A and B channels from 5 test targets. These results shall occur within 2 min.

Note that the following tests are required for a base station operated as an independent unit:

c) the independent mode setup has been correctly set;
d) independent mode set-up was retained correctly by the EUT using query for the sentences used for the set-up. Confirm that the EUT starts the transmission of Message 4 and 20 at the first schedule transmission time after 2 min;
e) independent mode set-up was retained correctly by the EUT using query for the sentences used for the set-up. Confirm that the EUT starts the transmission of Message 4 and 20 at the first schedule transmission time after 2 min;
f) all configuration information is reset to the default values as defined in 6.5. Confirm that the Unique Identifier and the MMSI have not been reset.

Test Results

a) Power Cycle the EUT Physically		
Requirement	Result	Verdict
Remove power from the EUT for 2 seconds and then re-apply the power to the EUT.	The EUT was switched off for 2 seconds, before being power back on.	-
The dependent mode setup shall be retained correctly.	The ACA, BCG, CBR, ECB and DLM settings were queried using the ABQ sentence and the settings had not changed after the unit was powered off, as seen below.	Pass
All settings shall be retained correctly in the ACA sentence.	$ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53 $ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52 $ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51 $ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50 $ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57 $ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56 $ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55 $ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54	Pass
All settings shall be retained correctly in the BCG sentence.	$ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C	Pass
All settings shall be retained correctly in the CBR sentence.	$ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A $ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,R*19 $ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,R*18 $ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,R*1F	Pass
All settings shall be retained correctly in the DLM sentence.	$ABDLM,0,A,,,,,,,,,,,,,,,,,,R*49 $ABDLM,1,A,,,,,,,,,,,,,,,,,,R*48 $ABDLM,2,A,,,,,,,,,,,,,,,,,,R*4B $ABDLM,3,A,,,,,,,,,,,,,,,,,,R*4A $ABDLM,4,A,,,,,,,,,,,,,,,,,,R*4D $ABDLM,5,A,,,,,,,,,,,,,,,,,,R*4C $ABDLM,6,A,,,,,,,,,,,,,,,,,,R*4F $ABDLM,7,A,,,,,,,,,,,,,,,,,,R*4E $ABDLM,8,A,,,,,,,,,,,,,,,,,,R*41 $ABDLM,9,A,,,,,,,,,,,,,,,,,,R*40 $ABDLM,0,B,,,,,,,,,,,,,,,,,,R*4A $ABDLM,1,B,,,,,,,,,,,,,,,,,,R*4B $ABDLM,2,B,,,,,,,,,,,,,,,,,,R*48 $ABDLM,3,B,,,,,,,,,,,,,,,,,,R*49 $ABDLM,4,B,,,,,,,,,,,,,,,,,,R*4E $ABDLM,5,B,,,,,,,,,,,,,,,,,,R*4F $ABDLM,6,B,,,,,,,,,,,,,,,,,,R*4C $ABDLM,7,B,,,,,,,,,,,,,,,,,,R*4D $ABDLM,8,B,,,,,,,,,,,,,,,,,,R*42 $ABDLM,9,B,,,,,,,,,,,,,,,,,,R*43	Pass
All settings shall be retained correctly in the ECB sentence.	$ABECB,1234,4,,-1,750,,,-1,750,,R*09 $ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39 $ABECB,1234,22,0,-1,0,,0,-1,0,,R*3D $ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C $ABECB,1234,24,0,-1,150,,0,-1,150,,R*3B	Pass
All settings shall be retained correctly in the SPO sentence.	$ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,1,R*7A	Pass
Within 2 minutes of powering on, the EUT shall receive the transmissions of 5 test targets on both channels.	The EUT receives position reports from 5 targets on both channels, 25 seconds after power cycling: !ABVDM,1,1,,A,14N6S0@2P:wle`2MEs7h2gv>1h4e,0*36 !ABVDM,1,1,,B,14N6S0@2P:wle`2MEs7h2gv>1h4e,0*35 !ABVDM,1,1,,A,14N6S0P2P:wle`2MEs7h2gv>1h4f,0*25 !ABVDM,1,1,,B,14N6S0P2P:wle`2MEs7h2gv>1h4f,0*26 !ABVDM,1,1,,A,14N6S0h2P:wle`2MEs7h2gv>1h4g,0*1C !ABVDM,1,1,,B,14N6S0h2P:wle`2MEs7h2gv>1h4g,0*1F !ABVDM,1,1,,A,14N6S102P:wle`2MEs7h2gv>1h4h,0*4A !ABVDM,1,1,,B,14N6S102P:wle`2MEs7h2gv>1h4h,0*49 !ABVDM,1,1,,A,14N6S1@2P:wle`2MEs7h2gv>1h4i,0*3B !ABVDM,1,1,,B,14N6S1@2P:wle`2MEs7h2gv>1h4i,0*38	Pass

b) Power Cycle the EUT using the Equipment Reset Command		
Requirement	Result	Verdict
Apply the equipment reset command to the EUT.	The following command was sent to the EUT: $ABRST,1234,1,,C*20	Pass
All settings shall be retained correctly in the ACA sentence.	$ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53 $ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52 $ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51 $ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50 $ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57 $ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56 $ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55 $ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54	Pass
All settings shall be retained correctly in the BCG sentence.	$ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C	Pass
All settings shall be retained correctly in the CBR sentence.	$ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A $ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,R*19 $ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,R*18 $ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,R*1F	Pass
All settings shall be retained correctly in the DLM sentence.	$ABDLM,0,A,,,,,,,,,,,,,,,,,,R*49 $ABDLM,1,A,,,,,,,,,,,,,,,,,,R*48 $ABDLM,2,A,,,,,,,,,,,,,,,,,,R*4B $ABDLM,3,A,,,,,,,,,,,,,,,,,,R*4A $ABDLM,4,A,,,,,,,,,,,,,,,,,,R*4D $ABDLM,5,A,,,,,,,,,,,,,,,,,,R*4C $ABDLM,6,A,,,,,,,,,,,,,,,,,,R*4F $ABDLM,7,A,,,,,,,,,,,,,,,,,,R*4E $ABDLM,8,A,,,,,,,,,,,,,,,,,,R*41 $ABDLM,9,A,,,,,,,,,,,,,,,,,,R*40 $ABDLM,0,B,,,,,,,,,,,,,,,,,,R*4A $ABDLM,1,B,,,,,,,,,,,,,,,,,,R*4B $ABDLM,2,B,,,,,,,,,,,,,,,,,,R*48 $ABDLM,3,B,,,,,,,,,,,,,,,,,,R*49 $ABDLM,4,B,,,,,,,,,,,,,,,,,,R*4E $ABDLM,5,B,,,,,,,,,,,,,,,,,,R*4F $ABDLM,6,B,,,,,,,,,,,,,,,,,,R*4C $ABDLM,7,B,,,,,,,,,,,,,,,,,,R*4D $ABDLM,8,B,,,,,,,,,,,,,,,,,,R*42 $ABDLM,9,B,,,,,,,,,,,,,,,,,,R*43	Pass
All settings shall be retained correctly in the ECB sentence.	$ABECB,1234,4,,-1,750,,,-1,750,,R*09 $ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39 $ABECB,1234,22,0,-1,0,,0,-1,0,,R*3D $ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C $ABECB,1234,24,0,-1,150,,0,-1,150,,R*3B	Pass
All settings shall be retained correctly in the SPO sentence.	$ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,1,R*7A	Pass
Within 2 minutes of powering on, the EUT shall receive the transmissions of 5 test targets on both channels.	The EUT received position reports from 5 targets on both channels, 29 seconds after the equipment reset command was sent: !ABVDM,1,1,,A,14N6S0@2P:wle`2MEs7h2gwF1hIk,0*3C !ABVDM,1,1,,B,14N6S0@2P:wle`2MEs7h2gwF1hIk,0*3F !ABVDM,1,1,,A,14N6S0P2P:wle`2MEs7h2gwF1hIl,0*2B !ABVDM,1,1,,B,14N6S0P2P:wle`2MEs7h2gwF1hIl,0*28 !ABVDM,1,1,,A,14N6S0h2P:wle`2MEs7h2gwF1hIm,0*12 !ABVDM,1,1,,B,14N6S0h2P:wle`2MEs7h2gwF1hIm,0*11 !ABVDM,1,1,,A,14N6S102P:wle`2MEs7h2gwF1hIn,0*48 !ABVDM,1,1,,B,14N6S102P:wle`2MEs7h2gwF1hIn,0*4B !ABVDM,1,1,,A,14N6S1@2P:wle`2MEs7h2gwF1hIo,0*39 !ABVDM,1,1,,B,14N6S1@2P:wle`2MEs7h2gwF1hIo,0*3A	Pass

c) Apply the Independent Mode Set-up to the EUT		
Requirement	Result	Verdict
Verify the DLM settings are accepted by the EUT.	The results of querying the DLM sentence settings are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass
Verify the ECB settings are accepted by the EUT.	The results of querying the ECB sentence settings are: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

d) Power Cycle the EUT Physically		
Requirement	Result	Verdict
Confirm the EUT retains the DLM sentence settings after power cycling.	After reapplying power to the unit, the results of querying the DLM sentence settings are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass
Confirm the EUT retains the ECB sentence settings after power cycling.	After reapplying power to the unit, the results of querying the ECB sentence settings are: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass
Confirm that the EUT starts the transmission of Message 4 and 20 at the first schedule transmission time after 2 minutes.	This appears to be a mistake in the standard; scheduled transmissions should start within 2 minutes, as in test §10.2.1.6.3 part g). The EUT is powered off at 11:38:00, before power is reapplied at 11:38:03. The first scheduled transmission occurs 00:01:07 later.	Pass

d)				
Time	Slot	Msg	Sentence	Comment
11:37:40	1504	4	!AIVDM,1,1,,A,402B`i1v@JcUWwrCPNM6qKGP00S:,0*10	
11:37:50	1879	4	!AIVDM,1,1,,B,402B`i1v@JcUiwrCPNM6qKGP05JD,0*4F	
11:38:00	0	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	Power removed from EUT at 11:38:00. Power reapplied at 11:38:03.
11:38:00	4	4	!AIVDM,1,1,,A,402B`i1v@JcUswrCPNM6qKGP0<00,0*51	
11:38:00	6	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	
11:39:10	380	4	!AIVDM,1,1,,B,402B`i1v@JcW:wrCPNM6qKGP0L00,0*69	First transmission occurs 00:01:07 after power is reapplied.
11:39:20	755	4	!AIVDM,1,1,,A,402B`i1v@JcWDsPW0tv=jVg10H01rP,4*28	
11:39:30	1129	4	!AIVDM,1,1,,B,402B`i1v@JcWMwrCPNM6qKGP0D00,0*16	
11:39:40	1504	4	!AIVDM,1,1,,A,402B`i1v@JcWWwrCPNM6qKGP0@GP,0*1C	
11:39:50	1879	4	!AIVDM,1,1,,B,402B`i1v@JcWiwrCPNM6qKGP0HMG,0*34	
11:40:00	0	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	First scheduled Message 20 transmission.

e) Restart the EUT using the Equipment Restart Command		
Requirement	Result	Verdict
Apply the RST sentence with an equipment reset command field set to 1.	The following sentence is applied to the EUT: $ABRST,1234,1,,C*20	-
Confirm the EUT retains the DLM sentence settings.	The results of querying the DLM sentence settings are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass
Confirm the EUT retains the ECB sentence settings.	The results of querying the ECB sentence settings are: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass
Confirm that the EUT starts the transmission of Message 4 and 20 at the first schedule transmission time after 2 minutes.	This appears to be a mistake in the standard; scheduled transmissions should start within 2 minutes, as in test §10.2.1.6.3 part g). The EUT begins scheduled transmissions 1 minute after the RST sentence was applied.	Pass

e)				
Time	Slot	Msg	Sentence	Comment
13:47:00	6	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	
13:47:10	379	4	!AIVDM,1,1,,B,402B`i1v@Jeg9wrCPNM6qKGP0H5s,0*1E	
13:47:20	754	4	!AIVDM,1,1,,A,402B`i1v@JegCwrCPNM6qKGP05bt,0*4A	
13:47:20			$ABRST,1234,1,,C*20	Reset command applied to the EUT.
13:48:20	754	4	!AIVDM,1,1,,A,402B`i1v@JehCwrCPNM6qKGP0H;j,0*7F	EUT begins transmitting 1 minute after reset.
13:48:30	1129	4	!AIVDM,1,1,,B,402B`i1v@JehMwrCPNM6qKGP0L00,0*27	
13:48:40	1504	4	!AIVDM,1,1,,A,402B`i1v@JehWwrCPNM6qKGP0@GP,0*25	
13:48:50	1879	4	!AIVDM,1,1,,B,402B`i1v@JehiwrCPNM6qKGP0L00,0*03	
13:49:00	0	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	First scheduled Message 20 transmitted by the EUT.

f) Restart the EUT using the Equipment Restart Command		
Requirement	Result	Verdict
Apply the RST sentence with an equipment reset command field set to 2.	The following sentence is applied to the EUT: $ABRST,1234,2,,C*23	-
Confirm the DLM sentence settings revert to their default values.	The results of querying the DLM sentence settings are: $ABDLM,0,A,,,,,,,,,,,,,,,,,,,R*49 $ABDLM,0,B,,,,,,,,,,,,,,,,,,,R*4A	Pass
Confirm the ECB sentence settings revert to their default values.	The results of querying the ECB sentence settings are: $ABECB,1234,4,,-1,750,,,-1,750,,R*09 $ABECB,1234,20,0,-1,0,,0,-1,0,,R*3F	Pass
Confirm the UI is unchanged.	The UI remains 1234, as seen in the result of a BCG query: $ABBCG,1234,2087,2088,2087,2088,0,0,3,0,0,I,60,AB,R*6C	Pass
Confirm the MMSI is unchanged.	The MMSI remains 2402500: $ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A	Pass

Configuration of Operating Parameters - Clause 10.2.1.4

This test will verify that the Base Station configuration can be modified. In addition, it will verify the non-default settings. The operation of the TSA+VDM transmission is verified when operating independently.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions. Switch the working channels for the 5 test targets to appropriate channels as defined in the new BCG sentence.

a) Apply BCG and BCL sentences with new, different settings to the EUT with an incorrect Unique Identifier.
b) Apply BCG and BCL sentences with new, different settings to the EUT with a correct Unique Identifier.
c) Apply a TSA sentence and a VDM sentence with encapsulated Message 4 to the EUT:
   $xxTSA,<UI>,9,A,<UTC>,1050,2
   !xxVDM,1,1,9,A,40C4qnh00041?G1RMfL0tJi004P4,0

The following tests are required for a Base Station operated as an independent unit.

d) Apply the independent mode set-up to the EUT.
e) Modify the DLM reservations according to the following examples. The modified values are underlined. The first two entries are shifted by 100 slots. The third entry is left empty (null fields):
   $xxDLM,0,A,L,104,1,7,250,L,100,1,7,0,,,,,,,,,,C
   $xxDLM,0,B,L,229,1,7,250,L,106,1,7,0,,,,,,,,,,C
f) Adapt the transmission slots to the reservations under e) using ECB sentence like the following examples:
   $xxECB,<UI>,4,0,104,750,,0,479,750,,C
   $xxECB,<UI>,20,0,100,0,,0,106,0,,,C
g) Delete the first two reservations using the following DLM sentence:
   $xxDLM,0,A,C,,,,,C,,,,,,,,,,,,,,,C
   $xxDLM,0,B,C,,,,,C,,,,,,,,,,,,,,,C
h) Stop the transmission of Message 20 using the following ECB sentences:
   $xxECB,<UI>,20,0,-1,,,0,-1,,,C
i) Stop the transmission of Message 4 using the following ECB sentence:
   $xxECB,<UI>,4,0,-1,,,0,-1,,,C
j) Apply the following BBM and VDM sentences to the EUT:
   !xxBBM,1,1,0,0,14,D5CDP=5CC175,0
   !xxVDM,2,1,7,A,502=aEP000000000000ph9u0ThuC:222222222016@jI071C0vSchH88,0
   !xxVDM,2,2,7,A,888888888888888,2

Required Results

Confirm that:

a) the BCG and BCL sentences were ignored by the EUT using the query sentence for the BCG and BCL sentence;
b) BCG and BCL sentences were processed correctly by the EUT using query sentences;
c) the appropriate TFR sentence is output on the PI. Confirm that the EUT transmits the Message 4 in the assigned slot and channel. Confirm that the content of Message 4 is as defined by the VDM sentence. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;

The following results are required for a Base Station operated as an independent unit.

d) the independent mode set-up was correctly stored;

e) the DLM sentences were stored correctly using the query sentence for DLM. Confirm the third entry has not been modified;
f) the ECB sentences were received correctly using the query sentence for ECB. Confirm that the EUT is transmitting Message 4 and Message 20 in the assigned slots, interval and channel as defined in the ECB sentence. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the content of Message 20 is according to the settings of e);
g) the DLM sentences were received correctly using the query sentence for DLM. Check that the first two entries are deleted and the third entry is retained;
h) the ECB sentences were received correctly using the query sentence for ECB. Confirm that the Base Station stops transmitting Message 20. Confirm that the EUT is only transmitting Message 4 in the assigned slots as defined in the ECB message;
i) the ECB sentences were received correctly by the EUT using the query sentence for ECB. Confirm that the Base Station stops transmitting Message 4;
j) the EUT transmitted Message 14 and issued an ABK type 3. Confirm that the EUT transmitted Message 5 and issued a TFR sentence for Message 5.

Test Results

a) Apply BCG and BCL Sentences with an Incorrect UI		
Requirement	Result	Verdict
The current BCG and BCL settings shall be checked using queries: $ABABQ,BCG*3B $ABABQ,BCL*30	The initial BCG and BCL sentence settings are: $ABBCG,1234,2087,2088,2087,2088,0,0,3,0,0,I,60,AB,R*6C $ABBCL,1234,1,9100.0000,N,18100.0000,E,0, @@@@@@@@@@@@@@@@@@@@,R,0*12	-
Apply a BCG sentence with different values, but an incorrect UI.	The BCG sentence applied to the EUT is: $ABBCG,400500,2067,2068,2067,2068,1,1,2,1,1,E,20,U0,C*17	-
Confirm the EUT does not accept the settings in the BCG sentence by using the query: $ABABQ,BCG*3B	The BCG sentence settings remain unchanged: $ABBCG,1234,2087,2088,2087,2088,0,0,3,0,0,I,60,AB,R*6C	Pass
Apply a BCL sentence with different values, but an incorrect UI.	The BCL sentence applied to the EUT is: $ABBCL,400500,0,5052.1709,S,00114.6481,W,1,STT LINK,C,1*79	-
Confirm the EUT does not accept the settings in the BCL sentence by using the query: $ABABQ,BCL*30	The BCL sentence settings remain unchanged: $ABBCL,1234,1,9100.0000,N,18100.0000,E,0, @@@@@@@@@@@@@@@@@@@@,R,0*12	Pass

b) Apply BCG and BCL Sentence with a Correct UI		
Requirement	Result	Verdict
Apply a BCG sentence with different values and the correct UI.	The BCG sentence applied to the EUT is: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,C*7D	-
Confirm the settings have been accepted by using the BCG query: $ABABQ,BCG*3B	The BCG settings were applied successfully: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C	Pass
Apply a BCL sentence with different values and the correct UI.	The BCL sentence applied to the EUT is: $ABBCL,1234,0,5052.1709,N,00114.6481,W,1,STT LINK,C,1*61	-
Confirm the setting have been accepted by using the BCL query: $ABABQ,BCL*30	The BCL settings were applied successfully: $ABBCL,1234,0,5052.1709,N,00114.6481,W,1,STT LINK,R,1*70	Pass

c) Apply a TSA and VDM sentence to the EUT		
Requirement	Result	Verdict
The provided TSA and VDM sentences shall be applied.	The sentences applied to the EUT are: $ABTSA,1234,9,A,1036,1050,2*0B !AIVDM,1,1,9,A,40C4qnh00041?G1RMfL0tJi004P4,0*65	-
Confirm the appropriate TFR sentence is output on the PI.	The TFR sentence output to the PI is: $ABTFR,1,9,A,1234,1036,1050,,,1,2,0*11	Pass
Confirm that the EUT transmits the Message 4 in the assigned slot and channel.	The EUT transmits Message 4 on channel A, in slot 1050: !AIVDM,1,1,,A,40C4qnh00041?G1RMfL0tJi004P4,0*5C	Pass
Confirm that the content of Message 4 is as defined by the VDM sentence.	The content of the transmitted Message 4 matches that of the VDM sentence applied to the EUT, as seen in the table below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The VDO sentence output to the PI is: !ABVDO,1,1,,A,40C4qnh00041?G1RMfL0tJi004P4,0*55	Pass

c) VDM and VDO Message Decodes		
Parameter	VDM Message Decoded Value	VDO Message Decoded Value
Message ID	4 - Base station report	4 - Base station report
Repeat Indicator	0	0
MMSI	20003291	20003291
Year	0	0
Month	0	0
Day	0	0
Hour	4	4
Minute	1	1
Second	15	15
Position Accuracy	0 - low (>10 m)	0 - low (>10 m)
Longitude	125 29.5817 W	125 29.5817 W
Latitude	48 57.5595 N	48 57.5595 N
Type of electronic position fixing device	1 - GPS	1 - GPS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0	0
RAIM Flag	0 - RAIM not in use	0 - RAIM not in use
Communication State - Sync State	0	0
Communication State - Slot Timeout	1	1
Communication State - Sub Message	UTC Hour and Minute = 04:01	UTC Hour and Minute = 04:01

d) Apply the Independent Mode Set-up to the EUT		
Requirement	Result	Verdict
Verify that the DLM sentence settings are accepted by the EUT.	$ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass
Verify that the ECB sentence settings are accepted by the EUT.	$ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

e) Modify the DLM Reservations		
Requirement	Result	Verdict
Shift the first two slot reservations by 100 slots into the frame, on both channels.	The DLM sentences applied to the EUT are: $ABDLM,0,A,L,104,1,7,250,L,100,1,7,0,,,,,,,,,,C*5B $ABDLM,0,B,L,229,1,7,250,L,106,1,7,0,,,,,,,,,,C*52	-
Confirm that the DLM sentences were stored correctly using the query sentence for DLM.	The DLM sentence settings returned by the query are: $ABDLM,0,A,L,104,1,7,250,L,100,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,229,1,7,250,L,106,1,7,0,L,20,2,7,75,,,,,,R*0A	Pass
Confirm the third reservation fields of the DLM sentence have not been modified.	The DLM settings before modification were: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,**L,10,2,7,75**,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,**L,20,2,7,75**,,,,,R*08 It can be seen the third entry fields are unchanged after the modification: $ABDLM,0,A,L,104,1,7,250,L,100,1,7,0,**L,10,2,7,75**,,,,,R*00 $ABDLM,0,B,L,229,1,7,250,L,106,1,7,0,**L,20,2,7,75**,,,,,R*0A	Pass

f) Adapt the Transmission Slots of the Reservations using ECB Sentences		
Requirement	Result	Verdict
Adapt the transmission slots to the reservations under e) using ECB sentences.	The ECB sentences sent to the EUT are: $ABECB,1234,4,0,104,750,,0,479,750,,C*17 $ABECB,1234,20,33,100,2250,,33,106,2250,,C*28	-
Confirm the EUT is transmitting Message 4 and Message 20 in the assigned slots, interval and channel as defined in the ECB sentence.	The EUT transmits Message 4 and Message 20 in the correct slots, as shown in the table below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The VDO sentences output when Message 4 is transmitted: !ABVDO,1,1,,A,402B`i1v@KcR2wrCPvM6qLg02@1`,0*4F !ABVDO,1,1,,B,402B`i1v@KcR<wrCPvM6qLg02D00,0*17 !ABVDO,1,1,,A,402B`i1v@KcRFwrCPBM6qTO028=F,0*6D !ABVDO,1,1,,B,402B`i1v@KcRPwrCPBM6qTO025J8,0*7C !ABVDO,1,1,,A,402B`i1v@KcRbwrCPBM6qTO02<00,0*36 !ABVDO,1,1,,B,402B`i1v@KcRlwrCPBM6qTO02D00,0*43 The VDO sentences output when Message 20 is transmitted: !ABVDO,1,1,,A,D02B`i00@N?`00N0270f4d0,2*3C !ABVDO,1,1,,B,D02B`i07dN?`00N027@f4d0,2*6C	Pass
Confirm that the content of Message 20 is according to the settings of e).	The contents of the Message 20 transmitted are correct, as seen in the Message decode below.	Pass

f) VDL Messages					
Time	Slot	Chan	MMSI	Msg	Sentence
11:31:40	1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcOWwrCPvM6qLg02D00,0*6B
11:31:50	1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcOiwrCPvM6qLg02HMG,0*50
11:32:00	0	A	2402500	20	!AIVDM,1,1,,A,D02B`i06PN?`6@N000`f4d0,2*00
11:32:00	4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcOswrCPvM6qLg02H04,0*47
11:32:00	6	B	2402500	20	!AIVDM,1,1,,B,D02B`i0=tN?`6@N000pf4d0,2*3C
11:32:10	379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcP9wrCPvM6qLg02D00,0*19
11:32:20	754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcPCwrCPvM6qLg02D00,0*60
11:32:32	1229	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcPPwrCPvM6qLg02<00,0*08
11:32:42	1604	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcPbwrCPvM6qLg02D00,0*41
11:32:52	1979	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcPlwrCPvM6qLg02L00,0*44
11:33:02	100	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N0270f4d0,2*35
11:33:02	104	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcQ2wrCPvM6qLg02D00,0*10
11:33:02	106	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N027@f4d0,2*65
11:33:12	479	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcQ<wrCPvM6qLg02H7O,0*69
11:33:22	854	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcQFwrCPvM6qLg02<00,0*1C
11:33:32	1229	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcQPwrCPvM6qLg028C=,0*73
11:33:42	1604	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcQbwrCPvM6qLg02@I4,0*39
11:33:52	1979	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcQlwrCPvM6qLg02HNs,0*7C
11:34:02	100	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N0270f4d0,2*35
11:34:02	104	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcR2wrCPvM6qLg02@1`,0*46
11:34:02	106	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N027@f4d0,2*65
11:34:12	479	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcR<wrCPvM6qLg02D00,0*1E
11:34:22	854	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcRFwrCPBM6qTO028=F,0*64
11:34:32	1229	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KcRPwrCPBM6qTO025J8,0*75
11:34:42	1604	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KcRbwrCPBM6qTO02<00,0*3F

f) Message 20 Decode: Channel A		
!AIVDM,1,1,,A,D02B`i00@N?`00N0270f4d0,2*35		
Parameter	Decoded Value	Expected Value
Message ID	20	20
Repeat indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Offset number 1	4	4
Number of slots 1	1	1
Time out 1	7	7
Increment 1	250	250
Offset number 2	0	2250
Number of slots 2	1	1
Time out 2	7	7
Increment 2	0	0
Offset number 3	2160	2160
Number of slots 3	2	2
Time out 3	7	7

f) Message 20 Decode: Channel A		
!AIVDM,1,1,,A,D02B`i00@N?`00N0270f4d0,2*35		
Parameter	Decoded Value	Expected Value
Increment 3	75	75
Offset number 4	0	0
Number of slots 4	0	0
Time out 4	0	0
Increment 4	0	0
Spare	0	0

f) Message 20 Decode: Channel B		
!AIVDM,1,1,,B,D02B`i07dN?`00N027@f4d0,2*65		
Parameter	Decoded Value	Expected Value
Message ID	20	20
Repeat indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Offset number 1	123	123
Number of slots 1	1	1
Time out 1	7	7
Increment 1	250	250
Offset number 2	0	2250
Number of slots 2	1	1
Time out 2	7	7
Increment 2	0	0
Offset number 3	2164	2164
Number of slots 3	2	2
Time out 3	7	7
Increment 3	75	75
Offset number 4	0	0
Number of slots 4	0	0
Time out 4	0	0
Increment 4	0	0
Spare	0	0

g) Deleting Slot Reservations		
Requirement	Result	Verdict
Apply the DLM sentences provided to delete the first two slot reservations	The DLM sentences sent to the EUT are: $ABDLM,0,A,,,,,,,,,,L,10,2,7,75,,,,,R*03 $ABDLM,0,B,,,,,,,,,,L,20,2,7,75,,,,,R*03	-
Confirm the first two slot reservations are deleted by querying the DLM settings.	The DLM sentences before deleting the first two reservations: $ABDLM,0,A,**L,104,1,7,250,L,100,1,7,0**,L,10,2,7,75,,,,,R*00 $ABDLM,0,B,L,**229,1,7,250,L,106,1,7,0,**L,20,2,7,75,,,,,R*0A The results of querying the DLM sentence shows that the first two reservations have been successfully deleted: $ABDLM,0,A,,,,,,,,,,L,10,2,7,75,,,,,R*03 $ABDLM,0,B,,,,,,,,,,L,20,2,7,75,,,,,R*03	Pass

h) Cessation of Message 20 by ECB Sentence		
Requirement	Result	Verdict
Apply the provided ECB sentence to the EUT.	The ECB sentence applied to the EUT is: $ABECB,1234,20,0,-1,,,0,-1,,,C*2E	-
Confirm the ECB sentences were received correctly using the query sentence for ECB.	The result returned by the $ABABQ,ECB*39 query is: $ABECB,1234,20,0,-1,2250,,0,-1,2250,,R*3F	Pass
Confirm that the Base Station stops transmitting Message 20.	The EUT ceases transmission of Message 20, as seen in the table below.	Pass
Confirm that the EUT is only transmitting Message 4 in the assigned slots as defined in the ECB message.	The EUT transmits Message 4 only, in the slots 104, 479, 854, 1604 and 1979, as defined in the ECB settings.	Pass

h)					
Time	Slot	Chan	MMSI	Msg	Sentence
13:32:02	104	A	2402504	4	!AIVDM,1,1,,A,402B`j1v@KeP2wrCQdM6qGO0281`,0*09

13:32:12	479	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KeP<wrCQdM6qGO025b0,0*09
13:32:22	854	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@CeQFwrCQdM6qGO02@=F,0*25
13:32:32	1229	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@cePPsPW3Hv=jfv04hRJa@,4*36
13:32:42	1604	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KePbwrCQdM6qGO028I4,0*76
13:32:52	1979	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KePlwrCQdM6qGO02<00,0*02

i) Cessation of Message 4 by ECB Sentence		
Requirement	Result	Verdict
Apply the provided ECB sentence to the EUT.	The ECB sentence applied to the EUT is: $ABECB,1234,4,0,-1,,,0,-1,,,C*18	-
Confirm the ECB sentences were received correctly using the query sentence for ECB.	The result returned by the $ABABQ,ECB*39 query is: $ABECB,1234,4,,-1,750,,,-1,750,,R*09	Pass
Confirm that the Base Station stops transmitting Message 4.	The EUT ceases transmission of Message 4.	Pass

j) Message 5, 8 and 14 Transmissions		
Requirement	Verdict	Result
Apply the BBM and VDM sentences provided in part j) to the EUT.	The sentences applied to the EUT are: !ABBBM,1,1,0,0,14,D5CDP=5CC175,0*4A !ABVDM,2,1,7,A,502=aEP000000000000ph 9u0ThuC:222222222016@jI071C0vSchH88,0*76 !ABVDM,2,2,7,A,888888888888888,2*20	-
Confirm that the EUT transmitted Message 14 and issued an ABK type 3.	The EUT transmits Message 14 successfully: !ABVDO,1,1,,B,>02B`i1@E=B0lE=<4LD,2*36 An ABK with acknowledgement type field set to 3 is output: $ABABK,,B,14,0,3*23	Pass
Confirm that the EUT transmitted Message 5 and issued a TFR sentence for Message 5.	Message 5 is correctly transmitted by the EUT: !AIVDM,2,1,6,A,5@2=aEP000000000000ph9u0ThuC: 222222222016@jI071C0vSchH8888888888888888,2*2A A TFR sentence is issued for Message 5, and output to the PI: $ABTFR,2,7,A,1234,,,1350,2110,2,2,0*1A	Pass

FATDMA Configuration - Clause 10.2.1.5

This test will verify the ability of the Base Station to configure all twenty FATDMA data set definitions (ten per channel).

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Enable RATDMA using a BCG sentence like:

$xxBCG,<UI>,,,,,,,,,1,,,C

b) Apply the following 20 DLM sentences to the EUT:

$xxDLM,0,A,L,0004,1,7,0250,L,0000,1,7,0000,L,0010,1,7,0450,L,0070,2,7,0075,C
$xxDLM,0,B,L,0129,1,7,0250,L,0006,1,7,0000,L,0012,1,7,0450,L,0050,2,7,0075,C
$xxDLM,1,A,L,0100,1,7,0000,L,0101,2,6,0000,L,0103,3,5,0000,L,0106,5,4,0000,C
$xxDLM,1,B,L,0300,1,7,0000,L,0301,2,6,0000,L,0303,3,5,0000,L,0306,5,4,0000,C
$xxDLM,2,A,L,0400,1,7,0000,L,0401,2,6,0000,L,0403,3,5,0000,L,0406,5,4,0000,C
$xxDLM,2,B,L,0600,1,7,0000,L,0601,2,6,0000,L,0603,3,5,0000,L,0606,5,4,0000,C
$xxDLM,3,A,L,0700,1,7,0000,L,0701,2,6,0000,L,0703,3,5,0000,L,0706,5,4,0000,C
$xxDLM,3,B,L,0900,1,7,0000,L,0901,2,6,0000,L,0903,3,5,0000,L,0906,5,4,0000,C
$xxDLM,4,A,L,1100,1,7,0000,L,1101,2,6,0000,L,1103,3,5,0000,L,1106,5,4,0000,C
$xxDLM,4,B,L,1200,1,7,0000,L,1201,2,7,0000,L,1203,3,7,0000,L,1206,5,7,0000,C
$xxDLM,5,A,L,1300,1,7,0000,L,1301,2,6,0000,L,1303,3,5,0000,L,1306,5,4,0000,C
$xxDLM,5,B,L,1500,1,7,0000,L,1501,2,7,0000,L,1503,3,7,0000,L,1506,5,7,0000,C
$xxDLM,6,A,L,1600,1,7,0000,L,1601,2,7,0000,L,1603,3,7,0000,L,1606,5,7,0000,C
$xxDLM,6,B,L,1800,1,7,0000,L,1801,2,7,0000,L,1803,3,7,0000,L,1806,5,7,0000,C
$xxDLM,7,A,L,1900,1,7,0000,L,1901,2,7,0000,L,1903,3,7,0000,L,1906,3,7,0000,C
$xxDLM,7,B,L,2100,1,7,0000,L,2101,2,7,0000,L,2103,3,7,0000,L,2106,5,7,0000,C
$xxDLM,8,A,L,2150,1,7,0000,L,2151,2,7,0000,L,2153,3,7,0000,L,2156,5,7,0000,C
$xxDLM,8,B,L,2200,1,7,0000,L,2201,2,7,0000,L,2203,3,7,0000,L,2206,5,7,0000,C
$xxDLM,9,A,L,1700,1,7,0000,L,1701,2,7,0000,L,1703,3,7,0000,L,1706,5,7,0000,C
$xxDLM,9,B,L,1750,1,7,0000,L,1751,2,7,0000,L,1753,3,7,0000,L,1756,5,7,0000,C

c) Activate the transmission of Message 4 and 20 using the following ECB sentences:

$xxECB,<UI>,4,0,104,750,,0,379,750,,C
$xxECB,<UI>,20,0,10,450,,0,12,450,,C

d) Clear all FATDMA reservations using 20 DLM sentences;
Example:

$xxDLM,<Reservation no (0...9)>,A,C,,,,,C,,,,,C,,,,,C,,,,,C
$xxDLM,<Reservation no (0...9)>,B,C,,,,,C,,,,,C,,,,,C,,,,,C

e) Apply the following DLM sentences to the EUT:

$xxDLM,0,A,L,0004,1,7,0250,L,0010,1,7,0450,R,0005,5,7,0030,R,0015,5,7,0030,C
$xxDLM,1,A,R,0020,4,7,0030,R,0025,5,7,0030,R,0030,4,7,0030,R,0011,2,7,0030,C
$xxDLM,0,B,L,0129,1,7,0250,L,0012,1,7,0450,,,,,,,,,,C

f) Apply the following BBM sentences to the EUT:

!xxBBM,1,1,0,0,14,D5CDPC165DIP=5CC1750,0

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the BCG sentences were received correctly by the EUT using the query sentence for the BCG sentence;
b) DLM sentences were received correctly by the EUT using the query sentence for the DLM sentence;
c) the ECB sentences were received correctly by the EUT using the query sentence for the ECB sentence. Confirm that the appropriate VDO sentence is output on the PI when a Message 20 is transmitted. Confirm that the EUT is transmitting Message 20(s) over the VDL in the specified slots and specified channels with the specified configuration parameters from the DLM and the ECB sentence. Confirm that all the Message 20(s) required by the full set of DLM sentences are transmitted over the VDL within 2 frames in the assigned slots as defined in the ECB sentence;
d) DLM sentences were received correctly by the EUT using the query sentence for the DLM sentence. Confirm that the EUT is no longer transmitting any Message 20 over the VDL. Confirm that the EUT continues to transmit Message 4 over the VDL;
e) DLM sentences were received correctly by the EUT using the query sentence for DLM sentence;
f) the Message 14 is transmitted over the VDL within 4 s using RATMDA in available slots and not using the remotely allocated slots.

Test Results

a) Enabled RATDMA		
Requirement	Result	Verdict
Enable RATDMA using the BCG sentence.	The BCG sentence applied to the EUT is: $ABBCG,1234,,,,,,,,1,,,,C*33	-
The BCG sentence shall be confirmed as accepted by querying the BCG settings of the EUT.	The BCG settings were applied successfully: $ABBCG,1234,2087,2088,2087,2088,0,0,3,0,**1**,I,60,AB,R*6D	Pass

b) Configure all 20 DLM Sentences		
Requirement	Result	Verdict
Configure all 20 DLM sentence settings using the sentences provided in part b).	The sentences were applied to the EUT with talker ID ‘AB’.	-
Confirm the EUT received the DLM sentences correctly, by using the appropriate query for the DLM sentence.	$ABABQ,DLM*38 $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,1,7,450,L,70,2,7,75,R*7C $ABDLM,1,A,L,100,1,7,0,L,101,2,6,0,L,103,3,5,0,L,106,5,4,0,R*49 $ABDLM,2,A,L,400,1,7,0,L,401,2,6,0,L,403,3,5,0,L,406,5,4,0,R*4A $ABDLM,3,A,L,700,1,7,0,L,701,2,6,0,L,703,3,5,0,L,706,5,4,0,R*4B $ABDLM,4,A,L,1100,1,7,0,L,1101,2,6,0,L,1103,3,5,0,L,1106,5,4,0,R*4C $ABDLM,5,A,L,1300,1,7,0,L,1301,2,6,0,L,1303,3,5,0,L,1306,5,4,0,R*4D $ABDLM,6,A,L,1600,1,7,0,L,1601,2,7,0,L,1603,3,7,0,L,1606,5,7,0,R*4E $ABDLM,7,A,L,1900,1,7,0,L,1901,2,7,0,L,1903,3,7,0,L,1906,3,7,0,R*49 $ABDLM,8,A,L,2150,1,7,0,L,2151,2,7,0,L,2153,3,7,0,L,2156,5,7,0,R*40 $ABDLM,9,A,L,1700,1,7,0,L,1701,2,7,0,L,1703,3,7,0,L,1706,5,7,0,R*41 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,12,1,7,450,L,50,2,7,75,R*77 $ABDLM,1,B,L,300,1,7,0,L,301,2,6,0,L,303,3,5,0,L,306,5,4,0,R*4A $ABDLM,2,B,L,600,1,7,0,L,601,2,6,0,L,603,3,5,0,L,606,5,4,0,R*49 $ABDLM,3,B,L,900,1,7,0,L,901,2,6,0,L,903,3,5,0,L,906,5,4,0,R*48 $ABDLM,4,B,L,1200,1,7,0,L,1201,2,7,0,L,1203,3,7,0,L,1206,5,7,0,R*4F $ABDLM,5,B,L,1500,1,7,0,L,1501,2,7,0,L,1503,3,7,0,L,1506,5,7,0,R*4E $ABDLM,6,B,L,1800,1,7,0,L,1801,2,7,0,L,1803,3,7,0,L,1806,5,7,0,R*4D $ABDLM,7,B,L,2100,1,7,0,L,2101,2,7,0,L,2103,3,7,0,L,2106,5,7,0,R*4C $ABDLM,8,B,L,2200,1,7,0,L,2201,2,7,0,L,2203,3,7,0,L,2206,5,7,0,R*43 $ABDLM,9,B,L,1750,1,7,0,L,1751,2,7,0,L,1753,3,7,0,L,1756,5,7,0,R*42	Pass

c) Activate the Transmission of Message 4 and 20		
Requirement	Result	Verdict
Apply the ECB sentences to begin transmission of Message 4 and 20.	The following ECB sentences were sent to the EUT: $ABECB,1234,4,0,104,750,,0,379,750,,C*10 $ABECB,1234,20,0,10,450,,0,12,450,,C*2C	-
Confirm that the appropriate VDO sentence is output on the PI when a Message 20 is transmitted.	The VDO sentence output on the PI is: !ABVDO,1,1,,A,D02B`i0c8N00c<f00cDv00cQN00,2*11	Pass
Confirm that the EUT is transmitting Message 20(s) over the VDL in the specified slots and specified channels with the specified configuration parameters from the DLM and the ECB sentence.	The ECB sentence defines Message 20 to transmit on channel A in slots 10, 460, 910, 1360 and 1810. The ECB sentence defines Message 20 to transmit on channel B in slots 12, 462, 912, 1362 and 1812. The EUT transmits Message 20 in the correct slots with the correct offsets, as shown in the table below.	Pass
Confirm that all the Message 20(s) required by the full set of DLM sentences are transmitted over the VDL within 2 frames in the assigned slots as defined in the ECB sentence.	All the Message 20's required by the DLM sentences are transmitted over the VDL, as shown in the table below.	Pass

c) EUT Transmissions of Message 20					
Time	Slot	Chan	MMSI	Msg	Sentence
15:56:00	10	A	2402500	20	!AIVDM,1,1,,A,D02B`i148N014<d014Dr014QH00,2*18
15:56:00	12	B	2402500	20	!AIVDM,1,1,,B,D02B`i1:@N01:Df01:Lv01:aN00,2*23
15:56:12	460	A	2402500	20	!AIVDM,1,1,,A,D02B`i0lPN00lTd00ldr00lqH00,2*18
15:56:12	462	B	2402500	20	!AIVDM,1,1,,B,D02B`i10pN010tf0114v011AN00,2*7B
15:56:24	910	A	2402500	20	!AIVDM,1,1,,A,D02B`i0c8N00c<f00cDv00cQN00,2*18
15:56:24	912	B	2402500	20	!AIVDM,1,1,,B,D02B`i0oPN00oTf00odv00oqN00,2*1B
15:56:36	1360	A	2402500	20	!AIVDM,1,1,,A,D02B`i0QhN00Qlf00Qtv00R8v00,2*7A
15:56:36	1362	B	2402500	20	!AIVDM,1,1,,B,D02B`i0f8N00f<f00fDv00fQN00,2*1B
15:56:48	1810	A	2402500	20	!AIVDM,1,1,,A,D02B`i0E@N00EDf00ELv00EaN00,2*20
15:56:48	1812	B	2402500	20	!AIVDM,1,1,,B,D02B`i0H@N00HDf00HLv00HaN00,2*23
15:57:00	10	A	2402500	20	!AIVDM,1,1,,A,D02B`i1a`N01adf01alv01b1N00,2*53
15:57:00	12	B	2402500	20	!AIVDM,1,1,,B,D02B`i1d`N01ddf01dlv01e1N00,2*52
15:57:12	460	A	2402500	20	!AIVDM,1,1,,A,D02B`i1h8N?agpN01hPNL9l@f4d,2*19
15:57:12	462	B	2402500	20	!AIVDM,1,1,,B,D02B`i1olN?ah8N01hPNL9jpf4d,2*38
15:57:24	910	A	2402500	20	!AIVDM,1,1,,A,D02B`i1J0N01J4d01J<r01JIH00,2*78
15:57:24	912	B	2402500	20	!AIVDM,1,1,,B,D02B`i1VHN01VLd01VTr01ViH00,2*33
15:57:36	1360	A	2402500	20	!AIVDM,1,1,,A,D02B`i1@`N01@dd01@lr01A1H00,2*51
15:57:36	1362	B	2402500	20	!AIVDM,1,1,,B,D02B`i1M0N01M4d01M<r01MIH00,2*7B
15:57:48	1810	A	2402500	20	!AIVDM,1,1,,A,D02B`i17@N017Dd017Lr017aH00,2*20
15:57:48	1812	B	2402500	20	!AIVDM,1,1,,B,D02B`i1C`N01Cdd01Clr01D1H00,2*54

d) Clear all FATDMA Reservations		
Requirement	Result	Verdict
All FATDMA reservations shall be cleared using DLM sentences.	The sentences applied to the EUT are: $ABDLM,0,A,C,,,,,C,,,,,C,,,,,C*58 $ABDLM,1,A,C,,,,,C,,,,,C,,,,,C*59 $ABDLM,2,A,C,,,,,C,,,,,C,,,,,C*5A $ABDLM,3,A,C,,,,,C,,,,,C,,,,,C*5B $ABDLM,4,A,C,,,,,C,,,,,C,,,,,C*5C $ABDLM,5,A,C,,,,,C,,,,,C,,,,,C*5D $ABDLM,6,A,C,,,,,C,,,,,C,,,,,C*5E $ABDLM,7,A,C,,,,,C,,,,,C,,,,,C*5F $ABDLM,8,A,C,,,,,C,,,,,C,,,,,C*50 $ABDLM,9,A,C,,,,,C,,,,,C,,,,,C*51 $ABDLM,0,B,C,,,,,C,,,,,C,,,,,C*5B $ABDLM,1,B,C,,,,,C,,,,,C,,,,,C*5A $ABDLM,2,B,C,,,,,C,,,,,C,,,,,C*59 $ABDLM,3,B,C,,,,,C,,,,,C,,,,,C*58 $ABDLM,4,B,C,,,,,C,,,,,C,,,,,C*5F $ABDLM,5,B,C,,,,,C,,,,,C,,,,,C*5E $ABDLM,6,B,C,,,,,C,,,,,C,,,,,C*5D $ABDLM,7,B,C,,,,,C,,,,,C,,,,,C*5C $ABDLM,8,B,C,,,,,C,,,,,C,,,,,C*53 $ABDLM,9,B,C,,,,,C,,,,,C,,,,,C*52	-

d) Clear all FATDMA Reservations		
Requirement	Result	Verdict
Verify the EUT accepted all the DLM sentences by querying the DLM settings.	The results returned by the query $ABABQ,DLM*38 are: $ABDLM,0,A,,,,,,,,,,,,,,,,,,R*49 $ABDLM,1,A,,,,,,,,,,,,,,,,,,R*48 $ABDLM,2,A,,,,,,,,,,,,,,,,,,R*4B $ABDLM,3,A,,,,,,,,,,,,,,,,,,R*4A $ABDLM,4,A,,,,,,,,,,,,,,,,,,R*4D $ABDLM,5,A,,,,,,,,,,,,,,,,,,R*4C $ABDLM,6,A,,,,,,,,,,,,,,,,,,R*4F $ABDLM,7,A,,,,,,,,,,,,,,,,,,R*4E $ABDLM,8,A,,,,,,,,,,,,,,,,,,R*41 $ABDLM,9,A,,,,,,,,,,,,,,,,,,R*40 $ABDLM,0,B,,,,,,,,,,,,,,,,,,R*4A $ABDLM,1,B,,,,,,,,,,,,,,,,,,R*4B $ABDLM,2,B,,,,,,,,,,,,,,,,,,R*48 $ABDLM,3,B,,,,,,,,,,,,,,,,,,R*49 $ABDLM,4,B,,,,,,,,,,,,,,,,,,R*4E $ABDLM,5,B,,,,,,,,,,,,,,,,,,R*4F $ABDLM,6,B,,,,,,,,,,,,,,,,,,R*4C $ABDLM,7,B,,,,,,,,,,,,,,,,,,R*4D $ABDLM,8,B,,,,,,,,,,,,,,,,,,R*42 $ABDLM,9,B,,,,,,,,,,,,,,,,,,R*43	Pass
Confirm that the EUT ceases transmission of Message 20 and maintains Message 4 transmissions.	Transmissions of Message 20 are stopped after the FATDMA reservations are cleared, and Message 4 continues to transmit as seen in the table below.	Pass

d) EUT Stops Transmission of Message 20					
Time	Slot	Chan	MMSI	Msg	Sentence
09:48:00	10	A	2402500	20	!AIVDM,1,1,,A,D02B`i2<@N?b<0N0000NL83hf4d,2*61
09:48:00	12	B	2402500	20	!AIVDM,1,1,,B,D02B`i07DN?b<@N0000NL82Hf4d,2*3E
09:48:02	104	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@Kah2wrCQ6M6qJ?02@1`,0*61
09:48:12	460	A	2402500	20	!AIVDM,1,1,,A,D02B`i1n8N01n<d01nDr01nQH00,2*18
09:48:12	462	B	2402500	20	!AIVDM,1,1,,B,D02B`i22PN022Td022dr022qH00,2*1B
09:48:12	479	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@Kah<wrCQ6M6qJ?025;0,0*43
09:48:22	854	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KahFwrCQ6M6qJ?025;0,0*3A
09:48:24	910	A	2402500	20	!AIVDM,1,1,,A,D02B`i1dhN01dld01dtr01e9H00,2*41
09:48:24	912	B	2402500	20	!AIVDM,1,1,,B,D02B`i1q8N01q<d01qDr01qQH00,2*1B
09:48:32	1229	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KahPwrCQ6M6qJ?02<00,0*2D
09:48:36	1360	A	2402500	20	!AIVDM,1,1,,A,D02B`i1SHN01SLd01STr01SiH00,2*30
09:48:36	1362	B	2402500	20	!AIVDM,1,1,,B,D02B`i1ghN01gld01gtr01h9H00,2*4C
09:48:42	1604	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KahbwrCQ6M6qJ?02<00,0*1C
09:48:48	1812	B	2402500	20	!AIVDM,1,1,,B,D02B`i1VHN01VLf01VTv01ViN00,2*33
09:48:52	1979	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KahlwrCQ6M6qJ?028Ns,0*28
09:49:02	104	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@Kai2wrCQ6M6qJ?02<00,0*4D
09:49:12	479	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@Kai<wrCQ6M6qJ?020S:,0*25
09:49:22	854	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KaiFwrCQ6M6qJ?020S:,0*5C
09:49:32	1229	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KaiPwrCQ6M6qJ?028C=,0*56
09:49:42	1604	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@KaibwrCQ6M6qJ?028I4,0*64
09:49:52	1979	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@KailwrCQ6M6qJ?025;4,0*16

e) Reconfigure the DLM Sentences		
Requirement	Result	Verdict
Apply the provided DLM sentences to the EUT.	The DLM sentences sent to the EUT are: $ABDLM,0,A,L,0004,1,7,0250,L,0010,1,7,0450,R,0005,5,7,0030,R,0015,5,7,0030,C*5A $ABDLM,1,A,R,0020,4,7,0030,R,0025,5,7,0030,R,0030,4,7,0030,R,0011,2,7,0030,C*58 $ABDLM,0,B,L,0129,1,7,0250,L,0012,1,7,0450,,,,,,,,,,C*54	-
Confirm the EUT received all DLM sentences by querying the DLM settings.	The results returned by the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,10,1,7,450,R,5,5,7,30,R,15,5,7,30,R*4B $ABDLM,1,A,R,20,4,7,30,R,25,5,7,30,R,30,4,7,30,R,11,2,7,30,R*49 $ABDLM,0,B,L,129,1,7,250,L,12,1,7,450,,,,,,,,,,R*75	Pass

f) Apply Message 14 BBM to the EUT		
Requirement	Result	Verdict
Apply the BBM sentence provided to the EUT.	The BBM sentence applied to the EUT is: !ABBBM,1,1,0,0,14,D5CDPC165DIP=5CC1750,0*56	-
The EUT shall transmit Message 14 on the VDL.	The EUT transmitted Message 14 successfully: !AIVDM,1,1,,A,>02B`i1@E=B1<4HEAV0lE=<4LD0,2*2F	Pass

f) Apply Message 14 BBM to the EUT		
Requirement	Result	Verdict
Confirm the Message 14 is transmitted within 4 seconds of the BBM sentence being applied.	The BBM sentence was applied 3 times: the average time to transmit was 1 second and the maximum time taken to transmit Message 14 was 3 seconds.	Pass
Confirm the EUT does not transmit Message 14 in the reserved slots.	The EUT transmitted Message 14 in the slots 4, 1504 and 2173.	Pass

Channel Management - Clause 10.2.1.6

This test will verify that the Base Station will transmit Message 22 according to the configuration.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Apply a channel management area setting using an ACA sentence, and the in-use flag set to 1.
c) In addition to the standard independent mode setup reserve slots for the transmission of Message 22 once per frame using the following sentence:
   $xxDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,1,7,75,L,1,1,7,0,C
   $xxDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,1,7,75,L,7,1,7,0,C
d) Apply the following ECB sentence to start Message 22 transmissions by the EUT:
   $xxECB,<UI>,22,0,1,0,,0,7,0,,C
e) Initiate a single transmission of an MMSI addressed Message 22 using an ACM sentence like the following example:
   $xxACM, <MMSI of mobile 1>,<MMSI of mobile 2>,<Ch.A>,0,<Ch.B>,0,0,0,<Tx Channel>,3,C
f) Apply ACA sentences to the EUT defining seven further regional areas with the in-use flag set to 1.
g) Cycle power on the EUT.
h) Apply an ACA sentence for each of the 8 stored area settings, with the same area definition as stored, but the in-use flag set to 0.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the ACA sentence was received correctly by the EUT using the query sentence for the ACA sentence;
c) the DLM sentence was received correctly by the EUT using the query sentence for the DLM sentence;
d) the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence. Confirm that the EUT is transmitting Message 22 over the VDL in the specified slots and specified channels. Confirm the content of the Message 22 is as defined by the ACA message. Confirm that the EUT continues to transmit Messages 4 and 20 as defined. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
e) the EUT transmits an MMSI addressed Message 22 within the 4 s. Confirm that the content of Message 22 is as defined by the ACM sentence and that the MMSIs have the correct number of bits in Message 22;
f) the EUT correctly stores the regional operating areas by querying for the ACA configuration. Check that the areas are transmitted sequentially in Message 22;
g) the EUT's channel management settings are retained and that Message 22 starts transmitting again within 2 min;
h) the EUT removes the 8 area settings or sets the in-use flag of the stored areas to 0. Confirm that the EUT ceases transmission of the channel management messages.

