

Operational and Performance Testing of the

SAAB R60 AIS AtoN Station and R60 VDES Base Station in accordance with IEC 62320-2 :2016

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Authorised Signatory	Nic Forsyth	08 August 2022	

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 62320-2:2016



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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 August 2022

Table 1

1.2 Introduction

Applicant	Saab AB (publ.) TransponderTech
Manufacturer	Saab AB (publ.) TransponderTech
Model Number(s)	R60 AIS AtoN Station R60 VDES Base Station
Serial Number(s)	100002
Hardware Version(s)	A
Software Version(s)	1.0.3t
Number of Samples Tested	1
Test Specification/Issue/Date	IEC 62320-2:2016
Order Number	DK-16
Date	30 March 2022
Date of Receipt of EUT	06-November-2019
Start of Test	13-April-2022
Finish of Test	01-June-2022
Name of Engineer(s)	Matthew Bushell



1.3 Brief Summary of Results

Section	Specification Clause	Test Description	Mod State	Result
2.1	8.1.2	Configuration for Message 21	1	Pass
2.2	8.1.3	Schedule mode A FATDMA Message 21 (single report, alternating channel operation)	1	Pass
2.3	8.1.4	Schedule mode B FATDMA Message 21 (dual report, dual channel operation)	0	Pass
2.4	8.1.5	Schedule mode C FATDMA Message 21 (single report, single channel operation)	0	Pass
2.5	8.1.6	Schedule mode A RATDMA Message 21 (Type 3) (single report, alternating channel operation)	1	Pass
2.6	8.1.7	Schedule mode B RATDMA Message 21 (Type 3) (dual report, dual channel operation)	-	N/A
2.7	8.1.8	Schedule mode C RATDMA Message 21 (Type 3) (single channel operation)	-	N/A

Table 2 - Tests carried out in accordance with IEC 62320-2 Edition 2.0

N/A - Not Applicable



1.4 Application Form

Equipment Description

Technical Description: (Please provide a brief description of the intended use of the equipment)	Fixed receiving and transmitting AIS unit for operation on the maritime band
Manufacturer:	Saab AB (publ.) Transponder Tech
Model:	R60 AIS AtoN Station and R60 VDES Base Station
Part Number:	7000 120-100
Hardware Version:	A
Software Version:	0.9.7

Table 3

Type of Equipment

Fixed Station ☒	Transmitter ☒ Receiver ☒	Simplex ☒ Duplex ☐	Integral Antenna ☐ Single Antenna ☒
Mobile Station ☐	Transceiver ☐		Two Antenna Connector ☐ Multiple Antenna Connectors ☐ Number:
Portable Station ☐			
Transponder (Tag) ☐	Active ☐ Passive ☐		

Table 4

Transmitter Technical Characteristics – Frequency Characteristics

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

Table 5

Transmitter RF Power Characteristics - Maximum rated transmitter output

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

Table 6

Transmitter RF Power Characteristics - Minimum rated transmitter output

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

Table 7



Transmitter RF Power Characteristics - Other

Antenna Gain:			dBi N/A		
Is transmitter intended for:					
Continuous duty: Yes ☐ No ☒					
Intermittent duty only: Yes ☒ No ☐					
If intermittent duty state DUTY CYCLE:					
Transmitter ON:	0.053	seconds	Transmitter OFF:	60	seconds

Table 8

Transmitter Modulation

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

Table 9

Receiver Technical Characteristics – Frequency Characteristics

Receiver frequency alignment range:		155 – 163 MHz						
Receiver channel switching frequency:		25 kHz						
Channel separation (if applicable):		25 kHz						
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

Table 10

AC Power Source

Supply frequency:	50/60	Hz	100/240	V	Max current:	2	A
Single phase ☒ Three phase ☐							

Table 11

DC Power Source

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

Table 12



Battery Power Source

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:	

Table 13

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

Table 14

Cable Loss

Adapter Cable Loss (Conducted sample)	N/A	dB
--	-----	----

Table 15

Automatic Equipment Switch Off

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 ☐	

Table 16

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

Table 17

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

Name: Peter Mattsson

Position held: Product Development Manager

Date: 12 April 2022



1.5 Product Information

1.5.1 Technical Description

The SAAB R60 Station can be configured for various applications and tasks within the AIS, it can be configured as AIS Base Station, AIS AtoN Station and AIS Receiving station or combinations of above.