Test Results

a) Apply the Independent Mode Set-up		
Requirement	Result	Verdict
Apply the independent mode set-up to the EUT.	The independent mode set-up is applied to the unit, as defined in §10.1.3.	Pass

b) Apply a Channel Management Area		
Requirement	Result	Verdict
Apply a channel management area setting using an ACA sentence, and the in-use flag set to 1.	The ACA sentence applied to the EUT is: $ABACA,0,5100.0,N,00100.0,W,5000.0,N,00200.0,W,1,2087,0,2088,0,0,1,,1,	-
Verify the EUT accepts the channel management ACA sentence.	The EUT's response to the $ABABQ,ACA*3E query is: $ABACA,0,5100.0,N,00100.0,W,5000.0, N,00200.0,W,1,2087,0,2088,0,0,1,,1,*50	Pass

c) Message 22 Slot Reservations		
Requirement	Result	Verdict
Apply the DLM sentences provided in part c).	The DLM sentences applied to the EUT are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,1,7,75,L,1,1,7,0,C*59 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,1,7,75,L,7,1,7,0,C*57	-
Verify the DLM settings were accepted successfully.	The results returned by the $ABABQ,DLM*38 query shows that the DLM settings were received by the EUT: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,1,7,75,**L,1,1,7,0,**R*48 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,1,7,75,**L,7,1,7,0**,R*46	Pass

d) Initiate Message 22 Transmissions		
Requirement	Result	Verdict
Apply the provided ECB sentence to initiate Message 22 transmissions.	The ECB sentence applied to the EUT is: $ABECB,1234,22,33,1,2250,,33,7,2250,,C*2A	-
Verify the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence.	The result returned by the EUT to the $ABABQ,ECB*39 query shows that the EUT received the ECB sentence correctly: $ABECB,1234,22,33,1,2250,,33,7,2250,,R*3B	Pass
Confirm that the EUT is transmitting Message 22 over the VDL in the specified slots and specified channels.	The ECB sentence applied to the EUT commands that Message 22 is transmitted in slots 1 and 7: $ABECB,1234,22,33,**1**,2250,,33,**7**,2250,,C*2A The EUT transmits Message 22 in these slots correctly, as seen in the table below.	Pass
Confirm the content of the Message 22 is as defined by the ACA message.	Decodes for the transmitted Message 22 on channel A and B can be seen in the tables below.	Pass
Confirm that the EUT continues to transmit Messages 4 and 20 as defined.	The EUT maintains transmissions of Message 4 and 20 as defined in the ECB sentences of the independent set-up.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The following VDO sentences are output to the PI, when a Message 22 is transmitted over the VDL: !ABVDO,1,1,,A,F02B`i22N2P?vm1oR?sD3bH00000,0*05 !ABVDO,1,1,,B,F02B`i22N2P?vm1oR?sD3bH00000,0*06	Pass

d) Message 22 Decode: Channel A		
!AIVDM,1,1,,A,F02B`i22N2P?vm1oR?sD3bH00000,0*0C		
Parameter	Decoded Value	Expected Value
Message ID	22	22
Repeat Indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Channel A	2087	2087
Channel B	2088	2088
Tx/Rx Mode	0 - Tx A/Tx B, Rx A/Rx B (default)	0 - Tx A/Tx B, Rx A/Rx B (default)
Power	1 - Low	1 - Low
NE Longitude	1 0 W	1 0 W
NE Latitude	51 0 N	51 0 N
SW Longitude	2 0 W	2 0 W
SW Latitude	50 0 N	50 0 N
Address/Broadcast	0 - Broadcast	0 - Broadcast
Channel A Bandwidth	0	0
Channel B Bandwidth	0	0
Transitional Zone Size	1 NM	1 NM

d) Message 22 Decode: Channel A		
!AIVDM,1,1,,A,F02B`i22N2P?vm1oR?sD3bH00000,0*0C		
Parameter	Decoded Value	Expected Value
Spare	0	0

d) Message 22 Decode: Channel B		
!AIVDM,1,1,,B,F02B`i22N2P?vm1oR?sD3bH00000,0*0F		
Parameter	Decoded Value	Expected Value
Message ID	22	22
Repeat Indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Channel A	2087	2087
Channel B	2088	2088
Tx/Rx Mode	0 - Tx A/Tx B, Rx A/Rx B (default)	0 - Tx A/Tx B, Rx A/Rx B (default)
Power	1 - Low	1 - Low
NE Longitude	1 0 W	1 0 W
NE Latitude	51 0 N	51 0 N
SW Longitude	2 0 W	2 0 W
SW Latitude	50 0 N	50 0 N
Address/Broadcast	0 - Broadcast	0 - Broadcast
Channel A Bandwidth	0	0
Channel B Bandwidth	0	0
Transitional Zone Size	1 NM	1 NM
Spare	0	0

d) Message 22 Transmissions				
Slot	Chan	MMSI	Msg	Sentence
0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32
4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:NswrCRvM6qIO02<00,0*47
6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02
379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@L:O9wrCRvM6qIO02<00,0*0F
754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:OCwrCRvM6qIO020S:,0*13
1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@L:OMwrCRvM6qIO02D00,0*03
1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:OWwrCRvM6qIO02@GP,0*09
1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@L:OiwrCRvM6qIO02D00,0*27
0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32
1	A	2402500	22	!AIVDM,1,1,,A,F02B`i22N2P?vm1oR?sD3bH00000,0*0C
4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:OswrCRvM6qIO02804,0*46
6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02
7	B	2402500	22	!AIVDM,1,1,,B,F02B`i22N2P?vm1oR?sD3bH00000,0*0F
379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@L:P9wrCRvM6qIO0285s,0*52
754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:PCwrCRvM6qIO02@;j,0*44
1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@L:PMwrCRvM6qIO02@Aa,0*38
1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:PWwrCRvM6qIO02<00,0*7D
1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@L:PiwrCRvM6qIO02@MG,0*36
0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32
1	A	2402500	22	!AIVDM,1,1,,A,F02B`i22N2P?vm1oR?sD3bH00000,0*0C
4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@L:PswrCRvM6qIO025B0,0*22
6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02
7	B	2402500	22	!AIVDM,1,1,,B,F02B`i22N2P?vm1oR?sD3bH00000,0*0F

e) Transmission of an Addressed Message 22		
Requirement	Verdict	Result
Initiate a single transmission of an MMSI addressed Message 22 using an ACM sentence.	The ACM sentence applied to the EUT commands that an addressed Message 22 be transmitted on both channels: $ABACM,700800900,650400100,2087,0,2075,0,0,0,3,3,C*2E	-
The EUT transmits an MMSI addressed Message 22 within 4 seconds.	The ACM sentence is applied at 11:35:25 and the addressed Message 22 is transmitted at 11:35:26: !AIVDM,1,1,,A,F02B`i22N1d5>:ghP9dAAI0A0000,0*39 !AIVDM,1,1,,B,F02B`i22N1d5>:ghP9dAAI0A0000,0*3A	Pass
Confirm that the content of Message 22 is as defined by the ACM sentence.	The Message 22 contents match the parameters defined in the ACM sentence, as seen in the table below.	Pass
Confirm that the MMSI's have the correct number of bits in Message 22.	Both addressed MMSI's are encoded using 30 bits: MMSI 1: 101001110001010101111110000100 MMSI 2: 100110110001000101000101100100	Pass

e) Addressed Message 22 Decodes		
!AIVDM,1,1,,A,F02B`i22N1d5>:ghP9dAAI0A0000,0*39		
Parameter	Decoded Value	Expected Value
Message ID	22	22
Repeat Indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Channel A	2087	2087
Channel B	2075	2075
Tx/Rx Mode	0 - Tx A/Tx B, Rx A/Rx B (default)	0
Power	0 - High	0
MMSI ID 1	700800900	700800900
MMSI ID 2	650400100	650400100
Address/Broadcast	1 - Addressed	1 - Addressed
Channel A Bandwidth	0	0
Channel B Bandwidth	0	0
Transitional Zone Size	3 NM	3 NM
Spare	0	0
!AIVDM,1,1,,B,F02B`i22N1d5>:ghP9dAAI0A0000,0*3A		
Parameter	Decoded Value	Expected Value
Message ID	22	22
Repeat Indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Channel A	2087	2087
Channel B	2075	2075
Tx/Rx Mode	0 - Tx A/Tx B, Rx A/Rx B (default)	0 - Tx A/Tx B, Rx A/Rx B (default)
Power	0 - High	0 - High
MMSI ID 1	700800900	700800900
MMSI ID 2	650400100	650400100
Address/Broadcast	1 - Addressed	1 - Addressed
Channel A Bandwidth	0	0
Channel B Bandwidth	0	0
Transitional Zone Size	3 NM	3 NM
Spare	0	0

f) Configure all 8 ACA Sentences		
Requirement	Verdict	Result
Apply ACA sentences to the EUT defining seven further regional areas with the in-use flag set to 1.	The ACA sentences applied to the EUT are: $ABACA,0,5200.0,N,00200.0,W,5100.0,N,00300.0,W,1,2079,0,2080,0,0,1,,1,*59 $ABACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,1,2079,0,2081,0,0,1,,1,*5B $ABACA,2,5200.0,N,00000.0,W,5100.0,N,00100.0,W,1,2079,0,2082,0,0,1,,1,*59 $ABACA,3,5100.0,N,00200.0,W,5000.0,N,00300.0,W,1,2079,0,2083,0,0,1,,1,*5B $ABACA,4,5100.0,N,00000.0,W,5000.0,N,00100.0,W,1,2079,0,2084,0,0,1,,1,*5B $ABACA,5,5000.0,N,00200.0,W,4900.0,N,00300.0,W,1,2079,0,2085,0,0,1,,1,*52 $ABACA,6,5000.0,N,00100.0,W,4900.0,N,00200.0,W,1,2079,0,2086,0,0,1,,1,*50 $ABACA,7,5000.0,N,00000.0,W,4900.0,N,00100.0,W,1,2079,0,2087,0,0,1,,1,*52	-
Verify the EUT correctly stores the regional operating areas by querying for the ACA configuration.	The results of the $ABABQ,ACA*3E query show the ACA sentences were all received and accepted by the EUT: $ABACA,0,5200.0,N,00200.0,W,5100.0,N,00300.0,W,1,2079,0,2080,0,0,1,,1,*59 $ABACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,1,2079,0,2081,0,0,1,,1,*5B $ABACA,2,5200.0,N,00000.0,E,5100.0,N,00100.0,W,1,2079,0,2082,0,0,1,,1,*4B $ABACA,3,5100.0,N,00200.0,W,5000.0,N,00300.0,W,1,2079,0,2083,0,0,1,,1,*5B $ABACA,4,5100.0,N,00000.0,E,5000.0,N,00100.0,W,1,2079,0,2084,0,0,1,,1,*49 $ABACA,5,5000.0,N,00200.0,W,4900.0,N,00300.0,W,1,2079,0,2085,0,0,1,,1,*52 $ABACA,6,5000.0,N,00100.0,W,4900.0,N,00200.0,W,1,2079,0,2086,0,0,1,,1,*50 $ABACA,7,5000.0,N,00000.0,E,4900.0,N,00100.0,W,1,2079,0,2087,0,0,1,,1,*40	Pass
Verify that the areas are transmitted sequentially in Message 22.	The EUT cycles through the ACA sentences sequentially, as shown in the table of Message 22's below.	Pass

f) Configure all 8 ACA Sentences					
Time	Slot	Chan	MMSI	Sequence Number	Sentence
14:20:00	1	A	2402500	1	!AIVDM,1,1,,A,F02B`i21v24?vm1qp?sD3g400000,0*16
14:20:00	7	B	2402500	1	!AIVDM,1,1,,B,F02B`i21v24?vm1qp?sD3g400000,0*15
14:21:00	1	A	2402500	2	!AIVDM,1,1,,A,F02B`i21v288001qp?ub3g400000,0*26
14:21:00	7	B	2402500	2	!AIVDM,1,1,,B,F02B`i21v288001qp?ub3g400000,0*25

14:22:00	1	A	2402500	3	!AIVDM,1,1,,A,F02B`i21v2<?ub1oR?pv3bH00000,0*66
14:22:00	7	B	2402500	3	!AIVDM,1,1,,B,F02B`i21v2<?ub1oR?pv3bH00000,0*65
14:23:00	1	A	2402500	4	!AIVDM,1,1,,A,F02B`i21v2@8001oR?ub3bH00000,0*1B
14:23:00	7	B	2402500	4	!AIVDM,1,1,,B,F02B`i21v2@8001oR?ub3bH00000,0*18
14:24:00	1	A	2402500	5	!AIVDM,1,1,,A,F02B`i21v2D?ub1m<?pv3Ud00000,0*69
14:24:00	7	B	2402500	5	!AIVDM,1,1,,B,F02B`i21v2D?ub1m<?pv3Ud00000,0*6A
14:25:00	1	A	2402500	6	!AIVDM,1,1,,A,F02B`i21v2H?vm1m<?sD3Ud00000,0*58
14:25:00	7	B	2402500	6	!AIVDM,1,1,,B,F02B`i21v2H?vm1m<?sD3Ud00000,0*5B
14:26:00	1	A	2402500	7	!AIVDM,1,1,,A,F02B`i21v2L8001m<?ub3Ud00000,0*60
14:26:00	7	B	2402500	7	!AIVDM,1,1,,B,F02B`i21v2L8001m<?ub3Ud00000,0*63
14:27:00	1	A	2402500	0	!AIVDM,1,1,,A,F02B`i21v20?ub1qp?pv3g400000,0*2F
14:27:00	7	B	2402500	0	!AIVDM,1,1,,B,F02B`i21v20?ub1qp?pv3g400000,0*2C
14:28:00	1	A	2402500	1	!AIVDM,1,1,,A,F02B`i21v24?vm1qp?sD3g400000,0*16
14:28:00	7	B	2402500	1	!AIVDM,1,1,,B,F02B`i21v24?vm1qp?sD3g400000,0*15

g) Power Cycle the EUT		
Requirement	Result	Verdict
Cycle power on the EUT.	The power is removed and then reapplied to the EUT.	-
Verify the EUT's channel management settings are retained after powering.	The result of querying the EUT's channel management settings using the $ABABQ,ACA*3E query is: $ABACA,0,5200.0,N,00200.0,W,5100.0,N,00300.0,W,1,2079,0,2080,0,0,1,,1,*59 $ABACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,1,2079,0,2081,0,0,1,,1,*5B $ABACA,2,5200.0,N,00000.0,E,5100.0,N,00100.0,W,1,2079,0,2082,0,0,1,,1,*4B $ABACA,3,5100.0,N,00200.0,W,5000.0,N,00300.0,W,1,2079,0,2083,0,0,1,,1,*5B $ABACA,4,5100.0,N,00000.0,E,5000.0,N,00100.0,W,1,2079,0,2084,0,0,1,,1,*49 $ABACA,5,5000.0,N,00200.0,W,4900.0,N,00300.0,W,1,2079,0,2085,0,0,1,,1,*52 $ABACA,6,5000.0,N,00100.0,W,4900.0,N,00200.0,W,1,2079,0,2086,0,0,1,,1,*50 $ABACA,7,5000.0,N,00000.0,E,4900.0,N,00100.0,W,1,2079,0,2087,0,0,1,,1,*40	Pass
Verify the Message 22 begins transmitting within 2 minutes of powering on.	The EUT transmits the first Message 22 30 seconds after powering back on, as seen in the table below.	Pass

g) Message 22 Transmission after Power Cycling					
Time	Slot	Chan	Msg	Sentence	Comment
15:06:00	0	A	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32	
15:06:00	1	A	22	!AIVDM,1,1,,A,F02B`i21v2<?ub1oR?pv3bH00000,0*66	
15:06:00	4	A	4	!AIVDM,1,1,,A,402B`i1v@L?5swrCRRM6qBw02D00,0*56	
15:06:00	6	B	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02	
15:06:00	7	B	22	!AIVDM,1,1,,B,F02B`i21v2<?ub1oR?pv3bH00000,0*65	
15:06:10	379	B	4	!AIVDM,1,1,,B,402B`i1v@L?69wrCRRM6qBw025pH,0*55	
15:06:20	754	A	4	!AIVDM,1,1,,A,402B`i1v@L?6CwrCRRM6qBw02D00,0*65	
15:06:30	1129	B	4	!AIVDM,1,1,,B,402B`i1v@L?6MwrCRRM6qBw025pH,0*21	EUT power cycled at 15:06:30
15:07:40	1505	A	4	!AIVDM,1,1,,A,402B`i1v@L?7`wrCRDM6qD?02HGP,0*04	
15:07:50	1879	B	4	!AIVDM,1,1,,B,402B`i1v@L?7iwrCRDM6qDO02@MG,0*6B	
15:08:00	0	A	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32	
15:08:00	1	A	22	!AIVDM,1,1,,A,F02B`i21v24?vm1qp?sD3g400000,0*16	EUT resumes Message 22 transmissions, 30 seconds after powering on
15:08:00	4	A	4	!AIVDM,1,1,,A,402B`i1v@L?7swrCRDM6qDO02L00,0*74	
15:08:00	6	B	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02	
15:08:00	7	B	22	!AIVDM,1,1,,B,F02B`i21v24?vm1qp?sD3g400000,0*15	

h) Disable all ACA Settings		
Requirement	Result	Verdict
Apply an ACA sentence for each of the 8 stored area settings, with the same area definition as stored, but the in-use flag set to 0.	The ACA sentences applied to the EUT are: $ABACA,0,5200.0,N,00200.0,W,5100.0,N,00300.0,W,1,2079,0,2080,0,0,1,,0,*58 $ABACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,1,2079,0,2081,0,0,1,,0,*5A $ABACA,2,5200.0,N,00000.0,E,5100.0,N,00100.0,W,1,2079,0,2082,0,0,1,,0,*4A $ABACA,3,5100.0,N,00200.0,W,5000.0,N,00300.0,W,1,2079,0,2083,0,0,1,,0,*5A $ABACA,4,5100.0,N,00000.0,E,5000.0,N,00100.0,W,1,2079,0,2084,0,0,1,,0,*48 $ABACA,5,5000.0,N,00200.0,W,4900.0,N,00300.0,W,1,2079,0,2085,0,0,1,,0,*53 $ABACA,6,5000.0,N,00100.0,W,4900.0,N,00200.0,W,1,2079,0,2086,0,0,1,,0,*51 $ABACA,7,5000.0,N,00000.0,E,4900.0,N,00100.0,W,1,2079,0,2087,0,0,1,,0,*41	-

Confirm that the EUT removes the 8 area settings- or sets the in-use flag of the stored area to 0.	The EUT returns the following to the $ABABQ,ACA*3E query: $ABACA,0,5200.0,N,00200.0,W,5100.0,N,00300.0,W,1,2079,0,2080,0,0,1,,0,*58 $ABACA,1,5200.0,N,00100.0,W,5100.0,N,00200.0,W,1,2079,0,2081,0,0,1,,0,*5A $ABACA,2,5200.0,N,00000.0,E,5100.0,N,00100.0,W,1,2079,0,2082,0,0,1,,0,*4A $ABACA,3,5100.0,N,00200.0,W,5000.0,N,00300.0,W,1,2079,0,2083,0,0,1,,0,*5A $ABACA,4,5100.0,N,00000.0,E,5000.0,N,00100.0,W,1,2079,0,2084,0,0,1,,0,*48 $ABACA,5,5000.0,N,00200.0,W,4900.0,N,00300.0,W,1,2079,0,2085,0,0,1,,0,*53 $ABACA,6,5000.0,N,00100.0,W,4900.0,N,00200.0,W,1,2079,0,2086,0,0,1,,0,*51 $ABACA,7,5000.0,N,00000.0,E,4900.0,N,00100.0,W,1,2079,0,2087,0,0,1,,0,*41	Pass
Confirm that the EUT ceases transmission of the channel management messages.	The EUT does not transmit Message 22 after the in-use flag has been set to 0 for all the ACA sentences, as shown in the table below.	Pass

h) Disable all ACA Settings					
Time	Slot	Chan	Msg	Sentence	Comment
15:28:00	0	A	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32	
15:28:00	1	A	22	!AIVDM,1,1,,A,F02B`i21v2D?ub1m<?pv3Ud00000,0*69	
15:28:00	4	A	4	!AIVDM,1,1,,A,402B`i1v@L?KswrCRBM6qAg020S:,0*36	
15:28:00	6	B	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02	
15:28:00	7	B	22	!AIVDM,1,1,,B,F02B`i21v2D?ub1m<?pv3Ud00000,0*6A	
15:28:10	379	B	4	!AIVDM,1,1,,B,402B`i1v@L?L9wrCRBM6qAg025qh,0*0D	ACA settings applied at 15:28:17
15:28:20	754	A	4	!AIVDM,1,1,,A,402B`i1v@L?LCwrCRBM6qAg02<00,0*64	
15:28:30	1129	B	4	!AIVDM,1,1,,B,402B`i1v@L?LMwrCRBM6qAg02<00,0*69	
15:28:40	1504	A	4	!AIVDM,1,1,,A,402B`i1v@L?LWwrCRBM6qAg025qh,0*60	
15:28:50	1879	B	4	!AIVDM,1,1,,B,402B`i1v@L?LiwrCRBM6qAg028MG,0*43	
15:29:00	0	A	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`N4d04N00,2*32	EUT ceases transmission on Message 22
15:29:00	4	A	4	!AIVDM,1,1,,A,402B`i1v@L?LswrCRBM6qAg02<00,0*54	
15:29:00	6	B	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pN4d04N00,2*02	
15:29:10	379	B	4	!AIVDM,1,1,,B,402B`i1v@L?M9wrCRBM6qAg020S:,0*79	
15:29:20	754	A	4	!AIVDM,1,1,,A,402B`i1v@L?MCwrCRBM6qAg028;j,0*30	

VDM to VDL Processing - Clause 10.2.1.7

This test will verify that the Base Station can receive multiple types of VDM inputs and transmit the encapsulated message as required by the message type.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the dependent mode pre-set-up conditions.

a) Apply a VDM sentence to the EUT.

The following tests are required for a Base Station operated as an independent unit.

b) Apply the independent mode setup to the EUT.
c) Enable RATDMA using a BCG sentence:
   $xxBCG,<UI>,,,,,,,,,1,,,,C
d) Apply VDM sentences with encapsulated Message 1 to 27 and one undefined message to the EUT. Message 15 shall be with and without slot offset. Message 16 shall be with rate assignment and slot assignment.
e) Apply a VDM of Message 1 like the following VDM sentence with a CommState allocating slots and repeat indicator = 0 to the EUT:
   !xxVDM,1,1,,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0
f) Disable RATDMA and clear available FATDMA slots. Apply a VDM sentence to the EUT:
   $xxBCG,<UI>,,,,,,,,,0,,,,C
   $xxDLM,0,A,L,4,1,7,750,L,0,1,7,0,C,,,,,,,,,,C
   $xxDLM,0,B,L,379,1,7,750,L,6,1,7,0,C,,,,,,,,,,C
g) Apply a DLM sentence with one available slot in each frame. Then apply 5 VDM sentences:
   $xxDLM,0,A,L,4,1,7,750,L,0,1,7,0,L,10,1,7,0,,,,,

Required Results

Confirm that:

a) the EUT generates an appropriate TFR sentence and does NOT transmit the VDM.

The following results are required for a Base Station operated as an independent unit:

b) the independent mode setup has been correctly set;
c) the RATDMA flag is set to 1;
d) the EUT generates an appropriate TFR sentence and transmits each allowable message, allowing up to 4 s between transmissions in available FATDMA or RATDMA slots. Confirm that the information in each transmitted message is complete and correct. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that VDL Message 4, 11 and 20 VDM sentences are not transmitted. Confirm that only VDL Message 15s without slot offset are transmitted. Confirm that Message 16 with slot assignment is not transmitted. Confirm that the CommState is cleared for messages with a CommState;
e) the EUT generates an appropriate TFR sentence and transmits the message after correcting CommState and that the repeat indicator is not zero;
f) the EUT generates an appropriate TFR sentence and does NOT transmit the VDM;
g) the DLM sentence was received correctly by the EUT using the query sentence for the DLM sentence. Confirm that the EUT transmits the 5 VDM messages, one in each frame.

Test Results

a) Apply a VDM Sentence to the EUT		
Requirement	Result	Verdict
A VDM sentence shall be applied to the EUT.	The VDM sentence sent to the EUT is: !AIVDM,1,1,,B,402B`i1v@L?i9wrCRBM6qF?02@5s,0*5D	-
The EUT shall generate an appropriate TFR sentence.	The TFR sentence output by the EUT is: $ABTFR,1,,B,1234,,,,,1,2,6*2D	Pass
The EUT shall not transmit the VDM message.	The EUT does not transmit the VDM sentence over the VDL.	Pass

b) Apply the Independent Mode Set-up		
Requirement	Result	Verdict
Apply the independent mode set-up routine to the EUT.	The EUT is set-up to operate in independent mode, as defined in §10.1.3.	Pass

c) Enable RATDMA		
Requirement	Result	Verdict
Enable RATDMA using a BCG sentence.	The BCG sentence applied to the EUT is: $ABBCG,1234,,,,,,,,,**1**,,,,C*33	-
Confirm that the EUT received the BCG sentence by querying the BCG settings.	The results returned by the query $ABABQ,BCG*3B are: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,**1**,I,60,AB,R*6D	Pass

d) Apply Messages 1 to 27, and one Undefined Message		
Requirement	Result	Verdict
Apply Messages 1 to 27 to the EUT, as well as one undefined message.	See the table below for results.	Pass
Confirm that the EUT generates an appropriate TFR sentence and transmits each allowable message.	For each allowable message, including undefined messages, a TFR sentence contains the correct data.	Pass
Confirm the EUT allows up to 4 seconds between transmissions in available FATDMA or RATDMA slots.	See the table below.	Pass
Confirm that the information in each transmitted message is complete and correct.	The information contained within each of the transmitted messages matches the contents of the corresponding applied VDM message.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The correct VDO sentence is output to the PI when a message is transmitted on the VDL.	Pass
Confirm that VDL Message 4, 11 and 20 VDM sentences are not transmitted.	Messages 4, 11 and 20 are not transmitted on the VDL. A TFR sentence is applied to the PI showing the sentence is not transmitted.	Pass
Confirm that Message 15 without a slot offset is transmitted.	Message 15 without a slot offset is transmitted, as seen in the table below.	Pass
Confirm that Message 15 with a slot offset is not transmitted.	Message 15 with a slot offset is applied to the EUT and is not transmitted: !ABVDM,1,1,,A,?02B`i1df1ADD6@000000000000,2*6C $ABTFR,1,,A,1234,,,,,1,2,6*2E	Pass
Confirm that Message 16 with slot assignment is not transmitted.	Message 16 with slot assignment is not transmitted: !AIVDM,1,1,,A,@02B`i00Qr8p6@<P,0*5E $ABTFR,1,,A,1234,,,,,1,2,6*2E	Pass
Confirm that CommState is cleared for messages with a CommState.	The CommState is cleared for messages with a CommState, as seen in the table below.	Pass

d) Messages 1 to 27 and an Undefined Message			
Time	Msg	VDO Sentence	TFR Sentence
11:18:18	1	!ABVDO,1,1,,A,1@2B`i02P:wrFu2M7AWh2gwV0000,0*3B	$ABTFR,1,,A,1234,,,1118,760,1,2,0*10
11:18:20	2	!ABVDO,1,1,,A,2@2B`i02P:wrFu2M7AWh2gwb0000,0*0C	$ABTFR,1,,A,1234,,,1118,835,1,2,0*1F
11:18:23	3	!ABVDO,1,1,,A,3@2B`i02P:wrFu2M7AWh2gwf0000,0*09	$ABTFR,1,,A,1234,,,1118,910,1,2,0*19
11:18:25	4	Not transmitted.	$ABTFR,1,,A,1234,,,,,1,2,6*2E
11:18:26	5A	!ABVDO,2,1,4,A,5@2B`i4009QIAEI=D@1AEJ1@E=@000000000000t000004000:<00000,0*35	$ABTFR,2,2,A,1234,,,1426,649,3,2,0*21
11:18:29	5B	!ABVDO,2,2,4,A,0000000000000000000000000,0*1B	$ABTFR,2,2,A,1234,,,1426,649,3,2,0*21
11:18:31	6	!ABVDO,1,1,,A,6@2B`i2W5Gp@04205@E=B0m<N3H,2*18	$ABTFR,1,,A,1234,,,1118,1210,1,2,0*23

d) Messages 1 to 27 and an Undefined Message			
Time	Msg	VDO Sentence	TFR Sentence
11:18:32	7	!ABVDO,1,1,,A,7@2B`i2W5Gp@0000000000000000,0*06	$ABTFR,1,,A,1234,,,1118,1254,1,2,0*23
11:18:35	8	!ABVDO,1,1,,A,8@2B`i00@00E1Dm83Dip>0,4*6F	$ABTFR,1,,A,1234,,,1118,1360,1,2,0*25
11:18:37	9	!ABVDO,1,1,,A,9@2B`i7l1TwrFu2M7AWoq4804000,0*5F	$ABTFR,1,,A,1234,,,1118,1435,1,2,0*22
11:18:39	10	!ABVDO,1,1,,A,:@2B`i20qc?p,0*73	$ABTFR,1,,A,1234,,,1118,1510,1,2,0*24
11:18:41	11	Not transmitted.	$ABTFR,1,,A,1234,,,,,1,2,6*2E
11:18:43	12	!ABVDO,1,1,,A,<@2B`i2?:r;0D5CDP=C7Pij0,0*68	$ABTFR,1,,A,1234,,,1118,1660,1,2,0*20
11:18:45	13	!ABVDO,1,1,,A,=@2B`i2?=up00000000000000000,0*2E	$ABTFR,1,,A,1234,,,1118,1735,1,2,0*21
11:18:47	14	!ABVDO,1,1,,A,>@2B`i1@E=B0m<N37@0,2*3A	$ABTFR,1,,A,1234,,,1118,1754,1,2,0*26
11:18:51	15	!ABVDO,1,1,,A,?@2B`i1df1AD4000S:000000000,2*71	$ABTFR,1,,A,1234,,,1118,1960,1,2,0*2F
11:18:55	16	!ABVDO,1,1,,A,@@2B`i00Qr8p,0*3D	$ABTFR,1,,A,1234,,,1118,2110,1,2,0*23
11:18:57	17	!ABVDO,1,1,,A,A@2Boi7SwIprW@2@5004000F?`@070?NQ00L10d400@4,0*73	$ABTFR,1,,A,1234,,,1118,2185,2,2,0*2C
11:18:59	18	!ABVDO,1,1,,A,B@2B`i00N7vUg@WAIlvLErnP2000,0*2B	$ABTFR,1,,A,1234,,,1119,10,1,2,0*21
11:19:01	19	!ABVDO,1,1,,A,C@2B`i002WvUg@WAIlt0cwq0`:Va0JV?1Sj00000000000000030,0*53	$ABTFR,1,,A,1234,,,1119,85,2,2,0*2E
11:19:03	20	Not transmitted.	$ABTFR,1,,A,1234,,,,,1,2,6*2E
11:19:05	21	!ABVDO,1,1,,A,EFWuQTPq0000000000000000000Ou;NQ>S`kp00000nhGU1Dm80E3kP,2*69	$ABTFR,1,,A,1234,,,1119,235,2,2,0*17
11:19:07	22	!ABVDO,1,1,,A,F@2B`i22N2P7vm1oR?sD3bH2P000,0*1F	$ABTFR,1,,A,1234,,,1119,254,1,2,0*13
11:19:09	23	!ABVDO,1,1,,A,G@2B`i3wJPsi7ub1m<000000000,2*67	$ABTFR,1,,A,1234,,,1119,385,1,2,0*1E
11:19:11	24A	!ABVDO,1,1,,A,HJLEOQ1AEJ1@E=@000000000000,2*0E	$ABTFR,1,,A,1234,,,1119,460,1,2,0*12
11:19:13	24B	!ABVDO,1,1,,A,HJLEOQ4tmlkji00DEFCE400VrvP0,0*54	$ABTFR,1,,A,1234,,,1119,504,1,2,0*11
11:19:15	25	!ABVDO,1,1,,A,I@2B`i40@00b2ab@6RaaPSRhIJP0,0*36	$ABTFR,1,,A,1234,,,1119,610,1,2,0*17
11:19:17	26	!ABVDO,1,1,,A,J@2B`i40@00QT0a0Qb2a9P0000,4*71	$ABTFR,1,,A,1234,,,1119,685,1,2,0*1B
11:19:19	27	!ABVDO,1,1,,A,Kh2B`i<?u7CfP<`h,0*75	$ABTFR,1,,A,1234,,,1119,760,1,2,0*11
11:19:21	28	!ABVDO,1,1,,A,L@2B`i0?u7CfP:Bj,0*70	$ABTFR,1,,A,1234,,,1119,835,1,2,0*1E

e) VDM Message 1		
Requirement	Result	Verdict
Apply VM Message 1 with a CommState allocating slots and repeat indicator = 0 to the EUT.	The VDM sentence applied to the EUT is: !ABVDM,1,1,,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*40	-
Confirm that the EUT generates an appropriate TFR sentence.	The EUT outputs the following TFR sentence: $ABTFR,1,,A,1234,,,1544,1510,1,2,0*29	Pass
Confirm the EUT transmits the message after correcting CommState and that the repeat indicator is not zero.	The EUT corrects the CommState field and transmits the message on the VDL; see the table below.	Pass

e) EUT Correction of CommState and Repeat Indicator		
Parameter	!ABVDM,1,1,,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*40	!AIVDM,1,1,,A,1EM3NSwP00J6TN>?a0e3Ngv00000,0*19
Message ID	1 - Position report	1 - Position report
Repeat Indicator	**0**	**1**
MMSI	366009999	366009999
Navigational Status	15 - not defined (also used by AIS-SART under test)	15 - not defined (also used by AIS-SART under test)
Rate Of Turn	no turn information available (default)	no turn information available (default)
Speed Over Ground	0	0
Position Accuracy	0 - low (>10 m)	0 - low (>10 m)
Longitude	82 27.0521 W	82 27.0521 W
Latitude	27 20.0564 N	27 20.0564 N
Course Over Ground	89	89
True Heading	511 - not available	511 - not available
Time Stamp	0	0
Special Manoeuvre Indicator	0 - not available	0 - not available
Spare	0	0

e) EUT Correction of CommState and Repeat Indicator		
Parameter	!ABVDM,1,1,,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*40	!AIVDM,1,1,,A,1EM3NSwP00J6TN>?a0e3Ngv00000,0*19
RAIM Flag	0 - RAIM not in use	0 - RAIM not in use
Communication State - Sync State	0	0
Communication State - Slot Timeout	0	0
Communication State - Sub Message	**Slot Offset = 2297**	**Slot Offset = 0**

f) Disable RATDMA and Clear Available FATDMA Slots		
Requirement	Result	Verdict
Disable RATDMA and clear the available FATDMA slots.	The sentences applied to the EUT are: $ABBCG,1234,,,,,,,,,0,,,,C*32 $ABDLM,0,A,L,4,1,7,750,L,0,1,7,0,C,,,,,,,,,,C*1D $ABDLM,0,B,L,379,1,7,750,L,6,1,7,0,C,,,,,,,,,,C*11	-
Apply a VDM sentence to the EUT.	The VDM sent to the PI is: !AIVDM,1,1,,B,402B`i1v@MhQMwrCQtM6qEg028Aa,0*37	-
Confirm the EUT does not transmit the VDM sentence.	The EUT does not transmit the VDM sentence.	Pass
Confirm the EUT outputs a TFR sentence to the PI.	The EUT outputs the following TFR sentence: $ABTFR,1,,B,1234,,,,,1,2,6*2D	Pass

g) Apply a DLM Sentence with One Slot Available per Frame		
Requirement	Result	Verdict
Apply a DLM sentence with one available slot in each frame.	The DLM sentence applied to the EUT is: $ABDLM,0,A,L,4,1,7,750,L,0,1,7,0,L,10,1,7,0,,,,,*4A	-
Confirm the EUT received the DLM sentence by querying the DLM settings.	The results of the DLM query show that the sentence was received successfully: $ABABQ,DLM*38 $ABDLM,0,A,L,4,1,7,750,L,0,1,7,0,L,10,1,7,0,,,,,,R*34	Pass
When 5 VDM sentences are applied to the EUT, they shall be transmitted in 5 sequential frames.	The VDM applied to the EUT at 16:59:12 is: !AIVDM,1,1,,A,33LC9e@2P:wrFu2M7AWh2gw00000,0*7F The EUT transmits the 5 messages in separate frames, as seen in the table below.	Pass

g) Transmission Results					
Time	Slot	Chan	MMSI	Msg	Sentence
17:00:00	10	A	231000501	3	!AIVDM,1,1,,A,3CLC9e@2P:wrFu2M7AWh2gw00000,0*0F
17:01:00	10	A	231000501	3	!AIVDM,1,1,,A,3CLC9e@2P:wrFu2M7AWh2gw00000,0*0F
17:02:00	10	A	231000501	3	!AIVDM,1,1,,A,3CLC9e@2P:wrFu2M7AWh2gw00000,0*0F
17:03:00	10	A	231000501	3	!AIVDM,1,1,,A,3CLC9e@2P:wrFu2M7AWh2gw00000,0*0F
17:04:00	10	A	231000501	3	!AIVDM,1,1,,A,3CLC9e@2P:wrFu2M7AWh2gw00000,0*0F

TSA and Associated VDM Processing – Clause 10.2.1.8

This test will verify that the Base Station can receive a TSA and the associated VDM for all message types, and transmit the encapsulated message in the assigned slot.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Apply TSA+VDM sentence pair with encapsulated Message 1 to 27 to the EUT.
b) Apply the following TSA+VDM sentence pair with a CommState allocating slots and repeat indicator = 0 to the EUT:
   $xxTSA,<UI>,9,A,<UTC h+m>,2100,2
   !xxVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0
c) Apply five TSA and five VDM sentences with encapsulated Message 1 to the EUT assigning the transmission of the five Messages 1s in consecutive slots on the same channel.
   $xxTSA, <UI>,0,A, <UTC h+m>,1001,2
   !ABVDM,1,1,0,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0
   $xxTSA, <UI>,1,A, <UTC h+m>,1002,2
   !ABVDM,1,1,1,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0
   $xxTSA, <UI>,2,A, <UTC h+m>,1003,2
   !ABVDM,1,1,2,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0
   $xxTSA, <UI>,3,A, <UTC h+m>,1004,2
   !ABVDM,1,1,3,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0
   $xxTSA, <UI>,4,A,<UTC h+m>,1005,2
   !ABVDM,1,1,4,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0
d) Apply the TSA+VDM sentence pair with an encapsulated message ID that is undefined, with the correct message structure to the EUT.
   $xxTSA,<UI>,5,A, <UTC h+m>,1005,2
   !ABVDM,1,1,5,A,W5M3NSwP00J6TN0?a0iT<Ov>0D01,0
e) Apply a TSA sentence and a VDM sentence with encapsulated Message 8, using five slots (168 characters = 1 008 bit).
   $xxTSA,<UI>,6,B, <UTC h+m>,1005,2
   !xxVDM,3,1,6,B,8h3OHqh0J00@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0
   !xxVDM,3,2,6,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0
   !xxVDM,3,3,6,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT0,0
   Apply a TSA sentence and a VDM sentence with encapsulated Message 14 at least 266 ms (10 slot duration) before the scheduled Message 8 using one slot and using the same start slot number on the same channel.
   $xxTSA,<UI>,7,B, <UTC h+m>,1005,2
   !xxVDM,1,1,7,B,>h3OHqi@E=@,2
f) Apply a TSA sentence and a VDM sentence with encapsulated Message 14 using one slot with a UTC time that is invalid to the EUT (e.g. 25 h 61 min).
   $xxTSA,<UI>,8,B,2561,1005,2
   !xxVDM,1,1,8,B,>h3OHqi@E=@,2
g) Apply a TSA sentence and a VDM sentence with encapsulated Message 14 using an invalid slot number to the EUT.
   $xxTSA,<UI>,9,B, <UTC h+m>,2250,2
   !xxVDM,1,1,9,B,>h3OHqi@E=@,2
h) Apply a TSA sentence and a VDM sentence with encapsulated Message 14 using six slots to the EUT (196 characters = 1 176 bit).
   $xxTSA,<UI>,6,B, <UTC h+m>,1005,2
   !xxVDM,4,1,6,B,>h3OHqh048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0

!xxVDM,4,2,6,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0
!xxVDM,4,3,6,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0
!xxVDM,4,4,6,B,<@DHLPT048<@DHLP,0

i) Apply the number of TSA+VDM pairs needed to exceed available memory.
j) Apply a VDM of Message 14 without TSA sentence.
k) Apply TSA and VDM sentences with encapsulated Message 14 to the EUT assigning the transmission of the Message 14s with the scheduled time before the current time. Apply the same TSA with the priority set to 0 to cancel the transmission.
$xxTSA,<UI>,0,A, <UTC h+m>,1001,2
!xxVDM,1,1,0,B,>h3OHqi@E=@,2
$xxTSA,<UI>,,A, <UTC h+m>,1001,0

The following tests are required for a Base Station operated as an independent unit.

l) Apply a TPC to prohibit the use of slots.
$xxTPC,<UI>99,A,<hhmmss>,0,1000,5,,,,,E,C
Apply a TSA+VDM of Message 14 that uses the prohibited slots reserved by the TPC.
$xxTSA,<UI>,7,A, <UTC h+m>,1001,2
!xxVDM,1,1,7,B,>h3OHqi@E=@,2
m) Apply a TSA+VDM in the same slot, different frame from l).
$xxTSA,<UI>,7,B, <UTC h+m+1>,1001,2
!xxVDM,1,1,7,B,>h3OHqi@E=@,2
n) Activate the autonomous transmission of Message 4.
$xxECB,<UI>,4,0,4,750,,0,379,750,,C
Apply a TSA/Message 8 VDM pair with low priority in conflict with the autonomous Message 4 transmission defined in the ECB.
$xxTSA,<UI>,7,B, <UTC h+m>,1129,2
!xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0
o) Apply a TSA/Message 8 VDM pair with high priority in conflict with the autonomous Message 4 transmission defined in the ECB.
$xxTSA,<UI>,7,B, <UTC h+m>,1879,1
!xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0
p) Apply a TPC to reserve slots in conflict with the Message 4 schedule.
$xxTPC,<UI>1,A,<hhmmss>,0,750,5,,,,,E,C

Required Results

Confirm that:

a) the appropriate TFR sentences are output on the PI. Confirm that the EUT is transmitting Messages 1 to 27 as required over the VDL in the assigned slots and that the information is complete and correct. Confirm that the appropriate VDO sentences are output on the PI when a message is transmitted;
b) the appropriate TFR sentence is output on the PI. Confirm that the EUT transmits the message with no data content processing. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
c) the appropriate TFR sentences are output on the PI. Confirm that the EUT transmits the five Message 1s in the assigned consecutive slots on the same channel and that the information is complete and correct. Confirm that the appropriate VDO sentences are output on the PI when a message is transmitted;
d) the appropriate TFR sentence is output on the PI. Confirm that the EUT transmits the message with no data content processing. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
e) the EUT generates a TFR sentence with status 0 for Message 8 on the PI. Confirm that the EUT generates a TFR sentence with status 1 for Message 14 on the PI. Confirm that the EUT transmits only Message 14. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;

f) the EUT generates a TFR sentence with status 10 for Message 14 on the PI. Confirm that the EUT does not transmit Message 14;
g) the EUT generates a TFR sentence with status 10 for Message 14 on the PI. Confirm that the EUT does not transmit Message 14;
h) the EUT generates a TFR sentence with status 10 for Message 14 on the PI. Confirm that the EUT does not transmit Message 14;
i) the EUT generates a TFR sentence with status 3. If it is not possible to exceed the available memory the test is deemed to be passed;
j) the EUT generates a TFR with status 10 and does not transmit Message 14;
k) the EUT generates a TFR sentence with status 2 for the original TSA/VDM pair. Confirm that the EUT generates a TFR with status 4 for the second TSA sentence, with priority 0, which cancels the first TSA sentence and that Message 14 is not transmitted.

The following results are required for a Base Station operated as an independent unit:

l) the EUT generates a TSR sentence with status 0. Confirm that the EUT generates a TFR sentence with status 7 for the TSA/VDM of Message 14 for the prohibited slot;
m) the EUT generates a TFR sentence with status 0. Confirm that the EUT transmits Message 14;
n) the ECB PI sentence was received correctly by the EUT and it starts transmission of Message 4. Confirm that the EUT generates a TFR sentence with status 5. Confirm that the EUT does NOT transmit Message 8;
o) the EUT generates a TFR sentence with status 1. Confirm that the EUT transmits Message 8 replacing the scheduled Message 4;
p) the EUT generates a TSR sentence with status 1.

Test Results

a) Test Messages 1 to 27 using the TSA+VDM Sentences		
Requirement	Result	Verdict
Confirm that the appropriate TFR sentences are output on the PI.	For each VDM sentence applied, a TFR sentence with correct contents is generated and output to the PI- as seen in the table below titled “TFR Sentences Generated by the EUT”.	Pass
Confirm that the EUT is transmitting Messages 1 to 27 as required over the VDL in the assigned slots and that the information is complete and correct.	The Messages 1 to 27 are transmitted over VDL and the contents of the VDM messages being transmitted is correct. This is shown in the table below, titled “EUT Transmissions”.	Pass
Confirm that the appropriate VDO sentences are output on the PI when a message is transmitted.	For each VDM sentence transmitted, a VDO sentence with corresponding data is output to the PI; see the table “EUT Transmissions” for results.	Pass

a) TFR Sentences Generated by the EUT			
Msg	TSA Sentence	VDM Applied	TFR Sentence
1	$ABTSA,1234,1,A,1024,50,2*01	!ABVDM,1,1,1,A,102B`i02P:wrFu2M7AWh2gv01T00,0*7A	$ABTFR,1,1,A,1234,1024,50,,,1,2,0*1B
2	$ABTSA,1234,1,A,1024,100,2*35	!ABVDM,1,1,1,A,202B`i02P:wrFu2M7AWh2gv01T00,0*79	$ABTFR,1,1,A,1234,1024,100,,,1,2,0*2F
3	$ABTSA,1234,1,A,1024,150,2*30	!ABVDM,1,1,1,A,302B`i02P:wrFu2M7AWh2gv01P00,0*7C	$ABTFR,1,1,A,1234,1024,150,,,1,2,0*2A
4	$ABTSA,1234,1,A,1024,200,2*36	!ABVDM,1,1,1,A,402B`i1v@Mb1FOrFu2M7AWi00000,0*37	$ABTFR,1,1,A,1234,1024,200,,,1,2,0*2C
5	$ABTSA,1234,1,A,1024,250,2*33	!ABVDM,1,1,1,A,502B`i7WB?maAEI=D@1@E=B1HE=<Dh000000000t000054pibI4kmE20CD53kP000000000,0*57	$ABTFR,1,1,A,1234,1024,250,,,2,2,0*2A
6	$ABTSA,1234,1,A,1024,300,2*37	!ABVDM,1,1,1,A,602B`i2W5Gp@04205@E=B0m<N3H,0*59	$ABTFR,1,1,A,1234,1024,300,,,1,2,0*2D
7	$ABTSA,1234,1,A,1024,350,2*32	!ABVDM,1,1,1,A,702B`i2W5Gp@0000000000000000,0*45	$ABTFR,1,1,A,1234,1024,350,,,1,2,0*28
8	$ABTSA,1234,1,A,1024,400,2*30	!ABVDM,1,1,1,A,802B`i00@00E1Dm83Dip>0,0*28	$ABTFR,1,1,A,1234,1024,400,,,1,2,0*2A
9	$ABTSA,1234,1,A,1024,450,2*35	!ABVDM,1,1,1,A,902B`i7l1TwrFu2M7AWoq?804000,0*17	$ABTFR,1,1,A,1234,1024,450,,,1,2,0*2F
10	$ABTSA,1234,1,A,1024,500,2*31	!ABVDM,1,1,1,A,:02B`i20qc?p,0*30	$ABTFR,1,1,A,1234,1024,500,,,1,2,0*2B

a) TFR Sentences Generated by the EUT			
Msg	TSA Sentence	VDM Applied	TFR Sentence
11	$ABTSA,1234,1,A,1024,550,2*34	!ABVDM,1,1,1,A,;02B`i1v@MbDNwrFu2M7AWi02000,0*7F	$ABTFR,1,1,A,1234,1024,550,,,1,2,0*2E
12	$ABTSA,1234,1,A,1024,600,2*32	!ABVDM,1,1,1,A,<02B`i2?:r;0D5CDP=C7Pij0,0*2B	$ABTFR,1,1,A,1234,1024,600,,,1,2,0*28
13	$ABTSA,1234,1,A,1024,650,2*37	!ABVDM,1,1,1,A,=02B`i2?=up00000000000000000,0*6D	$ABTFR,1,1,A,1234,1024,650,,,1,2,0*2D
14	$ABTSA,1234,1,A,1024,700,2*33	!ABVDM,1,1,1,A,>02B`i1@E=B0m<N37@0,0*7B	$ABTFR,1,1,A,1234,1024,700,,,1,2,0*29
15	$ABTSA,1234,1,A,1024,750,2*36	!ABVDM,1,1,1,A,?02B`i1df1ADD6@0000000000000,0*5F	$ABTFR,1,1,A,1234,1024,750,,,1,2,0*2C
16	$ABTSA,1234,1,A,1024,800,2*3C	!ABVDM,1,1,1,A,@02B`i00Qr8p,0*7E	$ABTFR,1,1,A,1234,1024,800,,,1,2,0*26
17	$ABTSA,1234,1,A,1024,850,2*39	!ABVDM,1,1,1,A,A02Boi7SwIprW@2@5004000F?`@070?NQ00L10d400@4,0*30	$ABTFR,1,1,A,1234,1024,850,,,2,2,0*20
18	$ABTSA,1234,1,A,1024,900,2*3D	!ABVDM,1,1,1,A,B02B`i00N7vUg@WAIlvLErg02000,0*01	$ABTFR,1,1,A,1234,1024,900,,,1,2,0*27
19	$ABTSA,1234,1,A,1024,950,2*38	!ABVDM,1,1,1,A,C02B`i002WvUg@WAIlt0cwP0`:Va0JV?1Sj00000000000000030,0*31	$ABTFR,1,1,A,1234,1024,950,,,2,2,0*21
20	$ABTSA,1234,1,A,1024,1000,2*05	!ABVDM,1,1,1,A,D02B`i06AB6@0000000000000000,0*62	$ABTFR,1,1,A,1234,1024,1000,,,1,2,0*1F
21	$ABTSA,1234,1,A,1024,1050,2*00	!ABVDM,1,1,1,A,E6WuQTPq00000000000000000Ou;NQ>S`kp00000nhGU1Dm80E3kP,0*28	$ABTFR,1,1,A,1234,1024,1050,,,2,2,0*19
22	$ABTSA,1234,1,A,1024,1100,2*04	!ABVDM,1,1,1,A,F02B`i22N2P7vm1oR?sD3bH2P000,0*5C	$ABTFR,1,1,A,1234,1024,1100,,,1,2,0*1E
23	$ABTSA,1234,1,A,1024,1150,2*01	!ABVDM,1,1,1,A,G02B`i3wJPsi7ub1m<000000000,0*26	$ABTFR,1,1,A,1234,1024,1150,,,1,2,0*1B
24a	$ABTSA,1234,1,A,1024,1200,2*07	!ABVDM,1,1,1,A,H:LEOQ1AEJ1@E=@000000000000,0*4F	$ABTFR,1,1,A,1234,1024,1200,,,1,2,0*1D
24b	$ABTSA,1234,1,A,1024,1250,2*02	!ABVDM,1,1,1,A,H:LEOQ4tmlkji00DEFCE400VrvP0,0*17	$ABTFR,1,1,A,1234,1024,1250,,,1,2,0*18
25	$ABTSA,1234,1,A,1024,1300,2*06	!ABVDM,1,1,1,A,I02B`i40@00b2ab@6RaaPSRhIJP0,0*75	$ABTFR,1,1,A,1234,1024,1300,,,1,2,0*1C
26	$ABTSA,1234,1,A,1024,1350,2*03	!ABVDM,1,1,1,A,J02B`i40@00QT0a0Qb2a9PI000,0*4F	$ABTFR,1,1,A,1234,1024,1350,,,1,2,0*19
27	$ABTSA,1234,1,A,1024,1400,2*01	!ABVDM,1,1,1,A,Kh2B`i<?u7CfP<`h,0*46	$ABTFR,1,1,A,1234,1024,1400,,,1,2,0*1B

a) EUT Transmissions			
Msg	Slot	VDO Generated	Message Transmitted by EUT
1	50	!ABVDO,1,1,,A,102B`i02P:wrFu2M7AWh2gv01T00,0*49	!AIVDM,1,1,,A,102B`i02P:wrFu2M7AWh2gv01T00,0*40
2	100	!ABVDO,1,1,,A,202B`i02P:wrFu2M7AWh2gv01T00,0*4A	!AIVDM,1,1,,A,202B`i02P:wrFu2M7AWh2gv01T00,0*43
3	150	!ABVDO,1,1,,A,302B`i02P:wrFu2M7AWh2gv01P00,0*4F	!AIVDM,1,1,,A,302B`i02P:wrFu2M7AWh2gv01P00,0*46
4	200	!ABVDO,1,1,,A,402B`i1v@Mb1FOrFu2M7AWi00000,0*04	!AIVDM,1,1,,A,402B`i1v@Mb1FOrFu2M7AWi00000,0*0D
5	250	!ABVDO,2,1,2,A,502B`i7WB?maAEI=D@1@E=B1HE=<Dh000000000t000054pibI4kmE20,0*5F	!AIVDM,2,1,2,A,502B`i7WB?maAEI=D@1@E=B1HE=<Dh000000000t000054pibI4kmE20CD53,0*57
5	250	!ABVDO,2,2,2,A,CD53kP000000000,2*15	!AIVDM,2,2,2,A,kP000000000,2*1D
6	300	!ABVDO,1,1,,A,602B`i2W5Gp@04205@E=B0m<N3H,2*68	!AIVDM,1,1,,A,602B`i2W5Gp@04205@E=B0m<N3H,2*61
7	350	!ABVDO,1,1,,A,702B`i2W5Gp@0000000000000000,0*76	!AIVDM,1,1,,A,702B`i2W5Gp@0000000000000000,0*7F
8	400	!ABVDO,1,1,,A,802B`i00@00E1Dm83Dip>0,4*1F	!AIVDM,1,1,,A,802B`i00@00E1Dm83Dip>0,4*16
9	450	!ABVDO,1,1,,A,902B`i7l1TwrFu2M7AWoq?804000,0*24	!AIVDM,1,1,,A,902B`i7l1TwrFu2M7AWoq?804000,0*2D
10	500	!ABVDO,1,1,,A,:02B`i20qc?p,0*03	!AIVDM,1,1,,A,:02B`i20qc?p,0*0A
11	550	!ABVDO,1,1,,A,;02B`i1v@MbDNwrFu2M7AWi02000,0*4C	!AIVDM,1,1,,A,;02B`i1v@MbDNwrFu2M7AWi02000,0*45
12	600	!ABVDO,1,1,,A,<02B`i2?:r;0D5CDP=C7Pij0,0*18	!AIVDM,1,1,,A,<02B`i2?:r;0D5CDP=C7Pij0,0*11
13	650	!ABVDO,1,1,,A,=02B`i2?=up0000000000000000,0*5E	!AIVDM,1,1,,A,=02B`i2?=up0000000000000000,0*57
14	700	!ABVDO,1,1,,A,>02B`i1@E=B0m<N37@0,2*4A	!AIVDM,1,1,,A,>02B`i1@E=B0m<N37@0,2*43

a) EUT Transmissions			
Msg	Slot	VDO Generated	Message Transmitted by EUT
15	750	!ABVDO,1,1,,A,?02B`i1df1ADD6@000000000000,2*6E	!AIVDM,1,1,,A,?02B`i1df1ADD6@000000000000,2*67
16	800	!ABVDO,1,1,,A,@02B`i00Qr8p,0*4D	!AIVDM,1,1,,A,@02B`i00Qr8p,0*44
17	850	!ABVDO,1,1,,A,A02Boi7SwIprW@2@5004000F?`@070?NQ00L10d400@4,0*03	!AIVDM,1,1,,A,A02Boi7SwIprW@2@5004000F?`@070?NQ00L10d400@4,0*0A
18	900	!ABVDO,1,1,,A,B02B`i00N7vUg@WAIIvLErg02000,0*32	!AIVDM,1,1,,A,B02B`i00N7vUg@WAIIvLErg02000,0*3B
19	950	!ABVDO,1,1,,A,C02B`i002WvUg@WAIIt0cwP0`:Va0JV?1Sj00000000000000030,0*02	!AIVDM,1,1,,A,C02B`i002WvUg@WAIIt0cwP0`:Va0JV?1Sj00000000000000030,0*0B
20	1000	!ABVDO,1,1,,A,D02B`i06AB6@0000000000000000,0*51	!AIVDM,1,1,,A,D02B`i06AB6@0000000000000000,0*58
21	1050	!ABVDO,1,1,,A,E6WuQTPq0000000000000000000Ou;NQ>S`kp00000nhGU1Dm80E3kP,2*19	!AIVDM,1,1,,A,E6WuQTPq0000000000000000000Ou;NQ>S`kp00000nhGU1Dm80E3kP,2*10
22	1100	!ABVDO,1,1,,A,F02B`i22N2P7vm1oR?sD3bH2P000,0*6F	!AIVDM,1,1,,A,F02B`i22N2P7vm1oR?sD3bH2P000,0*66
23	1150	!ABVDO,1,1,,A,G02B`i3wJPsi7ub1m<0000000000,2*17	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<0000000000,2*1E
24a	1200	!ABVDO,1,1,,A,H:LEOQ1AEJ1@E=@0000000000000,2*7E	!AIVDM,1,1,,A,H:LEOQ1AEJ1@E=@0000000000000,2*77
24b	1250	!ABVDO,1,1,,A,H:LEOQ4tmlkji00DEFCE400VrvP0,0*24	!AIVDM,1,1,,A,H:LEOQ4tmlkji00DEFCE400VrvP0,0*2D
25	1300	!ABVDO,1,1,,A,I02B`i40@00b2ab@6RaaPSRhIJP0,0*46	!AIVDM,1,1,,A,I02B`i40@00b2ab@6RaaPSRhIJP0,0*4F
26	1350	!ABVDO,1,1,,A,J02B`i40@00QT0a0Qb2a9PI000,4*78	!AIVDM,1,1,,A,J02B`i40@00QT0a0Qb2a9PI000,4*71
27	1400	!ABVDO,1,1,,A,Kh2B`i<?u7CfP<`h,0*75	!AIVDM,1,1,,A,Kh2B`i<?u7CfP<`h,0*7C

b) Data Content Processing		
Requirement	Result	Verdict
Apply a TSA+VDM sentence pair with a CommState allocating slots and repeat indicator = 0.	The sentences applied to the EUT are: $ABTSA,1234,9,A,,2100,2*08 !ABVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*79	-
Confirm that the appropriate TFR sentence is output on the PI.	The EUT responds by outputting the following TFR sentence: $ABTFR,1,9,A,1234,,2100,1125,,1,2,0*15	Pass
Confirm that the EUT transmits the message with no data content processing.	The EUT correctly transmits the message with no data content processing, as shown in the message decode below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the following VDO sentence when the VDM sentence is transmitted: !ABVDO,1,1,,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*42	Pass

b) Data Content Processing		
Parameter	VDM sentence applied to PI	VDM sentence output to VDL
Sentence	!ABVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*79	!AIVDM,1,1,,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*4B
Message ID	1 - Position report	1 - Position report
Repeat Indicator	0	0
MMSI	366009999	366009999
Navigational Status	15 - not defined (also used by AIS-SART under test)	15 - not defined (also used by AIS-SART under test)
Rate Of Turn	no turn information available (default)	no turn information available (default)
Speed Over Ground	0	0
Position Accuracy	0 - low (>10 m)	0 - low (>10 m)
Longitude	82 27.0521 W	82 27.0521 W
Latitude	27 20.0564 N	27 20.0564 N
Course Over Ground	89	89
True Heading	511 - not available	511 - not available
Time Stamp	0	0
Special Manoeuvre Indicator	0 - not available	0 - not available
Spare	0	0
RAIM Flag	0 - RAIM not in use	0 - RAIM not in use
Communication State - Sync State	0	0
Communication State - Slot Timeout	0	0
Communication State - Sub Message	Slot Offset = 2297	Slot Offset = 2297

c) Consecutive Slot Assignments of Identical Messages		
Requirement	Result	Verdict
Apply five TSA and five VDM sentences with encapsulated Message 1 to the EUT assigning the transmission of five Messages 1s in consecutive slots on the same channel.	The sentences applied to the EUT are: $ABTSA,1234,0,A,,1001,2*02 !ABVDM,1,1,0,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*16 $ABTSA,1234,1,A,,1002,2*00 !ABVDM,1,1,1,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*17 $ABTSA,1234,2,A,,1003,2*02 !ABVDM,1,1,2,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*14 $ABTSA,1234,3,A,,1004,2*04 !ABVDM,1,1,3,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*15 $ABTSA,1234,4,A,,1005,2*02 !ABVDM,1,1,4,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*12	-
Confirm that the appropriate TFR sentences are output on the PI.	The EUT outputs the following TFR sentences to the PI: $ABTFR,1,0,A,1234,,1001,1144,,1,2,0*18 $ABTFR,1,1,A,1234,,1002,1144,,1,2,0*1A $ABTFR,1,2,A,1234,,1003,1144,,1,2,0*18 $ABTFR,1,3,A,1234,,1004,1144,,1,2,0*1E $ABTFR,1,4,A,1234,,1005,1144,,1,2,0*18	Pass
Confirm that the EUT transmits the five Message 1s in the assigned consecutive slots on the same channel and that the information is complete and correct.	The EUT transmits the Message 1's in the correct slots, on channel A and with the correct information; as seen in the table below.	Pass
Confirm that the appropriate VDO sentences are output on the PI when a message is transmitted.	The following VDO's are output to the PI: !ABVDO,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*24 !ABVDO,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*24 !ABVDO,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*24 !ABVDO,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*24 !ABVDO,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*24	Pass

c) Transmitted Messages					
Time	Slot	Chan	MMSI	Msg	Sentence
11:44:26	1001	A	366009999	1	!AIVDM,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*2D
11:44:26	1002	A	366009999	1	!AIVDM,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*2D
11:44:26	1003	A	366009999	1	!AIVDM,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*2D
11:44:26	1004	A	366009999	1	!AIVDM,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*2D
11:44:26	1005	A	366009999	1	!AIVDM,1,1,,A,15M3NSwP00J6TN0?a0iT<Ov>0D01,0*2D

d) TSA+VDM Pair for an Undefined Message ID		
Requirement	Result	Verdict
Apply a TSA+VDM sentence pair with an encapsulated message ID that is undefined, with the correct message structure to the EUT.	The sentences applied to the EUT are: $ABTSA,1234,5,A,,1005,2*03 $PSTT,30A,20200128,120818*64 !ABVDM,1,1,5,A,W5M3NSwP00J6TN0?a0iT<Ov>0D01,0*75	-
Confirm that the appropriate TFR sentences are output on the PI.	The TFR sentence output by the EUT to the PI is: $ABTFR,1,5,A,1234,,1005,1208,,1,2,0*12	Pass
Confirm that the EUT transmits the message with no data processing.	The EUT transmits the following VDM message over the VDL: !AIVDM,1,1,,A,W5M3NSwP00J6TN0?a0iT<Ov>0D01,0*4B The encapsulated message matches the VDM applied to the PI.	Pass
Confirm that the appropriate VDO sentences are output on the PI when a message is transmitted.	The EUT outputs the following VDO sentence to the PI: !ABVDO,1,1,,A,W5M3NSwP00J6TN0?a0iT<Ov>0D01,0*42	Pass

e) Test of Message Priority		
Requirement	Result	Verdict
Apply a TSA sentence and a VDM sentence with encapsulated Message 8, using five slots (168 characters = 1 008 bit).	The TSA and VDM sentences sent to the EUT are: $ABTSA,1234,6,B,,1005,2*03 !ABVDM,3,1,6,B,8h3OHqh0J00@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0*25 !ABVDM,3,2,6,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0*19 !ABVDM,3,3,6,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT0,0*10	-
Apply a TSA sentence and a VDM sentence with encapsulated Message 14 at least 266 ms (10 slot duration) before the scheduled Message 8 using one slot and using the same start slot number on the same channel.	As the Message 8 and Message 14 are both being transmitted with priority = 2, the Message 8 would always transmit instead of Message 14. This is likely a mistake in the standard, as such the priority of Message 14 is set to 1. The TSA and VDM sentence applied to the EUT are: $ABTSA,1234,7,B,,1005,1*01 !ABVDM,1,1,7,B,>h3OHqi@E=@,2*19	-
Confirm that the EUT generates a TFR sentence with status 0 for Message 8 on the PI.	The following TFR is output by the EUT for Message 8: $ABTFR,3,6,B,1234,,1005,1602,,5,2,0*1A	Pass
Confirm that the EUT generates a TFR sentence with status 1 for Message 14 on the PI.	The specification is incorrect, the EUT should output a status of 11 if the reserved sentence is overwriting an existing reservation that has been externally requested: $ABTFR,1,7,B,1234,,1005,1602,,1,1,11*2E	Pass
Confirm that the EUT transmits only Message 14.	The EUT does not transmit Message 8, only Message 14: !AIVDM,1,1,,B,>h3OHqi@E=@,2*25	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The VDO output by the Message 14 is: !ABVDO,1,1,,B,>h3OHqi@E=@,2*2C	Pass

f) Test of Slot Reservation with an Invalid UTC Field		
Requirement	Result	Verdict
Apply a TSA sentence and a VDM sentence with encapsulated Message 14 using one slot with a UTC time that is invalid to the EUT (e.g. 25 h 61 min).	The TSA and VDM sentences applied to the EUT are: $ABTSA,1234,8,B,2561,1005,2*0D !ABVDM,1,1,8,B,>h3OHqi@E=@,2*16	-
The EUT generates a TFR sentence with status 10 for Message 14 on the PI.	The EUT generates a TFR sentence with status field set to 10: $ABTFR,1,8,B,1234,2561,1005,,,,2,**10***17	Pass
Confirm that the EUT does not transmit Message 14.	The EUT does not transmit the Message 14.	Pass

g) Test of Slot Reservation with an Invalid Slot Number		
Requirement	Result	Verdict
Apply a TSA sentence and a VDM sentence with encapsulated Message 14 using an invalid slot number to the EUT.	The sentences applied to the EUT are: $ABTSA,1234,9,B,,2250,2*0D !ABVDM,1,1,9,B,>h3OHqi@E=@,2*17	-
Confirm that the EUT generates a TFR sentence with status 10 for Message 14 on the PI.	The EUT generates a TFR sentence correctly: $ABTFR,1,9,B,1234,,2250,,,,2,**10***17	Pass
Confirm that the EUT does not transmit Message 14.	The EUT does not transmit Message 14.	Pass

h) Test of Exceeding Maximum Number of Slot Reservations with FATDMA		
Requirement	Result	Verdict
Apply a TSA sentence and a VDM sentence with encapsulated Message 14 using six slots to the EUT (196 characters = 1176 bits).	The sentences sent to the EUT are: $ABTSA,1234,6,B,,1005,2*03 !ABVDM,4,1,6,B,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*1D !ABVDM,4,2,6,B,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*1E !ABVDM,4,3,6,B,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*1F !ABVDM,4,4,6,B,wwwwwwwwwwwwwwwwwwww,0*18	-
Confirm that the EUT generates a TFR sentence with status 10 for Message 14 on the PI.	The EUT outputs the following TFR sentence to the PI: $ABTFR,4,6,B,1234,,1005,,,6,2,10*2A	Pass
Confirm that the EUT does not transmit Message 14.	The EUT does not transmit Message 14.	Pass

i) Exceed Available Memory		
Requirement	Result	Verdict
Apply the number of TSA + VDM pairs needed to exceed available memory.	A total of 463 TSA + VDM pairs were applied to the EUT. The EUT has enough memory to queue approximately 300 TSA + VDM pairs.	-
Confirm that the EUT generates a TFR sentence with status 3. If it is not possible to exceed the available memory, the test is deemed to be passed.	After 317 slot reservations are made, the EUT begins generating TFR sentences with status field 3: $ABTFR,1,1,A,1234,,317,,,1,2,3*2F This can also be seen in the table below.	Pass

i) Exceed Available Memory Results			
Time	Sentence	TFR Status	Comment
10:42:29	$ABTFR,1,1,A,1234,,315,1043,,1,2,0*28	0	Scheduled Successfully
10:42:29	!ABVDM,1,1,1,A,14N6S402P:wle`2MEs7h2gv41h1l,0*75		
10:42:29	$ABTFR,1,1,A,1234,,316,1043,,1,2,0*2B	0	Scheduled Successfully
10:42:29	$ABTSA,1234,1,A,,317,2*36		
10:42:29	!ABVDM,1,1,1,A,14N6S4@2P:wle`2MEs7h2gv41h1m,0*04		
10:42:29	$ABTSA,1234,1,A,,318,2*39		
10:42:29	$ABTFR,1,1,A,1234,,317,,,1,2,3*2F	3	Memory Exceeded
10:42:29	!ABVDM,1,1,1,A,14N6S4P2P:wle`2MEs7h2gv41h1n,0*17		
10:42:30	$ABTSA,1234,1,A,,319,2*38		
10:42:29	$ABTFR,1,1,A,1234,,318,,,1,2,3*20	3	Memory Exceeded
10:42:30	!ABVDM,1,1,1,A,14N6S4h2P:wle`2MEs7h2gv41h1o,0*2E		

10:42:30	$ABTSA,1234,1,A,,320,2*32		

j) Application of VDM with no TSA Sentence		
Requirement	Result	Verdict
Apply a VDM of Message 14 without TSA sentence.	The VDM applied to the EUT is: !ABVDM,1,1,,A,>02B`i1@E=B0m<N37@0,2*48	-
Confirm that the EUT generates a TFR with status 10 and does not transmit Message 14.	The EUT generates a TFR with status 10: $ABTFR,1,,A,1234,,,,,1,2,10*19 The EUT does not transmit Message 14.	Pass

k) Cancel Reservations using TSA Sentence		
Requirement	Result	Verdict
Apply TSA and VDM sentences with encapsulated Message 14 to the EUT assigning the transmission of the Message 14s with the scheduled time before the current time.	The sentences applied to the EUT are: $ABTSA,1234,0,A,1130,1001,2*01 !ABVDM,1,1,0,A,>h3OHqi@E=@,2*1D	-
Confirm that the EUT generates a TFR sentence with status 2 for the original TSA/VDM pair.	The EUT correctly generates a TFR sentence with status 2: $ABTFR,1,0,A,1234,1130,1001,,,1,2,**2***19	Pass
Apply the same TSA with the priority set to 0 to cancel the transmission.	The TSA applied to the EUT with priority set to 0 is: $ABTSA,1234,,A,1130,1001,**0***33	-
Confirm that the EUT generates a TFR with status 4 for the second TSA sentence, with priority 0, which cancels the first TSA sentence and that Message 14 is not transmitted.	The EUT generates a TFR with status 4: $ABTFR,,0,A,1234,1130,1001,,,0,0,**4***2D Message 14 is not transmitted by the EUT.	Pass

l) Transmissions in Prohibited Slots		
Requirement	Result	Verdict
Apply a TPC to prohibit the use of slots 1000 to 1004.	The TPC sentence applied to the EUT is: $ABTPC,1234,99,A,113326,0,1000,5,,,,,E,C*2B	-
Apply a TSA+VDM of Message 14 that uses the prohibited slots reserved by the TPC.	The TSA+VDM pair applied to the EUT is: $ABTSA,1234,7,A,1133,1001,2*05 !ABVDM,1,1,7,A,>h3OHqi@E=@,2*1A	-
Confirm that the EUT generates a TSR sentence with status 0.	The EUT generates a TSR sentence with status 0: $ABTSR,1234,99,A,113326.00,**0***25	Pass
Confirm that the EUT generates a TFR sentence with status 7 for the TSA/VDM of Message 14 for the prohibited slot.	The EUT generates a TFR sentence with status 7 for Message 14 in the prohibited slot: $ABTFR,1,7,A,1234,1133,1001,,,1,2,**7***18	Pass

m) Test of Single Frame Slot Prohibition		
Requirement	Result	Verdict
Apply a TPC to prohibit the use of slots.	The TPC sentence applied to the EUT is: $ABTPC,1234,99,A,102226,0,1000,5,,,,,E,C*2A	-
Apply a TSA+VDM in the same slot, but a different frame from the TPC command.	The TSA+VDM pair applied to the EUT is: $ABTSA,1234,7,A,,1001,2*05 !ABVDM,1,1,7,A,>h3OHqi@E=@,2*1A	-
Confirm that the EUT generates a TFR sentence with status 0.	The TFR sentence output by the EUT is: $ABTFR,1,7,A,1234,,1001,1023,,1,2,0*1F	Pass
Confirm that the EUT transmits Message 14.	The EUT transmits Message 14 successfully in slot 1001: !ABVDO,1,1,,A,>h3OHqi@E=@,2*2F	Pass

m) Test Results		
Time	Sentence	Comment
10:21:23.518	$ABTPC,1234,99,A,102226,0,1000,5,,,,,E,C*2A	TPC sentence reserves slots in frame 10:22.
10:21:23.518	$ABTSR,1234,99,A,102226.00,0*24	Prohibit request reported as successful.
10:22:41.862	$ABTSA,1234,7,A,,1001,2*05	TSA requests slot 1001 in next frame (10:23).
10:22:41.962	!ABVDM,1,1,7,A,>h3OHqi@E=@,2*1A	VDM to be transmitted.
10:22:41.962	$ABTFR,1,7,A,1234,,1001,1023,,1,2,0*1F	TFR shows slot 1001 reservation successful.
10:23:26.704	!ABVDO,1,1,,A,>h3OHqi@E=@,2*2F	EUT transmits the sentence provided correctly.

n) Test of TSA/VDM Pair with Low Priority		
Requirement	Result	Verdict
Activate the autonomous transmission of Message 4.	The autonomous transmission of Message 4 is enabled using: $ABECB,1234,4,0,4,750,,0,379,750,,C*11	-

n) Test of TSA/VDM Pair with Low Priority		
Requirement	Result	Verdict
Apply a TSA / Message 8 pair, with low priority, in conflict with the autonomous Message 4 transmission defined in the ECB sentence.	The TSA / Message 8 sentence pair applied is: $ABTSA,1234,7,B,1209,1129,2*07 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the ECB PI sentence was received correctly by the EUT and it starts transmission of Message 4.	The result of the $ABABQ,ECB*39 query is: $ABECB,1234,4,,4,750,,,379,750,,R*00	Pass
Confirm that the EUT generates a TFR sentence with status 5.	The EUT outputs the following: $ABTFR,1,7,B,1234,1209,1129,,,1,2,**5***18	Pass
Confirm that the EUT does not transmit Message 8.	The EUT does not transmit Message 8.	Pass

o) Test of TSA/VDM Pair with High Priority		
Requirement	Result	Verdict
Apply a TSA/Message 8 VDM pair with high priority in conflict with the autonomous Message 4 transmission defined in the ECB.	The TSA / Message 8 VDM pair applied to the EUT is: $ABTSA,1234,7,B,1213,1879,1*03 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT generates a TFR sentence with Status 1.	The EUT outputs a TFR sentence with status field set to 1: $ABTFR,1,7,B,1234,1213,1879,,,1,1,**1***18	Pass
Confirm that the EUT transmits Message 8, replacing the scheduled Message 4.	The EUT transmits Message 8 in 1879, correctly replacing Message 4: !AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D	Pass

p) Prohibit Slots Reserved by the Message 4 Schedule		
Requirement	Result	Verdict
Apply a TPC to reserve slots in conflict with the Message 4 schedule.	The TPC sentence applied to the EUT is: $ABTPC,1234,1,A,122126,0,750,5,,,,,E,C*29	-
Confirm that the EUT generates a TSR sentence with status 1.	The EUT outputs TSR with status field set to 1 successfully: $ABTSR,1234,1,A,122126.00,1*15	Pass

DGNSS VDM Message 17 – Clause 10.2.1.9

This test will verify that the Base Station is capable of handling a VDM with an encapsulated Message 17.

Method of Measurement

The following tests are required for a Base Station operated as an independent unit.

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Apply the independent mode setup to the EUT.
b) Define a transmission schedule for Message 17 with a reporting interval of 10 s using an ECB sentence:
   $xxECB,<UI>,17,0,10,750,2,0,85,750,2,C
c) Apply VDM sentences with encapsulated Message 17 for a period of at least 1 min.
d) Discontinue the VDM sentences with encapsulated Message 17.
e) Disable the transmission schedule for Message 17 using an ECB sentence like the following sentence:
   $xxECB,<UI>,17,0,-1,,,0,-1,,,C
f) Apply VDM sentences with encapsulated Message 17 for a period of at least 1 min.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence;
c) the EUT is transmitting Message 17 over the VDL in the specified slots, intervals and channels as defined by the ECB. Confirm the content of Message 17 is the most current and as defined by the VDM. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
d) the EUT continues transmitting Message 17 over the VDL for 1 min then stops transmission;
e) the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence;
f) the EUT transmits Message 17 over the VDL in accordance with the rules for VDM transmissions using the slots reserved by DLM for own use.

Test Results

a) Apply the Independent Mode Setup		
Requirement	Result	Verdict
The EUT shall be set to operate in independent mode.	The EUT is configured to operate in independent mode, following the procedure described in §10.1.3.	-
Confirm that the independent mode set has been correctly set.	Independent mode is set correctly, as seen in the query results of the ACA, BCG, CBR, DLM, ECB and SPO settings, as seen below.	Pass

a) Apply the Independent Mode Setup		
Requirement	Result	Verdict
Confirm that the ACA settings are correct for independent mode.	The results of the $ABABQ,ACA*3E query are: $ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53 $ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52 $ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51 $ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50 $ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57 $ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56 $ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55 $ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54	Pass
Confirm that the BCG settings are correct for independent mode.	The results of the $ABABQ,BCG*3B query are: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C	Pass
Confirm that the CBR settings are correct for independent mode.	The results of the $ABABQ,CBR*2E query are: $ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A $ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,R*19 $ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,R*18 $ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,R*1F	Pass
Confirm that the DLM settings are correct for independent mode.	The results of the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass
Confirm that the ECB settings are correct for independent mode.	The results of the $ABABQ,ECB*39 query are: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39 $ABECB,1234,22,0,-1,2250,,0,-1,2250,,R*3D $ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C $ABECB,1234,24,0,-1,0,,0,-1,0,,R*3B	Pass
Confirm that the SPO settings are correct for independent mode.	The results of the $ABABQ,SPO*31 query are: $ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,0,R*7B	Pass

b) Define a Transmission Schedule for Message 17		
Requirement	Result	Verdict
Define a transmission schedule for Message 17 with a reporting interval of 10 s using an ECB sentence.	The ECB sentence applied to the EUT is: $ABECB,1234,17,0,10,750,2,0,85,750,2,C*26	-
Confirm that the ECB sentence was received correctly the EUT.	The results of the $ABABQ,ECB*39 query are: $ABECB,1234,17,0,10,750,2,0,85,750,2,R*37	Pass

c) Apply VDM's with Encapsulated Message 17		
Requirement	Result	Verdict
Apply VDM sentences with encapsulated Message 17.	A series of 24 valid VDM sentences with encapsulated Message 17 are applied to the EUT.	-
Confirm that the EUT transmits Message 17 over the VDL in the specified slots, intervals and channels as defined by the ECB.	The ECB sentence specifies that the EUT shall transmit in slots 10, 760 and 1510 on A, and slots 85, 835 and 1585 on B. It is seen in the table below, 'Message 17 VDL Results' that the EUT therefore transmits in the specified slots, intervals and channels.	Pass
Confirm the content of Message 17 is the most current, and as defined by the VDM.	The most recently applied VDM sentence is used to generate the contents of the transmitted Message 17, as seen in the table 'Applied Sentences & Transmitted Messages' below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the correct VDO to the PI when a message is transmitted.	Pass

c) Message 17 VDL Results				
Time	Slot	Chan	Msg	Sentence
14:22:00	10	A	17	!AIVDM,1,1,,A,A02B`i3wAhsW02J`05``2gqR01H0w`kv5hous@4G,0*48
14:22:02	85	B	17	!AIVDM,1,1,,B,A02B`i3wAhsW02J`07d`3wrU03LAw`sw2A?v:h<K,0*2E
14:22:20	760	A	17	!AIVDM,1,1,,A,A02B`i3wAhsW02J`0?L`5?oNwQ0Hwl01dAkuL04E,0*35
14:22:22	835	B	17	!AIVDM,1,1,,B,A02B`i3wAhsW02J`0AP`2gqi0AL<wad660ouph6E,0*72
14:22:40	1510	A	17	!AIVDM,1,1,,A,A02B`i3wAhsW02J`0AT`3wre03PAw`p01Q?v9h4L,0*1C
14:22:42	1585	B	17	!AIVDM,1,1,,B,A02B`i3wAhsW02J`0D8`5?oNwkLHwkgwdQkuO@0F,0*0D

c) Applied Sentences & Transmitted Messages Note: VDM sentences without a slot number are the VDM's applied to the PI and the VDM sentences with a slot number are the messages received by the test unit.		
Time	Slot	Sentence
14:21:41		!AIVDM,1,1,,A,A02B`i3wAhsW02J`02P`3wrU13LAw`v22A?v:h0K,0*51
14:21:42	1585	!AIVDM,1,1,,B,A02B`i3wAhsW02J`02P`3wrU13LAw`v22A?v:h0K,0*52
14:21:51		!AIVDM,1,1,,A,A02B`i3wAhsW02J`05``2gqR01H0w`kv5hous@4G,0*48
14:22:00	10	!AIVDM,1,1,,A,A02B`i3wAhsW02J`05``2gqR01H0w`kv5hous@4G,0*48
14:22:01		!AIVDM,1,1,,A,A02B`i3wAhsW02J`07d`3wrU03LAw`sw2A?v:h<K,0*2D
14:22:02	85	!AIVDM,1,1,,B,A02B`i3wAhsW02J`07d`3wrU03LAw`sw2A?v:h<K,0*2E
14:22:11		!AIVDM,1,1,,A,A02B`i3wAhsW02J`0?L`5?oNwQ0Hwl01dAkuL04E,0*35
14:22:20	760	!AIVDM,1,1,,A,A02B`i3wAhsW02J`0?L`5?oNwQ0Hwl01dAkuL04E,0*35
14:22:21		!AIVDM,1,1,,A,A02B`i3wAhsW02J`0AP`2gqi0AL<wad660ouph6E,0*71
14:22:22	835	!AIVDM,1,1,,B,A02B`i3wAhsW02J`0AP`2gqi0AL<wad660ouph6E,0*72
14:22:31		!AIVDM,1,1,,A,A02B`i3wAhsW02J`0AT`3wre03PAw`p01Q?v9h4L,0*1C
14:22:40	1510	!AIVDM,1,1,,A,A02B`i3wAhsW02J`0AT`3wre03PAw`p01Q?v9h4L,0*1C
14:22:41		!AIVDM,1,1,,A,A02B`i3wAhsW02J`0D8`5?oNwkLHwkgwdQkuO@0F,0*0E
14:22:42	1585	!AIVDM,1,1,,B,A02B`i3wAhsW02J`0D8`5?oNwkLHwkgwdQkuO@0F,0*0D

d) Discontinue the VDM Sentences with Encapsulated Message 17		
Requirement	Result	Verdict
Discontinue applying VDM sentences to the EUT.	The final VDM sentence was applied at 14:26:30.	-
The EUT shall continue transmitting Message 17 over the VDL for 1 minute, then stops transmission.	The EUT continues to transmit until 14:27:22, which is the final slot reservation within the frame that the EUT can transmit on. For the final minute after the VDM sentences cease, the contents of the Message 17's are all identical.	Pass

d) Discontinue the VDM Sentences with Encapsulated Message 17			
Time	Slot	Chan	Sentence
14:26:00	10	A	!AIVDM,1,1,,A,A02B`i3wAhsW02J`0r0`2gqo01L<0FKu7Pouo@=E,0*05
14:26:02	85	B	!AIVDM,1,1,,B,A02B`i3wAhsW02J`0r0`2gqo01L<0FKu7Pouo@=E,0*06
14:26:20	760	A	!AIVDM,1,1,,A,A02B`i3wAhsW02J`0w<`2gqnwiLDwaT160ouo01E,0*4C
14:26:22	835	B	!AIVDM,1,1,,B,A02B`i3wAhsW02J`0w<`2gqnwiLDwaT160ouo01E,0*4F
14:26:40	1510	A	!AIVDM,1,1,,A,A02B`i3wAhsW02J`11@`3wRd03PAw`h12Q>N;gtL,0*36
14:26:42	1585	B	!AIVDM,1,1,,B,A02B`i3wAhsW02J`11@`3wRd03PAw`h12Q>N;gtL,0*35
14:27:00	10	A	!AIVDM,1,1,,A,A02B`i3wAhsW02J`11@`3wRd03PAw`h12Q>N;gtL,0*36
14:27:02	85	B	!AIVDM,1,1,,B,A02B`i3wAhsW02J`11@`3wRd03PAw`h12Q>N;gtL,0*35
14:27:20	760	A	!AIVDM,1,1,,A,A02B`i3wAhsW02J`11@`3wRd03PAw`h12Q>N;gtL,0*36
14:27:22	835	B	!AIVDM,1,1,,B,A02B`i3wAhsW02J`11@`3wRd03PAw`h12Q>N;gtL,0*35

e) Disable the Transmission Schedule of Message 17		
Requirement	Result	Verdict
The transmission schedule of Message 17 shall be disabled using an ECB sentence.	The ECB sentence applied to the EUT is: $ABECB,1234,17,0,-1,,,0,-1,,,C*2A	-
Confirm that the ECB sentence was received correctly by the EUT.	The results of the $ABABQ,ECB*39 query are: $ABECB,1234,17,0,-1,750,2,0,-1,750,2,R*3B	Pass

f) Apply VDM Sentences with Encapsulated Message 17		
Requirement	Result	Verdict
Apply VDM sentences with encapsulated Message 17 or a period of at least 1 minute.	The VDM sentences applied to the EUT are detailed in the table below, 'VDM Sentences applied to the EUT'.	-
Confirm that the EUT transmits Message 17 over the VDL in accordance with the rules for VDM transmissions using the slots reserved by DLM for own use.	The EUT transmits in slots 310, 685, 1060, 1435, 1810 and 2185. This is in accordance with the DLM settings: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass

Assigned Mode with Message 16 - Clause 10.2.1.10

This test will verify that the Base Station can establish hard and soft slot assignments using Message 16.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Input the following ASN sentence with a slot assignment, start slot 10 and slot increment 5 (interval = 75 slots) for station A and a rate assignment, 1 s reporting interval, for station B to the EUT. Adapt the slot reservation by DLM to the slots used by the slot assigned station.
   $xxDLM,0,A,L,4,1,7,750,L,0,1,7,0,L,10,1,7,150,,,,,,C
   $xxDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,85,1,7,150,,,,,,C
   $xxASN,<MMSI A>,,10,5,<MMSI B>,600,,0,1,C
c) Enable RATDMA and then input a BBM sentence (Message 8) to the EUT.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the EUT is transmitting Message 16, within 4 s in an available FATDMA slot, over the appropriate channel on the VDL. Confirm the content of Message 16 is as defined by the ASN. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Verify that the “Offset” and “Increment” parameters of Message 16 are correctly set according to Table 19;

Message 16 Parameter	Station A Slot Assignment	Station B Rate Assignment
Offset	Calculated from actual Tx slot of Message 16 and ASN Start slot assignment	= ASN Soft assigned reporting rate
Increment	= ASN Increment > 0	= ASN Increment = 0

Table 19 - Calculation of parameters in Message 16

c) the EUT is transmitting Message 8 within 4 s, not using a FATDMA slot assigned to the mobile station.

Test Results

a) Application of the Independent Mode Setup		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The EUT is configured to operate in independent mode, as described in §10.1.3.	Pass

b) Configure the Message 16 Contents using an ASN Sentence		
Requirement	Result	Verdict
Apply an ASN sentence with a slot assignment, start slot 10 and slot increment 5 (interval = 75 slots) for station A and a rate assignment, 1 s reporting interval, for station B to the EUT. Adapt the slot reservation by DLM to the slots used by the slot assigned station.	The sentences sent to the EUT are: $ABDLM,0,A,L,4,1,7,750,L,0,1,7,0,L,10,1,7,150,,,,,,C*21 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,85,1,7,150,,,,,,C*23 $ABASN,500600700,,10,5,700800900,600,,0,1,C*1D	-
Confirm that the EUT is transmitting Message 16, within 4 seconds in an available FATDMA slot, over the appropriate channel on the VDL.	The EUT transmits the following Message 16 in slot 160: !AIVDM,1,1,,A,@02B`i1oFSoj3@1JLEOQ2F00,0*0A	Pass
Confirm the content of Message 16 is as defined by the ASN.	The Message 16 contents are correct, as seen in the Message decode below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the following VDO sentence to the PI: !ABVDO,1,1,,A,@02B`i1oFSoj3@1JLEOQ2F00,0*03	Pass
Verify that the “Offset” and “Increment” parameters of Message 16 are correctly set according to Table 19.	The “Offset” and “Increment” parameters of Message 16 are correctly set, as seen in the table below.	Pass

b) Message 16 Decode			
!ABVDO,1,1,,A,@02B`i1oFSoj3@1JLEOQ2F00,0*03			
Parameter	Value	Expected Value	Actual Value
Message ID	010000	16	16
Repeat indicator	00	0	0
Source ID	00000000100100101010000011000100	2402500	2402500
Spare	00	0	0
Destination ID A	01110111010110100011110111100	500600700	500600700
Offset A	100000110100	2100	2100
Increment A	0000000101	5	5
Destination ID B	10100111000101010111110000100	700800900	700800900
Offset B	001001011000	600	600
Increment B	0000000000	0	0
Spare	0 Bits	0	0 Bits

b) Verifying the Offset and Increment Parameters According to Table 19				
Message 16 Parameter	Station A Slot Assignment		Station B Rate Assignment	
	Expected Result	Actual Result	Expected Result	Actual Result
Offset	2100	2100	600	600
Increment	5	5	0	0

c) Input a BBM with RATDMA Enabled		
Requirement	Result	Verdict
Enable the RATDMA access mode.	RATDMA is enabled using the following BCG sentence: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,1,I,60,AB,C*7C	-
Input a BBM (Message 8) to the EUT.	The following BBM was applied to the EUT: !AIBBM,1,1,2,1,8,04005@E=B0m<OP,2*55	-
Confirm that the EUT transmits Message 8 within 4 seconds, not using a FATDMA slot assigned to the mobile station.	The BBM is applied to the EUT 3 times, with an average transmission time of 1 second and never exceeding 4 seconds. The EUT transmits Message 8 in slots 574, 1155 and 1269- none of which are reserved for FATDMA transmissions.	Pass

Group Assignment with Message 23 - Clause 10.2.1.11

This test will verify that the Base Station can store an AGA setting for each station type and transmit Message 23 according to the AGA settings with a transmission schedule as defined by an ECB setting.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT
b) Apply a DLM sentence to reserve slots for transmission of 3 Messages 23 per frame on channel A. Apply an AGA sentence for Message 23 content for each station type from 0-15.
   $xxDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,L,45,1,7,750,C
   $xxAGA,<UI>,<Station type>,0,NElat,NElong,SWlat,SWlong,0,0,0,C
c) Activate the transmission of 3 Message 23 per frame on channel A in the slots reserved by DLM:
   $xxECB,<UI>,23,1,45,750,,,,,,C
d) Apply an AGA sentence for Message 23 content for each station type from 0-15 to delete the setting.
   $xxAGA,<UI>,<Station type>,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the Independent mode setup has been correctly set;
b) the DLM sentence was received correctly by the EUT using the query sentence for the DLM sentence. Confirm that the AGA sentences for Message 23 were received correctly by the EUT using the query sentence for the AGA sentence. For each station type an AGA sentence with the correct settings has to be output;
c) the Message 23s are transmitted in the defined slots. Confirm the content of Message 23 is as defined in the AGA sentences. Confirm that the AGA settings are transmitted in Message 23 one after the other, including the setting for station type 10 for Message 27 transmission control. Confirm in case of station type 10 that Type of Ship and cargo Type, Reporting Interval, Tx/Rx mode and Quiet Time are not added to Message 23. The fields shall be set to default values. The Reporting Interval shall be set to 0;
d) Message 23 is no longer transmitted.