The R60 Aids-to-Navigation (AtoN) Station is designed for marking of offshore maritime installations, such as wind energy farms, navigational aids and hazards. The R60 AtoN receives AIS data from all AIS units within the VHF coverage area and transmits information of Navigational Aids and Isolated Dangers within the same area. The R60 AtoN is a valuable tool in increasing the situation awareness and the efficiency of operations and safety.

The SAAB R60 Base Station is used in shore based installations to communicate with 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.

The SAAB R60 Base Station can additionally be configured to provide Aids-to-Navigation services in parallel with the base station operation.

1.6 Deviations from the Standard

Testing under Clauses 8.1.7 and 8.1.8 was deemed not applicable to R60 VDES Base Station as this AtoN is designed for continuous reporting from higher structures with sufficient energy supply and no sleep modes. Please refer to Manufacturer's information for further clarification.

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
Model: R60 VDES, Serial Number: 100002				
0	0.9.7	As supplied by the customer	Not Applicable	Not Applicable
1	1.0.3t	Functionality to ensure that a synthetic or virtual Aids-to-Navigation target cannot be transmitted if the MMSI is configured to 000000000	TUV SUD	28-April-2022

Table 18 – A record of modifications made by the manufacturer



1.8 Test Location

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

Test Description	Name of Engineer(s)	Accreditation
Configuration for Message 21	Matthew Bushell	UKAS
Schedule mode A FATDMA Message 21 (single report, alternating channel operation)	Matthew Bushell	UKAS
Schedule mode B FATDMA Message 21 (dual report, dual channel operation)	Matthew Bushell	UKAS
Schedule mode C FATDMA Message 21 (single report, single channel operation)	Matthew Bushell	UKAS
Schedule mode A RATDMA Message 21 (Type 3) (single report, alternating channel operation)	Matthew Bushell	UKAS

Table 19 – Test Engineers and Accreditation of Testing

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom



2 Test Details

2.1 Configuration for Message 21

2.1.1 Specification Reference

IEC 62320-2, Clause 8.1.2

2.1.2 Equipment Under Test and Modification State

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

2.1.3 Date of Test

13-April-2022 to 29-April 2022

2.1.4 Test Results and Methods of Measurement

Purpose – Clause 8.1.2.1

The purpose of this test is to ensure that Message 21 parameters can be entered into the EUT and are retained after the power off/on cycle.

Method of Measurement

Set up the standard test environment.

- a) With the MMSI of EUT set to 000000000, configure a valid transmission schedule for Message 21, using the CBR sentence with MMSI in the first field set to 000000000 to match the MMSI of EUT.
- b) Configure the EUT with the following parameters for transmission of Message 21:
 - MMSI number: 991234567;
 - type of AtoN: “20” – cardinal mark north;
 - name of AtoN: “TEST FLOATING AIS ATON STATION”;
 - position accuracy: to accuracy of EPFS;
 - assigned position (longitude and latitude): “within off-position threshold of current EPFS position”;
 - dimension/reference for position: “A=B=C=D=5”;
 - type of EPFS: Enter EUT’s EPFS type (for example “1” for GPS);
 - off-position threshold: 200 m;
 - set power level;
 - channel 1 set to channel 2087; if receiver supported, set channel 1 receiver to same;
 - channel 2 set to channel 2088; if receiver supported, set channel 2 receiver to same;
 - Virtual AtoN flag set to 0 = default = Real AtoN at indicated position;
 - set AtoN status default (00000000);
 - off-position behaviour set to “maintain current transmission schedule”;
 - set UTC lost behaviour as per manufacturer’s declaration;
 - read configuration from EUT.
- c) Remove power from the EUT for 5 min. Switch on the EUT. Read configuration from EUT.

Required Results

Verify that configuration is:

- a) not accepted by EUT and the EUT does not start transmission of Message 21;
- b) accepted by EUT and that the parameters have been correctly set;
- c) retained after power cycle.