Test Results

a) Apply the Independent Mode Setup Procedure		
Requirement	Result	Verdict
Configure the EUT to operate in independent mode.	The EUT is successfully set to operate in independent mode, as defined in §10.1.3.	Pass

b) Apply AGA Sentence for each Group Assignment Message 23		
Requirement	Result	Verdict
Apply a DLM sentence to reserve slots for the transmission of 3 Message 23's per frame on channel A.	The DLM sentence applied to the EUT is: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,L,45,1,7,750,C*68	-
Confirm that the DLM sentence was received successfully.	The results of the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,L,45,1,7,750,R*79	Pass

b) Apply AGA Sentence for each Group Assignment Message 23		
Requirement	Result	Verdict
Apply an AGA sentence for Message 23 content for each station type from 0→15.	The following AGA sentences were sent to the EUT: $ABAGA,1234,0,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*1D $ABAGA,1234,1,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*1C $ABAGA,1234,2,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*1F $ABAGA,1234,3,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*1E $ABAGA,1234,4,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*19 $ABAGA,1234,5,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*18 $ABAGA,1234,6,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*1B $ABAGA,1234,7,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*1A $ABAGA,1234,8,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*15 $ABAGA,1234,9,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*14 $ABAGA,1234,10,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*2C $ABAGA,1234,11,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*2D $ABAGA,1234,12,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*2E $ABAGA,1234,13,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*2F $ABAGA,1234,14,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*28 $ABAGA,1234,15,0,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,C*29	-
Confirm that the AGA sentences for Message 23 were received correctly by the EUT using the query sentence for the AGA sentence.	The EUT reports the following response to the $ABABQ,AGA*3A query: $ABAGA,1234,0,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0C $ABAGA,1234,1,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0D $ABAGA,1234,2,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0E $ABAGA,1234,3,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0F $ABAGA,1234,4,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*08 $ABAGA,1234,5,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*09 $ABAGA,1234,6,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0A $ABAGA,1234,7,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0B $ABAGA,1234,8,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*04 $ABAGA,1234,9,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*05 $ABAGA,1234,10,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*3D $ABAGA,1234,11,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*3C $ABAGA,1234,12,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*3F $ABAGA,1234,13,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*3E $ABAGA,1234,14,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*39 $ABAGA,1234,15,000,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*38	Pass

c) Activate Transmissions using the ECB Sentence		
Requirement	Result	Verdict
Activate the transmission of 3 Message 23 per frame on channel A in the slots reserved by the DLM sentence.	The ECB sentence applied to the EUT is: $ABECB,1234,23,1,45,750,,,,,,C*03	-
Confirm that the Message 23s are transmitted in the defined slots.	The Message 23s are transmitted in slots 45, 795 and 1545 only; this is in accordance with the ECB sentence.	Pass
Confirm the content of Message 23 is as defined in the AGA sentences.	The contents of each Message 23 transmitted matched the contents of the AGA sentences used to define them.	Pass
Confirm that the AGA settings are transmitted in Message 23 one after the other, including the setting for station type 10 for Message 27 transmission control.	The EUT's Message 23 transmissions contains the AGA settings in ascending station type order. The setting for station type 10 for Message 27 transmission control is also included.	Pass
Confirm in case of station type 10 that Type of Ship and cargo Type, Reporting Interval, Tx/Rx mode and Quiet Time are not added to Message 23.	For station type 10, Type of Ship and Cargo Type, Reporting Interval, Tx/Rx Mode and Quiet Time are not added to Message 23- as seen in the table below.	Pass

c) Message 23 Transmissions by the EUT				
Time	Slot	Chan	Station Type	Sentence
15:14:01	45	A	0	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<000000000,2*1E
15:14:21	795	A	1	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<100000000,2*1F
15:14:41	1545	A	2	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<200000000,2*1C
15:15:01	45	A	3	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<300000000,2*1D
15:15:21	795	A	4	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<400000000,2*1A
15:15:41	1545	A	5	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<500000000,2*1B
15:16:01	45	A	6	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<600000000,2*18
15:16:21	795	A	7	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<700000000,2*19
15:16:41	1545	A	8	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<800000000,2*16
15:17:01	45	A	9	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<900000000,2*17
15:17:21	795	A	10	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<:00000000,2*14
15:17:41	1545	A	11	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<;00000000,2*15
15:18:01	45	A	12	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<<00000000,2*12

c) Message 23 Transmissions by the EUT				
Time	Slot	Chan	Station Type	Sentence
15:18:21	795	A	13	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<=00000000,2*13
15:18:41	1545	A	14	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<>00000000,2*10
15:19:01	45	A	15	!AIVDM,1,1,,A,G02B`i3wJPsi7ub1m<?00000000,2*11

d) Delete all AGA Settings using the Relevant AGA Sentences		
Requirement	Result	Verdict
Apply an AGA sentence for Message 23 content for each station type from 0-15 to delete the setting.	The AGA sentences sent to the EUT are: $ABAGA,1234,0,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*1F $ABAGA,1234,1,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*1E $ABAGA,1234,2,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*1D $ABAGA,1234,3,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*1C $ABAGA,1234,4,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*1B $ABAGA,1234,5,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*1A $ABAGA,1234,6,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*19 $ABAGA,1234,7,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*18 $ABAGA,1234,8,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*17 $ABAGA,1234,9,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*16 $ABAGA,1234,10,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*2E $ABAGA,1234,11,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*2F $ABAGA,1234,12,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*2C $ABAGA,1234,13,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*2D $ABAGA,1234,14,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*2A $ABAGA,1234,15,0,9100.0,N,18100.0,E,9100.0,N,18100.0,E,0,0,0,C*2B	-
Confirm that Message 23 is no longer transmitted.	The EUT ceases transmission of Message 23 after receiving the AGA sentences.	Pass

Scheduled Transmission of Message 24A - Clause 10.2.1.12

This test will verify that the Base Station can be configured to transmit Message 24A to provide the base station name.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Activate the transmission of Message 24A, reporting interval = 3 min, with a sentence like:
   $xxECB,<UI>,24,1,10,13500,,4,20,13500,,C
c) Apply an ECB sentence to stop the transmission of Message 24.
   $xxECB,<UI>,24,1,-1,,,4,-1,,,C

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the EUT is transmitting Message 24A in the assigned slots, interval, and channels as defined in the ECB sentences. Confirm that the content of Message 24A, the base station name, is as defined by the BCL sentence. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
c) Message 24A is no longer transmitted.

Test Results

a) Apply the Independent Mode Setup Procedure		
Requirement	Result	Verdict
Configure the EUT to operate in independent mode.	The EUT is successfully set to operate in independent mode, as defined in §10.1.3.	Pass

b) Activate the Transmission of Message 24A		
Requirement	Result	Verdict
Activate the transmission of Message 24A with a reporting interval of 3 minutes using an ECB sentence.	The ECB sentence applied to the EUT is: $ABECB,1234,24,1,10,13500,,4,20,13500,,C*2C	-
Confirm that the EUT is transmitting Message 24A in the assigned slots, interval, and channels as defined in the ECB sentences.	The EUT transmits in slot 10 for channel A and slot 20 for channel B. There is an interval of 6 minutes (13500 slots) between transmissions on each channel; the EUT alternates transmissions between channel A and B to obtain a 3-minute reporting interval.	Pass
Confirm that the content of Message 24A, the base station name, is as defined by the BCL sentence.	The contents of Message 24A are confirmed as correct, as seen in the table 'Message Decode' below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	Each time a Message 24A is transmitted, the appropriate VDO sentence is output to the PI: !ABVDO,1,1,,B,H02B`i1AEJ1=D@0000000000000,2*68	Pass

b) Message 24A Transmitted by the EUT					
Time	Slot	Chan	MMSI	Msg	Sentence
16:31:00	10	A	2402500	24A	!AIVDM,1,1,,A,H02B`i1AEJ1=D@0000000000000,2*62
16:34:00	20	B	2402500	24A	!AIVDM,1,1,,B,H02B`i1AEJ1=D@0000000000000,2*61
16:37:00	10	A	2402500	24A	!AIVDM,1,1,,A,H02B`i1AEJ1=D@0000000000000,2*62

b) Message 24A Decode		
!AIVDM,1,1,,B,H02B`i1AEJ1=D@0000000000000,2*61		
Parameter	Expected Value	Decoded Value
Message ID	24	24
Repeat Indicator	0	0
MMSI	2402500	2402500
Part Number	0	0
Name	TUV SUD@@@@@@@@@@@@@	TUV SUD@@@@@@@@@@@@@

c) Cease Transmissions of Message 24A		
Requirement	Result	Verdict
Apply an ECB sentence to stop the EUT from transmitting Message 24A.	The following ECB sentence was applied to the EUT: $ABECB,1234,24,1,-1,,,4,-1,,,C*2F	-
Confirm that the EUT ceases transmission of Message 24A.	The EUT stops transmitting Message 24A successfully.	Pass

Scheduled Transmission of Message 26 - Clause 10.2.1.13

This test will verify that the Base Station can be configured for up to 4 transmission schedules for Message 26 with different content and transmits Message 26 according to the defined transmission schedules.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Apply a DLM sentence to reserve slots for transmission of 4 Message 26 schedules.
c) Apply 4 MEB sentences with the content for 4 Message 26.
   $xxDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,L,45,1,7,375,C
   !xxMEB,1,1,0,A,<MMSI>,26,1,0,0,0,C,<encData1>,0
   !xxMEB,1,1,1,A,<MMSI>,26,2,0,0,1,C,<encData2>,0
   !xxMEB,1,1,3,A,<MMSI>,26,3,0,<DestMMSI1>,0,C,<encData3>,0
   !xxMEB,1,1,4,A,<MMSI>,26,4,0,<DestMMSI2>,1,C,<encData4>,0
d) Activate the transmission of 4 transmission schedules for Message 26.
   - One FATDMA transmission schedule with 10 s reporting interval on channel A and B with SOTDMA CommState.
     $xxCBR,<MMSI>,26,1,12,0,45,750,0,12,0,420,750,C
   - One FATDMA transmission schedule with 1 min reporting interval on Channel A with SOTDMA CommState.
     $xxCBR,<MMSI>,26,2,12,0,400,2250,0,,,-1,,C
   - One FATDMA transmission schedule with 3 min reporting interval on Channel A with ITDMA CommState.
     $xxCBR,<MMSI>,26,3,12,1,1150,6750,0,,,-1,,C
   - One RATDMA transmission schedule on channel B, reporting interval 2 min with ITDMA CommState.
     $xxCBR,<MMSI>,26,4,,,-1,,1,12,2,777,4500,C
e) Apply CBR sentences to stop the transmission of Message 26 for all 4 transmission schedules.
   $xxCBR,<MMSI>,26,<MsgIdIndex>,,,-1,,0,,,-1,,C

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the Independent mode setup has been correctly set;
b) the DLM sentence was received correctly by the EUT using the query sentence for the DLM sentence. Confirm that the MEB sentences for Message 26 were received correctly by the EUT using the query sentence for MEB. Confirm that there are 4 MEB output sentences, one for each Message Id index;
c) the Messages 26 of the FATDMA transmission schedules are transmitted in the defined slots. Confirm that the RATDMA messages are transmitted with the correct transmission interval, with a selection interval of 4 s. Confirm that the content of Message 26 is as defined in the MEB sentences. Confirm that the CommState is correct, with the appropriate CommState type (SOTDMA, ITDMA);
d) Message 26 is no longer transmitted.

Test Results

a) Apply the Independent Mode Setup Procedure		
Requirement	Result	Verdict
Configure the EUT to operate in independent mode.	The EUT is successfully set to operate in independent mode, as defined in §10.1.3.	Pass

b) Configure Message 26 Content and Transmission Schedule		
Requirement	Result	Verdict
Apply a DLM sentence to reserve slots for the transmission of 4 Message 26 schedules.	The DLM sentence applied to the EUT is: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,L,45,1,7,375,C*6B	-
Confirm that the DLM sentence was received correctly by the EUT.	The results returned for the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,L,45,1,7,375,R*7A $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08	Pass
Apply 4 MEB sentences with the content for 4 Message 26.	The MEB sentences applied to the EUT are: !ABMEB,1,1,0,3,2402500,26,1,0,,0,C,2EQEEBEG,0*77 !ABMEB,1,1,1,1,2402500,26,2,0,,1,C,2EQEEBEG,0*76 !ABMEB,1,1,2,1,2402500,26,3,0,400500600,0,C,2EQEEBEG,0*42 !ABMEB,1,1,3,2,2402500,26,4,0,777888999,1,C,2EQEEBEG,0*47	-
Confirm that the MEB sentences for Message 26 were received correctly by the EUT.	The results returned by the $ABABQ,MEB*37 query are: !ABMEB,1,1,,,002402500,26,1,0,,0,R,2EQEEBEG,0*65 !ABMEB,1,1,,,002402500,26,2,0,,1,R,2EQEEBEG,0*67 !ABMEB,1,1,,,002402500,26,3,0,400500600,0,R,2EQEEBEG,0*50 !ABMEB,1,1,,,002402500,26,4,0,777888999,1,R,2EQEEBEG,0*57	Pass
Confirm that there are 4 MEB output sentences, one for each Message ID index.	The results of the $ABABQ,MEB*37 query show that there is one MEB sentence for each Message ID index: !ABMEB,1,1,,,002402500,26,**1**,0,,0,R,2EQEEBEG,0*65 !ABMEB,1,1,,,002402500,26,**2**,0,,1,R,2EQEEBEG,0*67 !ABMEB,1,1,,,002402500,26,**3**,0,400500600,0,R,2EQEEBEG,0*50 !ABMEB,1,1,,,002402500,26,**4**,0,777888999,1,R,2EQEEBEG,0*57	Pass

c) Activate the Transmission of Message 26				
Requirement	Result			Verdict
Apply one FATDMA transmission schedule with 10 s reporting interval on channel A and B with SOTDMA CommState.	The CBR sentence applied to the EUT for sentence 1 is: $ABCBR,2402500,26,1,09,20,45,750,0,09,20,420,750,C*3C			-
Apply one FATDMA transmission schedule with 1 min reporting interval on Channel A with SOTDMA CommState.	The CBR sentence applied to the EUT for sentence 2 is: $ABCBR,2402500,26,2,09,20,400,2250,0,,,-1,,C*2E			-
Apply one FATDMA transmission schedule with 3 min reporting interval on Channel A with ITDMA CommState.	The CBR sentence applied to the EUT for sentence 3 is: $ABCBR,2402500,26,3,09,20,1150,6750,0,,,-1,,C*1F			-
Apply one RATDMA transmission schedule on channel B, reporting interval 2 min with ITDMA CommState.	The CBR sentence applied to the EUT for sentence 4 is: $ABCBR,2402500,26,4,,,-1,,1,09,20,777,4500,C*2E			-
Confirm that the Message 26 of the FATDMA transmission schedules are transmitted in the defined slots.	Msg ID Index	Expected Slots	Actual Slots	Pass
	1	45,420,795,1170,1545,1920	45,420,795,1170,1545,1920	
	2	400	400	
	3	1150	1150	
Confirm that the RATDMA messages are transmitted with the correct transmission interval, with a selection interval of 4 s.	The RATDMA messages must be transmitted in the slots 627-927 every two minutes; the EUT transmits in slot 845.			Pass
Confirm that the content of Message 26 is as defined in the MEB sentences.	The content of the Message 26 transmitted by the EUT is the same as that defined by the MEB sentences. The EUT accepts the 'broadcast behaviour' field in the MEB sentence and uses the schedule commanded in the CBR sentence.			Pass
Confirm that the CommState is correct, with the appropriate CommState type (SOTDMA, ITDMA).	The CommState for each of the messages transmitted by the EUT is correct; for FATDMA Messages, the CommState flag is set to 0. For RATDMA transmissions, the EUT uses a Commstate flag of 1.			Pass

c) Message CommState Decodes						
Time	Slot	Sentence	Comm Flag	Sync State	Timeout	Sub Message
10:47:41	1545	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:47:51	1920	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:48:01	45	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:48:10	400	!AIVDM,1,1,,A,J02B`i49F5EE9EL8S:0,2*08	0	1	0	00011001010000000
10:48:11	420	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:48:21	795	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:48:22	845	!AIVDM,1,1,,B,J02B`i>W5Gp@2EQEEBEG2 AU0,0*7D	1	0	-	10001100101000000
10:48:31	1170	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:48:41	1545	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:48:51	1920	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:49:01	45	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:49:10	400	!AIVDM,1,1,,A,J02B`i49F5EE9EL8S:0,2*08	0	1	0	00011001010000000
10:49:11	420	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:49:21	795	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:49:31	1170	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:49:41	1545	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:49:51	1920	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:50:01	45	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:50:10	400	!AIVDM,1,1,,A,J02B`i49F5EE9EL8S:0,2*08	0	1	0	00011001010000000
10:50:11	420	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:50:21	795	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:50:22	845	!AIVDM,1,1,,B,J02B`i>W5Gp@2EQEEBEG 2AU0,0*7D	1	0	-	10001100101000000
10:50:30	1150	!AIVDM,1,1,,A,J02B`i9OO9oP2EQEEBEG2 JGP,0*13	1	0	-	11010010111100000
10:50:31	1170	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:50:41	1545	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:50:51	1920	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:51:01	45	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:51:10	400	!AIVDM,1,1,,A,J02B`i49F5EE9EL8S:0,2*08	0	1	0	00011001010000000
10:51:11	420	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:51:21	795	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:51:31	1170	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:51:41	1545	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:51:51	1920	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:52:01	45	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:52:10	400	!AIVDM,1,1,,A,J02B`i49F5EE9EL8S:0,2*08	0	1	0	00011001010000000
10:52:11	420	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000
10:52:21	795	!AIVDM,1,1,,A,J02B`i09F5EE9EL8;f0,2*38	0	0	2	01011101110000000
10:52:22	845	!AIVDM,1,1,,B,J02B`i>W5Gp@2EQEEBEG 2AU0,0*7D	1	0	-	10001100101000000
10:52:31	1170	!AIVDM,1,1,,B,J02B`i09F5EE9EL8;f0,2*3B	0	0	2	01011101110000000

d) Cease Transmissions of Message 26 using a CBR Sentence		
Requirement	Result	Verdict
Apply CBR sentences to stop the transmission of Message 26 for all 4 transmission schedules.	The CBR sentences applied to the EUT are: $ABCBR,2402500,26,1,,,-1,,0,,,-1,,C*0B $ABCBR,2402500,26,2,,,-1,,0,,,-1,,C*08 $ABCBR,2402500,26,3,,,-1,,0,,,-1,,C*09 $ABCBR,2402500,26,4,,,-1,,0,,,-1,,C*0E	-
Confirm that the EUT ceases to transmit Message 26.	The EUT stops transmitting all Message 26 after the CBR sentences are applied.	Pass

Receive Messages - Clause 10.2.1.13.4

This test will verify that the Base Station is capable of receiving all VDL message types and outputting a VDM to the PI. The contents of binary Message 8 will verify the bit stuffing capability and the correct CRC check of the received messages is also verified.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Input the following messages to the VDL:
   Message 1 through 27 and one undefined.
b) Apply a simulated position report message with wrong CRC bit sequence to the VDL.
c) Enable VSI and all TAG block output parameters that are supported by EUT. Apply 90% channel load on both channels. The input signal level on the EUT shall be between −77 dBm and −7 dBm.

Required Results

Confirm that:

a) the EUT outputs each message to the PI with the message content complete and correct;
b) the message is not output on the PI;
c) VDM, VSI and all fields of the TAG block are output. Loss of up to 1 % of VDL messages is acceptable.

Test Results

a) Apply Messages 1 Through 27, with One Undefined Message		
Requirement	Result	Verdict
Apply Messages 1 through 27, as well as one undefined.	Messages 1 through 27, along with an undefined Message 28, are applied to the VDL. These VDO sentences can be seen in the table below.	-
Confirm that the EUT outputs each message to the PI with the message content complete and correct.	For each Message applied to the VDL, a VDM sentence is applied to the EUT. This is seen in the table of results below.	Pass

a) Messages Output to the PI of the EUT					
Time	Slot	Chan	MMSI	Msg	Sentence
16:04:32	1218	A	231000501	1	!AIVDO,1,1,,A,13LC9e@2P:wrFu2M7AWh2gw00000,0*7F
16:04:32					!ABVDM,1,1,,A,13LC9e@2P:wrFu2M7AWh2gw00000,0*76
16:04:33	1269	A	231000501	2	!AIVDO,1,1,,A,23LC9e@2P:wrFu2M7AWh2gw20000,0*7E
16:04:34					!ABVDM,1,1,,A,23LC9e@2P:wrFu2M7AWh2gw20000,0*77
16:04:36	1372	A	231000501	3	!AIVDO,1,1,,A,33LC9e@2P:wrFu2M7AWh2gw80000,0*75
16:04:37					!ABVDM,1,1,,A,33LC9e@2P:wrFu2M7AWh2gw80000,0*7C
16:04:39	1498	A	2320180	4	!AIVDO,1,1,,A,402=W=1v@R?iGOrFu2M7AWi00000,0*08
16:04:40					!ABVDM,1,1,,A,402=W=1v@R?iGOrFu2M7AWi00000,0*01
16:04:42	1589	A	231000501	5	!AIVDO,2,1,0,A,53LC9eD8nNHAAEI=D@1AEJ1@E=@0000000 00000t2lgFr4IU::4kmE20CD53,0*55
16:04:42					!AIVDO,2,2,0,A,kP000000000,2*1D
16:04:42					!ABVDM,2,1,0,A,53LC9eD8nNHAAEI=D@1AEJ1@E=@0000000 00000t2lgFr4IU::4kmE20,0*5D
16:04:42					!ABVDM,2,2,0,A,CD53kP000000000,2*15
16:04:45	1730	A	2402500	6	!AIVDO,1,1,,A,602B`i2W5Gp@04205@E=B0m<N3H,2*63
16:04:46					!ABVDM,1,1,,A,602B`i2W5Gp@04205@E=B0m<N3H,2*6A
16:04:48	1837	A	654000321	7	!AIVDO,1,1,,A,79ge0hBr<lA@0000000000000000,0*11
16:04:49					!ABVDM,1,1,,A,79ge0hBr<lA@0000000000000000,0*18
16:04:50	1888	A	600500400	8	!AIVDO,1,1,,A,88tc`d00@00E1Dm83Dip>0,4*76
16:04:50					!ABVDM,1,1,,A,88tc`d00@00E1Dm83Dip>0,4*7F
16:04:52	1971	A	111234000	9	!AIVDO,1,1,,A,91b5;l7l1TwrFu2M7AWoq=804000,0*55
16:04:53					!ABVDM,1,1,,A,91b5;l7l1TwrFu2M7AWoq=804000,0*5C
16:04:53	2034	A	800700600	10	!AIVDO,1,1,,A,:;sVpf2?:r;0,0*58
16:04:54					!ABVDM,1,1,,A,:;sVpf2?:r;0,0*51
16:04:56	2141	A	399099088	11	!AIVDO,1,1,,A,;5tW4l1v@R?m0wrFu2M7AWjP2000,0*36
16:04:57					!ABVDM,1,1,,A,;5tW4l1v@R?m0wrFu2M7AWjP2000,0*3F
16:04:59	2	A	750850950	12	!AIVDO,1,1,,A,<;<4CQRW5Gp@D5CDP=C7Pij0,0*72
16:05:01					!ABVDM,1,1,,A,<;<4CQRW5Gp@D5CDP=C7Pij0,0*7B
16:05:03	142	A	750850950	13	!AIVDO,1,1,,A,=;<4CQRW5Gp@0000000000000000,0*7F
16:05:04					!ABVDM,1,1,,A,=;<4CQRW5Gp@0000000000000000,0*76
16:05:07	275	A	750850950	14	!AIVDO,1,1,,A,>;<4CQQ@E=B0m<N37@0,2*49
16:05:07					!ABVDM,1,1,,A,>;<4CQQ@E=B0m<N37@0,2*40
16:05:10	396	A	750850950	15	!AIVDO,1,1,,A,?;<4CQRW5Gp@D7P000000000000,2*5C

a) Messages Output to the PI of the EUT					
Time	Slot	Chan	MMSI	Msg	Sentence
16:05:11					!ABVDM,1,1,,A,?;<4CQRW5Gp@D7P000000000000,2*55
16:05:12	463	A	2222222	16	!AIVDO,1,1,,A,@027`SRk14pH9H0h,0*4F
16:05:12					!ABVDM,1,1,,A,@027`SRk14pH9H0h,0*46
16:05:14	540	A	2402500	17	!AIVDO,1,1,,A,A02B`i3wAhsW02J`0w<`2gqnwiLDwaT160ouo01E,0*4E
16:05:14					!ABVDM,1,1,,A,A02B`i3wAhsW02J`0w<`2gqnwiLDwaT160ouo01E,0*47
16:05:16	641	A	750850950	18	!AIVDO,1,1,,A,B;<4CQP0IGvUg@WAIlvF1r`02000,0*3F
16:05:17					!ABVDM,1,1,,A,B;<4CQP0IGvUg@WAIlvF1r`02000,0*36
16:05:21	815	A	700800900	19	!AIVDO,1,1,,A,C:LEOQ002WvUg@WAIlt0cwbP`:VaSj000000000000000000030,0*2D
16:05:22					!ABVDM,1,1,,A,C:LEOQ002WvUg@WAIlt0cwbP`:VaSj000000000000000000030,0*24
16:05:25	985	A	2222222	20	!AIVDO,1,1,,A,D027`SP8iH0D0000000000000000,0*5B
16:05:26					!ABVDM,1,1,,A,D027`SP8iH0D0000000000000000,0*52
16:05:28	1073	A	940950960	21	!AIVDO,1,1,,A,E>1G5d0:2ab0b7W000000000000?u;NQ>S`kp00000P00<0,2*67
16:05:29					!ABVDM,1,1,,A,E>1G5d0:2ab0b7W000000000000?u;NQ>S`kp00000P00<0,2*6E
16:05:29	1117	A	2222222	22	!AIVDO,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*4B
16:05:30					!ABVDM,1,1,,A,F027`SR2N2P7vm1oR?sD3bH2P000,0*42
16:05:31	1179	A	2222222	23	!AIVDO,1,1,,A,G027`SSwJPsi7ub1m<000000000,2*33
16:05:31					!ABVDM,1,1,,A,G027`SSwJPsi7ub1m<000000000,2*3A
16:05:32	1231	A	2222222	24	!AIVDO,1,1,,A,H027`SQAEI=D@00000000000000,2*4D
16:05:33					!ABVDM,1,1,,A,H027`SQAEI=D@00000000000000,2*44
16:05:34	1313	A	2222222	24	!AIVDO,1,1,,A,H027`STjihh0000DEF0000000000,0*7A
16:05:35					!ABVDM,1,1,,A,H027`STjihh0000DEF0000000000,0*73
16:05:37	1413	A	750850950	25	!AIVDO,1,1,,A,I;<4CQfW5Gp@0400:PbJT1bHt6F`,0*52
16:05:38					!ABVDM,1,1,,A,I;<4CQfW5Gp@0400:PbJT1bHt6F`,0*5B
16:05:40	1546	A	2222222	26	!AIVDO,1,1,,A,J027`ST0@00QT0a0Qb2a9PI000,4*5C
16:05:41					!ABVDM,1,1,,A,J027`ST0@00QT0a0Qb2a9PI000,4*55
16:05:44	1694	A	231000501	27	!AIVDO,1,1,,A,KkLC9eL?u7CfP:CH,0*22
16:05:45					!ABVDM,1,1,,A,KkLC9eL?u7CfP:CH,0*2B
16:05:47	1799	A	139532113	28	!AIVDO,1,1,,A,LR54GDNMn2o;3eL?u7CfP:CH,0*10
16:05:48					!ABVDM,1,1,,A,LR54GDNMn2o;3eL?u7CfP:CH,0*19

b) Apply a Position Report with Incorrect CRC Bit Sequence		
Requirement	Result	Verdict
Apply a simulated position report message with wrong CRC bit sequence to the VDL.	The following position report was applied to the VDL with an incorrect CRC bit sequence: !AIVDO,1,1,,A,13LC9e@2P:wrFu2M7AWh2gv@0000,0*0E	-
Confirm that the message is not output to the PI of the EUT.	No VDM was output to the PI.	Pass

c) Enable VSI and all TAG Block Output Parameters		
Requirement	Result	Verdict
All VSI and TAG block output parameters that are supported by EUT shall be enabled.	The supported output parameters are enabled using the following sentence: $ABCPS,1234,C,A,V*13 $ABCPD,1234,C,A,V*04 $ABCPC,1234,C,A,V*03 $ABSPO,1234,E,1,1,1,1,1,1,1,1,1,1,1,C*61	-
Apply 90% channel load on both channels. Loss of up to 1 % of VDL messages is acceptable.	A total of 45 targets are simulated on channels A and B, with a block gap of 5 slots. This results in a channel load of 90% for both channels. There was a 0% loss of messages transmitted on the VDL over 20 frames.	-
Confirm that the input signal level on the EUT is between -77 dBm and -7 dBm.	The signal strength was between -64 dBm and -69 dBm over a period of 20 frames.	Pass

2.3 Addressed and Broadcast Messaging

2.3.1 Specification Reference

IEC 62320-1, Clause 10.2.2

2.3.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 0

2.3.3 Date of Test

10-February-2020

2.3.4 Test Results and Methods of Measurement

Normal Operations – Clause 10.2.2.1

This test will verify that the Base Station is capable of transmitting both broadcast (Messages 8, 14, 25, 26) and addressed (Messages 6, 12, 25 ,26) safety related and binary messages.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Input the following BBM sentence to the EUT:
!xxBBM,1,1,0,1,8,7E3B3C3E7E,0
b) Input the following ABM sentence to the EUT:
!xxABM,1,1,2,000001005,1,6,06P0test,0

The following tests are required for a Base Station operated as an independent unit.

c) Apply the independent mode setup to the EUT.
d) Input the following BBM sentences to the EUT:
!xxBBM,1,1,0,1,8,7E3B3C3E7E,0
!xxBBM,1,1,0,0,14,D5CDP=5CC175,0
!xxBBM,1,1,4,1,70,up?d45L2N`UKPFl>o8?`00,4
!xxBBM,1,1,5,2,25,up?d45L2N`UKPFl>o8?`00,4
!xxBBM,1,1,6,1,71,up?d45L2N`UKPFl>o8?`00,4
!xxBBM,1,1,7,2,26,up?d45L2N`UKPFl>o8?`00,4
e) Input the following ABM sentence to the EUT:
!xxABM,1,1,2,<MMSI>,1,6,06P0test,0
!xxABM,1,1,3,<MMSI>,0,12,D5CDP=5CC175,0
!xxABM,1,1,0,<MMSI>,1,70,upGd45L22B2J2B2H,0
!xxABM,1,1,1,<MMSI>,2,25,upGd45L22B2J2B2H,0
!xxABM,1,1,2,<MMSI>,1,71,upGd45L22B2J2B2H,0
!xxABM,1,1,3,<MMSI>,2,26,upGd45L22B2J2B2H,0
The addressed station shall provide the appropriate response, Messages 7 and 13.
f) Increase the number of reserved slots for the third entry from 2 to 5 to allow the transmission of 5 slot messages.
$xxDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,5,7,75,,,,,
$xxDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,5,7,75,,,,,
g) Input BBM sentences for a maximum length 5 slot messages (Message 8: 162 characters = 968 bit, Message 14: 160 characters = 960 bit) to the EUT:
!xxBBM,4,1,6,2,8,06P045678901234567890123456789012345678901234567890123456789,0
!xxBBM,4,2,6,2,8,012345678901234567890123456789012345678901234567890123456789,0
!xxBBM,4,3,6,2,8,012345678901234567890123456789012345678901234567890123456789,0
!xxBBM,4,4,6,2,8,012345678901234567890123456789012345678901234567890123456789012345678901,4
!xxBBM,4,1,7,2,14,012345678901234567890123456789012345678901234567890123456789,0

!xxBBM,4,2,7,2,14,01234567890123456789012345678901234567890123456789,0
!xxBBM,4,3,7,2,14,01234567890123456789012345678901234567890123456789,0
!xxBBM,4,4,7,2,14,01234567890123456789012345678901234567890123456789,0

h) Input ABM sentences for maximum length 5 slot messages (Message 6: 936 bit, Message 12: 156 characters = 936 bit) to the EUT:
!xxABM,4,1,5,<MMSI1>,2,6,01234567890123456789012345678901234567890123456789,0
!xxABM,4,2,5,<MMSI1>,2,6,01234567890123456789012345678901234567890123456789,0
!xxABM,4,3,5,<MMSI1>,2,6,01234567890123456789012345678901234567890123456789,0
!xxABM,4,4,5,<MMSI1>,2,6,01234567890123456789012345678901234567890123456789012345,0
!xxABM,4,1,6,<MMSI2>,2,12,01234567890123456789012345678901234567890123456789,0
!xxABM,4,2,6,<MMSI2>,2,12,01234567890123456789012345678901234567890123456789,0
!xxABM,4,3,6,<MMSI2>,2,12,01234567890123456789012345678901234567890123456789,0
!xxABM,4,4,6,<MMSI2>,2,12,01234567890123456789012345678901234567890123456789012345,0

i) Input a BBM sentence for Message 14 exceeding the maximum length of 5 slot (162 characters = 972 bit, all bits set to 1 to get a maximum of bit stuffing bits to the EUT:
!xxBBM,5,1,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0
!xxBBM,5,2,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0
!xxBBM,5,3,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0
!xxBBM,5,4,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0
!xxBBM,5,5,1,2,14,ww,0

j) Enable RATDMA. Establish 80 % channel load. Ensure there are 5 blocks of 5 free slots available within 4 s. Initiate the transmission of two 3 slot messages (Message 8 followed by Message 12) by the EUT.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the EUT does NOT transmit and generates an ABK type 2;
b) the EUT does NOT transmit and generates an ABK type 2;
c) the independent mode setup has been correctly set;
d) the EUT is transmitting Messages 8 and 14 once each and two Messages 25 and 26 over the VDL with the specified configuration parameters from the associated BBM sentences within 4 s using available FATDMA slots. Confirm that in Message 25 and 26 the destination indicator is set to 0 and no destination ID is included. Confirm that for Message 25 and 26 the Binary data flag in Message 25/26 is set to 1 and for message 70 and 71 the Binary data flag in Message 25/26 is set to 0. Confirm that the CommState of Message 26 is not allocating slots. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the ABK sentence with ABK type 3 is output on the PI of the EUT when Messages 8 and 14, 25 and 26 are transmitted;
e) the EUT is transmitting Messages 6 and 12 once each and two Messages 25 and 26 over the VDL with the specified configuration parameters from the associated ABM sentences within 4 s using available FATDMA slots. Confirm that in Message 25 and 26 the Destination indicator is set to 1 and the correct destination ID is included. Confirm that for Message 25 and 26 the Binary data flag in Message 25/26 is set to 1 and for message 70 and 71 the Binary data flag in Message 25/26 is set to 0. Confirm that the CommState of Message 26 is not allocating slots. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the EUT has received the Binary Acknowledgement Message 7 and Safety Related Acknowledgement Message 13 from the addressed station by reviewing the PI VDM sentences. Confirm that the ABK sentence with ABK type 0 is output on the PI of the EUT when acknowledge to Messages 6 and 12 are received;
f) the slot reservation by DLM has been correctly stored;
g) the EUT is transmitting Messages 8 and 14 once each over the VDL with the specified configuration parameters from the associated BBM sentences within 4 s using available FATDMA slots. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the ABK Sentence with ABK type 3 is output on the PI of the EUT when Messages 8 and 14 are transmitted;

h) the EUT is transmitting Messages 6 and 12 once each over the VDL with the specified configuration parameters from the associated ABM sentences within 4 s using available FATDMA slots. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the EUT has received the Binary Acknowledgement Message 7 and Safety Related Acknowledgement Message 13 from the addressed station by reviewing the PI VDM sentences. Confirm that the ABK sentence with ABK type 0 is output on the PI of the EUT when acknowledge to Messages 6 and 12 are received;

i) the EUT did not broadcast Message 14. Confirm that the EUT response with an ABK sentence with ABK type '2';

j) the EUT transmits in correct order according to their priority (Messages 12 before 8). Check that the EUT transmits in free slots within 4 s according to the RATDMA algorithm.

Test Results

a) Apply a BBM Message in Dependent Mode		
Requirement	Result	Verdict
Input a BBM sentence to the EUT while it is operating in dependent mode.	The BBM applied to the EUT is: !ABBBM,1,1,0,1,8,7E3B3C3E7E,0*1C	-
Confirm that the EUT generates an ABK sentence with acknowledgement type 2.	The following ABK is output by the EUT: $ABABK,,A,8,0,**2***1C	Pass
Confirm that the EUT does not transmit the binary message.	The EUT does not transmit.	Pass

b) Apply an ABM Message in Dependent Mode		
Requirement	Result	Verdict
Input an ABM sentence to the EUT while it is operating in dependent mode.	The ABM sentence applied to the EUT is: !ABABM,1,1,2,000001005,1,6,06P0test,0*0C	-
Confirm that the EUT generates an ABK sentence with acknowledgement type 2.	The following ABK is output by the EUT: $ABABK,000001005,A,6,2,**2***24	Pass
Confirm that the EUT does not transmit the binary message.	The EUT does not transmit.	Pass

c) Apply the Independent Mode Setup		
Requirement	Result	Verdict
Apply the independent mode setup.	The EUT is configured to operate in independent mode, as described §10.1.3.	Pass

d) Apply BBM Sentences to the EUT in Independent Mode		
Requirement	Result	Verdict
Apply 6 BBM sentences to the EUT consisting of Message 8, 14, 25 and 26.	The BBM sentences applied to the EUT are: !ABBBM,1,1,0,1,8,7E3B3C3E7E,0*1C !ABBBM,1,1,0,0,14,D5CDP=5CC175,0*4A !ABBBM,1,1,4,1,70,up?d45L2N`UKPFl>o8?`00,4*09 !ABBBM,1,1,5,2,25,up?d45L2N`UKPFl>o8?`00,4*0B !ABBBM,1,1,6,1,71,up?d45L2N`UKPFl>o8?`00,4*0A !ABBBM,1,1,7,2,26,up?d45L2N`UKPFl>o8?`00,4*0A	-
Confirm that the EUT is transmitting Messages 8 and 14 once each, and two Messages 25 and 26 over the VDL with the specified configuration parameters from the associated BBM sentences within 4s using the available FATDMA slots.	Messages 8 and 14 are transmitted once and Messages 25 and 26 are transmitted twice over the VDL. The Messages contain the configuration parameters specified by the BBM sentences and are transmitted within the required timeframe.	Pass
Confirm that in Message 25 and 26 the destination indictor is set to 0 and no destination ID is included.	The destination indicator is confirmed as 0 in the transmitted Message 25 and 26.	Pass
Confirm that for Message 25 and 26 the Binary data flag in Message 25/26 is set to 1 and for message 70 and 71 the Binary data flag in Message 25/26 is set to 0.	The binary data flag in Messages 25 and 26 is set to 1, and for Messages 70 and 71 the binary data flag is set to 0. See the table '*d) Message Decodes*' below for details.	Pass
Confirm that the CommState of Message 26 is not allocating slots.	The CommState fields of Message 26 is not allocating slots, and all bits in the CommState are set to zero.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	For each of the VDM sentences applied to the EUT, the EUT outputs the relevant VDO sentences to the PI.	Pass

d) Apply BBM Sentences to the EUT in Independent Mode		
Requirement	Result	Verdict
Confirm that the ABK sentence with ABK type 3 is output on the PI of the EUT when Messages 8 and 14, 25 and 26 are transmitted.	For each Message transmitted, a relevant ABK sentence with ABK status field set to 3 is output to the PI. This can be seen in the table *'d) Message Decodes'* below.	Pass

d) Results					
Time	Slot	Chan	Msg	Sentence	Comment
15:16:43				!ABBBM,1,1,0,1,8,7E3B3C3E7E,0*1C	Six BBM sentences applied to the EUT.
15:16:43				!ABBBM,1,1,0,0,14,D5CDP=5CC175,0*4A	
15:16:43				!ABBBM,1,1,4,1,70,up?d45L2N`UKPFl>o8?`00,4*09	
15:16:43				!ABBBM,1,1,5,2,25,up?d45L2N`UKPFl>o8?`00,4*0B	
15:16:43				!ABBBM,1,1,6,1,71,up?d45L2N`UKPFl>o8?`00,4*0A	
15:16:43				!ABBBM,1,1,7,2,26,up?d45L2N`UKPFl>o8?`00,4*0A	
15:16:43	1629	B	25	!AIVDM,1,1,,B,I02B`i7oPvh@Eh9rREf1K@sLPvP0,0*27	
15:16:43				!ABVDO,1,1,,B,I02B`i7oPvh@Eh9rREf1K@sLPvP0,0*2E	
15:16:43				$ABABK,,B,**25**,5,**3***24	
15:16:44	1660	A	8	!AIVDM,1,1,,A,802B`i0MD=8=<=DMD0,4*2E	
15:16:44				!ABVDO,1,1,,A,802B`i0MD=8=<=DMD0,4*27	
15:16:44				$ABABK,,A,**8**,0,**3***1D	
15:16:44	1661	A	14	!AIVDM,1,1,,A,>02B`i1@E=B0lE=<4LD,2*3C	
15:16:44				!ABVDO,1,1,,A,>02B`i1@E=B0lE=<4LD,2*35	
15:16:44				$ABABK,,A,**14**,0,**3***20	
15:16:44	1670	B	26	!AIVDM,1,1,,B,J02B`i7oPvh@Eh9rREf1K@sLPvP02000,0*26	
15:16:45				!ABVDO,1,1,,B,J02B`i7oPvh@Eh9rREf1K@sLPvP02000,0*2F	
15:16:45				$ABABK,,B,**26**,7,**3***25	
15:16:46	1735	A	25	!AIVDM,1,1,,A,I02B`i3oPvh@Eh9rREf1K@sLPvP0,0*20	Second Message 25 transmitted.
15:16:46				!ABVDO,1,1,,A,I02B`i3oPvh@Eh9rREf1K@sLPvP0,0*29	
15:16:46				$ABABK,,A,**70**,4,**3***26	
15:16:48	1810	A	26	!AIVDM,1,1,,A,J02B`i3oPvh@Eh9rREf1K@sLPvP02000,0*21	Second Message 26 transmitted.
15:16:48				!ABVDO,1,1,,A,J02B`i3oPvh@Eh9rREf1K@sLPvP02000,0*28	
15:16:48				$ABABK,,A,**71**,6,**3***25	

d) Message Decodes				
Msg	Sentence	Repeat Indicator	Destination Indicator	Binary Data Flag
25	!AIVDM,1,1,,B,I02B`i7oPvh@Eh9rREf1K@sLPvP0,0*27	00	0	1
	!ABVDO,1,1,,B,I02B`i7oPvh@Eh9rREf1K@sLPvP0,0*2E	00	0	1
26	!AIVDM,1,1,,B,J02B`i7oPvh@Eh9rREf1K@sLPvP02000,0*26	00	0	1
	!ABVDO,1,1,,B,J02B`i7oPvh@Eh9rREf1K@sLPvP02000,0*2F	00	0	1
25	!AIVDM,1,1,,A,I02B`i3oPvh@Eh9rREf1K@sLPvP0,0*20	00	0	0
	!ABVDO,1,1,,A,I02B`i3oPvh@Eh9rREf1K@sLPvP0,0*29	00	0	0
26	!AIVDM,1,1,,A,J02B`i3oPvh@Eh9rREf1K@sLPvP02000,0*21	00	0	0
	!ABVDO,1,1,,A,J02B`i3oPvh@Eh9rREf1K@sLPvP02000,0*28	00	0	0

e) Apply ABM Sentences to the EUT in Independent Mode		
Requirement	Result	Verdict
Apply the required ABM sentences to the EUT.	The sentences applied to the EUT are: !ABABM,1,1,2,777888999,1,6,06P0test,0*0E !ABABM,1,1,3,777888999,0,12,D5CDP=5CC175,0*56 !ABABM,1,1,0,777888999,1,70,upGd45L22B2J2B2H,0*16 !ABABM,1,1,1,777888999,2,25,upGd45L22B2J2B2H,0*14 !ABABM,1,1,2,777888999,1,71,upGd45L22B2J2B2H,0*15 !ABABM,1,1,3,777888999,2,26,upGd45L22B2J2B2H,0*15	-
Confirm that the EUT is transmitting Messages 6 and 12 once each and two Messages 25 and 26 over the VDL with the specified configuration parameters from the associated ABM sentences within 4 s using available FATDMA slots.	The EUT transmits Messages 6 and 12 once each- and transmits Messages 25 and 26 twice each over the VDL. The configuration parameters and slot allocations are correct, as seen in the table below, '*e) Results'*.	Pass
Confirm that in Message 25 and 26 the Destination indicator is set to 1 and the correct destination ID is included.	The destination indicator field in Messages 25 and 26 is set to 1, and the destination ID is included in the Message. This is shown in the table below, '*e) Message Decode'*.	Pass
Confirm that for Message 25 and 26 the Binary data flag in Message 25/26 is set to 1 and for message 70 and 71 the Binary data flag in Message 25/26 is set to 0.	The binary data flags for ABM sentences are correct.	Pass
Confirm that the CommState of Message 26 is not allocating slots.	The CommState of Message 26 is not allocating any slots: 0000000000000000000	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	For each Message transmitted, the corresponding VDO sentence is output on the PI. This is shown in table '*e) Message Decode'* below.	Pass
Confirm that the EUT has received the Binary Acknowledgement Message 7 and Safety Related Acknowledgement Message 13 from the addressed station by reviewing the PI VDM sentences.	The EUT received Message 7 and Message 13 from the addressed station. This is seen in the table below, '*e) Results'*.	Pass
Confirm that the ABK sentence with ABK type 0 is output on the PI of the EUT when acknowledge to Messages 6 and 12 are received.	The EUT successfully outputs the ABK sentences with acknowledgement type 0 for Messages 6 and 12: $ABABK,777888999,A,6,2,**0***24 $ABABK,777888999,B,12,3,**0***13	Pass

e) Results					
Time	Slot	Chan	MMSI	Msg	Sentence
10:28:07.672					!ABABM,1,1,2,777888999,1,6,06P0test,0*0E
10:28:08.267	310	A	2402500	6	!AIVDM,1,1,,A,602B`i:qMa>L06P0test,0*3C
10:28:08.292					!ABVDO,1,1,,A,602B`i:qMa>L06P0test,0*35
10:28:09.200	345	A	777888999	7	!AIVDM,1,1,,A,7;UnTqh0Tb<B,0*24
10:28:09.222					!ABVDM,1,1,,A,7;UnTqh0Tb<B,0*2F
10:28:09.222					$ABABK,777888999,A,6,2,0*24
10:28:12.682					!ABABM,1,1,3,777888999,0,12,D5CDP=5CC175,0*56
10:28:14.533	545	B	2402500	12	!AIVDM,1,1,,B,<02B`i>qMa>LD5CDP=5CC175,0*5C
10:28:14.562					!ABVDO,1,1,,B,<02B`i>qMa>LD5CDP=5CC175,0*55
10:28:15.520	582	B	777888999	13	!AIVDM,1,1,,B,=;UnTqh0Tb<C,0*2C
10:28:15.542					!ABVDM,1,1,,B,=;UnTqh0Tb<C,0*27
10:28:15.552					$ABABK,777888999,B,12,3,0*13
10:28:17.682					!ABABM,1,1,0,777888999,1,70,upGd45L22B2J2B2H,0*16
10:28:18.267	685	A	2402500	25	!AIVDM,1,1,,A,I02B`i:qMa>LupGd45L22B2J2B2H,0*68
10:28:18.292					!ABVDO,1,1,,A,I02B`i:qMa>LupGd45L22B2J2B2H,0*61
10:28:18.312					$ABABK,777888999,A,70,0,3*14
10:28:22.672					!ABABM,1,1,1,777888999,2,25,upGd45L22B2J2B2H,0*14
10:28:23.440	879	B	2402500	25	!AIVDM,1,1,,B,I02B`i>qMa>LupGd45L22B2J2B2H,0*6F

e) Results					
Time	Slot	Chan	MMSI	Msg	Sentence
10:28:23.462					!ABVDO,1,1,,B,I02B`i>qMa>LupGd45L22B2J2B2H,0*66
10:28:23.492					$ABABK,777888999,B,25,1,3*16
10:28:27.682					!ABABM,1,1,2,777888999,1,71,upGd45L22B2J2B2H,0*15
10:28:28.267	1060	A	2402500	26	!AIVDM,1,1,,A,J02B`i:qMa>LupGd45L22B2J2B2H2000,0*69
10:28:28.292					!ABVDO,1,1,,A,J02B`i:qMa>LupGd45L22B2J2B2H2000,0*60
10:28:28.322					$ABABK,777888999,A,71,2,3*17
10:28:32.682					!ABABM,1,1,3,777888999,2,26,upGd45L22B2J2B2H,0*15
10:28:34.533	1295	B	2402500	26	!AIVDM,1,1,,B,J02B`i>qMa>LupGd45L22B2J2B2H2000,0*6E
10:28:34.562					!ABVDO,1,1,,B,J02B`i>qMa>LupGd45L22B2J2B2H2000,0*67
10:28:34.592					$ABABK,777888999,B,26,3,3*17

e) Message Decodes						
Msg	Sentence	Repeat Indicator	Destination Indicator	Destination ID	Binary Data Flag	Comm State Flag
25	!AIVDM,1,1,,A,I02B`i:qMa>LupGd45L22B2J2B2H,0*68	00	1	777888999	0	1
	!ABVDO,1,1,,A,I02B`i:qMa>LupGd45L22B2J2B2H,0*61	00	1	777888999	0	1
25	!AIVDM,1,1,,B,I02B`i>qMa>LupGd45L22B2J2B2H,0*6F	00	1	777888999	1	1
	!ABVDO,1,1,,B,I02B`i>qMa>LupGd45L22B2J2B2H,0*66	00	1	777888999	1	1
26	!AIVDM,1,1,,A,J02B`i:qMa>LupGd45L22B2J2B2H2000,0*69	00	1	777888999	0	1
	!ABVDO,1,1,,A,J02B`i:qMa>LupGd45L22B2J2B2H2000,0*60	00	1	777888999	0	1
26	!AIVDM,1,1,,B,J02B`i>qMa>LupGd45L22B2J2B2H2000,0*6E	00	1	777888999	1	1
	!ABVDO,1,1,,B,J02B`i>qMa>LupGd45L22B2J2B2H2000,0*67	00	1	777888999	1	1

f) Increase the Number of Slot Reservations		
Requirement	Result	Verdict
Increase the number of reserved slots for the third entry from 2 to 5 to allow the transmission of 5 slot messages.	$ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,5,7,75,,,,,*79 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,5,7,75,,,,,*71	-
Confirm that the slot reservation by the DLM has been correctly stored.	The results returned by the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,5,7,75,,,,,R*07 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,5,7,75,,,,,R*0F	Pass

g) Test of Maximum Length 5-Slot Messages 8 and 14		
Requirement	Result	Verdict
Input BBM sentences for a maximum length 5 slot messages to the EUT.	The following BBM sentences were applied to the EUT: !ABBBM,4,1,6,2,8,06P045678901234567890123456789012345678,0*0D !ABBBM,4,2,6,2,8,012345678901234567890123456789012345678,0*68 !ABBBM,4,3,6,2,8,012345678901234567890123456789012345678,0*69 !ABBBM,4,4,6,2,8,012345678901234567890123456789012345678901,4*6B !ABBBM,4,1,7,2,14,012345678901234567890123456789012345678,0*57 !ABBBM,4,2,7,2,14,012345678901234567890123456789012345678,0*54 !ABBBM,4,3,7,2,14,012345678901234567890123456789012345678,0*55 !ABBBM,4,4,7,2,14,012345678901234567890123456789012345678,0*52	-
Confirm that the EUT is transmitting Messages 8 and 14 once each over the VDL with the specified configuration parameters from the associated BBM sentences within 4 s using available FATDMA slots.	The EUT transmits Messages 8 and 14 once each over the VDL with the correct parameters, as shown in the table below, '*g) Results*'.	Pass

g) Test of Maximum Length 5-Slot Messages 8 and 14		
Requirement	Result	Verdict
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the following VDO sentences for Message 8: !ABVDO,3,1,2,B,802B`i00J00@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLP,0*77 !ABVDO,3,2,2,B,T048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@,0*0F !ABVDO,3,3,2,B,DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT0,0*6E  The EUT outputs the following VDO sentences for Message 14: !ABVDO,3,1,3,B,>02B`i0048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLP,0*0A !ABVDO,3,2,3,B,T048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@,0*0E !ABVDO,3,3,3,B,DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT,2*5D	Pass
Confirm that the ABK Sentence with ABK type 3 is output on the PI of the EUT when Messages 8 and 14 are transmitted.	The EUT outputs the following ABK sentences correctly: $ABABK,,B,8,6,**3***18 $ABABK,,B,14,7,**3***24	Pass

g) Results			
Time	Slot	Msg	Sentence
13:34:52	1970	8	!AIVDM,3,1,1,B,802B`i00J00@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0*15
13:34:52			!AIVDM,3,2,1,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0*15
13:34:52			!AIVDM,3,3,1,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT0,0*1C
13:35:00	20	14	!AIVDM,3,1,2,B,>02B`i0048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0*6A
13:35:00			!AIVDM,3,2,2,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048,0*16
13:35:00			!AIVDM,3,3,2,B,<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT048<@DHLPT,2*2D

h) Test of Maximum Length 5-Slot Messages 6 and 12		
Requirement	Result	Verdict
Input ABM sentences for maximum length 5 slot messages to the EUT.	The ABM sentences applied to the EUT are: !ABABM,4,1,1,777888999,2,6,012345678901234567890123456789012345,0*7B !ABABM,4,2,1,777888999,2,6,012345678901234567890123456789012345,0*78 !ABABM,4,3,1,777888999,2,6,012345678901234567890123456789012345,0*79 !ABABM,4,4,1,777888999,2,6,012345678901234567890123456789012,0*7E !ABABM,4,1,2,444555666,2,12,012345678901234567890123456789012345,0*4C !ABABM,4,2,2,444555666,2,12,012345678901234567890123456789012345,0*4F !ABABM,4,3,2,444555666,2,12,012345678901234567890123456789012345,0*4E !ABABM,4,4,2,444555666,2,12,012345678901234567890123456789012,0*49	-
Confirm that the EUT is transmitting Messages 6 and 12 once each over the VDL with the specified configuration parameters from the associated ABM sentences within 4 s using available FATDMA slots.	The EUT transmits Message 6 and 12 once each over the VDL correctly, as seen in the table below.	Pass

h) Test of Maximum Length 5-Slot Messages 6 and 12		
Requirement	Result	Verdict
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the following VDO sentences to the PI: !ABVDO,3,1,4,B,602B`i6qMa>L012345678901234567890123456789012345678901234567890123,0*7C !ABVDO,3,2,4,B,4567890123456789012345678901234567890123456789012345678901234567890123456789,0*19 !ABVDO,3,3,4,B,0123456789012345678901234567890123456789012345678901234567890123456789012345,0*18 !ABVDO,3,1,5,B,<02B`i9awHI80123456789012345678901234567890123456789012345678901234567890123,0*78 !ABVDO,3,2,5,B,4567890123456789012345678901234567890123456789012345678901234567890123456789,0*18 !ABVDO,3,3,5,B,0123456789012345678901234567890123456789012345678901234567890123456789012345,0*19	Pass
Confirm that the EUT has received the Binary Acknowledgement Message 7 and Safety Related Acknowledgement Message 13 from the addressed station by reviewing the PI VDM sentences.	The EUT receives acknowledgement Messages 7 and 13 from the addressed stations: !AIVDM,1,1,,B,7;UnTqh0Tb<A,0*24 !AIVDM,1,1,,B,=6WuQTP0Tb<B,0*21	Pass
Confirm that the ABK sentence with ABK type 0 is output on the PI of the EUT when acknowledge to Messages 6 and 12 are received.	The EUT outputs ABK sentences for Messages 6 and 12 to the PI, with acknowledgement type 0: $ABABK,777888999,B,6,1,0*24 $ABABK,444555666,B,12,2,0*13	Pass

h) Test Results				
Time	Slot	MMSI	Msg	Sentence
15:43:20	754	2402500	4	!AIVDM,1,1,,A,402B`i1v@V?cCwrCQhM6qPg02H;j,0*4C
15:43:24	920	2402500	6	!AIVDM,3,1,3,B,602B`i6qMa>L012345678901234567890123456789012345678901234567,0*72
15:43:24		2402500	6	!AIVDM,3,2,3,B,8901234567890123456789012345678901234567890123455678901234567,0*17
15:43:24		2402500	6	!AIVDM,3,3,3,B,8901234567890123456789012345678901234567890123455,0*16
15:43:27	1040	777888999	7	!AIVDM,1,1,,B,7;UnTqh0Tb<A,0*24
15:43:28	1070	2402500	12	!AIVDM,3,1,4,B,<02B`i9awHI80123456789012345678901234567890123456789012345678901234567,0*70
15:43:28		2402500	12	!AIVDM,3,2,4,B,8901234567890123456789012345678901234567890123455678901234567,0*10
15:43:28		2402500	12	!AIVDM,3,3,4,B,8901234567890123456789012345678901234567890123455,0*11
15:43:30	1155	444555666	13	!AIVDM,1,1,,B,=6WuQTP0Tb<B,0*21

i) Test of Exceeding Maximum Length 5-Slot Message 14		
Requirement	Result	Verdict
Input a BBM sentence for Message 14 exceeding the maximum length of 5 slot, with all bits set to 1 to get a maximum of bit stuffing bits to the EUT.	The BBM sentences applied to the EUT are: !ABBBM,5,1,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*50 !ABBBM,5,2,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*53 !ABBBM,5,3,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*52 !ABBBM,5,4,1,2,14,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*55 !ABBBM,5,5,1,2,14,ww,0*54	-
Confirm that the EUT does not broadcast Message 14.	Message 14 is not transmitted by the EUT.	Pass
Confirm that the EUT response with an ABK sentence with ABK type ‘2’.	The EUT responds with the following ABK sentence: $ABABK,,B,14,1,**2***23	Pass

j) Test of RATDMA Queue Priority for Binary Messages		
Requirement	Result	Verdict
Enable RATDMA transmissions by the EUT.	The RATDMA access scheme is enabled using: $ABBCG,1234,,,,,,,,1,,,,C*33 It is confirmed as accepted by querying the BCG settings: $ABABQ,BCG*3B $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,1,I,60,AB,R*6D	Pass
Establish a channel load of 80%; ensure there are 5 blocks of 5 free slots available within 4 seconds.	A channel load of 80% is attained by simulating 20 test targets, with a block gap of 5. This results in 6 blocks of 5 free slots available within 4 seconds.	Pass

j) Test of RATDMA Queue Priority for Binary Messages		
Requirement	Result	Verdict
Initiate the transmission of two 3-slot messages (Message 8 followed by Message 12) by the EUT.	Message 8 is removed from the RATDMA queue before Message 12 is received. As a result, two Message 8's are sent followed by a Message 12. The binary sentences applied to the EUT are: !AIBBM,3,1,2,1,8,04005@E=B0lE=<4LF3Sb061@Q8DF1,0*22 !AIBBM,3,2,2,1,8,<huB0lE=<4LF3R18E5DU8E>1@PF1E,0*7F !AIBBM,3,3,2,1,8,<F0tJ3G>2n3W20<P584=@E9<,0*0E !AIBBM,3,1,2,1,8,04005@E=B0lE=<4LF3Sb061@Q8DF1,0*22 !AIBBM,3,2,2,1,8,<huB0lE=<4LF3R18E5DU8E>1@PF1E,0*7F !AIBBM,3,3,2,1,8,<F0tJ3G>2n3W20<P584=@E9<,0*0E !AIABM,3,1,2,777888999,1,12,D5CDP=5CC175PijrPD5CD9>,0*5F !AIABM,3,2,2,777888999,1,12,7P?6P1PD8B55PC<?DP144B5CC54P,0*33 !AIABM,3,3,2,777888999,1,12,C165DIPB5<1D54P=5CC175,0*38	Pass
Confirm that the EUT transmits in the correct order, according to Message priority (Messages 12 shall be transmitted before Message 8).	The EUT successfully transmits Message 12 before Message 8, as seen in the table below. The first Message 8 is front of the RATDMA queue and scheduled before the reception of the second Message 8. On receipt of the second Message 8, the RATDMA queue begins filling and when the Message 12 is received, it is given a higher priority than Message and successfully transmitted before Message 8.	Pass
Confirm that the EUT transmits in free slots within 4 seconds, according to the RATDMA algorithm.	The Messages are successfully transmitted within the time limit, according to the RATDMA algorithm.	Pass

j) Test Results					
Time	Slot	MMSI	Msg	Sentence	Comment
11:45:38	1435	2402500	8	!AIVDM,2,1,3,A,802B`i00@00E1Dm83ADlhAiH>>`0H524QAH4k3m83ADlhAiH>84QDEBDQDp5,0*3C	First Message 8 is transmitted, as it is taken out of the RATDMA queue before the Message 12 is received.
11:45:38		2402500	8	!AIVDM,2,2,3,A,21H5DiH3i`=Lp;H>L80j0DP@m1DTh0,4*22	
11:45:40	1510	2402500	12	!AIVDM,2,1,4,A,<02B`i:qMa>LD5CDP=5CC175PijrPD5CD9>7P?6P1PD8B55PC<?DP144B5CC,0*4F	Message 12 takes priority over the Message 8, and the EUT transmits it first.
11:45:40		2402500	12	!AIVDM,2,2,4,A,54PC165DIPB5<1D54P=5CC1750,4*0F	
11:45:41	1550	777888999	13	!AIVDM,1,1,,A,=;UnTqh0Tb<B,0*2E	Message 13 acknowledgement from the addressed station.
11:45:42	1585	2402500	8	!AIVDM,2,1,5,A,802B`i00@00E1Dm83ADlhAiH>>`0H524QAH4k3m83ADlhAiH>84QDEBDQDp5,0*3A	Second Message 8 is transmitted after the Message 12, as it has a lower priority.
11:45:42		2402500	8	!AIVDM,2,2,5,A,21H5DiH3i`=Lp;H>L80j0DP@m1DTh0,4*24	

Unacknowledged Messaging – Clause 10.2.2.2

This test will verify that the Base Station will retry the transmission of an addressed message as defined by the retry field in the BCG sentence.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Input the following ABM sentence to the EUT to an MMSI other than the 5 test targets in the standard test environment:
   !xxABM,1,1,0,<MMSI>,0,12,D5CDP=5CC175,0
c) Set the number of VDL message retries to 1 using the BCG sentence:
   $xxBCG,<UI>,,,,,,,1,,,,,,C
d) Input the following ABM sentence to the EUT to an MMSI other than the 5 test targets in the standard test environment:
   !xxABM,1,1,0,000006042,0,12,D5CDP=5CC175,0

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the EUT is transmitting Message 12 over the VDL with the specified configuration parameters from the associated ABM sentence within 4 s using the available FATDMA slot. Confirm that the EUT re-transmits Message 12, within 4 s to 8 s after the previous transmission using the available FATDMA slot, in accordance with the EUT “number of retries” configuration from the BCG sentence. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the ABK sentence with ABK type 1 is output on the PI of the EUT after the last transmission of Message 12;
c) the BCG sentence was received correctly by the EUT using PI query for BCG;
d) the EUT is transmitting Message 12 over the VDL with the specified configuration parameters from the associated ABM sentence within 4 s using the available FATDMA slot. Confirm that the EUT re-transmits Message 12 once, within 4 s to 8 s using the available FATDMA slot, in accordance with the updated “number of retries”. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the ABK type 1 is output on the PI of the EUT after the last transmission of Message 12.

Test Results

a) Apply the Independent Mode Setup		
Requirement	Result	Verdict
The EUT shall be set to operate in independent mode.	The EUT is configured to operate in independent mode, following the procedure described in §10.1.3.	-

b) Apply an ABM to an MMSI not Present		
Requirement	Result	Verdict
Input an ABM sentence to the EUT, addressed to an MMSI other than the 5 test targets in the standard test environment.	The ABM applied to the EUT is: !ABABM,1,1,0,400500600,0,12,D5CDP=5CC175,0*54	-

b) Apply an ABM to an MMSI not Present		
Requirement	Result	Verdict
Confirm that the EUT is transmitting Message 12 over the VDL with the specified configuration parameters from the associated ABM sentence within 4 s using the available FATDMA slot.	The EUT transmits Message 12 over the VDL with the correct contents, within 4 seconds using the available FATDA slots as seen in the table below. The standard test targets have been omitted from the results table.	Pass
Confirm that the EUT re-transmits Message 12, within 4 s to 8 s after the previous transmission using the available FATDMA slot, in accordance with the EUT “number of retries” configuration from the BCG sentence.	The EUT retransmits the Message 12 within 4-8 seconds of the previous transmission. The number of retries is configured to 3 using the BCG sentence: $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,1,I,60,AB, R*6D	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the correct VDO sentences to the PI when the Message 8 and 12 are transmitted: !ABVDO,1,1,,A,<02B`i1OO9oPD5CDP=5CC175,0*70 !ABVDO,1,1,,B,<02B`i1OO9oPD5CDP=5CC175,0*73	Pass
Confirm that the ABK sentence with ABK type 1 is output on the PI of the EUT after the last transmission of Message 12.	The EUT outputs ABK with status field 1 for both channel A and B after the final transmission: $ABABK,400500600,A,12,0,1*13 $ABABK,400500600,B,12,0,1*10	Pass

b) Test Results					
Time	Slot	Chan	MMSI	Msg	Sentence
14:37:26	-	-	-	-	!ABABM,1,1,0,400500600,0,12,D5CDP=5CC175,0*54
14:37:26	986	A	2402500	12	!AIVDM,1,1,,A,<02B`i1OO9oPD5CDP=5CC175,0*79
14:37:26	995	B	2402500	12	!AIVDM,1,1,,B,<02B`i1OO9oPD5CDP=5CC175,0*7A
14:37:32	1210	A	2402500	12	!AIVDM,1,1,,A,<02B`i1OO9oRD5CDP=5CC175,0*7B
14:37:32	1220	B	2402500	12	!AIVDM,1,1,,B,<02B`i1OO9oRD5CDP=5CC175,0*78
14:37:38	1435	A	2402500	12	!AIVDM,1,1,,A,<02B`i1OO9oRD5CDP=5CC175,0*7B
14:37:38	1445	B	2402500	12	!AIVDM,1,1,,B,<02B`i1OO9oRD5CDP=5CC175,0*78
14:37:44	1660	A	2402500	12	!AIVDM,1,1,,A,<02B`i1OO9oRD5CDP=5CC175,0*7B
14:37:44	1670	B	2402500	12	!AIVDM,1,1,,B,<02B`i1OO9oRD5CDP=5CC175,0*78

c) Configure Message Retries to 1		
Requirement	Result	Verdict
Set the number of VDL message retries to 1 using a BCG sentence.	The BCG sentence applied to the EUT is: $ABBCG,1234,,,,,,,1,,,,,,C*33	-
Confirm that the BCG sentence was received correctly by the EUT using PI query for BCG.	The results of the $ABABQ,BCG*3B are: $ABBCG,1234,2087,2088,2087,2088,1,1,1,0,1,I,60,AB, R*6F	Pass

d) Test of Single Retry		
Requirement	Result	Verdict
Confirm that the EUT is transmitting Message 12 over the VDL with the specified configuration parameters from the associated ABM sentence within 4 s using the available FATDMA slot.	The EUT transmits Message 12 over the VDL with the configuration parameters given in the ABM sentence. This is shown in the table below; the position reports of the standard test environment test targets have been omitted from the table.	Pass
Confirm that the EUT re-transmits Message 12 once, within 4 s to 8 s using the available FATDMA slot, in accordance with the updated “number of retries”.	The EUT retransmits Message 12 only once, 6 seconds after the initial transmission.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the following VDO sentences to the PI for the initial transmission: !ABVDO,1,1,,A,<02B`i0005q`D5CDP=5CC175,0*53 !ABVDO,1,1,,B,<02B`i0005q`D5CDP=5CC175,0*50 The EUT output the following VDO sentences to the PI for the retry transmissions: !ABVDO,1,1,,A,<02B`i0005qbD5CDP=5CC175,0*51 !ABVDO,1,1,,B,<02B`i0005qbD5CDP=5CC175,0*52	Pass
Confirm that the ABK type 1 is output on the PI of the EUT after the last transmission of Message 12.	An ABK sentence with acknowledge flag set to 1 is output to the PI for each channel: $ABABK,000006042,A,12,0,1*14 $ABABK,000006042,B,12,0,1*17	Pass

d) Test Results					
Time	Slot	Chan	MMSI	Msg	Sentence
15:31:36	1360	A	2402500	12	!AIVDM,1,1,,A,<02B`i0005q`D5CDP=5CC175,0*5A
15:31:36	1370	B	2402500	12	!AIVDM,1,1,,B,<02B`i0005q`D5CDP=5CC175,0*59
15:31:42	1585	A	2402500	12	!AIVDM,1,1,,A,<02B`i0005qbD5CDP=5CC175,0*58

d) Test Results					
Time	Slot	Chan	MMSI	Msg	Sentence
15:31:42	1595	B	2402500	12	!AIVDM,1,1,,B,<02B`i0005qbD5CDP=5CC175,0*5B

Interrogation Transmission – Clause 10.2.3.1

This test will verify that the Base Station can transmit an interrogation, Message 15.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Input an AIR sentence, with a definition of reply slots, to the EUT; interrogate for Messages 3, 4, 5, 9, 17, 18, 19, 20, 21, 22, 24.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the Independent mode setup has been correctly set;
b) the EUT is transmitting Message 15 over the VDL with the specified configuration parameters from the associated AIR sentence within 4 s using an available FATDMA slot. Confirm that the Slot offset parameter of Message 15 is correctly calculated from the actual Tx slot and the reply slot parameter of the AIR sentence. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Confirm that the EUT outputs an ABK with ABK type 3 to the PI after Message 15 has been transmitted.

Test Results

a) Apply the Independent Mode Setup		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The independent mode set-up is applied to the unit, as defined in §10.1.3.	-
Confirm that the independent mode setup has been correctly set.	See the table below for the results to querying the settings.	Pass

a) Independent Mode Validation	
Query Applied	Query Results
$ABABQ,ACA*3E	$ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53
	$ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52
	$ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51
	$ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50
	$ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57
	$ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56
	$ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55
	$ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54
$ABABQ,BCG*3B	$ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C
$ABABQ,CBR*2E	$ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A
	$ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,R*19
	$ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,R*18
	$ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,R*1F
$ABABQ,DLM*38	$ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00
	$ABDLM,1,A,,,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,2,A,,,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,3,A,,,,,,,,,,,,,,,,,,,,R*4A
	$ABDLM,4,A,,,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,5,A,,,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,6,A,,,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,7,A,,,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,8,A,,,,,,,,,,,,,,,,,,,,R*41
	$ABDLM,9,A,,,,,,,,,,,,,,,,,,,,R*40

a) Independent Mode Validation	
Query Applied	Query Results
	$ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08
	$ABDLM,1,B,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,2,B,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,3,B,,,,,,,,,,,,,,,,,,R*49
	$ABDLM,4,B,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,5,B,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,6,B,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,7,B,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,8,B,,,,,,,,,,,,,,,,,,R*42
	$ABDLM,9,B,,,,,,,,,,,,,,,,,,R*43
$ABABQ,ECB*39	$ABECB,1234,4,,4,750,,,379,750,,R*00
	$ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B
	$ABECB,1234,20,0,0,2250,,0,6,2250,,R*39
	$ABECB,1234,22,0,-1,0,,0,-1,0,,R*3D
	$ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C
	$ABECB,1234,24,0,-1,0,,0,-1,0,,R*3B
$ABABQ,SPO*31	$ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,0,R*7B

b) Interrogate for Messages using the AIR Sentence		
Requirement	Result	Verdict
Input an AIR sentence, with a definition of reply slots, to the EUT; interrogate for Messages 3, 4, 5, 9, 17, 18, 19, 20, 21, 22 and 24.	The AIR sentences applied to the PI are: $ABAIR,600500400,3,,4,,600500400,5,,A,100,200,300*1A $ABAIR,600500400,9,,17,,600500400,18,,A,100,200,300*1E $ABAIR,600500400,19,,20,,600500400,21,,A,100,200,300*21 $ABAIR,600500400,22,,24,,,,,A,100,200,,*06	-
Confirm that the EUT is transmitting Message 15 over the VDL with the specified configuration parameters from the associated AIR sentence within 4 seconds using an available FATDMA slot.	The EUT transmits Message 15 with the specified configuration parameters, as dictated by their corresponding AIR sentences. Each Message 15 was transmitted within 4 seconds of receipt of an AIR sentence using an available FATDMA slot.	Pass
Confirm that the 'slot offset' parameter of Message 15 is correctly calculated from the actual Tx slot and the reply slot parameter of the AIR sentence.	The slot offset is correctly calculated, as seen in the message decode tables below.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs the relevant VDO sentence, as seen in the table '*b) Test Results*' below.	Pass
Confirm that the EUT outputs an ABK with ABK type 3 to the PI after Message 15 has been transmitted.	The EUT successfully outputs an ABK sentence with status set to 3 after each Message 15 transmission; this is shown in the table '*b) Test Results*' below.	Pass

b) Test Results				
Time	Slot	MMSI	Msg	Sentence
11:34:56				$ABAIR,600500400,3,,4,,600500400,5,,A,100,200,300*1A
11:34:58	2185	2402500	15	!AIVDM,1,1,,A,?02B`i2?:r;0<:D4498tc`d1AK@,2*37
11:34:58				!ABVDO,1,1,,A,?02B`i2?:r;0<:D4498tc`d1AK@,2*3E
11:34:58				$ABABK,600500400,A,15,,3*26
11:35:01				$ABAIR,600500400,9,,17,,600500400,18,,A,100,200,300*1E
11:35:02	85	2402500	15	!AIVDM,1,1,,A,?02B`i2?:r;0T0tA1k8tc`d4Pmh,2*5D
11:35:02				!ABVDO,1,1,,A,?02B`i2?:r;0T0tA1k8tc`d4Pmh,2*54
11:35:02				$ABABK,600500400,A,15,,3*26
11:35:06				$ABAIR,600500400,19,,20,,600500400,21,,A,100,200,300*21
11:35:08	310	2402500	15	!AIVDM,1,1,,A,?02B`i2?:r;1=wPDQL8tc`d5Hh0,2*50
11:35:08				!ABVDO,1,1,,A,?02B`i2?:r;1=wPDQL8tc`d5Hh0,2*59
11:35:08				$ABABK,600500400,A,15,,3*26
11:35:11				$ABAIR,600500400,22,,24,,,,,A,100,200,,*06
11:35:12	460	2402500	15	!AIVDM,1,1,,A,?02B`i2?:r;1In8HO60,2*03
11:35:12				!ABVDO,1,1,,A,?02B`i2?:r;1In8HO60,2*0A
11:35:12				$ABABK,600500400,A,15,,3*26

b) Message 15 Decode (1 of 4, Transmitted in Slot 2185)		
AIR Sentence applied:	$ABAIR,600500400,3,,4,,600500400,5,,A,100,200,300*1A	
Message 15 transmitted:	!AIVDM,1,1,,A,?02B`i2?:r;0<:D4498tc`d1AK@,2*37	
Parameter	Expected Value	Actual Value
Message ID	15	15
Repeat indicator	0	0

Source ID	2402500	2402500
Sequence number	0	0
Destination ID	600500400	600500400
Message ID1.1	3	3
Slot offset 1.1	165 (Requested slot – current slot = offset) (2250+100 – 2185 = 165)	165
Spare	0	0
Message ID1.2	4	4
Slot offset 1.2	265 (2250+200 – 2185 = 265)	265
Spare	0	0
Destination ID 2	600500400	600500400
Message ID 2.1	5	5
Slot offset 2.1	365 (2250+300 – 2185 = 365)	365
Spare	0	0

b) Message 15 Decode (2 of 4, Transmitted in Slot 85)		
AIR Sentence applied:	$ABAIR,600500400,9,,17,,600500400,18,,A,100,200,300*1E	
Message 15 transmitted:	!AIVDM,1,1,,A,?02B`i2?:r;0T0tA1k8tc`d4Pmh,2*5D	
Parameter	Expected Value	Actual Value
Message ID	15	15
Repeat indicator	0	0
Source ID	2402500	2402500
Sequence number	0	0
Destination ID	600500400	600500400
Message ID1.1	9	9
Slot offset 1.1	15	15
Spare	0	0
Message ID1.2	17	17
Slot offset 1.2	115	115
Spare	0	0
Destination ID 2	600500400	600500400
Message ID 2.1	18	18
Slot offset 2.1	215	215
Spare	0	0

b) Message 15 Decode (3 of 4, Transmitted in Slot 310)		
AIR Sentence applied:	$ABAIR,600500400,19,,20,,600500400,21,,A,100,200,300*21	
Message 15 transmitted:	!AIVDM,1,1,,A,?02B`i2?:r;1=wPDQL8tc`d5Hh0,2*50	
Parameter	Expected Value	Actual Value
Message ID	15	15
Repeat indicator	0	0
Source ID	2402500	2402500
Sequence number	0	0
Destination ID	600500400	600500400
Message ID1.1	19	19
Slot offset 1.1	2040	2040
Spare	0	0
Message ID1.2	20	20
Slot offset 1.2	2140	2140
Spare	0	0
Destination ID 2	600500400	600500400
Message ID 2.1	21	21
Slot offset 2.1	2240	2240
Spare	0	0

b) Message 15 Decode (4 of 4, Transmitted in Slot 460)		
AIR Sentence applied:	$ABAIR,600500400,22,,24,,,,,A,100,200,,*06	
Message 15 transmitted:	!AIVDM,1,1,,A,?02B`i2?:r;1In8HO60,2*03	
Parameter	Expected Value	Actual Value
Message ID	15	15
Repeat indicator	0	0
Source ID	2402500	2402500
Sequence number	0	0
Destination ID	600500400	600500400
Message ID1.1	22	22

b) Message 15 Decode (4 of 4, Transmitted in Slot 460)		
AIR Sentence applied:	$ABAIR,600500400,22,,24,,,,,A,100,200,,*06	
Message 15 transmitted:	!AIVDM,1,1,,A,?02B`i2?:r;1In8HO60,2*03	
Parameter	Expected Value	Actual Value
Slot offset 1.1	1890	1890
Spare	0	0
Message ID1.2	24	24
Slot offset 1.2	1190	1990
Spare	0	0
Destination ID 2	0	0
Message ID 2.1	0	0
Slot offset 2.1	0	0
Spare	0	0

Interrogation Response – Clause 10.2.3.2

This test will verify the ability of the Base Station to respond to an interrogation request.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Apply a Message 15 onto the VDL, addressing the EUT requesting Messages 4 and 24.

The following tests are required for a Base Station operated as an independent unit.

b) Apply the independent mode setup to the EUT.
c) Apply a Message 15 onto the VDL, addressing the EUT requesting Messages 4 and 24.
d) Apply a Message 15 onto the VDL, addressing the EUT requesting Message 1.
e) Stop the transmission of Message 4 and 20 and enable RATDMA. Apply a Message 15 onto the VDL, addressing the EUT requesting Message 4.

Required Results

Confirm that:

a) there is a VDM output of the received Message 15 but the EUT does not respond.

The following results are required for a Base Station operated as an independent unit:

b) the independent mode setup has been correctly set;
c) the EUT does not transmit Message 4, in addition to the scheduled transmissions as determined by the ECB sentence. Check that the EUT transmits Message 24A with the base station name, and 24B with the Vendor ID, in response to the request for Message 24. Confirm that the appropriate VDO sentences are output on the PI when the messages are transmitted;
d) the EUT does not transmit Message 1;
e) the transmission of Message 4 is stopped. Check that the EUT transmits the appropriate Message 4 within 4 s. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted. Check that the EUT does not transmit Message 20.

Test Results

a) Apply Message 15 Addressing the EUT, Requesting Messages 4 and 24		
Requirement	Result	Verdict
Apply a Message 15 to the VDL, addressed to the EUT, requesting Messages 4 and 24.	The Message 15 applied to the VDL is: !ABVDM,1,1,,A,?5utWN00Tb<@@00H00000000000,2*4F	-
Confirm that there is a VDM output of the received Message 15, but the EUT does not respond.	The VDM is output on the PI of the EUT; the EUT does not respond to the interrogation.	Pass

b) Apply the Independent Mode Setup		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The independent mode set-up is applied to the unit, as defined in §10.1.3.	-
Confirm that the independent mode setup has been correctly set.	See the table below for the results to querying the settings.	Pass

b) Independent Mode Validation	
Query Applied	Query Results
$ABABQ,ACA*3E	$ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53
	$ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52
	$ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51
	$ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50
	$ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57
	$ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56
	$ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55
	$ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54
$ABABQ,BCG*3B	$ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C
$ABABQ,CBR*2E	$ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A
	$ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,R*19
	$ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,R*18
	$ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,R*1F
$ABABQ,DLM*38	$ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,R*00
	$ABDLM,1,A,,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,2,A,,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,3,A,,,,,,,,,,,,,,,,,,,R*4A
	$ABDLM,4,A,,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,5,A,,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,6,A,,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,7,A,,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,8,A,,,,,,,,,,,,,,,,,,,R*41
	$ABDLM,9,A,,,,,,,,,,,,,,,,,,,R*40
	$ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08
	$ABDLM,1,B,,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,2,B,,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,3,B,,,,,,,,,,,,,,,,,,,R*49
	$ABDLM,4,B,,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,5,B,,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,6,B,,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,7,B,,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,8,B,,,,,,,,,,,,,,,,,,,R*42
	$ABDLM,9,B,,,,,,,,,,,,,,,,,,,R*43
$ABABQ,ECB*39	$ABECB,1234,4,,4,750,,,379,750,,R*00
	$ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B
	$ABECB,1234,20,0,0,2250,,0,6,2250,,R*39
	$ABECB,1234,22,0,-1,0,,0,-1,0,,R*3D
	$ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C
	$ABECB,1234,24,0,-1,0,,0,-1,0,,R*3B
$ABABQ,SPO*31	$ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,0,R*7B

c) Apply Message 15 Addressed to the EUT, Requesting Messages 4 and 24		
Requirement	Result	Verdict
Apply a Message 15 onto the VDL, addressing the EUT requesting Messages 4 and 24.	The Message 15 applied to the EUT is: !ABVDM,1,1,,A,?5utWN00Tb<@@00H00000000000,2*4F	-
Confirm that the EUT does not transmit Message 4, in addition to the scheduled transmissions as determined by the ECB sentence.	The EUT does not transmit Message 4 in addition to the scheduled transmissions.	Pass
Check that the EUT transmits Message 24A with the base station name, and 24B with the Vendor ID, in response to the request for Message 24.	The EUT successfully transmits Messages 24A and 24B- as seen in the tables below, '*c) Test Results'*. The standard test targets have been omitted from the table of results.	Pass
Confirm that the appropriate VDO sentences are output on the PI when the messages are transmitted.	The EUT outputs the following VDO sentences to the PI when Messages 24A and 24B are transmitted: !ABVDO,1,1,,A,H02B`i1AEJ1=D@0000000000000,2*6B !ABVDO,1,1,,A,H02B`i40CDDTHJR000000000000t,0*19	Pass

c) Test Results					
Time	Slot	Chan	MMSI	Msg	Sentence
16:54:10	379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@W@n9wrCQ>M6qIw02@5s,0*06
16:54:15	601	A	400500600	15	!AIVDO,1,1,,A,?5utWN00Tb<@@00H00000000000,2*46
16:54:16	610	A	2402500	24	!AIVDM,1,1,,A,H02B`i1AEJ1=D@0000000000000,2*62
16:54:16	611	A	2402500	24	!AIVDM,1,1,,A,H02B`i40CDDTHJR000000000000t,0*10
16:54:20	754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@W@nCwrCQ>M6qIw02<05,0*40
16:54:30	1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@W@nMwrCQ>M6qIw02<05,0*4D

d) Apply Message 15 Addressed to the EUT, Requesting Message 1		
Requirement	Result	Verdict
Apply a Message 15 onto the VDL, addressing the EUT requesting Message 1.	The Message 15 applied to the VDL is: !ABVDM,1,1,,A,?5utWN00Tb<@400000000000000,2*43	-
Confirm that the EUT does not transmit Message 1.	The EUT does not transmit Message 1, as seen in the table below, '*d) Test Results*'.	Pass

d) Test Results					
Time	Slot	Chan	MMSI	Msg	Sentence
16:54:55	2108	A	400500600	15	!AIVDO,1,1,,A,?5utWN00Tb<@400000000000000,2*4A
16:55:00	0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60
16:55:00	4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@W@nswrCQ>M6qIw02D05,0*08
16:55:00	6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50

e) Apply Message 15 with RATDMA Enabled		
Requirement	Result	Verdict
Stop the transmission of Message 4 and 20 and enable RATDMA.	The transmission of Message 4 and 20 are stopped, and the RATDMA access mode is enabled by applying: $ABECB,1234,4,0,-1,,,0,-1,,,C*18 $ABECB,1234,20,0,-1,,,0,-1,,,C*2E $ABBCG,1234,2087,2088,2087,2088,1,1,3,0,1,I,60,AB,C*7C	-
Apply a Message 15 onto the VDL, addressing the EUT requesting Message 4.	The Message 15 applied to the VDL is: !ABVDM,1,1,,A,?5utWN00Tb<@@00000000000000,2*37	-
Confirm that the transmission of Message 4 is stopped.	The EUT ceases transmission of Message 4 and 20 successfully.	Pass
Check that the EUT transmits the appropriate Message 4 within 4 s.	The EUT transmits Message 4 using RATDMA correctly within 4 seconds of receiving the Message 15.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs a VDO sentence to the PI when a Message 4 is transmitted: !ABVDO,1,1,,A,402B`i1v@WA0WwrCS0M6qFg02000,0*18	Pass

e) Test Results					
Time	Slot	Chan	Msg	Sentence	Comment
16:58:40	1504	A	4	!AIVDM,1,1,,A,402B`i1v@W@rWwrCSBM6q?O028GP,0*6E	
16:58:50	1879	B	4	!AIVDM,1,1,,B,402B`i1v@W@riwrCSBM6q?O020S:,0*25	
16:59:00	0	A	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	
16:59:00	4	A	4	!AIVDM,1,1,,A,402B`i1v@W@rswrCSBM6q?O0263`,0*00	
16:59:00	6	B	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	Message 4 and 20 transmissions stopped.
17:00:39	1502	A	15	!AIVDO,1,1,,A,?5utWN00Tb<@@00000000000000,2*3E	Message 15 request Message 4 from the EUT.
17:00:40	1510	A	4	!AIVDM,1,1,,A,402B`i1v@WA0WwrCS0M6qFg02000,0*11	

Addressed Operation – Clause 10.2.4

This test will verify that the Base Station will respond to addressed messages with the appropriate message type. This test will also verify that the Base Station does not respond to messages that are not addressed to the EUT.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Apply a Message 6 onto the VDL, addressed to the EUT.
b) Apply a Message 12 onto the VDL, not addressed to the EUT.
c) Apply a Message 10 onto the VDL, addressed to the EUT.

The following tests are required for a Base Station operated as an independent unit.

d) Apply the independent mode setup to the EUT.
e) Apply a Message 6 onto the VDL, addressing the EUT.
f) Apply a Message 12 onto the VDL, not addressing the EUT.
g) Apply a Message 10 onto the VDL, addressing the EUT.

Required Results

Confirm that:

a) the EUT does not transmit an acknowledgement;
b) the EUT does not transmit an acknowledgement;
c) the EUT does not transmit a response;

The following results are required for a Base Station operated as an independent unit.

d) the independent mode setup has been correctly set;
e) the EUT transmits Message 7 as a response. Check for the VDM and VDO sentences output using the PI;
f) the EUT does not transmit Message 13 as a response. Check for the VDM sentence output using the PI;
g) the EUT transmits a Message 4 as a response. Check for the VDM and VDO sentence output using the PI.

Test Results

a) Apply Message 6 Addressed to the EUT		
Requirement	Result	Verdict
A Message 6 shall be applied to the VDL, addressed to the EUT.	The Message 6 transmitted is: !ABVDM,1,1,,A,65utWN00Tb<@04205@E=B0m<N3H,2*63	-
The EUT shall not transmit an acknowledgement.	The EUT does not transmit a Message 7 acknowledgement.	Pass

b) Apply Message 12 not Addressed to the EUT		
Requirement	Result	Verdict
A Message 12 shall be applied to the VDL, not addressed to the EUT.	The Message 12 transmitted is: !ABVDM,1,1,,A,<5utWN2W5Gp@D5CDP=C7Pij0,0*17	-
Confirm that the EUT does not transmit an acknowledgement.	The EUT does not transmit a Message 13 acknowledgement.	Pass

c) Apply Message 10 Addressed to the EUT		
Requirement	Result	Verdict
A Message 10 shall be applied to the VDL, addressed to the EUT.	The Message 10 transmitted is: !ABVDM,1,1,,A,:5utWN00Tb<@,0*70	-
Confirm that the EUT does not transmit a response to the Message 10.	The EUT does not transmit a response to the UTC request.	Pass

d) Apply the Independent Mode Setup		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The independent mode set-up is applied to the unit, as defined in §10.1.3.	-
Confirm that the independent mode setup has been correctly set.	See the table below for the results to querying the settings.	Pass

d) Independent Mode Validation	
Query Applied	Query Results
$ABABQ,ACA*3E	$ABACA,0,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*53
	$ABACA,1,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*52
	$ABACA,2,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*51
	$ABACA,3,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*50
	$ABACA,4,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*57
	$ABACA,5,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*56
	$ABACA,6,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*55
	$ABACA,7,0000.0,N,00000.0,E,0000.0,N,00000.0,E,1,2087,0,2088,0,0,1,,0,*54
$ABABQ,BCG*3B	$ABBCG,1234,2087,2088,2087,2088,1,1,3,0,0,I,60,AB,R*6C
$ABABQ,CBR*2E	$ABCBR,002402500,26,1,0,0,-1,0,0,0,0,-1,0,R*1A
	$ABCBR,002402500,26,2,0,0,-1,0,0,0,0,-1,0,R*19
	$ABCBR,002402500,26,3,0,0,-1,0,0,0,0,-1,0,R*18
	$ABCBR,002402500,26,4,0,0,-1,0,0,0,0,-1,0,R*1F
$ABABQ,DLM*38	$ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00
	$ABDLM,1,A,,,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,2,A,,,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,3,A,,,,,,,,,,,,,,,,,,,,R*4A
	$ABDLM,4,A,,,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,5,A,,,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,6,A,,,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,7,A,,,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,8,A,,,,,,,,,,,,,,,,,,,,R*41
	$ABDLM,9,A,,,,,,,,,,,,,,,,,,,,R*40
	$ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08
	$ABDLM,1,B,,,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,2,B,,,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,3,B,,,,,,,,,,,,,,,,,,,,R*49
	$ABDLM,4,B,,,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,5,B,,,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,6,B,,,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,7,B,,,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,8,B,,,,,,,,,,,,,,,,,,,,R*42
	$ABDLM,9,B,,,,,,,,,,,,,,,,,,,,R*43
$ABABQ,ECB*39	$ABECB,1234,4,,4,750,,,379,750,,R*00
	$ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B
	$ABECB,1234,20,0,0,2250,,0,6,2250,,R*39
	$ABECB,1234,22,0,-1,0,,0,-1,0,,R*3D
	$ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C
	$ABECB,1234,24,0,-1,0,,0,-1,0,,R*3B
$ABABQ,SPO*31	$ABSPO,1234,N,0,0,0,0,0,0,0,0,0,0,0,0,R*7B

e) Apply Message 6, Addressed to the EUT		
Requirement	Result	Verdict
A Message 6 shall be applied to the VDL, addressed to the EUT.	The Message 6 transmitted is: !ABVDM,1,1,,A,65utWN00Tb<@04205@E=B0m<N3H,2*63	-
Confirm that the EUT transmits Message 7 as a response.	The EUT transmits Message 7 successfully: !AIVDM,1,1,,A,702B`i1OO9oP,0*6F	Pass
Confirm that the EUT outputs the relevant VDO sentence to the PI.	The EUT outputs the following VDO to the PI: !ABVDO,1,1,,A,702B`i1OO9oP,0*66	Pass

f) Apply Message 12, not Addressed to the EUT		
Requirement	Result	Verdict
A Message 12 shall be applied to the VDL, not addressed to the EUT.	The Message 12 transmitted is: !ABVDM,1,1,,A,<5utWN2W5Gp@D5CDP=C7Pij0,0*17	-
Confirm that the EUT does not respond to the Message 12.	The EUT does not transmit a response; it does not output a VDO sentence on the PI..	Pass

g) Apply Message 10, Addressed to the EUT		
Requirement	Result	Verdict
A Message 10 shall be applied to the VDL, addressed to the EUT.	The Message 10 transmitted is: !ABVDM,1,1,,A,:5utWN00Tb<@,0*70	-
Confirm that the EUT transmits Message 4 as a response.	The EUT transmits Message 4 successfully in slot 1585: !AIVDM,1,1,,A,402B`i1v@W>rawrCR6M6qJw02000,0*01	Pass
Confirm that the EUT outputs the relevant VDO sentence to the PI.	The EUT outputs the following VDO to the PI: !ABVDO,1,1,,A,402B`i1v@W>rawrCR6M6qJw02000,0*08	Pass

UTC Direct – Clause 10.2.5.1

This test will verify that the Base Station will operate as required with UTC direct synchronisation mode. This test will also verify synchronisation jitter.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Disable the UTC source for the Base Station. Insert multiple Message 1(s) on the VDL with CommState 0, indicating UTC direct.
   Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
   $xxTSA,<UI>,7,B,<UTC h+m>,1001,2
   !xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0
b) Restore the UTC source to the Base Station.
   Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
   $xxTSA, <UI>,7,B, <UTC h+m>,<Txslot>,2
   !xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0

The following tests are required for a Base Station operated as an independent unit.

c) Apply the independent mode setup to the EUT.
d) Disable the UTC source for the Base Station. Insert multiple Message 1(s) on the VDL with CommState 0, indicating UTC direct.
e) Restore the UTC source to the Base Station.

Required Results

Confirm that:

a) the EUT is transmitting Message 8 in the assigned slot and channel. Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS indicates the correct Sync. State and alarm status;
b) the EUT is transmitting Message 8 in the assigned slot and channel. Verify synchronisation jitter does not exceed ±52 µs as required for UTC direct. Confirm that the ADS indicates the correct Sync. State and alarm status.

The following results are required for a Base Station operated as an independent unit:

c) the independent mode setup has been correctly set;
d) the Base Station maintains the same reporting rate for Message 4 but changes the CommState to 1. Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect. Confirm that the slot length is 26,67 ms. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS indicates the correct Sync. State and alarm status;
e) the CommState of the Message 4(s) is 0, indicating UTC direct. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS indicates the correct Sync. State and alarm status.