Test Results

a)		
Requirement	Result	Verdict
With the MMSI of EUT set to 000000000, configure a valid transmission schedule for Message 21, using the CBR sentence with MMSI in the first field set to 000000000 to match the MMSI of EUT.	The EUT does not broadcast Message 21 when the MMSI of the base station and the MMSI of the AtoN is set to 0000000.	Pass

b)		
Requirement	Result	Verdict
MMSI number: 991234567;	MMSI was set to 991234567.	Pass
type of AtoN: "20" – cardinal mark north;	AtoN type was set to 20	Pass
name of AtoN: "TEST FLOATING AIS ATON STATION";	Name was broken into two parts due to length. Please see table below.	Pass
position accuracy: to accuracy of EPFS;	The position accuracy flag for Message 21 was set to high accuracy (same as the EUT)	Pass
Assigned position (longitude and latitude): "within off-position threshold of current EPFS position";	Position of the AtoN was set to Long 2 W0 0.00, Lat 51 N 50.00 As the AtoN is being produced by a base station it will only be at this point and not change.	Pass
dimension/reference for position: "A=B=C=D=5";	Dimension set to 5,5,5,5	Pass
type of EPFS: Enter EUT's EPFS type (for example "1" for GPS);	EPFS type was 1	Pass
off-position threshold: 200 m;	Off-position was set to active but no way to set it to 200m. there is no way to see what the current threshold is,	Pass
set power level;	No way to set the power from the AtoN interface. The EUT only functions through the web interface and proprietary sentences. There is no option in either of these to change the power level of AtoN's, ACF sentences do not work.	Pass
channel 1 set to channel 2087; if receiver supported, set channel 1 receiver to same;	First message 21 transmitted on channel A 2087	Pass
channel 2 set to channel 2088; if receiver supported, set channel 2 receiver to same;	Second message 21 transmitted on channel B 2088	Pass
Virtual AtoN flag set to 0 = default = Real AtoN at indicated position;	AtoN was set as a real AtoN at indicated position.	Pass
set AtoN status default (00000000);	Default status was set to 00000000 and output as 00000000 on the logs	Pass
off-position behaviour set to "maintain current transmission schedule";	Current schedule was maintained.	Pass
set UTC lost behaviour as per manufacturer's declaration;	UTC set to manufacturers' specification	Pass



read configuration from EUT.	EUT can be queried for the 3 parts that make up AtoN's with the following proprietary sentences. \$PSTT,201,230 \$PSTT,201,231 \$PSTT,201,233 If these sentences are sent to the EUT you get the following back. \$PSTT,230,1,0,000000000,180,500,20,1,TEST FLOATING AIS ATON STATION*03 \$PSTT,231,0,5150.0000,N,00200.0000,W,1,1,0,0,0,005 ,005,05,05,61,1,00*2F \$PSTT,233,0,1,200,6750,4,300,6750*05	Pass
------------------------------	---	------



b) Position Report Transmitted by EUT		
!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0bOsK20>m6<050``vh03k'4m0E2CkP,0*7C		
Parameter	Decoded Value	Comments
Message ID	21	
Repeat Indicator	0	
MMSI	991234567	
Type of aids-to navigation	20 - Floating AtoN - Cardinal Mark N	
Name of Aids to Navigation	TEST FLOATING AIS A	
Position accuracy	1	
Longitude	2 0 W	
Latitude	51 50 N	
Dimension/reference for position	5,5,5,5	
Type of EPFS	1 - GPS	
Time stamp	61	
Off Position indicator	1 - Off position	The off position was checked on in the web interface. There were no other options to change the threshold.
AtoN Status	0	
RAIM flag	0	
Virtual AtoN flag	0 - Real AtoN at indicated position	
Assigned mode flag	0 - Station operating in autonomous and continuous mode (Default)	
Spare	0	
Name of Aid to Navigation Extension	ON STATION	

c)		
Requirement	Result	Verdict
Remove power from the EUT for 5 min. Switch on the EUT. Read configuration from EUT.	The EUT lists the AtoN's when requested after a period of more than 5 minutes of being powered off.	Pass
Time	Sentence	Comment
12:02:36	\$PSTT,201,230*01	Proprietary sentence Query sentence sent to EUT by PI the 201 is for a query sentence the 230 is for AtoN's.
12:02:36	\$PSTT,230,0,0,991234567,180,500,20,1,TEST FLOATING AIS ATON STATION*02	Both AtoN's that were created are listed correctly.
12:02:36	\$PSTT,230,1,0,000000000,180,500,20,1,TEST FLOATING AIS ATON STATION*03	