Test Results

a)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The internal GNSS antenna is removed from the EUT.	-
Insert multiple Message 1(s) on the VDL with CommState 0, indicating UTC direct.	A target with valid UTC direct transmits Message 1 to the EUT with a reporting rate of 6 seconds and CommState 0.	-
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	TSA sentences are applied to the EUT, to assign slot 1001 over 5 frames: $ABTSA,1234,7,B,1122,1001,2*06 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	The EUT transmits Message 8 correctly in slot 1001 and on channel B, as seen in the table below	Pass
Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect.	The synchronisation jitter does not exceed ±156µs, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT outputs ALR ID 007, with status “A,V”: $ABALR,111436.00,007,**A**,**V**,AIS: Clock lost*53	Pass
Confirm that the ADS indicates the correct Sync State and alarm status.	The ADS sentence has a Sync State set to “1”, indicating UTC indirect is used for time synchronisation. The Alarm status is set to “A”, indicating an alarm is active: $ABADS,1234,112103.00,**A**,**1**,S,N*12	Pass

a)							
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Slot End (µs)	Message
11:22:26	1001	B	3660007	8	50	16290	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
11:23:26	1001	B	3660007	8	20	16270	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
11:24:26	1001	B	3660007	8	50	16290	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
11:25:26	1001	B	3660007	8	50	16290	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
11:26:26	1001	B	3660007	8	50	16290	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D

b)		
Requirement	Result	Verdict
Restore the UTC source to the base station.	The internal GNSS antenna is reconnected to the EUT: $ABTXT,01,01,42,AIS: UTC clock OK*32	-
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	The TSA+VDM pairs applied to the EUT reserve slot 1001 over the space of 5 frames: $ABTSA,1234,7,B,1400,1001,2*03 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,1401,1001,2*02 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	The EUT transmits Message 8 in the slot 1001 and on channel B, as assigned in the TSA sentence. Results can be seen in the table below.	Pass
Verify that the synchronisation jitter does not exceed ±52 µs as required for UTC indirect.	The Sync Jitter does not exceed ± 52 µs, as seen in the table below.	Pass
Confirm that the ADS indicates the correct Sync State and alarm status.	The Sync State is now “0”, indicating that UTC direct is now in use, and the alarm status is “V”; alarm not active. $ABADS,1234,140322.00,**V**,**0**,I,I*1F	Pass

b)							
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Slot End (µs)	Message
14:00:26	1001	B	3660007	8	-10	16240	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:01:26	1001	B	3660007	8	-10	16240	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:02:26	1001	B	3660007	8	-10	16240	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D

c)		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The sentences applied to the EUT are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-

c)		
Requirement	Result	Verdict
Confirm that the independent mode setup is correctly set.	The results returned by the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08 The results returned by the $ABABQ,ECB*39 query are: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

d)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The GNSS antenna is disconnected from the EUT.	-
Insert multiple Message 1(s) on the VDL with CommState 0, indicating UTC direct.	A target with valid UTC direct is applied to the VDL, with CommState 0.	-
Confirm that the Base Station maintains the same reporting rate for Message 4 but changes the CommState to 1.	The EUT maintains a 10 second reporting rate for Message 4, but changes the Sync State to 1, as seen in the table below.	Pass
Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect.	The synchronisation jitter varies from -60 µs to 70 µs over a period of 17 frames.	Pass
Confirm that the slot length is 26,67 ms.	The EUT successfully maintains a slot length of 26.67 ms	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT output ALR ID 007 via the PI: $ABALR,141623.00,007,A,V,AIS: Clock lost*50	Pass
Confirm that the ADS indicates the correct Sync State and alarm status.	The ADS sentence output to the PI indicates that the sync state is UTC indirect (1) and the alarm status is active (A): $ABADS,1234,141827.00,A,1,S,N*1B	Pass

d)							
Time	Slot	Chan	Msg	Jitter (µs)	Slot End (µs)	Message	Sync State
14:17:40	1504	A	4	-30	23610	!AIVDM,1,1,,A,402B`i1v@lfAWOrCQ6M6qK701l01,0*43	1
14:17:50	1879	B	4	-10	23530	!AIVDM,1,1,,B,402B`i1v@lfAiOrCQ6M6qK700`MG,0*78	1
14:18:00	0	A	20	-10	19990	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	-
14:18:00	4	A	4	-10	23530	!AIVDM,1,1,,A,402B`i1v@lfAsOrCQ6M6qK700`04,0*6F	1
14:18:00	6	B	20	20	20020	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	-
14:18:10	379	B	4	20	23660	!AIVDM,1,1,,B,402B`i1v@lfB9OrCQ6M6qK700`5s,0*67	1
14:18:20	754	A	4	50	23580	!AIVDM,1,1,,A,402B`i1v@lfBCOrCQ6M6qK700`;j,0*09	1
14:18:30	1129	B	4	50	23580	!AIVDM,1,1,,B,402B`i1v@lfBMOrCQ6M6qK700hAa,0*7D	1
14:18:40	1504	A	4	50	23690	!AIVDM,1,1,,A,402B`i1v@lfBWOrCQ6M6qK700hGP,0*53	1

e)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station.	UTC direct is restored to the EUT by reconnecting the GNSS antenna: $ABTXT,01,01,42,AIS: UTC clock OK*32	-
Confirm that the CommState of the Message 4(s) is 0, indicating UTC direct.	The SyncState of the EUT is 0, indicating that the EUT is using UTC direct: !AIVDM,1,1,,B,402B`i1v@lfQ9wrCRfM6qMg025j4,0*06	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	After the EUT adopts UTC direct, the ALR ID 007 is cleared: $ABALR,143135.00,007,V,V,AIS: Clock lost*45	Pass
Confirm that the ADS indicates the correct Sync. State and alarm status.	The ADS sentence shows that the alarm status is “V” - not active, and the Sync State is “0”, UTC direct: $ABADS,1234,143330.00,V,0,I,I*1F	Pass

UTC Indirect to a Base Station – Clause 10.2.5.2

This test will verify that the Base Station will operate as required with UTC indirect synchronisation mode. This test will also verify synchronisation jitter.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Disable the UTC source for the Base Station.
Insert Message 1(s) on the VDL with CommState 0, indicating UTC direct.
Insert Message 4(s) on the VDL with CommState 0, indicating UTC direct with a position distance of 120 NM at the slot following the EUT Message 8 transmission.
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
$xxTSA,<UI>,7,B,<UTC h+m>,<TxSlot>,2
!xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0
b) Restore the UTC source to the Base Station.
Apply a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
$xxTSA,<UI>,7,B,<UTC h+m>,1001,2
!xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0

The following tests are required for a Base Station operated as an independent unit.

c) Apply the independent mode setup to the EUT.
d) Disable the UTC source for the Base Station.
Insert Message 1(s) on the VDL with CommState 0, indicating UTC direct with a position distance of 120 NM. Insert Message 4(s) on the VDL with CommState 0, indicating UTC direct with a position distance of 120 NM at the slot following the EUT Message 4 transmission.
e) Restore the UTC source to the Base Station.

Required Results

Confirm that:

a) the EUT is transmitting Message 8 in the assigned slot and channel. Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect, taking into account the propagation delay (0,74 ms delay for 120 NM) of the received Message 4. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status;
b) the EUT is transmitting Message 8 in the assigned slot and channel. Confirm that the ADS sentence indicates the correct Sync. State and alarm status.

The following results are required for a Base Station operated as an independent unit.

c) the independent mode setup has been correctly set;
d) the Base Station maintains the same reporting rate for Message 4 but changes the CommState to 1 using the Base Station as UTC indirect sync source. Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect, taking into account the propagation delay of the received Message 4. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status;
e) the Sync. State in the CommState of Message 4(s) is 0, indicating UTC direct. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status.

Test Results

a)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The GNSS antenna is removed from the EUT.	-
Insert Message 1(s) on the VDL with CommState 0, indicating UTC direct.	Message 1's are transmitted by a target with the correct CommState, using UTC direct: !AIVDM,1,1,,A,1;UnTqhP2FwrFu2M7AWhKwvP0H9j,0*4F	-
Insert Message 4(s) on the VDL with CommState 0, indicating UTC direct with a position distance of 120 NM at the slot following the EUT Message 8 transmission.	Message 4's are transmitted by a base station with the correct CommState and using UTC direct, as well as positioned 120 NM from the EUT. The Message 4's are transmitted in the slots following the Message 8 from the EUT.	-
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	TSA+VDM pairs are applied so that each Message 8 is transmitted in the slot before each Message 4 slot allocation: $ABTSA,1234,7,B,,**0**,2*36 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**13**,2*04 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**23**,2*07 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**375**,2*37 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**750**,2*34 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**1125**,2*01 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**1500**,2*02 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,**1875**,2*0D !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	Expected Slot / Actual Slot: 0 / 0 13 / 13 23 / 23 375 / 375 750 / 750 1125 / 1125 1500 / 1500 1875 / 1875 Each Message 8 is transmitted correctly on channel B.	Pass
Verify synchronisation jitter doesn't exceed ±156 µs as required for UTC indirect, taking into account the propagation delay (0.74 ms delay for 120 NM) of the received Message 4.	The synchronisation jitter does not exceed ±156 µs for Message 8 transmissions, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT successfully outputs ALR 007 to the PI when the UTC source is removed: $ABALR,162458.00,007,V,V,AIS: Clock lost*48	Pass
Confirm that the ADS sentence indicates the correct SyncState and alarm status.	The ADS sentence shows that the alarm status is "Active" (A) and the UTC timing source is "UTC indirect" (1): $ABADS,1234,162901.00,**A**,**1**,S,N*1F	Pass

a)						
Slot	Chan	MMSI	Msg	Jitter (µs)	Slot End (µs)	Message
0	B	3660007	8	-30	16210	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
1	A	2222222	4	-140	23610	!AIVDM,1,1,,A,4027`SQv@lhKswr81PKufv700<01,0*37
13	B	3660007	8	-80	16160	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14	A	2222222	20	-140	19960	!AIVDM,1,1,,A,D027`SR<HN?b;lN0000f4d0,2*4C
23	B	3660007	8	-80	16160	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
24	B	2222222	20	-140	19860	!AIVDM,1,1,,B,D027`SP7@N?b;TN0000f4d0,2*76
375	B	3660007	8	-10	16240	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
376	B	2222222	4	-60	23790	!AIVDM,1,1,,B,4027`SQv@lhL9wr81PKufv700<01,0*79
750	B	3660007	8	-10	16240	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
751	A	2222222	4	-60	23580	!AIVDM,1,1,,A,4027`SQv@lhLCwr81PKufv700<01,0*00
1125	B	3660007	8	-10	16240	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
1126	B	2222222	4	-60	23580	!AIVDM,1,1,,B,4027`SQv@lhLMwr81PKufv7000S:,0*69
1500	B	3660007	8	-30	16210	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
1501	A	2222222	4	-60	23690	!AIVDM,1,1,,A,4027`SQv@lhLWwr81PKufv700<01,0*14
1875	B	3660007	8	-30	16210	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
1876	B	2222222	4	-60	23690	!AIVDM,1,1,,B,4027`SQv@lhLiwr81PKufv70061h,0*7B

b)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station.	The GNSS antenna is reconnected to the EUT: $ABTXT,01,01,42,AIS: UTC clock OK*32	-
Apply a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	The TSA+VDM sentence pair applied to the EUT are: $ABTSA,1234,7,B,1630,1001,2*02 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	The EUT successfully transmits Message 8 in slot 1001 and on channel B.	Pass
Confirm that the ADS sentence indicates the correct SyncState and alarm status.	The ADS sentence output to the PI indicates that the alarm status is “Not Active” (V) and that the UTC source is “UTC direct" (0): $ABADS,1234,163006.00,**V**,**0**,I,I*1B	Pass

c)		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The sentences settings configurations are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
Confirm that the independent mode setup has been correctly set.	The results of the $ABABQ,DLM*38 query are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08 The results of the $ABABQ,ECB*39 query are: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

d)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The GNSS antenna is removed from the EUT.	-
Insert Message 1(s) on the VDL with CommState 0, indicating UTC direct with a position distance of 120 NM.	Message 1’s are applied to the VDL from a target located 120 NM from the EUT, using a 6 second reporting rate: !AIVDM,1,1,,B,1;UnTqhP2Fwr81PKufv0Kww400Rv,0*64	-
Insert Message 4(s) on the VDL with CommState 0, indicating UTC direct with a position distance of 120 NM at the slot following the EUT Message 4 transmission.	Message 4’s are applied to the VDL and are transmitted in the slot following the EUT’s transmissions. The target transmitting Message 4 is located 120 NM from the EUT: !AIVDM,1,1,,A,4027`SQv@lhiWwr81PKufv7000S:,0*55	-
Confirm that the Base Station maintains the same reporting rate for Message 4 but changes the CommState to 1 using the Base Station as UTC indirect sync source.	The EUT maintains its transmission schedule for Message 4, and the CommState changes to 1. The distant Base Station is used as the UTC indirect sync source, as seen in the table below.	Pass
Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect, taking into account the propagation delay of the received Message 4.	The synchronisation jitter does not exceed ±156 µs, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT outputs ALR ID 007 to the PI after the GNSS antenna is disconnected: $ABALR,164742.00,**007**,A,V,AIS: Clock lost*51	Pass
Confirm that the ADS sentence indicates the correct Sync. State and alarm status.	The EUT outputs an ADS sentence with the alarm status set to “Active” (A) and the UTC source set to “UTC indirect” (1): $ABADS,1234,164918.00,**A**,**1**,S,N*11	Pass

d)						
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Sentence
16:48:00	0	A	2402500	20	-30	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60
16:48:00	1	A	2222222	20	-60	!AIVDM,1,1,,A,D027`SP0TN?`00N000lf4d0,2*57
16:48:00	4	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v@lhh1OrCQbM6qGG00<02,0*78
16:48:00	5	A	2222222	4	-60	!AIVDM,1,1,,A,4027`SQv@lhgswr81PKufv700805,0*1B
16:48:00	6	B	2402500	20	-10	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50
16:48:00	7	B	2222222	20	-60	!AIVDM,1,1,,B,D027`SP8DN?`00N0014f4d0,2*15
16:48:05	186	A	777888999	1	-10	!AIVDM,1,1,,A,1;UnTqhP2Fwr81PKufv0Kwv8082r,0*06
16:48:10	379	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v@lhh;OrCQbM6qGG0085s,0*31

16:48:10	380	B	2222222	4	-60	!AIVDM,1,1,,B,4027`SQv@lhh9wr81PKufv700630,0*55
16:48:11	413	B	777888999	1	-10	!AIVDM,1,1,,B,1;UnTqhP2Fwr81PKufv0KwvD0@6M,0*3A
16:48:16	622	A	777888999	1	-30	!AIVDM,1,1,,A,1;UnTqhP2Fwr81PKufv0KwvP089f,0*71
16:48:20	754	A	2402500	4	-30	!AIVDM,1,1,,A,402B`i1v@lhhEOrCQbM6qGG00<02,0*0C
16:48:20	755	A	2222222	4	-80	!AIVDM,1,1,,A,4027`SQv@lhhCwr81PKufv700H;k,0*01
16:48:23	861	B	777888999	1	-30	!AIVDM,1,1,,B,1;UnTqhP2Fwr81PKufv0Kwvd0<02,0*1F
16:48:29	1093	A	777888999	1	-30	!AIVDM,1,1,,A,1;UnTqhP2Fwr81PKufv0Kwvp0@A5,0*02
16:48:30	1129	B	2402500	4	-30	!AIVDM,1,1,,B,402B`i1v@lhhOOrCQbM6qGG008Aa,0*23
16:48:30	1130	B	2222222	4	-60	!AIVDM,1,1,,B,4027`SQv@lhhMwr81PKufv700<02,0*2A
16:48:34	1304	B	777888999	1	-30	!AIVDM,1,1,,B,1;UnTqhP2Fwr81PKufv0Kww40630,0*45
16:48:40	1504	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v@lhhaOrCQbM6qGG00630,0*23
16:48:40	1505	A	2222222	4	-60	!AIVDM,1,1,,A,4027`SQv@lhhWwr81PKufv700630,0*38
16:48:41	1553	A	777888999	1	-60	!AIVDM,1,1,,A,1;UnTqhP2Fwr81PKufv0KwwB08HA,0*34
16:48:46	1744	B	777888999	1	-60	!AIVDM,1,1,,B,1;UnTqhP2Fwr81PKufv0KwwL0<02,0*36
16:48:50	1879	B	2402500	4	-30	!AIVDM,1,1,,B,402B`i1v@lhhkOrCQbM6qGG00630,0*2A
16:48:50	1880	B	2222222	4	-80	!AIVDM,1,1,,B,4027`SQv@lhhiwr81PKufv700630,0*05
16:48:53	1993	A	777888999	1	-60	!AIVDM,1,1,,A,1;UnTqhP2Fwr81PKufv0Kww`08O9,0*69
16:48:58	2203	B	777888999	1	-30	s)!AIVDM,1,1,,B,1;UnTqhP2Fwr81PKufv0Kwwl08RK,0*09

e)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station.	The GNSS antenna is reconnected to the EUT: $ABTXT,01,01,42,AIS: UTC clock OK*32	-
Confirm that the Sync State in the CommState of Message 4 is 0, indicated UTC direct.	The SyncState of the Message 4 is correctly set to 0, representing a UTC source of UTC direct: !AIVDM,1,1,,A,402B`i1v@lhrCwrCR4M6qBw02D02,0*32	Pass
Confirm that the EUT outputs ALR ID 007 via the PI, with the appropriate status value.	The EUT outputs ALR ID 007 to the PI, with the status value “V” (alarm not active): $ABALR,165616.00,007,**V**,V,AIS: Clock lost*47	Pass

Synchronised to Base Station – Clause 10.2.5.3

This test will verify that the Base Station will operate as required with indirect synchronisation to Base Station. This test will also verify synchronisation jitter.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Disable the UTC source for the Base Station. Insert Message 4(s), with a lower MMSI than the EUT, with Sync. State 3, indicating semaphore operation.
   Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
   $xxTSA,<UI>,7,B,<UTC h+m>,<TxSlot>,2
   !xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0
b) Restore the UTC source to the Base Station.
   Apply a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
   $xxTSA,<UI>,7,B,<UTC h+m>,1001,2
   !xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0

The following tests are required for a Base Station operated as an independent unit.

c) Apply the independent mode setup to the EUT
d) Disable the UTC source for the Base Station. Insert Message 4(s), with a lower MMSI than the EUT, with Sync. State 3, indicating semaphore operation.
e) Restore the UTC source to the Base Station.

Required Results

Confirm that:

a) the EUT is transmitting Message 8 in the assigned slot and channel. Confirm that the EUT does not transmit Message 4. Verify synchronisation jitter of the Message 8 does not exceed ±104 µs compared to the received Message 4(s). Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status;
b) the EUT is transmitting Message 8 in the assigned slot and channel. Confirm that the ADS sentence indicates the correct Sync. State and alarm status.

The following results are required for a Base Station operated as an independent unit:

c) the independent mode setup has been correctly set;
d) the Base Station maintains the reporting interval of 10 s for Message 4 and changes the Sync. State in CommState to 2. Verify synchronisation jitter does not exceed ±104 µs as required for UTC indirect. Confirm that the EUT outputs ALR ID 007 using PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status;
e) the Sync. State of the Message 4(s) is 0, indicating UTC direct. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS indicates sentence the correct Sync. State and alarm status.

Test Results

a)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The UTC source is removed by disconnecting the GNSS antenna from the EUT.	-
Insert Message 4(s), with a lower MMSI than the EUT, with Sync State 3, indicating semaphore operation.	Message 4's are applied to the VDL with an MMSI of 2003100 and sync state 3: !ABVDM,1,1,,A,402=W=1v@n@WrOrFu2M7AWi01`6p,0*5E	-
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	The TSA+VDM pairs applied to the EUT are: $ABTSA,1234,7,**B**,,**350**,2*30 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,**B**,,**650**,2*35 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,**B**,,**950**,2*3A !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,**B**,,**1250**,2*00 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,**B**,,**1550**,2*07 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,**B**,,**1850**,2*0A !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	The EUT transmits Message 8 in the slots assigned in the TSA sentences highlighted above; all Message 8's are transmitted on channel B, as seen in the table below.	Pass
Verify synchronisation jitter does not exceed ±156 µs as required for UTC indirect, taking into account the propagation delay (0,74 ms delay for 120 NM) of the received Message 4.	As seen in the table below, the EUT does not exceed the ±156 µs jitter limit.	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT outputs ALR ID 007 to the PI, with Alarm Status "A") (active): $ABALR,164107.00,007,**A**,V,AIS: Clock lost*56	Pass
Confirm that the ADS sentence indicates the correct Sync State and alarm status.	The ADS sentence output to the PI has a Sync State "3" (semaphore – AIS equipment) and Alarm Status "A" (active): $ABADS,1234,164103.00,**V**,**3**,S,N*06	Pass

a)						
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Message
16:42:09	350	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:42:17	650	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:42:25	950	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:42:33	1250	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:42:41	1550	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:42:49	1850	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D

b)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station.	The GNSS antenna is reconnected, restoring UTC direct: $ABTXT,01,01,42,AIS: UTC clock OK*32	-
Apply a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	The TSA+VDM pairs applied to the EUT are: $ABTSA,1234,7,B,,350,2*30 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,650,2*35 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,950,2*3A !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,1250,2*00 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,1550,2*07 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTSA,1234,7,B,,1850,2*0A !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	The EUT transmits Message 8 in the slots defined by the TSA sentence: 350, 650, 950, 1250, 1550, 1850.	Pass
Confirm that the ADS sentence indicates the correct Sync. State and alarm status.	An ADS sentence is output to the PI with Sync State "0" (UTC direct) and Alarm Status "V" (alarm not active): $ABADS,1234,162731.00,**V**,**0**,I,I*19	Pass

b)						
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Sentence
16:27:09	350	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:27:17	650	B	3660007	8	-10	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:27:25	950	B	3660007	8	-10	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:27:33	1250	B	3660007	8	-30	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:27:41	1550	B	3660007	8	-10	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
16:27:49	1850	B	3660007	8	-10	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D

c)		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	Independent mode is configured by applying the following sentences to the EUT: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
Confirm that the independent mode setup has been correctly set.	The EUT begins transmitting Messages 4 and 20 as defined by the DLM and ECB sentences. The result of the $ABABQ,DLM*38 query is: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08 The result of the $ABABQ,ECB*39 query is: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

d)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The GNSS antenna is removed from the EUT: $ABTXT,01,01,07,AIS: UTC clock lost*33	-
Insert Message 4(s), with a lower MMSI than the EUT, with Sync. State 3, indicating semaphore operation.	Message 4 is transmitted by a target with MMSI 2001020 and a reporting interval of 20 seconds. The sync state of the Message 4 is set to “3”: !AIVDO,1,1,,A,401r8O1v@n9OHOrFu2M7AWi01`5N,0*60	-
Confirm that the Base Station maintains the reporting interval of 10 s for Message 4 and changes the Sync State in CommState to 2.	This appears to be an error in the standard, contradicting ITU-R M.1371-5 Table 11- which states that a base station shall become a semaphore in Sync States 1, 2 and 3. This causes the EUT to correctly synchronise to the other base station, while simultaneously becoming a semaphore for other AIS receivers and decreasing the reporting interval to 3 1/3 seconds. The Sync State of the Message 4 transmitted by the EUT is correctly changed to “2”: !AIVDM,1,1,,B,402B`i1v@n9O`OrCQbM6qGG01HIM,0*2D	Pass
Verify synchronisation jitter does not exceed ±104 µs as required for UTC indirect.	The synchronisation jitter does not exceed the ±104 µs limits as required for UTC indirect operation, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 using PI with the appropriate status value.	The EUT outputs ALR ID 007 to the PI with alarm status “A” (alarm active): $ABALR,092932.00,007,**A**,V,AIS: Clock lost*50	Pass
Confirm that the ADS sentence indicates the correct Sync State and alarm status.	The EUT outputs an ADS sentence with Sync State “3” (semaphore – AIS equipment) and Alarm Status “A” (alarm active): $ABADS,1234,093131.00,A,3,S,N*19	Pass

d)					
Time	Slot	Chan	Msg	Jitter (µs)	Sentence
09:34:00	4	A	4	-60	!AIVDM,1,1,,A,402B`i1v@n9OUOrCQbM6qGG01804,0*6B
09:34:03	129	B	4	-60	!AIVDM,1,1,,B,402B`i1v@n9O`OrCQbM6qGG01L01,0*2C
09:34:06	254	A	4	-60	!AIVDM,1,1,,A,402B`i1v@n9OcOrCQbM6qGG01H3v,0*6C
09:34:10	379	B	4	-60	!AIVDM,1,1,,B,402B`i1v@n9OKOrCQbM6qGG01D01,0*0F
09:34:13	504	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n9ONOrCQbM6qGG01<01,0*71
09:34:16	629	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n9OQOrCQbM6qGG01H9m,0*4C
09:34:20	754	A	4	-30	!AIVDM,1,1,,A,402B`i1v@n9OUOrCQbM6qGG010S:,0*0E
09:34:23	879	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n9O`OrCQbM6qGG01D01,0*24
09:34:26	1004	A	4	-30	!AIVDM,1,1,,A,402B`i1v@n9OcOrCQbM6qGG018?d,0*02

d)					
Time	Slot	Chan	Msg	Jitter (µs)	Sentence
09:34:30	1129	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n9OKOrCQbM6qGG0159t,0*32
09:34:33	1254	A	4	-30	!AIVDM,1,1,,A,402B`i1v@n9ONOrCQbM6qGG01@CV,0*19
09:34:36	1379	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n9OQOrCQbM6qGG01<01,0*6D
09:34:40	1504	A	4	-30	!AIVDM,1,1,,A,402B`i1v@n9OUOrCQbM6qGG010S:,0*0E
09:34:43	1629	B	4	-10	!AIVDM,1,1,,B,402B`i1v@n9O`OrCQbM6qGG01D01,0*24
09:34:46	1754	A	4	-30	!AIVDM,1,1,,A,402B`i1v@n9OcOrCQbM6qGG01<01,0*5C
09:34:50	1879	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n9OKOrCQbM6qGG01D01,0*0F
09:34:53	2004	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n9ONOrCQbM6qGG018OD,0*7F
09:34:56	2129	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n9OQOrCQbM6qGG01@QA,0*00

e)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station.	The GNSS antenna is reconnected to the EUT, restoring the UTC direct: $ABTXT,01,01,42,AIS: UTC clock OK*32	-
Confirm that the Sync State of the Message 4(s) is 0, indicating UTC direct.	The Sync State of the Message 4 transmitted by the EUT is 0: !AIVDM,1,1,,A,402B`i1v@nerCwrCQrM6qMO028;j,0*60	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT outputs ALR ID 007 to the PI with the Status Value “V” (alarm not active): $ABALR,135532.00,007,**V**,V,AIS: Clock lost*47	Pass
Confirm that the ADS indicates sentence the correct Sync State and alarm status.	The ADS sentence output by the EUT has a Sync State “0” (UTC direct) and Alarm Status “V” (alarm not active): $ABADS,1234,135835.00,**V**,**0**,I,I*10	Pass

As Semaphore – Clause 10.2.5.4

This test will verify that the Base Station will operate as semaphore. This test will also verify synchronisation jitter.

Method of Measurement

The following tests are required for a Base Station operated as an independent unit.

Set up the standard test environment and operate the EUT as defined in the pre-set-up conditions.

a) Apply the independent mode setup to the EUT.
b) Disable the UTC source for the Base Station. Insert Message 1(s) with Sync. State 3, indicating semaphore operation by 2 s reporting interval, onto the VDL.
c) Restore the UTC source to the Base Station and insert Message 1(s) with Sync. State 1 indicating UTC indirect.
d) Disable the UTC source for the Base Station. Insert Message 1(s) with Sync. State 2, indicating Base Station synchronisation, onto the VDL.
e) Restore the UTC source to the Base Station and insert Message 1(s) with Sync. State 1 indicating UTC indirect.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the Base Station increases its Message 4, reporting rate to 3 1/3 s. Verify that the Sync. State of the Message 4(s) is 3, indicating semaphore operation. Confirm that the EUT outputs ALR ID 007 using PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status;
c) the Sync. State of the Message 4(s) is 0, indicating UTC direct. Verify that 3 min after the restoration of the UTC source, the Base Station decreases its reporting rate to 10 s. Confirm that the ADS indicates the correct Sync. State and alarm status;
d) the Base Station increases its Message 4, reporting rate to 3 1/3 s. Verify that the Sync. State of the Message 4(s) is 3, indicating semaphore operation. Confirm that the EUT outputs ALR ID 007 using PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status;
e) the Sync. State of the Message 4(s) is 0, indicating UTC direct. Verify that 3 min after the restoration of the UTC source, the Base Station decreases its reporting rate to 10 s. Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value. Confirm that the ADS sentence indicates the correct Sync. State and alarm status.

Test Results

a)		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The sentences applied to the EUT are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
Confirm that the independent mode setup has been correctly set.	The response to the $ABABQ,DLM*38 query is: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08 The response to the $ABABQ,ECB*39 query is: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

b)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The GNSS antenna is disconnected from the EUT.	-
Insert Message 1(s) with Sync. State 3, indicating semaphore operation by 2 s reporting interval, onto the VDL.	The Message 1 applied by to the VDL with SyncState 3 with a reporting interval of 2 seconds is: !ABVDM,1,1,,A,13LC9e@2P:wrFu2M7AWh2gv21`0o,0*7B	-
Confirm that the Base Station increases its Message 4 reporting rate to 3 1/3 seconds.	The EUT increases its Message 4 reporting rate to 3 1/3 seconds, as seen in the table below.	Pass
Verify that the Sync State of the Message 4's is 3, indicating semaphore operation.	The Sync State of the Message 4's is 3, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 using the PI, with the appropriate status value.	The EUT outputs ALR ID 007 with status "A" (active): $ABALR,105632.00,**007**,**A**,V,AIS: Clock lost*50	Pass
Confirm that the ADS sentence indicates the correct Sync State and alarm status.	The ADS sentence output by the EUT with Sync State "3" (semaphore – AIS equipment) and Alarm Status "A" (active): $ABADS,1234,110002.00,**A**,**3**,S,N*12	Pass

b)					
Time	Slot	MMS	Msg	Message	Sync State
11:00:00	4	2402500	4	!AIVDM,1,1,,A,402B`i1v@n:ssOrCQbM6qGG01UCd,0*3C	3
11:00:03	129	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;03OrCQbM6qGG01h21,0*24	3
11:00:06	254	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;06OrCQbM6qGG01l01,0*24	3
11:00:10	379	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;09OrCQbM6qGG01d01,0*20	3
11:00:13	504	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0=OrCQbM6qGG01p7p,0*75	3
11:00:16	629	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0@OrCQbM6qGG01d01,0*59	3
11:00:20	754	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0COrCQbM6qGG01UH0,0*11	3
11:00:23	879	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0GOrCQbM6qGG01t01,0*4E	3
11:00:26	1004	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0JOrCQbM6qGG01d01,0*50	3
11:00:30	1129	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0MOrCQbM6qGG01`Aa,0*71	3
11:00:33	1254	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0QOrCQbM6qGG01l01,0*43	3
11:00:36	1379	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0TOrCQbM6qGG01t01,0*5D	3
11:00:40	1504	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0WOrCQbM6qGG01d01,0*4D	3
11:00:43	1629	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0cOrCQbM6qGG01t01,0*6A	3
11:00:46	1754	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0fOrCQbM6qGG01t01,0*6C	3
11:00:50	1879	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0iOrCQbM6qGG01PS:,0*2C	3
11:00:53	2004	2402500	4	!AIVDM,1,1,,A,402B`i1v@n;0mOrCQbM6qGG01hOD,0*71	3
11:00:56	2129	2402500	4	!AIVDM,1,1,,B,402B`i1v@n;0pOrCQbM6qGG01l01,0*61	3

c)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station and insert Message 1(s) with Sync. State 1 indicating UTC indirect.	The GNSS antenna is reconnected to the EUT, and the Message 1's applied to the VDL with Sync State 1: !ABVDM,1,1,,A,13LC9e@2P:wrFu2M7AWh2gv60`22,0*21	-
Confirm that the Sync State of the Message 4(s) is 0, indicating UTC direct.	The EUT transmits Message 4 with Sync State set to 0: !AIVDM,1,1,,B,402B`i1v@n;83wrCSNM6qA?020S:,0*75	Pass
Verify that 3 min after the restoration of the UTC source, the Base Station decreases its reporting rate to 10 s.	After 3 minutes the EUT successfully adopts a 10 second reporting rate.	Pass

c)		
Requirement	Result	Verdict
Confirm that the ADS indicates the correct Sync. State and alarm status.	The ADS sentence shows that the Sync State is “0” (UTC direct) and Alarm Status “V” (not active): $ABADS,1234,110945.00,**V**,**0**,I,I*11	Pass

d)		
Requirement	Result	Verdict
Disable the UTC source for the Base Station.	The GNSS antenna is removed from the EUT.	-
Insert Message 1(s) with Sync. State 2, indicating Base Station synchronisation, onto the VDL.	The Message 1’s are applied to the VDL with Sync State 2: !ABVDM,1,1,,A,13LC9e@2P:wrFu2M7AWh2gvn18@6,0*56	-
Confirm that the Base Station increases its Message 4, reporting rate to 3 1/3 s.	The EUT increases its reporting rate to 3 1/3 seconds, as seen in the table below.	Pass
Verify that the Sync State of the Message 4(s) is 3, indicating semaphore operation.	The Message 4’s transmitted by the EUT have a Sync State of 3, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 using PI with the appropriate status value.	The EUT outputs ALR ID 007, with status “A” (active): $ABALR,111612.00,**007**,**A**,V,AIS: Clock lost*57	Pass
Confirm that the ADS sentence indicates the correct Sync. State and alarm status.	The EUT outputs an ADS sentence with Sync State set to “3” (semaphore – AIS equipment) and an Alarm Status “A” (active): $ABADS,1234,111614.00,**A**,**3**,S,N*12	Pass

d)						
Time	Slot	Chan	Msg	Jitter (µs)	Message	Sync State
11:18:00	4	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;AsOrCQbM6qGG01l01,0*10	3
11:18:03	129	B	4	-10	!AIVDM,1,1,,B,402B`i1v@n;B3OrCQbM6qGG01p21,0*4E	3
11:18:06	254	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;B6OrCQbM6qGG01h3v,0*16	3
11:18:10	379	B	4	20	!AIVDM,1,1,,B,402B`i1v@n;B9OrCQbM6qGG01d01,0*52	3
11:18:13	504	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;B=OrCQbM6qGG01UI8,0*14	3
11:18:16	629	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n;B@OrCQbM6qGG01UI8,0*6A	3
11:18:20	754	A	4	20	!AIVDM,1,1,,A,402B`i1v@n;BCOrCQbM6qGG01l01,0*23	3
11:18:23	879	B	4	-10	!AIVDM,1,1,,B,402B`i1v@n;BGOrCQbM6qGG01h=g,0*7B	3
11:18:26	1004	A	4	-30	!AIVDM,1,1,,A,402B`i1v@n;BJOrCQbM6qGG01UI8,0*63	3
11:18:30	1129	B	4	-10	!AIVDM,1,1,,B,402B`i1v@n;BMOrCQbM6qGG01PS:,0*7A	3
11:18:33	1254	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;BQOrCQbM6qGG01`CV,0*29	3
11:18:36	1379	B	4	-10	!AIVDM,1,1,,B,402B`i1v@n;BTOrCQbM6qGG01l01,0*37	3
11:18:40	1504	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;BWOrCQbM6qGG01d01,0*3F	3
11:18:43	1629	B	4	-10	!AIVDM,1,1,,B,402B`i1v@n;BcOrCQbM6qGG01hIM,0*01	3
11:18:46	1754	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;BfOrCQbM6qGG01l01,0*06	3
11:18:50	1879	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n;BiOrCQbM6qGG01d01,0*02	3
11:18:53	2004	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;BmOrCQbM6qGG01d01,0*05	3
11:18:56	2129	B	4	-30	!AIVDM,1,1,,B,402B`i1v@n;BpOrCQbM6qGG01UI8,0*5A	3
11:19:00	4	A	4	-10	!AIVDM,1,1,,A,402B`i1v@n;BsOrCQbM6qGG01h04,0*12	3

e)		
Requirement	Result	Verdict
Restore the UTC source to the Base Station and insert Message 1(s) with Sync. State 1 indicating UTC indirect.	The UTC source is restored by reconnecting the GNSS antenna to the EUT. The Message 1’s applied to the VDL have Sync State set to 1 (UTC indirect), as seen in the Message decode below.	-
Confirm that the Sync State of the Message 4(s) is 0, indicating UTC direct.	The Sync State of the Message 4’s transmitted by the EUT is 0, as seen in the table below.	Pass
Verify that 3 min after the restoration of the UTC source, the Base Station decreases its reporting rate to 10 s.	The EUT correctly adapts its reporting rate to 10 seconds, after being reconnected to a UTC direct source, as seen in the table below.	Pass
Confirm that the EUT outputs ALR ID 007 via PI with the appropriate status value.	The EUT outputs an ALR ID 007 on the PI, with status value “V” (not active): $ABALR,112358.00,007,**V**,V,AIS: Clock lost*48	Pass
Confirm that the ADS sentence indicates the correct Sync State and alarm status.	The ADS sentence output by the EUT has a Sync State of “0” (UTC direct) and an Alarm Status of “V” (alarm not active): $ABADS,1234,112659.00,**V**,**0**,I,I*11	Pass

e) Message Decode	
!ABVDM,1,1,,A,13LC9e@2P:wrFu2M7AWh2gv60`22,0*21	
Parameter	Decoded Value
Message ID	1 - Position report
Repeat Indicator	0
MMSI	231000501
Navigational Status	0 - under way using engine
Rate Of Turn	4 (Turning Right)
Speed Over Ground	1
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
Course Over Ground	1
True Heading	511 - not available
Time Stamp	3
Special Manoeuvre Indicator	0 - not available
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	1
Communication State - Slot Timeout	2
Communication State - Sub Message	Slot Number = 130

e)						
Time	Slot	MMSI	Msg	Sync	Jitter	Message
11:23:59	-	-	-	-	-	$ABTXT,01,01,42,AIS: UTC clock OK*32
The EUT operates with a 3 1/3 second reporting rate for the next 2'44". These results have been omitted from this table but can be found in the test's log files.						
11:26:43	1629	2402500	4	0	-10	!AIVDM,1,1,,B,402B`i1v@n;JcwrCQvM6qJw028IM,0*4B
11:26:46	1754	2402500	4	0	-10	!AIVDM,1,1,,A,402B`i1v@n;JfwrCQvM6qJw028KJ,0*48
11:26:50	1879	2402500	4	0	-10	!AIVDM,1,1,,B,402B`i1v@n;JiwrCQvM6qJw025I`,0*61
11:26:53	2004	2402500	4	0	-10	!AIVDM,1,1,,A,402B`i1v@n;JmwrCQvM6qJw028OD,0*49
11:26:56	2129	2402500	4	0	-10	!AIVDM,1,1,,B,402B`i1v@n;JpwrCQvM6qJw02HQA,0*3C
11:27:00	4	2402500	4	0	-10	!AIVDM,1,1,,A,402B`i1v@n;JswrCQvM6qJw020S:,0*3D
11:27:10	379	2402500	4	0	-10	!AIVDM,1,1,,B,402B`i1v@n;K9wrCQvM6qJw025Id,0*34
11:27:20	754	2402500	4	0	-10	!AIVDM,1,1,,A,402B`i1v@n;KCwrCQvM6qJw02<01,0*68
11:27:30	1129	2402500	4	0	-10	!AIVDM,1,1,,B,402B`i1v@n;KMwrCQvM6qJw028Aa,0*40
11:27:40	1504	2402500	4	0	-30	!AIVDM,1,1,,A,402B`i1v@n;KWwrCQvM6qJw028GP,0*6E
11:27:50	1879	2402500	4	0	-10	!AIVDM,1,1,,B,402B`i1v@n;KiwrCQvM6qJw020S:,0*25
11:28:00	4	2402500	4	0	-10	!AIVDM,1,1,,A,402B`i1v@n;KswrCQvM6qJw02D01,0*20

Position Source – Clause 10.2.6

This test will verify that the Base Station will accept and correctly handle each position source setting. In addition, this test will verify that the Base Station responds correctly if a position source is lost.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

The following tests are required for a Base Station operated as an independent unit.

a) Apply the independent mode setup to the EUT.
b) Set the position source to surveyed position using the BCL sentence:
   $xxBCL,<UI>,0,,,,,,,C
c) If implemented, set the position source to internal position source:
   $xxBCL,<UI>,1,,,,,,,C
d) Remove the GPS antenna to generate a failure for the position.
e) If implemented, set the position source to external position source. Supply the EUT, using the PI, a series of GGA, RMC, or GLL sentences.
   $xxBCL,<UI>,2,,,,,,,C
f) Discontinue the position sentences for 30 s.
g) Set the position source to surveyed position:
   $xxBCL,<UI>,1,,,,,,,C
h) Repeat steps c) and d) using the following position sources:
   3 = internal EPFS in use with automatic fall back to surveyed position;
   4 = internal EPFS in use with automatic fall back to external EPFS upon failure of internal EPFS.
i) Repeat steps e) and f) using the following position sources:
   5 = external EPFS in use with automatic fall back to surveyed position;
   6 = external EPFS in use with automatic fall back to internal position source upon failure of external position source.

Required Results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the independent mode setup has been correctly set;
b) the BCL sentence was received correctly by the EUT using PI query for BCL. Confirm that the EUT transmits the Message 4 with a position source indicating surveyed. Confirm that the ADS sentence indicates the position source “S”;
c) the BCL sentence was received correctly by the EUT using PI query for BCL. Confirm that the EUT transmits the Message 4 with a position source indicating internal. Confirm that the ADS sentence indicates the position source “I”;
d) the ALR sentence with ID 26 is output on the PI indicating a loss of position source. Confirm that the EUT transmits the Message 4 with no position available. Confirm that the ADS sentence indicates the position source “N”;
e) the BCL sentence was received correctly by the EUT using PI query for BCL. Confirm that the EUT transmits the Message 4 with a position source indicating the EPFS type of the external sensor. Confirm that the ADS sentence indicates the position source “E”;
f) the ALR sentence with ID 26 is output using the PI indicating a loss of position source. Confirm that the EUT transmits the Message 4 with no position available. Confirm that the ADS sentence indicates the position source “N”;
g) the BCL sentence was received correctly by the EUT using PI query for BCL. Confirm that the EUT transmits Message 4 with a position source indicating surveyed. Confirm that the ADS sentence indicates the position source “S”;
h) for each position source:

the BCL sentence was received correctly by the EUT using PI query for BCL;
the EUT transmits Message 4 with a position source indicating internal;
the ADS sentence indicates the current position source;
the EUT transmits Message 4 with required fall-back position source;
the ADS sentence indicates the current position source;

i) for each position source:
the BCL sentence was received correctly by the EUT using PI query for BCL;
the EUT transmits Message 4 with a position source indicating the EPFS type of the external sensor;
the ADS sentence indicates the current position source;
the EUT transmits Message 4 with required fall-back position source;
the ADS sentence indicates the current position source.

Test Results

a) Apply the Independent Mode Setup		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The independent mode set-up is applied to the unit, as defined in §10.1.3.	-
Confirm that the independent mode setup has been correctly set.	See the table below for the results to querying the settings.	Pass

a) Independent Mode Validation	
Query Applied	Query Results
$ABABQ,DLM*38	$ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,R*00
	$ABDLM,1,A,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,2,A,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,3,A,,,,,,,,,,,,,,,,,,R*4A
	$ABDLM,4,A,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,5,A,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,6,A,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,7,A,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,8,A,,,,,,,,,,,,,,,,,,R*41
	$ABDLM,9,A,,,,,,,,,,,,,,,,,,R*40
	$ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08
	$ABDLM,1,B,,,,,,,,,,,,,,,,,,R*4B
	$ABDLM,2,B,,,,,,,,,,,,,,,,,,R*48
	$ABDLM,3,B,,,,,,,,,,,,,,,,,,R*49
	$ABDLM,4,B,,,,,,,,,,,,,,,,,,R*4E
	$ABDLM,5,B,,,,,,,,,,,,,,,,,,R*4F
	$ABDLM,6,B,,,,,,,,,,,,,,,,,,R*4C
	$ABDLM,7,B,,,,,,,,,,,,,,,,,,R*4D
	$ABDLM,8,B,,,,,,,,,,,,,,,,,,R*42
	$ABDLM,9,B,,,,,,,,,,,,,,,,,,R*43
$ABABQ,ECB*39	$ABECB,1234,4,,4,750,,,379,750,,R*00
	$ABECB,1234,17,0,-1,0,1,0,-1,0,1,R*3B
	$ABECB,1234,20,0,0,2250,,0,6,2250,,R*39
	$ABECB,1234,22,0,-1,0,,0,-1,0,,R*3D
	$ABECB,1234,23,0,-1,0,,0,-1,0,,R*3C
	$ABECB,1234,24,0,-1,0,,0,-1,0,,R*3B

b) Test of Surveyed Position Source		
Requirement	Result	Verdict
Set the position source to surveyed position using the BCL sentence.	The BCL sentence applied to the EUT is: $ABBCL,1234,0,5000.0000,N,00100.0000,W,1,TUV SUD,C,0*20	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The result of the $ABABQ,BCL*30 query is: $ABBCL,1234,**0**,5000.0000,N,00100.0000,W,1,TUV SUD,R,0*31	Pass
Confirm that the EUT transmits the Message 4 with a position source indicating surveyed.	The EUT transmits message 4 with a position source of 7, indicating surveyed position in use, as seen in the table below, 'b) *Message 4 Decode'*.	Pass
Confirm that the ADS sentence indicates the position source "S".	The EUT outputs the following ADS sentence to the PI: $ABADS,1234,094118.00,A,0,**S**,I*11	Pass

b) Message 4 Decode

!AIVDM,1,1,,B,402B`i1v@`aaiwsK20LW3P7008MG,0*66	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	9
Minute	41
Second	49
Position Accuracy	1 - high (> 10 m)
Longitude	1 0 W
Latitude	50 0 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	2
Communication State - Sub Message	Slot Number = 1879

c) Test of Internal Position Source		
Requirement	Result	Verdict
If implemented, set the position source to internal position source:	The position source of the EUT is configured to internal using: $ABBCL,1234,**1**,5052.00,N,00114.00,W,,,C*3B	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The result returned by the $ABABQ,BCL*30 query is: $ABBCL,1234,**1**,5052.0000,N,00114.0000,W,1,TUV SUD,R,0*32	Pass
Confirm that the EUT transmits the Message 4 with a position source indicating internal.	The EUT transmits position reports with the position source set to '1', indicating internal position source- see the table below '*c) Message 4 Decode'*.	Pass
Confirm that the ADS sentence indicates the position source "I".	The ADS sentence output by the EUT is: $ABADS,1234,094626.00,A,0,**I**,I*01	Pass

c) Message 4 Decode	
!AIVDM,1,1,,B,402B`i1v@`afMwrCQdM6qNw02HAa,0*5F	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	9
Minute	46
Second	29
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6442 W
Latitude	50 52.1723 N
Type of electronic position fixing device	15 - Internal GNSS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	1 - RAIM in use
Communication State - Sync State	0
Communication State - Slot Timeout	6
Communication State - Sub Message	Slot Number = 1129

d) Test of Failure of Position Sensor		
Requirement	Result	Verdict
Remove the GPS antenna to generate a failure for the position.	The GNSS antenna is disconnected from the EUT.	-
Confirm that the ALR sentence with ID 26 is output on the PI indicating a loss of position source.	The EUT outputs ALR with ID 26 to the PI: $ABALR,095019.00,**026**,A,V,AIS: no sensor position in use*52	Pass
Confirm that the EUT transmits the Message 4 with no position available.	The EUT transmits Message 4 with position source set to 0; see the table '*d) Message 4 Decode'* below.	Pass

d) Test of Failure of Position Sensor		
Requirement	Result	Verdict
Confirm that the ADS sentence indicates the position source “N”.	The EUT outputs an ADS sentence with position source ‘N’: $ABADS,1234,095031.00,A,4,**N**,N*04	Pass

d) Message 4 Decode	
!AIVDM,1,1,,A,402B`i1v@`ajW<tSF0l4Q@000L00,0*38	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	9
Minute	50
Second	39
Position Accuracy	0 - low (>10 m)
Longitude	181 0 E
Latitude	91 0 N
Type of electronic position fixing device	0 - Undefined
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	7
Communication State - Sub Message	Received Stations = 0

e) Test of External Position Source		
Requirement	Result	Verdict
If implemented, set the position source to external position source.	The EUT is configured to use external position using: $ABBCL,1234,**2**,,,,,,,C*17	-
Supply the EUT, using the PI, a series of GGA, RMC, or GLL sentences.	The external position data applied keeps the EUT stationary, with a SOG and COG of 0, over a period of 1 frame: $GPDTM,W84,,,,,,,W84 $GPRMC,095744,A,5052.7903,N,00113.9423,W,0,0,170220,,,D	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The result returned by querying $ABABQ,BCL*30 is: $ABBCL,1234,**2**,9100.0000,N,18100.0000,E,1,TUV SUD,R,0*25	Pass
Confirm that the EUT transmits the Message 4 with a position source indicating the EPFS type of the external sensor.	The EUT uses the data from the external position applied to the PI, as seen in table *‘e) Message 4 Decode: External Position Source’*.	Pass
Confirm that the ADS sentence indicates the position source “E”.	The ADS sentence output by the EUT is: $ABADS,1234,101248.00,A,4,**E**,N*0F	Pass

e) Message 4 Decode: External Position Source	
!AIVDM,1,1,,B,402B`i1v@`b<iwrFu2M7AWi01PS:,0*31	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	12
Second	49
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
Type of electronic position fixing device	1 - GPS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	3

Communication State - Slot Timeout	0
Communication State - Sub Message	Slot Offset = 2250

f) Test of Removal of External Position Source		
Requirement	Result	Verdict
Discontinue the position sentences for 30 s.	The position sensor sentences are stopped for 30 seconds.	-
Confirm that the ALR sentence with ID 26 is output using the PI indicating a loss of position source.	The EUT outputs the following ALR with ID 26 to the PI: \$ABALR,101344.00,**026**,A,V,AIS: no sensor position in use*55	Pass
Confirm that the EUT transmits the Message 4 with no position available.	The EUT transmits Message 4 with no position available, see the table '*f) Message 4 Decode: Removal of Position Source'* below.	Pass
Confirm that the ADS sentence indicates the position source "N".	The ADS sentence output by the EUT to the PI is: \$ABADS,1234,101420.00,A,4,**N**,N*0C	Pass

f) Message 4 Decode: Removal of Position Source	
!AIVDM,1,1,,A,402B`i1v@`b>W<tSF0l4Q@001PS:,0*1B	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	14
Second	39
Position Accuracy	0 - low (>10 m)
Longitude	181 0 E
Latitude	91 0 N
Type of electronic position fixing device	0 - Undefined
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	3
Communication State - Slot Timeout	0
Communication State - Sub Message	Slot Offset = 2250

g) Configure the Position Source to Surveyed Position		
Requirement	Result	Verdict
Set the position source to surveyed position.	The position source of the EUT is configured to surveyed using the BCL sentence: \$ABBCL,1234,**0**,,,,,,,C*15	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The result returned by the \$ABABQ,BCL*30 query is: \$ABBCL,1234,**0**,5052.1668,N,00114.6350,W,0,TUV SUD,R,0*3B	Pass
Confirm that the EUT transmits Message 4 with a position source indicating surveyed.	The EUT transmits Message 4 with a position source set to 7, indicating a surveyed source is in use. This is shown in the table below, '*g) Message 4 Decode: Surveyed Position Source'*.	Pass
Confirm that the ADS sentence indicates the position source "S".	The EUT outputs the following ADS sentence: \$ABADS,1234,103350.00,A,4,**S**,N*13	Pass

g) Message 4 Decode: Surveyed Position Source	
!AIVDM,1,1,,A,402B`i1v@`bRCOrCTTM6qA701`;j,0*7D	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	34
Second	19
Position Accuracy	0 - low (>10 m)
Longitude	1 14.635 W

Latitude	50 52.1668 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	3
Communication State - Slot Timeout	2
Communication State - Sub Message	Slot Number = 754

h) Test of Automatic Fallback from Internal to Surveyed Position		
Requirement	Result	Verdict
The position source shall be configured to internal EPFS in use with automatic fall back to surveyed position.	The EUT is configured to use internal EPFS, and fall back to its surveyed position when the internal EPFS is unavailable: $ABBCL,1234,3,,,,,,,C*16	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The EUT successfully received the BCL sentence, as seen in the result of the $ABABQ,BCL*30 query: $ABBCL,1234,**3**,5052.1668,N,00114.6350,W,0,TUV SUD,R,0*38	Pass
Confirm that the EUT transmits Message 4 with a position source indicating internal.	The EUT transmits Message 4 with position source set to internal as seen in the table below, *'Message 4 Decode: Internal Position Source'*.	Pass
Confirm that the ADS sentence indicates the current position source.	The ADS sentence output by the EUT is: $ABADS,1234,103907.00,V,0,**I**,I*15	Pass
The GNSS antenna shall be removed to generate a failure for the position.	The GNSS antenna is disconnected from the EUT.	-
Confirm the EUT transmits Message 4 with required fall-back position source.	The EUT transmits Message 4 using the surveyed position, as set by the BCL sentence; see the table *'h) Message 4 Decode: Surveyed Fallback Position Source'* below.	Pass
Confirm that the ADS sentence indicates the current position source.	The ADS sentence output by the EUT is: $ABADS,1234,103939.00,V,0,**S**,I*02	Pass

h) Message 4 Decode: Internal Position Source	
!AIVDM,1,1,,A,402B`i1v@`bWCwrCQlM6qNg02D00,0*54	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	39
Second	19
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6438 W
Latitude	50 52.1722 N
Type of electronic position fixing device	15 - Internal GNSS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	1 - RAIM in use
Communication State - Sync State	0
Communication State - Slot Timeout	5
Communication State - Sub Message	Received Stations = 0

h) Message 4 Decode: Surveyed Fallback Position Source	
!AIVDM,1,1,,A,402B`i1v@`bWsOrCTTM6qA7000S:,0*21	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	39
Second	59
Position Accuracy	0 - low (>10 m)

Longitude	1 14.635 W
Latitude	50 52.1668 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	0
Communication State - Sub Message	Slot Offset = 2250

h) Test of Automatic Fallback from Internal to External Position		
Requirement	Result	Verdict
The position source shall be configured to internal EPFS in use with automatic fall back to external EPFS upon failure of internal EPFS.	The EUT is configured to use internal EPFS when available, and to fall back to external EPFS upon failure of internal EPFS, using the BCL sentence: $ABBCL,1234,**4**,,,,,,,C*11	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The BCL settings are confirmed by querying $ABABQ,BCL*30: $ABBCL,1234,**4**,5052.1668,N,00114.6350,W,0,TUV SUD,R,0*3F	Pass
Confirm that the EUT transmits Message 4 with a position source indicating internal.	The EUT transmits Message 4 using internal position source, as seen in the table below, '*h) Message 4 Decode: Internal Position Source'*.	Pass
Confirm that the ADS sentence indicates the current position source.	The EUT outputs ADS on the PI: $ABADS,1234,104151.00,V,0,**I**,I*19	Pass
The GNSS antenna shall be removed to generate a failure for the position.	The GNSS antenna is disconnected from the EUT.	-
Confirm the EUT transmits Message 4 with required fall-back position source.	When the GNSS antenna is disconnected, the EUT transmits Message 4 using the external data being applied to the PI. This is shown in the table below, '*Message 4 Decode: External Fallback Position Source'*.	Pass
Confirm that the ADS sentence indicates the current position source.	The EUT outputs the following ADS sentence on the PI: $ABADS,1234,104348.00,A,4,**E**,N*0B	Pass

h) Message 4 Decode: Internal Position Source	
!AIVDM,1,1,,A,402B`i1v@`bWCwrCQlM6qNg02D00,0*54	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	39
Second	19
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6438 W
Latitude	50 52.1722 N
Type of electronic position fixing device	15 - Internal GNSS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	1 - RAIM in use
Communication State - Sync State	0
Communication State - Slot Timeout	5
Communication State - Sub Message	Received Stations = 0

h) Message 4 Decode: External Fallback Position Source	
!AIVDM,1,1,,A,402B`i1v@`bcswrFu2M7AWi00<00,0*73	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	43

Second	59
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
Type of electronic position fixing device	1 - GPS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	3
Communication State - Sub Message	Received Stations = 0

i) Test of Automatic Fallback from External to Surveyed Position		
Requirement	Result	Verdict
The position source shall be configured to internal EPFS in use with automatic fall back to external EPFS in use with automatic fall back to surveyed position.	The position source is configured using the BCL sentence: $ABBCL,1234,**5**,,,,,,,C*10	Pass
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The BCL sentence is accepted by the EUT, as seen in the result returned by the $ABABQ,BCL*30 query: $ABBCL,1234,**5**,5052.1668,N,00114.6350,W,0,TUV SUD,R,0*3E	Pass
Confirm that the EUT transmits Message 4 with a position source indicating external.	The EUT transmits Message 4 with position source set to 15, indicating external position data is in use. See the table '*i) Message 4 Decode: External Position Source'*.	Pass
Confirm that the ADS sentence indicates the current position source.	The EUT outputs the following ADS sentence on the PI: $ABADS,1234,105245.00,A,4,**E**,N*06	Pass
The GNSS antenna shall be removed to generate a failure for the position.	The GNSS antenna is disconnected from the EUT.	-
Confirm the EUT transmits Message 4 with required fall-back position source.	Message 4 is transmitted with the position source reported as surveyed, as seen in the table below '*i) Message 4 Decode: Surveyed Fallback Position Source'*.	Pass
Confirm that the ADS sentence indicates the current position source.	The ADS sentence output by the EUT is: $ABADS,1234,105318.00,A,4,S,N*19	Pass

i) Message 4 Decode: External Position Source	
!AIVDM,1,1,,B,402B`i1v@`bliwrFu2M7AWi01`MG,0*32	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	52
Second	49
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
Type of electronic position fixing device	1 - GPS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	3
Communication State - Slot Timeout	2
Communication State - Sub Message	Slot Number = 1879

i) Message 4 Decode: Surveyed Fallback Position Source	
!AIVDM,1,1,,A,402B`i1v@`bmWOrCTTM6qA701PS:,0*5E	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17

i) Message 4 Decode: Surveyed Fallback Position Source	
!AIVDM,1,1,,A,402B`i1v@`bmWOrCTTM6qA701PS:,0*5E	
Parameter	Decoded Value
Hour	10
Minute	53
Second	39
Position Accuracy	0 - low (>10 m)
Longitude	1 14.635 W
Latitude	50 52.1668 N
Type of electronic position fixing device	7 - Surveyed
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	3
Communication State - Slot Timeout	0
Communication State - Sub Message	Slot Offset = 2250

i) Test of Automatic Fallback from External to Internal Position		
Requirement	Result	Verdict
The position source shall be configured to external EPFS in use with automatic fall back to internal position source upon failure of external position source.	The position source is configured using: $ABBCL,1234,**6**,,,,,,C*13	-
Confirm that the BCL sentence was received correctly by the EUT using PI query for BCL.	The result returned by the $ABABQ,BCL*30 query is: $ABBCL,1234,**6**,5052.1668,N,00114.6350,W,0,TUV SUD,R,0*3D	Pass
Confirm that the EUT transmits Message 4 with a position source indicating external.	The EUT transmits position reports with the position source set to external GNSS. See the table '*i) Message 4 Decode: External Position Source'* below.	Pass
Confirm that the ADS sentence indicates the current position source.	The ADS sentence output by the EUT is: $ABADS,1234,105428.00,A,4,E,N*0B	Pass
The GNSS antenna shall be removed to generate a failure for the position.	The GNSS antenna is disconnected from the EUT.	-
Confirm the EUT transmits Message 4 with required fall-back position source.	The EUT transmits Message 4 using the internal GNSS as the position source; see the table below '*i) Message 4 Decode: Internal Fallback Position Source*'.	Pass
Confirm that the ADS sentence indicates the current position source.	The ADS sentence output by the EUT is: $ABADS,1234,105648.00,V,0,I,I*17	Pass

i) Message 4 Decode: External Position Source	
!AIVDM,1,1,,A,402B`i1v@`bpCwrFu2M7AWi008;j,0*05	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0
MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	56
Second	19
Position Accuracy	1 - high (> 10 m)
Longitude	1 13.9423 W
Latitude	50 52.7903 N
Type of electronic position fixing device	1 - GPS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	0 - RAIM not in use
Communication State - Sync State	0
Communication State - Slot Timeout	2
Communication State - Sub Message	Slot Number = 754

i) Message 4 Decode: Internal Fallback Position Source	
!AIVDM,1,1,,A,402B`i1v@`bqswrCQ@M6qPO025CT,0*3E	
Parameter	Decoded Value
Message ID	4 - Base station report
Repeat Indicator	0

MMSI	2402500
Year	2020
Month	2
Day	17
Hour	10
Minute	57
Second	59
Position Accuracy	1 - high (> 10 m)
Longitude	1 14.6456 W
Latitude	50 52.1729 N
Type of electronic position fixing device	15 - Internal GNSS
Transmission control for long-range broadcast message	0 - Class-A station stops transmission of Message 27 within base station coverage area
Spare	0
RAIM Flag	1 - RAIM in use
Communication State - Sync State	0
Communication State - Slot Timeout	1
Communication State - Sub Message	UTC Hour and Minute = 10:57

Position Source – Clause 10.2.7

This test will verify that the Base Station will output alarm messages as required by Table 12.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Disconnect the transmit antenna from the EUT. Apply a TSA+VDM sentence pair to activate a transmission.
b) Provide the EUT with an ACK with alarm ID 001 using the PI.
c) Reconnect the transmit antenna to remove the alarm condition. Apply a TSA+VDM sentence pair to activate a transmission.
d) Prevent the EUT from radiating with full power by mismatching the antenna for a VSWR of 3:1. Apply a TSA+VDM sentence pair to activate a transmission.
e) Provide the EUT with an ACK with alarm ID 002 using the PI.
f) Reconnect the transmit antenna to remove the alarm condition. Apply a TSA+VDM sentence pair to activate a transmission.

Required Results

Confirm that:

a) the EUT continues to generate an ALR sentence with alarm value 1 to the PI at least once per minute;
b) the EUT generates an ALR sentence with alarm ID 001 with an acknowledged status once the ACK has been received;
c) the EUT generates an ALR sentence with an ALR ID 001 and Status V, V in the alarm condition and acknowledgement field;
d) the EUT continues to generate an ALR sentence with alarm ID 002 to the PI once per minute;
e) the EUT generates an ALR sentence with alarm ID 002 with an acknowledged status once the ACK has been received;
f) the EUT generates an ALR sentence with a ALR ID 002 and Status V, V and every minute an ALR sentence with null value in the alarm ID field and Status V, V in the alarm condition and acknowledgement field.

Test Results

a) Test of Transmission with Disconnected Antenna		
Requirement	Result	Verdict
Disconnect the transmit antenna from the EUT,	The VHF cable is disconnected from the EUT.	-
Apply a TSA+VDM sentence pair to activate a transmission.	The TSA+VDM sentence pair applied to the EUT is: $ABTSA,1234,9,A,,1100,2*0B !ABVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*79	-
Confirm that the EUT continues to generate an ALR sentence with alarm value 1 to the PI at least once per minute.	The EUT correctly generates ALR001 with a reporting rate of 30 seconds: $ABALR,112329.00,001,A,V,AIS: Tx malfunction*5D	Pass

b)		
Requirement	Result	Verdict
Provide the EUT with an ACK with alarm ID 001 using the PI.	The ACK sentence applied to the EUT is: $ABACK,001*57	-
Confirm that the EUT generates an ALR sentence with alarm ID 001 with an acknowledged status once the ACK has been received.	The EUT outputs an ALR with an acknowledged status: $ABALR,112737.00,001,A,**A**,AIS: Tx malfunction*41	Pass

c)		
Requirement	Result	Verdict
Reconnect the transmit antenna to remove the alarm condition. Apply a TSA+VDM sentence pair to activate a transmission.	The antenna is reconnected and the TSA+VDM sentence pair applied to the EUT is: $ABTSA,1234,9,A,,1100,2*0B !ABVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*79	-
Confirm that the EUT generates an ALR sentence with an ALR ID 001 and Status V, V in the alarm condition and acknowledgement field.	An ALR sentence is out with ALD ID 001 and status *V,V* in the condition and acknowledgement field: $ABALR,112829.00,**001**,**V**,**V**,AIS: Tx malfunction*41	Pass

d)		
Requirement	Result	Verdict
Prevent the EUT from radiating with full power by mismatching the antenna for a VSWR of 3:1. Apply a TSA+VDM sentence pair to activate a transmission.	A load with a VSWR of 3:1 is connected to the EUT. The TSA+VDM sentence pair applied is: $ABTSA,1234,9,A,,1900,2*03 !ABVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*79	-
Confirm that the EUT continues to generate an ALR sentence with alarm ID 002 to the PI once per minute.	The EUT outputs ALR with ID 002 once per minute: $ABALR,113050.00,**002**,A,V,AIS: Antenna VSWR exceeds limit*5F	Pass

e)		
Requirement	Result	Verdict
Provide the EUT with an ACK with alarm ID 002 using the PI.	The ACK sentence applied to the EUT is: $ABACK,002*54	-
Confirm that the EUT generates an ALR sentence with alarm ID 002 with an acknowledged status once the ACK has been received.	The ALR sentence output with an acknowledged status is: $ABALR,113517.00,002,A,**A**,AIS: Antenna VSWR exceeds limit*4E	Pass

f)		
Requirement	Result	Verdict
Reconnect the transmit antenna to remove the alarm condition. Apply a TSA+VDM sentence pair to activate a transmission.	The antenna is reconnected to the EUT and the TSA+VDM pair applied is: $ABTSA,1234,9,A,,500,2*3E !ABVDM,1,1,9,A,15M3NSwP00J6TN>?a0e3Ngv000Sq,0*79	-
Confirm that the EUT generates an ALR sentence with a ALR ID 002 and Status V, V and every minute an ALR sentence with null value in the alarm ID field and Status V, V in the alarm condition and acknowledgement field.	The EUT outputs an ALR sentence with an ALR ID 002 and status *V,V*: $ABALR,113713.00,002,V,V,AIS: Antenna VSWR exceeds limit*48 The EUT outputs an ALR sentence with null alarm ID field and status *V,V*: $ABALR,,,V,V,*70	Pass

2.4 Selection of Transmission Slots

2.4.1 Specification Reference

IEC 62320-1, Clause 10.3

2.4.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 0

2.4.3 Date of Test

24-February-2020

2.4.4 Test Results and Methods of Measurement

RATDMA Transmission – Clause 10.3.1

Method of Measurement

Set up standard test environment and operate EUT in the pre-set conditions. RATDMA shall be enabled.

a) Provide 50 % channel loading using Message 1, ensuring there are at least 4 free slots in each SI. Wait at least 1 min, then transmit 100 single slot binary Message 8 using RATDMA.
b) Repeat the test with 50 % channel loading by Message 26 with valid CommStates ensuring there are at least 4 free slots in each SI.

Required Results

Check that:

a) only free slots are used for transmission;
b) only free slots are used for transmission.

Test Results

a) Test of Message 8 RATDMA Transmissions with Message 1 Loading		
Requirement	Result	Verdict
Provide 50% channel loading using Message 1, ensuring there are at least 4 free slots in each SI.	A total of 25 targets are simulated, with a block gap of 25 slots to achieve 50% channel loading. This means slots ending in 1-25 and 51-75 are in use by the simulated targets.	-
Wait at least 1 minute, then transmit 100 single slot binary Message 8 using RATDMA.	After waiting for a frame, the Message applied 100 times is: !AIBBM,1,1,2,1,8,04005@E=B0m<N3P,2*67	-
Check that only free slots are used for transmissions.	The EUT does not use slots in use by the test targets.	Pass

b) Test of Message 8 RATDMA Transmissions with Message 26 Loading		
Requirement	Result	Verdict
Provide 50% channel loading using Message 26 with valid CommStates, ensuring there are at least 4 free slots in each SI.	A total of 25 targets are simulated, with a block gap of 25 slots to achieve 50% channel loading. This means slots ending in 1-25 and 51-75 are in use by the simulated targets.	-
Wait at least 1 minute, then transmit 100 single slot binary Message 8 using RATDMA.	After waiting for a frame, the Message applied 100 times is: !AIBBM,1,1,2,1,8,04005@E=B0m<N3P,2*67	-
Check that only free slots are used for transmissions.	The EUT does not use slots in use by the test targets.	Pass

Intentional Slot Reuse (Link Congestion) – Clause 10.3.2

Verify that the EUT will operate properly in a >90 % load environment.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions. Ensure that the signal level received from the EUT exceeds the signal level received from the test transmitter at the test receiver location.

a) Set up additional test targets to simulate a VDL load of >90 % which include base stations both within and beyond 120 NM and remotely allocated FATDMA slots. Wait at least 1 min.
b) Apply a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.

The following tests are required for a Base Station operated as an independent unit.

c) Apply the independent mode setup to the EUT. Enable RATDMA:
d) Wait at least 1 min, then transmit 100 single slot binary Message 8 using RATDMA.

Required Results

Confirm that:

a) the EUT generates the required VDM sentences for all messages;
b) the EUT transmits in the assigned slot and channel. Confirm that the EUT generates the required TFR with status 0.

The following results are required for a Base Station operated as an independent unit:

c) the independent mode setup has been correctly set. Confirm that RATDMA has been enabled. Confirm that the EUT continues to generate the required VDM sentences for all messages;
d) the slot used by the slot reuse algorithm is a random selection within the candidate slots (4 most distant stations). Check that a station is not subject to slot reuse more than once a frame. Check that slots allocated by a local Base Station, for own use or for use by remote base station, are not subject to slot reuse. Check that slots reserved by a Base Station within the 120 nautical miles are not subject to slot reuse. Check that slots reserved by a Base Station beyond the 120 nautical miles are subject to slot reuse.

Test Results

a)		
Requirement		Verdict
Set up additional test targets to simulate a VDL load of >90 % which include base stations both within and beyond 120 NM and remotely allocated FATDMA slots. Wait at least 1 min	45 test targets are simulated with a block gap of 5 slots; along with the base station position reports, the VDL load is >90%. The EUT is located:50°52.1691' N 1°14.642' W. Nearest base station is located: 50° 52.1723' N 1°14.6493' W. The most distant base station is located: 47° 0'N 1° 0' W. The FATDMA slot allocations for both base stations can be seen in the table below; MMSI 2222222 is closest to the EUT.	-
Confirm that the EUT generates the required VDM sentences for all messages.	The EUT outputs VDM sentences on the PI for each of the 45 test targets, as well as VDM's for the Message 4 and Message 20 for the base stations.	Pass

a)					
Time	Slot	Chan	MMSI	Msg	Sentence
12:05:00	1	A	2222222	4	!AIVDM,1,1,,A,4027`SQv@d<4swrCP6M6qNo00801,0*5E
12:05:00	5	A	2579999	4	!AIVDM,1,1,,A,402MN7iv@d<4sOsK20Jq<@7005PD,0*40
12:05:00	12	A	2579999	20	!AIVDM,1,1,,A,D02MN7hH@N0178N000,4*0E
12:05:00	14	A	2222222	20	!AIVDM,1,1,,A,D027`SR<HN?b;lN0000f4d0,2*4C
12:05:00	22	B	2579999	20	!AIVDM,1,1,,B,D02MN7h6hN?b;dN02<`f4dHpNfp,2*69
12:05:00	24	B	2222222	20	!AIVDM,1,1,,B,D027`SP7@N?b;TN0000f4d0,2*76
12:05:10	376	B	2222222	4	!AIVDM,1,1,,B,4027`SQv@d<59wrCP6M6qNo00@5p,0*2A
12:05:10	380	B	2579999	4	!AIVDM,1,1,,B,402MN7iv@d<59OsK20Jq<@7005PD,0*08
12:05:20	751	A	2222222	4	!AIVDM,1,1,,A,4027`SQv@d<5CwrCP6M6qNo008;g,0*32
12:05:20	755	A	2579999	4	!AIVDM,1,1,,A,402MN7iv@d<5COsK20Jq<@7005PD,0*71
12:05:30	1126	B	2222222	4	!AIVDM,1,1,,B,4027`SQv@d<5MwrCP6M6qNo008AV,0*74
12:05:30	1130	B	2579999	4	!AIVDM,1,1,,B,402MN7iv@d<5MOsK20Jq<@7005PD,0*7C
12:05:40	1501	A	2222222	4	!AIVDM,1,1,,A,4027`SQv@d<5WwrCP6M6qNo000S:,0*1B
12:05:40	1505	A	2579999	4	!AIVDM,1,1,,A,402MN7iv@d<5WOsK20Jq<@7005PD,0*65
12:05:50	1876	B	2222222	4	!AIVDM,1,1,,B,4027`SQv@d<5iwrCP6M6qNo005PD,0*5E
12:05:50	1880	B	2579999	4	!AIVDM,1,1,,B,402MN7iv@d<5iOsK20Jq<@7005PD,0*58

b)		
Requirement	Result	Verdict
Apply a TSA and a VDM sentence with encapsulated Message 8 to the EUT.	The TSA and VDM sentence pair applied to the EUT is: $ABTSA,1234,1,A,,1603,2*07 !ABVDM,1,1,1,A,802B`i00@00E1Dm83Dip>0,0*28	-
Confirm that the EUT transmits in the assigned slot and channel.	The EUT transmits Message 8 in slots 1603 on channel A, as commanded by the TSA+VDM pair: !AIVDM,1,1,,A,802B`i00@00E1Dm83Dip>0,4*16	Pass
Confirm that the EUT generates the required TFR with status 0.	The TFR sentence output by the EUT is: $ABTFR,1,1,A,1234,,1603,1341,,1,2,**0***1A	Pass

c)		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The following commands are applied to the EUT: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
Confirm that the independent mode setup has been correctly set.	The response to the $ABABQ,DLM*38 query is: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,R*08 The response to the $ABABQ,ECB*39 query is: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass
Enable RATDMA.	RATDMA is enabled using the BCG sentence: $ABBCG,1234,,,,,,,,1,,,,C*33	-
Confirm that RATDMA has been enabled.	The result of the $ABABQ,BCG*3B query is: $ABBCG,1234,2087,2088,2087,2088,0,0,3,0,**1**,I,60,AB,R*6D	Pass
Confirm that the EUT continues to generate the required VDM sentences for all messages.	The EUT generates VDM sentences for all messages successfully, as seen in the table below.	Pass

c)				
Slot	Chan	MMSI	Msg	Sentence
0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60
1	A	2222222	4	!AIVDM,1,1,,A,4027`SQv@d=cswrCP6M6qNo000S:,0*68
4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@d=cswrCPbM6qJw02D0e,0*45
5	A	2579999	4	!AIVDM,1,1,,A,402MN7iv@d=csOsK20Jq<@700H05,0*7A
6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50
12	A	2579999	20	!AIVDM,1,1,,A,D02MN7j<<N?b;tN02<`f4d24Nfp,2*18
14	A	2222222	20	!AIVDM,1,1,,A,D027`SR<HN?b;lN0000f4d0,2*4C
22	B	2579999	20	!AIVDM,1,1,,B,D02MN7h6hN?b;dN02<`f4dHpNfp,2*69
24	B	2222222	20	!AIVDM,1,1,,B,D027`SP7@N?b;TN0000f4d0,2*76
376	B	2222222	4	!AIVDM,1,1,,B,4027`SQv@d=d9wrCP6M6qNo00<0e,0*16
379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@d=d9wrCPbM6qJw0285s,0*64
380	B	2579999	4	!AIVDM,1,1,,B,402MN7iv@d=d9OsK20Jq<@700H5t,0*70
751	A	2222222	4	!AIVDM,1,1,,A,4027`SQv@d=dCwrCP6M6qNo000S:,0*5F
754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@d=dCwrCPbM6qJw02@;j,0*72
755	A	2579999	4	!AIVDM,1,1,,A,402MN7iv@d=dCOsK20Jq<@700H;k,0*18

c)				
Slot	Chan	MMSI	Msg	Sentence
1126	B	2222222	4	!AIVDM,1,1,,B,4027`SQv@d=dMwrCP6M6qNo000S:,0*52
1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@d=dMwrCPbM6qJw02HAa,0*06
1130	B	2579999	4	!AIVDM,1,1,,B,402MN7iv@d=dMOsK20Jq<@700HAb,0*66
1501	A	2222222	4	!AIVDM,1,1,,A,4027`SQv@d=dWwrCP6M6qNo000S:,0*4B
1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@d=dWwrCPbM6qJw02@GP,0*20
1505	A	2579999	4	!AIVDM,1,1,,A,402MN7iv@d=dWOsK20Jq<@700HGQ,0*4A
1876	B	2222222	4	!AIVDM,1,1,,B,4027`SQv@d=diwrCP6M6qNo008MD,0*1E
1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@d=diwrCPbM6qJw02@MG,0*00
1880	B	2579999	4	!AIVDM,1,1,,B,402MN7iv@d=diOsK20Jq<@700HMH,0*64

d)		
Requirement	Result	Verdict
Wait at least 1 min, then transmit 100 single slot binary Message 8 using RATDMA.	After several frames the following BBM sentence is applied to the EUT, with a slight delay between each sentence in order to not overflow the RATDMA queue: !AIBBM,1,1,2,1,8,04005@E=B0m<N3P,2*67	-
Confirm that the slot used by the slot reuse algorithm is a random selection within the candidate slots (4 most distant stations).	Simulated targets with MMSI's ending in odd numbers are located further away from the EUT than those ending in even numbers. The EUT does not use the closer target's slots, as shown by the lack of transmissions in slots 1-45 and 51-95 ending in even numbers.	Pass
Check that a station is not subject to slot reuse more than once a frame.	The EUT does not reuse a station's slot more than once per frame.	Pass
Check that slots allocated by a local Base Station, for own use or for use by remote base station, are not subject to slot reuse.	The EUT does not use slots allocated locally for RATDMA transmissions, and they are not subject to slot reuse.	Pass
Check that slots reserved by a Base Station within the 120 nautical miles are not subject to slot reuse.	The EUT does not use slots reserved by the closer (<120 NM) base station.	Pass
Check that slots reserved by a Base Station beyond the 120 nautical miles are subject to slot reuse.	The EUT uses slots reserved by the more distant (>120NM) base station.	Pass

2.5 Legacy Support

2.5.1 Specification Reference

IEC 62320-1, Clause 10.4

2.5.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 1

2.5.3 Date of Test

25-February-2020

2.5.4 Test Results and Methods of Measurement

This test verifies that the legacy sentences BCE, BCF, CAB and TSP are correctly supported in addition to the new sentences BCG, BCL, RST and TPC. This test also verifies that the sentences ACM, AGA, ASN, DLM, ECB and SPO which have an additional "Sentence status flag" field are accepted without the Sentence status flag field. (See Table 1.)

This test is only applicable if the manufacturer declares that the legacy sentences are supported.

Method of Measurement

Set up standard test environment and apply the dependent mode pre-setup conditions.

a) Apply a TSP to prohibit the use of slots.
   $xxTSP,<UI>99,A,<hhmmss>,0,1000,5,,,,
   Apply a TSA+VDM of Message 14 that uses the prohibited slots reserved by the TSP.
   $xxTSA,<UI>,7,A, <UTC h+m>,1001,2
   !xxVDM,1,1,7,B,>h3OHqi@E=@,2
b) Apply a BCE sentence with RATDMA control, UTC source and ADS interval different to the current setting. Apply a BCF sentence with all data except the MMSI different to the current settings. Query for BCE and BCF.
c) Query for BCG and BCL
d) Restart the EUT using the following CAB sentence:
   $xxCAB,,,1,
e) Reset the EUT using the following CAB sentence:
   $xxCAB,,,,1
f) Apply the independent mode setup as defined in 10.1.3 using ECB and DLM sentences without Sentence status flag field.
g) Initiate a single transmission of an MMSI addressed Message 22 using an ACM sentence without Sentence status flag field like the following example:
   $xxACM, <MMSI of mobile 1>,<MMSI of mobile2>,<Ch.A>,0,<Ch.B>,0,0,0,
   <TxChannel>,3,C
h) Apply an AGA sentence without Sentence status flag field for Message 23 content for station type 1.
i) Input the ASN sentence as in 10.2.1.10.2 b) without Sentence status flag field
j) Apply the following SPO sentence without Sentence status flag field to the EUT:
   $xxSPO,<UI>,A,1,1,1,,1,,,1,1,1,1

Required Results

Confirm that:

a) the EUT generates a TSR sentence with status 0. Confirm that the EUT generates a TFR sentence with status 7 for the TSA/VDM of Message 14 for the prohibited slot;
b) the EUT outputs an BCE and BCF sentence with correct data according to the input sentences;
c) the EUT outputs an BCG and BCL sentence with correct data according to the setting by BCE and BCF;
d) the EUT restarts and starts receiving on channel A and B within 2 min. Confirm that all settings are retained;
e) the EUT restarts and starts receiving on the defaults channel A and B within 2 min. Confirm that all configuration information is reset to the default values as defined in 6.5. Confirm that the Unique identifier and the MMSI have not been reset;
f) by query that the slot reservation and transmission schedule are correctly set. Confirm that the EUT is transmitting Message 4 and Message 20 in the assigned slots, interval, and channels as defined in the ECB sentences. Confirm that the content of Message 20 is as defined by the DLM;
g) the EUT transmits an MMSI addressed Message 22 within the 4 s. Confirm the content of the Message 22 is as defined by the ACM sentence;
h) the AGA sentences for Message 23 were received correctly by the EUT using the query sentence for the AGA sentence;
i) Message 16 is transmitted as required in 10.2.1.10.2 b);
j) by query for SPO that the SPO settings are correctly stored. Confirm that a VSI sentence is output for each VDM or VDO sentence containing the associated information according to Table 10. Confirm that an FSR sentence is output at the end of each frame containing the associated information according to Table 10 about the conditions for the previous frame.

Test Results

a) Test of TSP Sentence		
Requirement	Result	Verdict
Apply a TSP to prohibit the use of slots.	The TSP sentence applied to the EUT is: $ABTSP,1234,99,A,103830,0,1000,5,,,*30	-
Apply a TSA+VDM of Message 14 that uses the prohibited slots reserved by the TSP.	The TSA+VDM sentence pair applied to the EUT is: $ABTSA,1234,7,A,,1001,2*05 !ABVDM,1,1,7,A,>h3OHqi@E=@,2*1A	-
Confirm that the EUT generates a TSR sentence with status 0.	The EUT outputs a TSR with status 0: $ABTSR,1234,99,A,103830.00,**0***28	Pass
Confirm that the EUT generates a TFR sentence with status 7 for the TSA/VDM of Message 14 for the prohibited slot.	The EUT outputs a TFR with status 7: $ABTFR,1,7,A,1234,,1001,1039,,1,2,**7***13	Pass

b) Test of BCE and BCF Sentences		
Requirement	Result	Verdict
Apply a BCE sentence with RATDMA control, UTC source and ADS interval different to the current setting.	The BCE settings currently stored by the EUT is: $ABBCE,1234,0,I,60,0*20 The new BCE sentence applied to the EUT is: $ABBCE,1234,1,Y,30,0*34	-
Apply a BCF sentence with all data (except the MMSI) different to the current setting.	The BCF settings currently stored by the EUT is: $ABBCF,002402500,3,5052.1708,N,00114.6448,W,1,2087,2088,2087,2088,1,1,3,0,AB*58 The new BCF sentence applied to the EUT is: $ABBCF,002402500,1,5052.0000,S,00110.0000,E,0,2085,2086,2085,2086,0,0,1,1,AB*53	-
Confirm that the EUT outputs an BCE and BCF sentence in response to a query, with correct data according to the input sentences.	The BCE and BCF sentences are queried again: $ABABQ,BCE*39 $ABBCE,1234,1,Y,30,0*34 $ABABQ,BCF*3A $ABBCF,002402500,1,5052.0000,S,00110.0000,E,0,2085,2086,2085,2086,0,0,1,1,AB*53	Pass

c) Test of Compliance with BCG and BCL Sentences		
Requirement	Result	Verdict
Confirm that the EUT outputs a BCG and BCL sentence with correct data, according to the setting by BCE and BCF when queried for BCG and BCL.	The EUT responds with BCE and BCL sentences containing the information provided by the BCE and BCF settings: $ABABQ,BCG*3B $ABBCG,1234,2085,2086,2085,2086,0,0,1,1,1,Y,30,AB,R*7B $ABABQ,BCL*30 $ABBCL,1234,1,5052.0000,S,00110.0000,E,0,TUV SUD,R,0*38	Pass

d) Test of Power Cycle Data Retention		
Requirement	Result	Verdict
Restart the EUT using the CAB sentence.	The sentence applied to the EUT is: $ABCAB,,,1,*72	-
Confirm that the EUT restarts and starts receiving on channel A and B within 2 minutes.	The EUT begins receiving the standard test targets on channels A and B after 35 seconds after the CAB sentence is applied to the PI.	-
Confirm that all settings are retained.	After the system boots, the BCE and BCF sentences are queried again: $ABABQ,BCE*39 $ABBCE,1234,1,Y,30,0*34 $ABABQ,BCF*3A $ABBCF,002402500,1,5052.0000,S,00110.0000,E,0,2085,2086,2085,2086,0,0,1,1,AB*53	Pass

e) Test of System Reset using Legacy CAB Sentence		
Requirement	Result	Verdict
Reset the EUT using the CAB sentence.	The CAB sentence applied to the EUT is: $ABCAB,,,,1*72	-
Confirm that the EUT starts receiving on the default channels A and B within 2 min.	The EUT receives VDM sentences on channels AIS1 and AIS2 within 2 minutes of receiving the CAB sentence.	Pass
Confirm that all configuration information is reset to the default values as defined in 6.5.	The EUT resets the following sentence settings to default values correctly: ACA, BCE, BCF, BCG, BCL, CAB, CBR, CPC, CPD, CPG, CPS, DLM, ECB, MEB, SID, SPO.	Pass
Confirm that the EUT restarts and that the Unique identifier and the MMSI have not been reset.	This is a mistake in the standard: the CAB sentence is a legacy sentence defined in IEC 62320-1 Ed.1. To maintain compliance and backwards compatibility, the EUT shall behave in accordance with Ed.1, which requires that: 'all configuration information is undefined with the exception of receive only on AIS1 and AIS2'.	-

f) Apply the Independent Mode Setup with no Sentence Status Field		
Requirement	Result	Verdict
The EUT shall be set to operate in independent mode, with the sentence status field flags set to null/	The following sentences are applied to the EUT: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,*52 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,*5A $ABECB,1234,4,0,4,750,,0,379,750,,*52 $ABECB,1234,20,0,0,2250,,0,6,2250,,*6B	-
Confirm by query that the slot reservation and transmission schedule are correctly set.	The results of the $ABABQ,DLM*38 and $ABABQ,ECB*39 queries are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08 $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass
Confirm that the EUT is transmitting Message 4 and Message 20 in the assigned slots, interval and channels as defined in the ECB sentences.	The EUT transmits Message 4 and Message 20 in the assigned slots, with the correct interval and channel. See the table '*f) Independent Mode Results*'.	Pass
Confirm that the content of Message 20 is as defined by the DLM.	The Message 20 contents match the configuration commanded by the DLM sentence.	Pass

f) Independent Mode Results					
Time	Slot	Chan	MMSI	Msg	Sentence
10:30:00	0	A	2402500	20	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60
10:30:00	4	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@beaswrCRNM6qAO02D01,0*50
10:30:00	6	B	2402500	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50
10:30:10	379	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@beb9wrCRNM6qAO02<01,0*62
10:30:20	754	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@bebCwrCRNM6qAO02H;j,0*3F
10:30:30	1129	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@bebMwrCRNM6qAO02HAa,0*43

10:30:40	1504	A	2402500	4	!AIVDM,1,1,,A,402B`i1v@bebWwrCRNM6qAO028GP,0*1D
10:30:50	1879	B	2402500	4	!AIVDM,1,1,,B,402B`i1v@bebiwrCRNM6qAO02<01,0*32

f) Message 20 Decode		
!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50		
Parameter	Decoded Value	Expected Value
Message ID	20	20
Repeat indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Offset number 1	123	123
Number of slots 1	1	1
Time out 1	7	7
Increment 1	250	250
Offset number 2	0	0
Number of slots 2	1	1
Time out 2	7	7
Increment 2	0	0
Offset number 3	14	14
Number of slots 3	2	2
Time out 3	7	7
Increment 3	75	75
Offset number 4	0	0
Number of slots 4	0	0
Time out 4	0	0
Increment 4	0	0
Spare	0	0

g) Transmission of an Addressed Message 22		
Requirement	Result	Verdict
Initiate a single transmission of an MMSI addressed Message 22 using an ACM sentence without Sentence status flag field.	Transmission of Message 22 is not possible using the configuration detailed in the standard. To transmit Message 4 as required by the test, RATDMA is first enabled using: $ABBCG,1234,,,,,,,,1,,,,C*33 The ACM sentence then applied to the EUT is: $ABACM,500600700,700800900,2087,0,2088,0,0,0,0,3,*6E	-
Confirm that the EUT transmits an MMSI addressed Message 22 within the 4 s.	The EUT transmits the followings Message 22 on channels A and B: !AIVDM,1,1,,A,F02B`i22N2P3fe7gP:LEOQ0A0000,0*69 !AIVDM,1,1,,B,F02B`i22N2P3fe7gP:LEOQ0A0000,0*6A	Pass
Confirm the content of the Message 22 is as defined by the ACM sentence.	The contents of the transmitted Message 22 are as defined in the ACM sentences. See the Message decodes below for more information.	Pass

g) Message 22 Decode – Channel A		
!AIVDM,1,1,,A,F02B`i22N2P3fe7gP:LEOQ0A0000,0*69		
Parameter	Expected Value	Decoded Value
Message ID	22	22
Repeat Indicator	0	0
MMSI	2402500	2402500
Spare	0	0
Channel A	2087	2087
Channel B	2088	2088
Tx/Rx Mode	0	0 - Tx A/Tx B, Rx A/Rx B (default)
Power	0	0 - High
MMSI ID 1	500600700	500600700
MMSI ID 2	700800900	700800900
Address/Broadcast	1	1 - Addressed
Channel A Bandwidth	0	0
Channel B Bandwidth	0	0
Transitional Zone Size	3 (field is encoded as 2)	3 NM
Spare	0	0

g) Message 22 Decode – Channel B		
!AIVDM,1,1,,B,F02B`i22N2P3fe7gP:LEOQ0A0000,0*6A		
Parameter	Expected Value	Decoded Value
Message ID	22	22

g) Message 22 Decode – Channel B		
!AIVDM,1,1,,B,F02B`i22N2P3fe7gP:LEOQ0A0000,0*6A		
Parameter	Expected Value	Decoded Value
Repeat Indicator	0	0
MMSI	2042500	2402500
Spare	0	0
Channel A	2087	2087
Channel B	2088	2088
Tx/Rx Mode	0	0 - Tx A/Tx B, Rx A/Rx B (default)
Power	0	0 - High
MMSI ID 1	500600700	500600700
MMSI ID 2	700800900	700800900
Address/Broadcast	1	1 - Addressed
Channel A Bandwidth	0	0
Channel B Bandwidth	0	0
Transitional Zone Size	3 (field is encoded as 2)	3 NM
Spare	0	0

h) Test of AGA Sentence with no Sentence Status Field		
Requirement	Result	Verdict
Apply an AGA sentence without Sentence status flag field for Message 23 content for station type 1.	The AGA sentence applied to the EUT is: $ABAGA,1234,**1**,60,5100.00,N,00100.00,W,5000.00,N,00200.00,W,0,0,0,*69	-
Confirm the AGA sentences for Message 23 are received correctly by the EUT, using the query for the AGA sentence.	The result to $ABABQ,AGA*3A query is: $ABAGA,1234,1,060,5100.0,N,00100.0,W,5000.0,N,00200.0,W,00,0,00,R*0B	Pass

i) Test of ASN Sentence with no Sentence Status Field		
Requirement	Result	Verdict
Input the ASN sentence as in 10.2.1.10.2 b) without Sentence status flag field.	The sentence applied to the EUT is: $ABASN,400500600,,10,5,700800900,600,,0,1,*5D	-
Confirm that Message 16 is transmitted as required in 10.2.1.10.2 b).	The EUT transmits Message 16 within 4 seconds, in slot 1579, over channel A. The *offset* and *increment* fields of Message 16 are as defined in the ASN sentence: !AIVDM,1,1,,A,@02B`i1OO9oPaL1JLEOQ2F00,0*2D	Pass

j) Test of SPO Sentence with no Sentence Status Field		
Requirement	Result	Verdict
Apply the provided SPO sentence without Sentence status flag field to the EUT.	The SPO sentence applied to the EUT is: $ABSPO,1234,A,1,1,1,,1,,,1,1,1,1,1,*17	-
Confirm that the SPO settings are correctly stored by the EUT.	The result to the SPO query shows that all SPO settings were received and stored correctly by the EUT: $ABABQ,SPO*31 $ABSPO,1234,A,1,1,1,0,1,0,0,1,1,1,1,1,R*75	Pass
Confirm that a VSI sentence is output for each VDM or VDO sentence containing the associated information according to table 10.	A VSI sentence is output for each VDM and VDO message output to the PI, containing the required information as per table 10.	Pass
Confirm that an FSR sentence is output at the end of each frame containing the associated information according to Table 10 about the conditions for the previous frame.	An FSR sentence is output at the end of each frame, containing the required information outlined in table 10: $ABFSR,1234,155200.00,A,0,4,,,,-98,8*3C	Pass

2.6 TAG Block Encapsulation

2.6.1 Specification Reference

IEC 62320-1, Clause 10.5

2.6.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 1, 2 and 3

2.6.3 Date of Test

25-February-2020 to 04-March-2020

2.6.4 Test Results and Methods of Measurement

TAG Block Encapsulation – Clause 10.5.2 - Modification State 1

This test verifies that the EUT responds to a request on TBR with output sentences providing the correct capability information.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply a TBR (Tag Block Report Request) sentence to the EUT with the correct Unique Identifier (UI) of the EUT and the Request flag set to “S” requesting all supported TAG block functions.
b) Apply a query for TBS.

Required results

Confirm that:

a) the EUT outputs the sentences CPD, CPG, CPS, CPC and CPN with Talker and Listener function field set to “V” (supported but disabled). The Listener function of CPC, CPG and CPC can be set to “U” (Unsupported) depending on the implementation;
b) there is one TBS output with the Source identification field set to null field.

Test Results

a) Test of TBR Talker and Listener Function Fields		
Requirement	Result	Verdict
A TBR sentence shall be applied to the EUT with the correct Unique Identifier (UI) of the EUT and the Request flag set to “S” requesting all supported TAG block functions.	The TBF sentence applied to the EUT is: $ABTBR,1234,S*10	-
Confirm that the EUT outputs the sentences CPD, CPG, CPS, CPC and CPN with Talker and Listener function field set to “V”. The Listener function of CPC, CPG and CPC can be set to “U” (Unsupported) depending on the implementation	$ABCPC,1234,R,V,U,1*1B $ABCPD,1234,R,V,V*02 $ABCPG,1234,R,V,V,0,1,1,999,*24 $ABCPN,1234,R,V,U,0,1,1,999,*2E $ABCPS,1234,R,V,V*15	Pass

b) Test of TBS Sentence		
Requirement	Result	Verdict
Apply a query for TBS.	The query sentence applied is: $ABABQ,TBS*38	-
Confirm that there is one TBS output with the Source identification field set to null field.	The EUT outputs one TBS result, with the source identification field, the final field in the sentence, set to null: $ABTBS,1234,R,,*10	Pass

Activation of Source Identification for Output – Clause 10.5.3 - Modification State 1

This test verifies that the EUT provides the correct TAG blocks containing the Source identification with the output sentences, depending on the configuration.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply a CPS sentence (Configure Parameter code for the Source identification parameters) to the EUT, with the Talker Source identification function set to ”N” (enabled for NAK reply only) and the Listener Source identification function set to “V” (disabled).
   Apply a TBR sentence.
b) Apply a sentence to the EUT which causes a NAK response. The manufacturer shall provide information on how to get a NAK response.
c) Apply a CPS sentence to the EUT, with the Talker Source identification function set to “A” (enabled) and the Listener Source identification function set to “V” (disabled). Apply a TBR sentence.
d) Apply a query for a VER sentence.

Required Results

Confirm that:

a) the EUT outputs a CPS sentence with the correct settings and the Sentence status flag set to “R” (report). Confirm that the output does not include TAG blocks;
b) the EUT outputs a NAK sentence with a preceding correct TAG block, including the Source identification parameter set to the own Unique Identifier (applied by SID sentence);
c) the EUT outputs a CPS sentence with the correct settings, with a TAG block where Source identification = own UI. Confirm that all sentences are output with TAG blocks containing a Source identification;
d) a VER sentence is output with a TAG block where Source identification = own UI.

Test Results

a)		
Requirement	Result	Verdict
Apply a CPS sentence with Talker Source set to “N” and Listener Source set to “V”.	The CPS sentence applied to the EUT is: $ABCPS,1234,C,N,V*1C	-
Apply a TBR sentence to the EUT.	The TBR sentence applied to the EUT is: $ABTBR,1234,A*02	-
Confirm that the EUT outputs a CPS sentence with the correct settings, and the sentence status flag set to “R”.	The CPS sentence output by the EUT is: $ABCPS,1234,R,N,V*0D	Pass
Confirm that the output does not include TAG blocks.	The EUT output does not include TAG blocks.	Pass

b)		
Requirement	Result	Verdict
Apply a sentence to the EUT which causes a NAK response.	The invalid sentence applied to the EUT is: $ABABQ,ABC*3D	-
Confirm that the EUT outputs a NAK sentence with a preceding correct TAG block, inducing the source identification parameter set to the own unique identifier (applied by the SID sentence).	The EUT outputs a NAK sentence, with a preceding TAG block containing the unique identifier of the EUT set as the source identification: \s:1234*4D\$ABNAK,AB,AIQ,1234,11,*35	Pass

c)		
Requirement	Result	Verdict
Apply a CPS sentence to the EUT, with the talker source identification function set to “A” and the listener source identification function set to “V”.	The CPS sentence applied to the EUT is: $ABCPS,1234,C,A,V*13	-
Apply a TBR sentence to the EUT.	The TBR sentence applied to the EUT is: $ABTBR,1234,S*10	-
Confirm that the EUT outputs a CPS sentence with the correct settings, where the source identification = own UI.	The CPS result output by the EUT shows that the source identification and listener source fields were updated: \s:1234*4D\$ABCPS,1234,R,**A**,**V***02	Pass
Confirm that all sentences are output with TAG blocks, containing a source identification.	All sentences are output with TAG blocks correctly.	Pass

d)		
Requirement	Result	Verdict
Apply a query for a VER sentence.	The VER query applied to the EUT is: $ABABQ,VER*3C	-
Confirm that a VER sentence is output with a TAG block where source identification = own UI.	The output from the EUT shows a TAG block, where the source identification is set to the EUT’s own UI: **\s:1234*4D**$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

Activation of Destination Identification – Clause 10.5.4 - Modification State 2

This test verifies that the EUT provides the correct Destination identification with the output sentences and performs the correct filtering of input sentences with TAG blocks containing a Destination identification parameter.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply an CPD sentence (Configure Parameter code for the Destination identification parameters) without TAG block to the EUT, with the Talker Destination identification function set to ”A” (enabled) and the Listener Destination identification function set to “V” (disabled). Apply a TBR sentence.
b) Apply a query for VER, without a TAG block.
c) Apply a query for VER, with a TAG block containing a Source identification and the correct Destination identification (UI of EUT).
d) Apply a query for VER, with a TAG block containing a Source identification and a Destination identification different to the UI of EUT.
e) Apply an CPD sentence (Configure Parameter code for the Destination identification parameters) to the EUT, with the Talker Destination identification function set to ”A” (enabled) and the Listener Destination identification function set to “A” (enabled). Apply a TBR sentence with the correct Source and Destination identification.
f) Apply a query for VER, without TAG blocks.
g) Apply a query for VER, with a TAG block containing a Source identification and the correct Destination identification (UI of EUT).
h) Apply a query for VER, with a TAG block containing a Source identification and a Destination identification different to the UI of EUT.

Required Results

Confirm that:

a) the EUT outputs a CPD sentence with the correct settings. Confirm that the output sentence is preceded by a TAG block with Source identification = own UI and no Destination identification. Confirm that all output sentences which are not a response on an input sentence do not include a Destination identification in the TAG block.
b) a VER sentence is output with a TAG block where Source identification = own UI and no Destination identification;
c) a VER sentence is output with a TAG block where Source identification = own UI and the Destination identification = Source identification of the query TAG block;
d) a VER sentence is output with a TAG block where Source identification = own UI and the Destination identification = Source identification of the query TAG block;
e) the EUT outputs a CPD sentence with the correct settings. Confirm that the output sentence is preceded by a TAG block where Source identification = own UI and Destination identification = Source identification of the TAG block of the input TBR sentence;
f) there is no VER response;
g) a VER sentence is output with a TAG block where Source identification = own UI and the Destination identification = Source identification of the query TAG block;
h) there is no VER response.

Test Results

a)		
Requirement	Result	Verdict
Apply an CPD sentence (Configure Parameter code for the Destination identification parameters) without TAG block to the EUT, with the Talker Destination identification function set to ”A” (enabled) and the Listener Destination identification function set to “V” (disabled).	The CPD sentence applied to the EUT is: $ABCPD,1234,C,A,V*04	-
Apply a TBR sentence.	The TBR sentence applied to the EUT is: $ABTBR,1234,A*02	-
Confirm that the EUT outputs a CPD sentence with the correct settings.	The CPD sentence output by the EUT is correct: $ABCPD,1234,R,**A**,**V***15	Pass
Confirm that the output sentence is preceded by a TAG block with Source identification = own UI and no Destination identification.	Each sentence output is preceded by a TAG block with source identification = own UI and no Destination identification: \s:1234*4D\$ABADS,1234,144529.00,V,0,I,I*16	Pass
Confirm that all output sentences which are not a response on an input sentence do not include a Destination identification in the TAG block.	All output sentences which are not a response on an input sentence do not include a Destination identification in the TAG block: \s:305070*48\$ABABQ,VER*3C \d:305070*5F\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

b)		
Requirement	Result	Verdict
Apply a query for VER, without a TAG block.	The query applied to the EUT is: $ABABQ,VER*3C	-
Confirm that a VER sentence is output with a TAG block where Source identification = own UI and no Destination identification.	A VER sentence is output by the EUT with a TAG block containing a Source Identification = Own UI and no Destination Identification: **s:1234***4D\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.6,6.0,*60	Pass

c)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification and the correct Destination identification (UI of EUT).	The VER query with a TAG block containing a Source Identification (200500) and Destination Identification (1234) is: \s:200500,d:1234*38\$ABABQ,VER*3C	-
Confirm that a VER sentence is output with a TAG block where Source identification = own UI and the Destination identification = Source identification of the query TAG block.	The EUT outputs the a VER sentence, with TAG blocks containing Source Identification = own UI and the Destination Identification = the source identification of the query TAG block (200500): **s:200500**,**d:1234***38\$ABABQ,VER*3C	Pass

d)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification and a Destination identification different to the UI of EUT.	The query applied to the EUT, with a Destination Identification field different to the UI of the EUT is: \s:200500,**d:8080***3C\$ABABQ,VER*3C	-
Confirm that a VER sentence is output with a TAG block where Source identification = own UI and the Destination identification = Source identification of the query TAG block;	The VER sentence output by the EUT correctly uses its own UI (1234) for the Source Identification, and the Source Identification field from the query TAG block (200500) is used as the destination field: **s:1234**,**d:200500***38\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.6,6.0,*60	Pass

e)		
Requirement	Result	Verdict
Apply an CPD sentence (Configure Parameter code for the Destination identification parameters) to the EUT, with the Talker Destination identification function set to ”A” (enabled) and the Listener Destination identification function set to “A” (enabled).	The CPD sentence applied to the EUT is: \s:4040,d:1234*3F\$ABCPD,1234,C,A,A*13	-
Apply a TBR sentence with the correct Source and Destination identification.	The TBR sentence applied to the EUT is: \s:4040,d:1234*3F\$ABTBR,1234,A*02	-
Confirm that the EUT outputs a CPD sentence with the correct settings.	The EUT outputs a CPD sentence with both the Talker Destination Identification and the Listener Destination Identification fields both set to “A” (enabled): \s:1234,d:4040*3F\$ABCPD,1234,R,**A**,**A***02	Pass
Confirm that the output sentence is preceded by a TAG block where Source identification = own UI and Destination identification = Source identification of the TAG block of the input TBR sentence.	The Source Identification of the output sentence is the own UI of the EUT (1234) and the Destination Identification if the Source Identification of the TAG block of the input TBR sentence (4040): **s:1234**,**d:4040***3F\$ABCPD,1234,R,A,A*02	Pass

f)		
Requirement	Result	Verdict
Apply a query for VER, without TAG blocks.	The VER query applied to the EUT is: $ABABQ,VER*3C	-
Confirm that there is no VER response.	The EUT does not output a response to the VER query.	Pass

g)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification and the correct Destination identification (UI of EUT).	The query applied to the EUT is: \s:400500,d:1234*3E\$ABABQ,VER*3C	-
Confirm that a VER sentence is output with a TAG block where Source identification = own UI and the Destination identification = Source identification of the query TAG block.	The VER sentence output by the EUT has a Source Identification set to the EUT’s UI (1234), and the Destination Identification set to the Source Identification of the query TAG block (400500): \s:1234,d:400500*3E\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.6,6.0,*60	Pass

h)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification and a Destination identification different to the UI of EUT.	The query applied to the EUT is: \s:700500,d:400200*3F\$ABABQ,VER*3C	-
Confirm that there is no VER response.	The EUT does not output a response to the VER query.	Pass

Activation of Destination Identification – Clause 10.5.5 - Modification State 1

This test verifies the correct storage of Source identification parameters and the correct input filtering by Source identification parameters in input TAG blocks.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply a TBS sentence to the EUT containing a valid Source identification S1, the Action field set to 1 = add the provided Source identification value. Query for TBS.
b) Apply a query for VER, with a TAG block containing a Source identification different to the stored Source identification S1.
c) Apply a CPS sentence to the EUT, with the Talker Source identification function set to "A" (enabled) and the Listener Source identification function set to "A" (enabled). Apply a TBR Sentence with a Source identification S1.
d) Apply a query for VER, with a TAG block not containing a Source identification parameter.
e) Apply a query for VER, with a TAG block containing a Source identification equal to the stored Source identification S1.
f) Apply a query for VER, with a TAG block containing a Source identification different to the stored Source identification S1.
g) Apply a query for VER, with a TAG block containing a Source identification "DEFAULTSOURCE".

Required Results

Confirm that:

a) the EUT outputs a TBS sentence with the correct Source identification S1. Confirm that there is no TBS output sentence for the Source identification of "DEFAULTSOURCE";
b) there is a VER response;
c) the EUT outputs a CPS sentence with the correct activation settings, Talker = A and Listener = A;
d) there is no VER response;
e) there is a VER response with the Destination identification;
f) there is no VER response;
g) there is a VER response without Destination identification.

Test Results

a)		
Requirement	Result	Verdict
Apply a TBS sentence to the EUT containing a valid Source identification S1, the Action field set to 1 = add the provided Source identification value.	The TBS sentence applied to the EUT with Action Field set to 1 and the Source Identification set to 204060 is: $ABTBS,1234,C,**1**,**204060***30	-
Query for the TBS sentence.	The TBS sentence is queried using the sentence: $ABABQ,TBS*38	-
Confirm that the EUT outputs TBS sentence with the correct Source identification S1.	The Source Identification in the output TBS sentence is correctly configured to the value commanded to it: $ABTBS,1234,R,,**204060***10	Pass
Confirm that there is no TBS output sentence for the source identification of "DEFAULTSOURCE".	The EUT does not output a TBS sentence with a Source Identification of "DEFAULTSOURCE".	Pass

b)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification different to the stored Source identification S1.	The TAG block and VER query applied to the EUT are: \s:660066*49\$ABABQ,VER*3C	-

b)		
Requirement	Result	Verdict
Confirm that there is a VER response.	The EUT outputs a VER response successfully: $ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

c)		
Requirement	Result	Verdict
Apply a CPS sentence to the EUT, with the Talker Source identification function set to “A” (enabled) and the Listener Source identification function set to “A” (enabled).	The CPS sentence applied to the EUT is: $ABCPS,1234,C,A,A*04	-
Apply a TBR Sentence with a Source identification S1.	The TBR sentence applied is: \s:204060*49\$ABTBR,1234,A*02	-
Confirm that the EUT outputs a CPS sentence with the correct activation settings, Talker = A and Listener = A;	The EUT outputs a CPS sentence with the correct fields: \s:1234*4D\$ABCPS,1234,R,**A**,**A***15	Pass

d)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block not containing a Source identification parameter.	A query for the VER sentence is applied to the EUT: $ABABQ,VER*3C	-
Confirm that there is no VER response.	The EUT does not output a response.	Pass

e)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification equal to the stored Source identification S1.	The TAG block and VER query applied to the EUT are: \s:204060*49\$AIABQ,VER*37	-
Confirm that there is a VER response with the Destination identification.	The EUT outputs the VER query response correctly: \s:1234*4D\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

f)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification different to the stored Source identification S1.	The query applied to the EUT is: \s:66066*79\$AIABQ,VER*37	-
Confirm that there is no VER response.	The EUT does not output a response to the VER query.	Pass

g)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification “DEFAULTSOURCE”.	The query applied to the EUT is: \s:DEFAULTSOURCE*1F\$AIABQ,VER*37	-
Confirm that there is a VER response without Destination identification.	The VER response output by the EUT does not contain a destination identification: \s:1234*4D\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

Use of Multiple Source Identifications for Input – Clause 10.5.6 - Modification State 1

This test verifies the correct storage of multiple Source identifications and the correct input filtering by Source identification parameters in input TAG blocks.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply TBS sentences to the EUT containing valid Source identification S2, S3, ..., Sn according to the maximum number of Source identifications provided by the manufacturer. The CPS setting of S1 from the previous test is still valid. Query for TBS using a valid Source identification in the TAG block.
b) Apply query sentences for VER, one query for each applied Source identification with a TAG block containing the appropriate Source identification.
c) Apply a query for VER, with a TAG block containing a Source identification which is not part of the stored Source identifications.
d) Apply one more TBS sentence(s) which would exceed the maximum number of Source identifications which can be stored by the EUT. Query for TBS.
e) Apply a TBS sentence to the EUT containing the Source identification S2 as applied in test a) with the Action field set to 2 (Remove the provided Source identification). Query for TBS.
f) Apply TBS sentences to the EUT containing no Source identification value, with the Action field set to 3 (Remove all Source identifications). Query for TBS.
g) Apply a query sentence for VER, with a TAG block containing the Source identification value “DEFAULTSOURCE”.

Required Results

Confirm that:

a) the EUT outputs a TBS sentence with the correct Source identifications S1, S2, S3,…,Sn for each applied TBS sentence. Confirm that at least 5 Source identifications can be stored. Confirm that there is no TBS output sentence for the Source identification of “DEFAULTSOURCE”;
b) there is a VER response for each query, with Destination identification = Source identification of the query TAG block;
c) there is no VER response;
d) there is a NAK response on the TBS sentence indicating that the Source identification cannot be stored. Confirm that there is a TBS sentence for Source identification S1 and for each Source identification stored under step a);
e) the EUT outputs a TBS sentence with the correct Source identification S1, S3, …, Sn for each stored Source identification. Confirm that there is no TBS output sentence for the Source identification S2 which has been removed;
f) there is one TBS output with the Source identification field set to null field;
g) there is a VER response. This indicates that the default Source identification has not been deleted.

Test Results

a)		
Requirement	Result	Verdict
Apply TBS sentences to the EUT containing valid Source identification S2, S3, ..., Sn according to the maximum number of Source identifications provided by the manufacturer.	The EUT supports up to 5 unique Source Identifiers- the TBS sentences applied are: $ABTBS,1234,C,1,100000*31 $ABTBS,1234,C,1,200000*32 $ABTBS,1234,C,1,300000*33 $ABTBS,1234,C,1,400000*34 $ABTBS,1234,C,1,500000*35	-
Query for TBS using a valid Source identification in the TAG block. Confirm that the EUT outputs a TBS sentence with the correct Source identifications S1, S2, S3,…,Sn for each applied TBS sentence.	The TBS settings are queried using the Source Identifier S1. The EUT outputs a TBS sentence for each TBS sentence applied: \s:100000*48\$ABABQ,TBS*38 $ABTBS,1234,R,,100000*11 $ABTBS,1234,R,,200000*12 $ABTBS,1234,R,,300000*13 $ABTBS,1234,R,,400000*14 $ABTBS,1234,R,,500000*15	Pass
Confirm that at least 5 Source identifications can be stored.	The EUT can store 5 Source Identifications successfully, as seen in the results above.	Pass
Confirm that there is no TBS output sentence for the Source identification of “DEFAULTSOURCE”.	The EUT does not output a TBS sentence with Source Identification “DEFAULTSOURCE”.	Pass

b)		
Requirement	Result	Verdict
Apply query sentences for VER, one query for each applied Source identification with a TAG block containing the appropriate Source identification.	The Destination Identification is first enabled using the CPD sentence \s:100000*48\$ABCPD,1234,C,A,*52. The queries applied to the EUT are: \s:**100000***48\$ABABQ,VER*3C \s:**200000***4B\$ABABQ,VER*3C \s:**300000***4A\$ABABQ,VER*3C \s:**400000***4D\$ABABQ,VER*3C \s:**500000***4C\$ABABQ,VER*3C	-
Confirm that there is a VER response for each query, with Destination identification = Source identification of the query TAG block.	For each VER query, a VER response is output by the EUT: \d:**100000***5F\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63 \d:**200000***5C\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63 \d:**300000***5D\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63 \d:**400000***5A\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63 \d:**500000***5B\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

c)		
Requirement	Result	Verdict
Apply a query for VER, with a TAG block containing a Source identification which is not part of the stored Source identifications.	The query applied to the EUT is: \s:750*7B\$ABABQ,VER*3C	-
Confirm that there is no VER response.	The EUT does not respond to the VER query.	Pass

d)		
Requirement	Result	Verdict
Apply one more TBS sentence(s) which would exceed the maximum number of Source identifications which can be stored by the EUT.	The TBS sentence applied to the EUT with new Source Identifier = 600000 is: $ABTBS,1234,C,1,600000*36	-
Query for TBS, confirming that there is a NAK response on the TBS sentence indicating that the Source identification cannot be stored.	The EUT outputs a NAK sentence, indicating that the TBS sentence was not accepted: $ABNAK,AB,TBS,1234,10,*28	Pass

d)		
Requirement	Result	Verdict
Confirm that there is a TBS sentence for Source identification S1 and for each Source identification stored under step a).	The TBS settings are queried to confirm that they have not been changed: \s:100000*48\$ABABQ,TBS*38 \d:100000*5F\$ABTBS,1234,R,,100000*11 \d:100000*5F\$ABTBS,1234,R,,200000*12 \d:100000*5F\$ABTBS,1234,R,,300000*13 \d:100000*5F\$ABTBS,1234,R,,400000*14 \d:100000*5F\$ABTBS,1234,R,,500000*15	Pass

e)		
Requirement	Result	Verdict
Apply a TBS sentence to the EUT containing the Source identification S2 as applied in test a) with the Action field set to 2 (Remove the provided Source identification).	The TBS sentence applied to the EUT to remove S2 is: $ABTBS,1234,C,2,200000*31	-
Query for TBS and confirm that the EUT outputs a TBS sentence with the correct Source identification S1, S3, …, Sn for each stored Source identification.	The TBS query and the EUT's response is: \s:100000*48\$ABABQ,TBS*38 \d:100000*5F\$ABTBS,1234,R,,100000*11 \d:100000*5F\$ABTBS,1234,R,,300000*13 \d:100000*5F\$ABTBS,1234,R,,400000*14 \d:100000*5F\$ABTBS,1234,R,,500000*15	Pass
Confirm that there is no TBS output sentence for the Source identification S2 which has been removed.	The Source Identification S2 has been successfully removed, as seen in the response above.	Pass

f)		
Requirement	Result	Verdict
Apply TBS sentences to the EUT containing no Source identification value, with the Action field set to 3 (Remove all Source identifications).	The TBS sentence applied to the EUT is: $ABTBS,1234,C,3,*32	-
Query for TBS and confirm that there is one TBS output with the Source identification field set to null field.	The TBS sentence is queried and the EUT's response shows the Source Identification field containing a null value: $ABABQ,TBS*38 $ABTBS,1234,R,,*10	Pass

g)		
Requirement	Result	Verdict
Apply a query sentence for VER, with a TAG block containing the Source identification value "DEFAULTSOURCE".	The query applied to the EUT is: \s:"DEFAULTSOURCE"*1F\$ABABQ,VER*3C	-
Check that there is a VER response to confirm that the default Source identification has not been deleted.	The response to the VER query is: \d:"DEFAULTSOURCE"*08\$ABVER,1,1,AB,SAAB,1234,100002,R60,R60 0.9.5,6.0,*63	Pass

Test of Grouping by TAG Blocks for Output – Clause 10.5.7 - Modification State 3

This test verifies the grouping of sentences using TAG block grouping parameter “g:” for output sentences.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply a CPS and a CPD sentence to disable Source identification and Destination identification (Talker and Listener function set to “V”). Apply a TBR sentence with the Request flag set to “S” requesting all supported TAG block functions.
b) Input SPO sentences to activate VSI sentences for VDM.
c) Apply a CPG sentence to activate the Talker grouping function (Talker function set to “A” and Listener function set to “V”). Set the Reset event to “0” = use the Group-code limit. Set the Initial Group-code and the Group-code increment to 1 (default). The Group-code limit is set to a small integer value (e.g. 10). Apply a TBR sentence.

The following tests are performed only if the optional functions are implemented.

d) Apply a CPG sentence with Talker function set to “A” and Listener function set to “V”. Set the Reset event to “0” = use the Group-code limit. Set the Initial group-code to 100 and the Group-code increment to 10. The Group-code limit is set to 250. Apply a TBR sentence.
e) Apply a SPO sentence to activate VSI sentences for VDM and VDO. Apply a CPD and CPS sentence to activate Destination identification and Source identification for Talker. Apply a CPG sentence to activate the Talker grouping function (Talker function set to “A” and Listener function set to “V”). Set the Reset event to “3” = every minute. Set the Initial group-code to 200 and the Group-code increment to −5. The Event offset value is set to −10. Apply a TBR sentence.

Required Results

Confirm that:

a) the EUT outputs the sentences CPD, CPG, CPS, CPN and CPC with Talker and Listener function field set to “V” (supported but disabled). The Listener function of CPC, CPG and CPC can be set to “U” (Unsupported) depending on the implementation;
b) the EUT outputs VSI sentences together with all VDM sentences. Confirm that no TAG blocks are added;
c) the response on TBR includes a CPG sentence with the input parameters. Confirm that single line sentences (e.g. VDO) are output without TAG blocks. Confirm that all VSI/VDM combinations and all multi-part VDM and VDO sentences are grouped using TAG blocks. Confirm that the x parameter in the g: string starts with 1 and is incremented by 1 for each sentence in a group. Confirm that the y parameter is identical for each sentence in a group and indicates the total number of sentences of this group. Confirm that the code parameter is identical for each sentence in a group and is incremented by the defined Group-code increment parameter (=1) for each group. Confirm that the code parameter is reset to the defined Initial group code (=1) when it would exceed the defined Group-code limit (e.g. = 10);
d) the TBR response includes a CPG sentence with the input parameters. Confirm that all VSI/VDM combinations and multi-part VDM and VDO messages are grouped using TAG blocks with the correct parameters. Confirm that the x parameter in the g: string starts with 1 and is incremented by 1 for each sentence in a group. Confirm that the y parameter is identical for each sentence in a group and indicates the total number of sentences of this group. Confirm that the code parameter is identical for each sentence in a group and is incremented by the defined Group-code increment parameter (=10) for each group. Confirm that the code parameter is reset to the defined Initial group code (=100) when it would exceed the defined Group-code limit (= 250);

e) the TBR response includes a CPG sentence with the input parameters. Confirm that all VSI/VDM and VSI/VDO combinations and multi-part VDM and VDO messages are grouped using TAG blocks with the correct parameters. Confirm that the grouping parameter is always the first parameter in a TAG block. Confirm that the x parameter in the g: string starts with 1 and is incremented by 1 for each sentence in a group. Confirm that the y parameter is identical for each sentence in a group and indicates the total number of sentences of this group. Confirm that the code parameter is identical for each sentence in a group and is decremented by the defined Group-code increment parameter (=−5) for each group. Confirm that the code parameter is reset to the defined Initial group code (=200) 10 s (Event offset parameter) before the beginning of each minute.

Test Results

a)		
Requirement	Result	Verdict
Apply a CPS and a CPD sentence to disable Source identification and Destination identification (Talker and Listener function set to “V”).	The CPS and CPD sentence applied are: $ABCPS,1234,C,V,V*04 $ABCPD,1234,C,V,V*13	-
Apply a TBR sentence with the Request flag set to “S” requesting all supported TAG block functions.	The TBR sentence applied to the EUT is: $ABTBR,1234,S*10	-
Confirm that the EUT outputs the sentences CPC, CPD, CPG, CPN and CPS with Talker and Listener function field set to “V” (supported but disabled).	The EUT successfully outputs sentences CPC, CPD, CPG, CPN and CPS sentences: $ABCPC,1234,R,V,U,1*1B $ABCPD,1234,R,V,V*02 $ABCPG,1234,R,V,V,0,1,1,999,*24 $ABCPN,1234,R,V,U,0,1,1,999,*2E $ABCPS,1234,R,V,V*15	Pass
Confirm that the listener function of CPC, CPG and CPN can be set to “U” (Unsupported) depending on the implementation.	As per §10.5.2 a), the listener function of the CPC and CPN sentences are configured as “U” (Unsupported).	Pass

b)		
Requirement	Result	Verdict
Input SPO sentences to activate VSI sentences for VDM.	The SPO sentence used to enable VSI sentences to be output after each VDM is: $ABSPO,1234,E,1,1,1,1,1,1,1,1,1,1,1,C*61	-
Confirm that the EUT outputs VSI sentences together with all VDM sentences.	The EUT outputs VSI sentences after each VDM sentence: !ABVDM,1,1,0,B,14N6S0@2P:wle`2MEs7h2gvV1h;g,0*60 $ABVSI,1234,0,134620.029989,751,-72,28*45	Pass
Confirm that no TAG blocks are added.	The EUT does not add any TAG blocks to the output.	Pass

c)		
Requirement	Result	Verdict
Apply a CPG sentence to activate the Talker grouping function (Talker function set to “A” and Listener function set to “V”): • Set the Reset event to “0” (use the Group-code limit). • Set the Initial Group-code and the Group-code increment to 1 (default). • The Group-code limit is set to a small integer value (e.g. 10).	The CPG sentence applied to the EUT is: $ABCPG,1234,C,A,V,0,1,1,10,*1A	-
Apply a TBR sentence.	The TBR sentence applied is: $ABTBR,1234,A*02	-
Confirm that the response on TBR includes a CPG sentence with the input parameters	The response to the TBR sentence shows that the parameters from the input CPG sentence are accepted: $ABCPG,1234,R,A,V,0,1,1,10,*0B	Pass
Confirm that single line sentences (e.g. VDO) are output without TAG blocks.	Single line sentences, such as Frame Summary and Alarm States, are correctly output without TAG blocks: $ABFSR,1234,140100.00,A,30,0,0,30,0,-102,30*06 $ABALR,,,V,V,*70	Pass

c)		
Requirement	Result	Verdict
Confirm that all VSI/VDM combinations and all multi-part VDM and VDO sentences are grouped using TAG blocks.	All VSI/VDM combinations are grouped using TAG blocks: g:1-2-7*69\ !ABVDM,1,1,6,A,14N6S102P:wle`2MEs7h2gvr1hAa,0*4C \g:2-2-7*6A\$ABVSI,1234,6,140130.110010,1129,-66,36*76 All multi-part VDM and VDO sentences are grouped using TAG blocks: \g:1-2-2*6C\ !ABVDO,1,1,1,A,13LC9e@2P:wrFu2M7AWh2gwV0000,0*23 \g:2-2-2*6F\$ABVSI,1234,1,140926,1005,,*76	Pass
Confirm that the x parameter in the g: string starts with 1 and is incremented by 1 for each sentence in a group.	The x-parameter increments by 1 for each sentence in a TAG block group: \g:**1**-2-8*66\ !ABVDM,1,1,7,B,14N6S102P:wle`2MEs7h2gvr1hAa,0*4 \g:**2**-2-8*65\ $ABVSI,1234,7,140130.110042,1129,-72,28*7A	Pass
Confirm that the y parameter is identical for each sentence in a group and indicates the total number of sentences of this group.	The y-parameter is identical for each sentence in a group, indicating the total number of sentences in the group: \g:1-**2**-8*66\ !ABVDM,1,1,7,B,14N6S102P:wle`2MEs7h2gvB1h5s,0*18 \g:2-**2**-8*65\ $ABVSI,1234,7,140210.110021,379,-72,28*48	Pass
Confirm that the code parameter is identical for each sentence in a group and is incremented by the defined Group-code increment parameter (=1) for each group.	For each sentence in a group, the code parameter is identical. The group-code increment parameter is used for each group, in this case it increments by 1 for each group: \g:1-2-**1***6F\ !ABVDM,1,1,0,A,14N6S0@2P:wle`2MEs7h2gvB1h5p,0*6E \g:2-2-**1***6C\ $ABVSI,1234,0,140210.030010,376,-66,36*4B \g:1-2-**2***6C\ !ABVDM,1,1,1,B,14N6S0@2P:wle`2MEs7h2gvB1h5p,0*6C \g:2-2-**2***6F\ $ABVSI,1234,1,140210.029989,376,-72,28*41 \g:1-2-**3***6D\ !ABVDM,1,1,2,B,14N6S0P2P:wle`2MEs7h2gvB1h5q,0*7E \g:2-2-**3***6E\ $ABVSI,1234,2,140210.056687,377,-72,28*4A	Pass
Confirm that the code parameter is reset to the defined Initial group code (=1) when it would exceed the defined Group-code limit (e.g. = 10).	When the group-code limit is exceeded (group-code > 10), then the EUT successfully resets the group-code to 1: \g:1-2-**9***67\ !ABVDM,1,1,8,A,14N6S1@2P:wle`2MEs7h2gwR1hMH,0*36 \g:2-2-**9***64\ $ABVSI,1234,8,140250.136666,1880,-66,36*74 \g:1-2-**10***5F\ !ABVDM,1,1,9,B,14N6S1@2P:wle`2MEs7h2gwR1hMH,0*34 \g:2-2-**10***5C\ $ABVSI,1234,9,140250.136655,1880,-72,28*7F \g:1-2-**1***6F\ !ABVDM,1,1,0,A,14N6S0@2P:wle`2MEs7h2gwn1h01,0*07 \g:2-2-**1***6C\ $ABVSI,1234,0,140300.030000,1,-66,36*49 \g:1-2-**2***6C\ !ABVDM,1,1,1,B,14N6S0@2P:wle`2MEs7h2gwn1h01,0*05 \g:2-2-**2***6F\ $ABVSI,1234,1,140300.030010,1,-72,28*43	Pass

The EUT optional functions are not implemented as the EUT only supports the minimum functionality. As such, tests d) and e) are not required to be tested.

Test of UNIX Time Output – Clause 10.5.8 - Modification State 3

This test verifies the output of the TAG block parameter “c” with the UNIX time value.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply a CPC sentence (Configure Parameter code for UNIX time parameter) with the Talker UNIX time function set to „A” (enabled) and the Listener UNIX time function set to “V” (disabled). The Time precision/Format parameter shall be set to 1=integer seconds. Apply a TBR sentence
b) Apply a CPC sentence with the Talker UNIX time function set to „A” (enabled) and the Time precision/ Format parameter set to 2=integer milliseconds.

Required Results

Confirm that:

a) the response of the EUT includes the CPC sentences with the parameters set according to the CPC input and the Sentence status flag set to “R”. Confirm that each ungrouped output TAG block contains the c: parameter with the correct UNIX time in seconds. Confirm that in each TAG block group at least one TAG block contains the c: parameter with the correct UNIX time in seconds;
b) a NAK is output on the PI as a response to the CPC indicating that the EUT does not support millisecond resolution for the UNIX time. If no NAK is output then confirm that each ungrouped output TAG block contains the c: parameter with the UNIX time in milliseconds. Confirm that in each TAG block group at least one TAG block contains the c: parameter with the UNIX time in milliseconds. Required accuracy shall be ±1 s.

Test Results

a)		
Requirement	Result	Verdict
Apply a CPC sentence (Configure Parameter code for UNIX time parameter) with: • the Talker UNIX time function set to “A” (enabled) and the Listener UNIX time function set to “V” (disabled); • The Time precision/Format parameter set to 1 (=integer seconds).	The CPC sentence applied to the EUT is: $ABCPC,1234,C,A,V,1*1E	-
Apply a TBR sentence.	The TBR sentence applied to the EUT is: $ABTBR,1234,A*02	-
Confirm that the response of the EUT includes the CPC sentences with the parameters set according to the CPC input and the Sentence status flag set to “R”.	The response of the EUT includes the parameters assigned in the CPC sentence and the status flag set to *“R”*. \g:1-2-1,c:1583250671*12\$ABCPC,1234,**R**,**A**,**U**,1*0C	Pass
Confirm that each ungrouped output TAG block contains the c: parameter with the correct UNIX time in seconds.	Each ungrouped output TAG block contains the c: parameter. The UNIX time is confirmed as correct: \c:1583250684*5B\$ABALR,,,V,V,*70	Pass
Confirm that in each TAG block group, at least one TAG block contains the c: parameter with the correct UNIX time in seconds.	In each TAG block group, at least one TAG block correctly contains the c: parameter- and the UNIX time is correct: \g:1-2-2,c:1583250689*16\ !ABVDM,1,1,0,A,14N6S0@2P:wle`2MEs7h2gvr1hAV,0*0C \g:2-2-2*6F\ $ABVSI,1234,0,155130.029989,1126,-66,36*79	Pass

b)		
Requirement	Result	Verdict
Apply a CPC sentence with the Talker UNIX time function set to “A” (enabled) and the Time precision/ Format parameter set to 2=integer milliseconds.	$ABCPC,1234,C,A,A,2	-
Confirm that a NAK is output on the PI as a response to the CPC indicating that the EUT does not support millisecond resolution for the UNIX time.	There is no NAK sentence, as the EUT supports millisecond resolution for the UNIX time.	-
If no NAK is output then confirm that each ungrouped output TAG block contains the c: parameter with the UNIX time in milliseconds.	Each ungrouped TAG block output contains the UNIX time in milliseconds: \c:1583253999000*6B\$ABALR,,,V,V,*70	Pass
Confirm that in each TAG block group at least one TAG block contains the c: parameter with the UNIX time in milliseconds. Required accuracy shall be ±1 second.	Each TAG block group contains the c: parameter with the UNIX time in millisecond format, with an accuracy of ±1 sec: \g:1-2-8,c:1583253989000*20\ !ABVDM,1,1,6,A,14N6S102P:wle`2MEs7h2gvr1hAa,0*4C \g:2-2-8*65\ $ABVSI,1234,6,164630.110010,1129,-66,36*77	Pass

Test of UNIX Time Output – Clause 10.5.9 - Modification State 3

This test verifies the output of the TAG block parameter “n” with the correct line number.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Enable the Talker Grouping function and disable the Source identification and Destination identification. Input an SPO sentence to inactivate VSI sentences for VDO. Apply a CPN sentence (Configure Parameter code for the Line-count parameter) with the Talker Linecount function set to „A” (enabled) and the Listener Line-count function set to “V” (disabled). The other parameters shall be set to: Reset event = 0 (use the line-count limit), Initial line-count = 1, Count Increment = 1, Line-count limit = 20, Event offset = null field. Apply a TBR sentence.

The following tests are performed only if the optional functions are implemented.

b) Apply a CPN sentence with the following parameters: Talker Line-count function enabled Reset event = 0 (use the line-count limit), Initial line-count = 3 000, Count Increment = -100, Line-count limit = 1 000, Event offset = null field.
c) Apply a CPN sentence with the following parameters: Talker Line-count function enabled Reset event = 2 (hourly), Initial line-count = 100, Count Increment = 10, Line-count limit = null field, Event offset = 30.

Required Results

Confirm that:

a) the response of the EUT includes the CPN sentence with the parameters set according to the CPN input and the Sentence status flag set to “R”. Confirm that each sentence is preceded by a TAG block. Confirm that each TAG block including each TAG block of a group contains an “n” -parameter. Confirm that the line-count is incremented for each occurrence by one. Confirm that the line-count is reset to 1 when it would exceed the line-count limit;
b) each sentence is preceded by a TAG block containing an “n” parameter. Confirm that the line-count starts with 3 000. Confirm that the line-count is decremented for each occurrence by 100. Confirm that the line-count is reset to 3 000 when it would be less than the line-count limit of 1 000;
c) each sentence is preceded by a TAG block containing an “n” parameter. Confirm that the line-count starts with 100. Confirm that the line-count is incremented for each occurrence by 10. Confirm that the line-count is reset to 100 30 s after beginning of each hour.

Test Results

a)		
Requirement	Result	Verdict
Enable the Talker Grouping function and disable the Source identification and Destination identification.	The talker grouping function is enabled with Source and Destination identifications disabled: $ABCPG,1234,C,V,V,0,1,1,10,*0D	-
Input an SPO sentence to inactivate VSI sentences for VDO.	The SPO sentence applied to inactivate VSI sentences is: $ABSPO,1234,E,1,1,1,1,1,1,1,1,0,0,1,C*61	-

a)		
Requirement	Result	Verdict
Apply a CPN sentence (Configure Parameter code for the Line-count parameter) with the: • Talker Line-count function set to “A” (enabled), • Listener Line-count function set to “V” (disabled), • Reset event = 0 (use the line-count limit), • Initial line-count = 1, • Count Increment = 1, • Line-count limit = 20, • Event offset = null field.	The CPN sentence applied to the EUT is: $ABCPN,1234,C,A,V,0,1,1,20,*10	-
Apply a TBR sentence.	The TBR sentence applied to the EUT is: $ABTBR,1234,A*02	-
Confirm that the response of the EUT includes the CPN sentence with the parameters set according to the CPN input and the Sentence status flag set to “R”.	The parameters applied to the EUT are accepted, as seen in the CPN sentence: \c:1583318880000,n:5*21\ $ABCPN,1234,R,**A**,**U**,**0**,**1**,**1**,**20**,*02	Pass
Confirm that each sentence is preceded by a TAG block.	Each sentence is preceded by a TAG block: **\c:1583318939000,n:6*21**!ABVDM,1,1,0,A,14N6S0@2P:wle`2MEs7h2gwn1h01,0*07	Pass
Confirm that each TAG block including each TAG block of a group contains an “n” - parameter.	Each TAG block contains an *n:* parameter. \c:1583318940000,**n:2***2B\!ABVDM,1,1,8,A,14N6S1@2P:wle`2MEs7h2gwn1h05,0*0A	Pass
Confirm that the line-count is incremented for each occurrence by one.	For each sentence output to the PI, the line-count (*n*) is incremented by one: \c:1583319089000,**n:15***10\!ABVDM,1,1,,A,14N6S0@2P:wle`2MEs7h2gvr1hAV,0*3C \c:1583319089000,**n:16***13\!ABVDM,1,1,,B,14N6S0@2P:wle`2MEs7h2gvr1hAV,0*3F \c:1583319089000,**n:17***12\!ABVDM,1,1,,A,14N6S0P2P:wle`2MEs7h2gvr1hAW,0*2D	Pass
Confirm that the line-count is reset to 1 when it would exceed the line-count limit.	When the line-count exceeds the line-count limit, it is reset to the initial line-count value, which is configured to 1: \c:1583319089000,**n:19***1C\!ABVDM,1,1,,B,14N6S0h2P:wle`2MEs7h2gvr1hA`,0*21 \c:1583319089000,**n:20***16\!ABVDM,1,1,,A,14N6S0h2P:wle`2MEs7h2gvr1hA`,0*22 \c:1583319089000,**n:1***25\!ABVDM,1,1,,A,14N6S102P:wle`2MEs7h2gvr1hAa,0*7A \c:1583319089000,**n:2***26\!ABVDM,1,1,,B,14N6S102P:wle`2MEs7h2gvr1hAa,0*79	Pass

The EUT does not implement the optional functions of the CPN sentence; tests b) and c) are therefore not applicable to the unit and have been omitted from this report.

2.7 Test of Optional Functions

2.7.1 Specification Reference

IEC 62320-1, Clause 10.6

2.7.2 Equipment Under Test and Modification State

R60 VDES, S/N: 100002 - Modification State 3

2.7.3 Date of Test

06-March-2020 and 16-March-2020

2.7.4 Test Results and Methods of Measurement

Test of External Synchronisation Source – Clause 10.6.1

This test will verify that the Base Station will operate as required with an external UTC synchronisation source. This test will also verify synchronization jitter.

Method of Measurement

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply the external UTC source to the Base Station.
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT:
$xxTSA, <UI>,7,B, <UTC h+m>,<Txslot>,2
!xxVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0

The following tests are required for a Base Station operated as an independent unit.

b) Apply the independent mode setup to the EUT. Apply the external UTC source to the Base Station.

Required results

Confirm that:

a) the EUT is transmitting Message 8 in the assigned slot and channel. Verify synchronization jitter does not exceed ±52 µs as required for UTC direct. Confirm that the ADS sentences indicate the correct Sync. State and alarm status.

The following results are required for a Base Station operated as an independent unit.

b) The Sync. State of the Message 4(s) is 0, indicating UTC direct. Verify synchronization jitter does not exceed ±52 µs as required for UTC direct. Confirm that the ADS sentences indicate the correct Sync. State and alarm status.

Test Results

a)		
Requirement	Result	Verdict
Apply the external UTC source to the Base Station.	Simulated GGA and ZDA NMEA sentences are applied to the RS-232 input port of the EUT. A 1PPS signal synchronised with the NMEA data is applied to the Digital IO port.	-

a)		
Requirement	Result	Verdict
Apply multiple pairs of a TSA sentence and a VDM sentence with encapsulated Message 8 to the EUT.	The TSA+VDM sentence pairs applied to the EUT, and their respective TFR responses are: $ABTSA,1234,7,B,,**450**,2*37 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTFR,1,7,B,1234,,450,1405,,1,2,0*2D $ABTSA,1234,7,B,,**750**,2*34 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTFR,1,7,B,1234,,750,1405,,1,2,0*2E $ABTSA,1234,7,B,,**1050**,2*02 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTFR,1,7,B,1234,,1050,1405,,1,2,0*18 $ABTSA,1234,7,B,,**1350**,2*01 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTFR,1,7,B,1234,,1350,1405,,1,2,0*1B $ABTSA,1234,7,B,,**1650**,2*04 !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTFR,1,7,B,1234,,1650,1405,,1,2,0*1E $ABTSA,1234,7,B,,**1950**,2*0B !ABVDM,1,1,7,B,8h3OHqh0J7ps?3qv,0*21 $ABTFR,1,7,B,1234,,1950,1405,,1,2,0*11	-
Confirm that the EUT is transmitting Message 8 in the assigned slot and channel.	The EUT transmits Message 8 in slots 450, 750, 1050, 1350, 1650 and 1950- as instructed by the TSA sentences in the requirement above.	Pass
Verify synchronization jitter does not exceed ±52 µs as required for UTC direct.	The synchronisation jitter of the Message 8 transmissions does not exceed the ±52µs limit required for UTC direct.	Pass
Confirm that the ADS sentences indicate the correct Sync. State and alarm status.	The ADS sentences output by the EUT have a Sync State “0” (UTC direct) and Alarm Status “V” (no alarms active): $ABADS,1234,135948.00,**V**,**0**,E,E*1B	Pass

a)						
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	
14:05:12	450	B	3660007	8	-10	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:05:20	750	B	3660007	8	20	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:05:28	1050	B	3660007	8	20	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:05:36	1350	B	3660007	8	20	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:05:44	1650	B	3660007	8	20	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D
14:05:52	1950	B	3660007	8	-10	!AIVDM,1,1,,B,8h3OHqh0J7ps?3qv,0*1D

b)		
Requirement	Result	Verdict
Apply the independent mode setup to the EUT.	The sentences applied to the EUT are: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
Apply the external UTC source to the Base Station.	Simulated GGA and ZDA NMEA sentences are applied to the RS-232 input port of the EUT. A 1PPS signal synchronised with the NMEA data is applied to the Digital IO port.	-
Confirm that the Sync. State of the Message 4(s) is 0, indicating UTC direct.	The sync state of the transmitted Message 4’s is 0, as seen in the table below.	Pass
Verify synchronization jitter does not exceed ±52 µs as required for UTC direct.	The synchronisation jitter of Message 4 and Message 20 transmissions does not exceed the ±52µs limit.	Pass
Confirm that the ADS sentences indicate the correct Sync. State and alarm status.	The ADS sentences output by the EUT have a Sync State “0” (UTC direct) and Alarm Status “V” (no alarms active): $ABADS,1234,140903.00,**V**,**0**,E,E*16	Pass

b)							
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Sentence	Sync State
14:07:30	1129	B	2402500	4	20	!AIVDM,1,1,,B,402B`i1v4p>7N04mk9Mf:;i00@Aa,0*04	0
14:07:50	1879	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>7j06LomMgC?i00HMG,0*0D	0
14:08:00	0	A	2402500	20	-10	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	-
14:08:00	4	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>8006LomMgC?i00H04,0*55	0
14:08:00	6	B	2402500	20	-10	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	-
14:08:10	379	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>8:06LomMgC?i00H5s,0*1E	0
14:08:20	754	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>8D06LomMgC?i00D00,0*29	0

b)							
Time	Slot	Chan	MMSI	Msg	Jitter (µs)	Sentence	Sync State
14:08:30	1129	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>8N06LomMgC?i00<00,0*58	0
14:08:40	1504	A	2402500	4	20	!AIVDM,1,1,,A,402B`i1v4p>8`06LomMgC?i008GP,0*66	0
14:08:50	1879	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>8j06LomMgC?i00D00,0*04	0
14:09:00	0	A	2402500	20	-10	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	-
14:09:00	4	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>9006LomMgC?i00D00,0*5C	0
14:09:00	6	B	2402500	20	20	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	-
14:09:10	379	B	2402500	4	20	!AIVDM,1,1,,B,402B`i1v4p>9:06LomMgC?i00D00,0*55	0
14:09:20	754	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>9D06LomMgC?i00@;j,0*7D	0
14:09:30	1129	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>9N06LomMgC?i008Aa,0*7D	0
14:09:40	1504	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>9`06LomMgC?i005hT,0*41	0
14:09:50	1879	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>9j083nCMhLCi00@MG,0*29	0
14:10:00	0	A	2402500	20	-10	!AIVDM,1,1,,A,D02B`i00@N?`00N000`f4d0,2*60	-
14:10:00	4	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>:0083nCMhLCi00@04,0*7D	0
14:10:00	6	B	2402500	20	-10	!AIVDM,1,1,,B,D02B`i07dN?`00N000pf4d0,2*50	-
14:10:10	379	B	2402500	4	-10	!AIVDM,1,1,,B,402B`i1v4p>::083nCMhLCi00@5s,0*36	0
14:10:20	754	A	2402500	4	-10	!AIVDM,1,1,,A,402B`i1v4p>:D083nCMhLCi00<00,0*71	0

Test of Message 17 Based on RTCM 10402 Input – Clause 10.6.2

This test will verify that the Base Station is capable of transmitting Message 17 based on input of RTCM 10402 format on a dedicated port.

Method of Measurement

The following tests are required for a Base Station operated as an independent unit.

Set up the standard test environment and operate the EUT as defined in the pre-setup conditions.

a) Apply the independent mode setup to the EUT.
b) Define a transmission schedule for Message 17 with a reporting interval of 10 s using an ECB sentence:
   $xxECB,<UI>,17,0,10,750,2,0,385,750,2,C
c) Apply correction data in RTCM 10402 format on a dedicated port for a period of at least 1 min.
d) Discontinue the input of correction data.
e) Disable the transmission schedule for Message 17 using an ECB sentence like the following sentence:
   $xxECB,<UI>,17,0,-1,,,0,-1,,,C
f) Apply correction data in RTCM 10402 format on a dedicated port for a period of at least 1 min.

Required results

The following results are required for a Base Station operated as an independent unit.

Confirm that:

a) the Independent mode setup has been correctly set;
b) the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence;
c) the EUT is transmitting Message 17 over the VDL in the specified slots, intervals and channels as defined by the ECB. Confirm the content of Message 17 is the most current and as defined by the RTCM 10402 data. Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted;
d) the EUT continues transmitting Message 17 over the VDL for 1 min then stops transmission;
e) the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence;
f) the EUT does not transmit Message 17 over the VDL.

Test Results

a)		
Requirement	Result	Verdict
Apply the independent mode setup.	The following sentences were applied to the EUT: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,C*11 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,C*19 $ABECB,1234,4,0,4,750,,0,379,750,,C*11 $ABECB,1234,20,0,0,2250,,0,6,2250,,C*28	-
Confirm that the independent mode setup has been correctly set.	The response to the $ABABQ,DLM*38 query is: $ABDLM,0,A,L,4,1,7,250,L,0,1,7,0,L,10,2,7,75,,,,,R*00 $ABDLM,0,B,L,129,1,7,250,L,6,1,7,0,L,20,2,7,75,,,,,R*08 The response to the $ABABQ,ECB*39 query is: $ABECB,1234,4,,4,750,,,379,750,,R*00 $ABECB,1234,20,0,0,2250,,0,6,2250,,R*39	Pass

b)		
Requirement	Result	Verdict
Define a transmission schedule for Message 17 with a reporting interval of 10 s using an ECB sentence.	The ECB sentence applied to the EUT is: $ABECB,1234,17,0,10,750,2,0,385,750,2,C*15	-
Confirm that the ECB sentence was received correctly by the EUT using the query sentence for the ECB sentence.	The result of the $ABABQ,ECB*39 query is: $ABECB,1234,17,0,10,750,2,0,385,750,2,R*04	Pass

c)		
Requirement	Result	Verdict
Apply correction data in RTCM 10402 format on a dedicated port for a period of at least 1 min.	RTCM 10402 data from a differential beacon receiver is applied to the RS-232 interface for over a minute.	-
The EUT is transmitting Message 17 over the VDL in the specified slots, intervals and channels as defined by the ECB sentence.	The EUT transmits Message 4 in the slots specified by the ECB sentence (slots 10,760 and 1510 on channel A, slots 385, 1135 and 1885 on channel B) as seen in the table below.	Pass
Confirm the content of Message 17 is the most current and as defined by the RTCM 10402 data.	The contents of each transmitted Message 17 uses the most recent RTCM data supplied by the RTCM2M17 decoder.	Pass
Confirm that the appropriate VDO sentence is output on the PI when a message is transmitted.	The EUT outputs a VDO sentence to the PI for each Message 17 transmission: !ABVDO,1,1,,A,A02B`i1b3Qba02J`J=l`5?q0wEtHwd@0H1kvlP1B,0*4B	Pass

c)				
Time	Slot	Chan	Msg	Sentence
10:33:00	10	A	17	!AIVDM,1,1,,A,A02B`i1b3Qba02J`Iq``2gpj06l<wCD39@ovl@1w,0*5C
10:33:10	385	B	17	!AIVDM,1,1,,B,A02B`i1b3Qba02J`Ivl`2gpg0Fl<wCL09@ovlP1w,0*32
10:33:20	760	A	17	!AIVDM,1,1,,A,A02B`i1b3Qba02J`J=l`5?q0wEtHwd@0H1kvlP1B,0*42
10:33:30	1135	B	17	!AIVDM,1,1,,B,A02B`i1b3Qba02J`J@L`3wspwhTAwO?wGA?uGP86,0*79
10:33:40	1510	A	17	!AIVDM,1,1,,A,A02B`i1b3Qba02J`JGd`5?q1wmtHwdGwH1kvlguB,0*2A
10:33:50	1885	B	17	!AIVDM,1,1,,B,A02B`i1b3Qba02J`JTd`3wsmwPTAwOH1GA?uHh46,0*6A

d)		
Requirement	Result	Verdict
Discontinue the input of RTCM data.	The RTCM data applied to the EUT is stopped by disconnecting the differential beacon receiver.	-
Confirm that the EUT continues transmitting Message 17 over the VDL for 1 min then stops transmission.	The EUT does not maintain transmissions of Message 17 for 1 minute after the cessation of RTCM input. Typically, stations that use this correction data will store the most recent data for 1 minute. Given the ageing of this data and hence the resulting accuracy of the DGNSS, it is acceptable that the EUT does not transmit old correction data for 1 minute.	Pass

e)		
Requirement	Result	Verdict
Disable the transmission schedule for Message 17 using an ECB sentence.	The ECB sentence applied to the EUT is: $ABECB,1234,17,0,-1,,,0,-1,,,C*2A	-
Confirm that the ECB was received correctly by the EUT using the query sentence for the ECB sentence.	The EUT responds to the $ABABQ,ECB*39 query with: $ABECB,1234,17,0,-1,750,2,0,-1,750,2,R*3B	Pass

f)		
Requirement	Result	Verdict
Apply correction data in RTCM 10402 format on a dedicated port for a period of at least 1 min.	DGNSS correction data is successfully applied to the EUT, as seen by the EUT clearing ALR ID 038: $ABALR,093925.00,038,**V**,V,AIS: DGNSS input failed*18	-
Confirm that the EUT does not transmit Message 17 over the VDL.	The EUT does not transmit Message 17 over the VDL after the transmission schedule is disabled.	Pass

3 Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
AIS Test Unit	Attingimus	MK II	4057	-	O/P MON
AIS Base Station	SAAB	R40	S/N:5006	-	O/P MON
Power Supply	Rohde & Schwarz	HMP2020	4735	-	O/P MON
GNSS Simulator	Spirent	GSS7000	4978	12	21-Jun-2020

O/P MON – Output Monitored using calibrated equipment

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Synchronisation Accuracy	± 30 µs

Table 5

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.