2.2 Schedule Mode A FATDMA Message 21 (single report, alternating channel operation)

2.2.1 Specification Reference

IEC 62320-2, Clause 8.1.3

2.2.2 Equipment Under Test and Modification State

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

2.2.3 Date of Test

04-May-2022

2.2.4 Test Results and Methods of Measurement

Purpose – Clause 8.1.3.1

Test that the AIS AtoN Station operates in accordance with the configured reporting schedule (see 5.2.5.2).

Method of Measurement

Set up the standard test environment and use the configuration as defined in 8.1.2.

a) Configure reporting of Message 21 to have the following parameters:

- start on channel 2;
- start slot: 512;
- reporting interval: 3 min;
- frame for the first transmission in every UTC hour: UTC minute: 1;
- start the EUT 2 min ahead of a schedule transmission.

b) Run the test over the hour and day boundary.

If synthetic and virtual AIS AtoN Message 21 reports are implemented (see 5.2.2.1.2):

c) Change the configuration of the EUT to be a synthetic AIS AtoN. Repeat the test.

d) Change the configuration of the EUT to be a virtual AIS AtoN. Repeat the test.

e) Repeat test a). Apply Message 20 on channel A and B reserving the slots assigned for FATDMA transmission.

Required Results

Verify that the:

a) EUT transmits Test Message 21 in the configured slots on both channels. EUT starts transmission in the correct UTC frames and alternates channels at the reporting interval within one reporting interval (3 min in this case), and should not wait until UTC minute 1. (The channel 1 transmissions shall occur in minutes 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58

with an increment of 6 min; the channel 2 transmissions shall occur in minutes 1, 7, 13, etc. with an increment of 6 min);

b) reporting behaviour is consistent through the hour and day boundaries and transmitted data is correct;

If synthetic and virtual AIS AtoN Message 21 reports are implemented:

c) Message 21 repeat indicator is 1;

d) Message 21 virtual flag is set;

e) EUT continues transmission of Message 21 using the reserved slots.



Test Results

a) Configure reporting of Message 21		
Requirement	Result	Verdict
EUT transmits Test Message 21 in the configured slots on both channels.	The EUT transmits a Message 21 on the configured slot on both channels.	Pass
EUT starts transmission in the correct UTC frames and alternates channels at the reporting interval within one reporting interval (3 min in this case)	The EUT transmits a Message 21 on alternating channels every 3 minutes	Pass
The channel 1 transmissions shall occur in minutes 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58 with an increment of 6 min	Channel A transmissions follow correctly the sequence of transmissions every 6 minutes	Pass
the channel 2 transmissions shall occur in minutes 1, 7, 13, etc. with an increment of 6 min	Channel B transmissions follow correctly the sequence of transmissions every 6 minutes	Pass

Time	Sentence	Chan	Slot
10:31:13	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*06	B	512
10:34:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	512
10:37:13	!AIVDM,1,1,5,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	B	512
10:40:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0F	A	512
10:43:13	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	B	512
10:46:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	A	512
10:49:13	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*06	B	512
10:52:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	512
10:55:13	!AIVDM,1,1,7,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	B	512
10:58:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512
11:01:13	!AIVDM,1,1,5,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	B	512
11:04:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0F	A	512
11:07:13	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	B	512
11:10:13	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*05	A	512
11:13:13	!AIVDM,1,1,8,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*07	B	512
11:16:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0B	A	512
11:19:13	!AIVDM,1,1,6,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*09	B	512
11:22:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	A	512
11:25:13	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	B	512
11:28:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	512
11:31:13	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*06	B	512
11:34:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0B	A	512
11:37:13	!AIVDM,1,1,4,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0B	B	512
11:40:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0F	A	512



b) Run the test over the hour and day boundary.		
Requirement	Result	Verdict
reporting behaviour is consistent through the hour and day boundaries and transmitted data is correct;	The EUT continues to correctly report Message 21 in their assigned slots and timing, over the hour and day boundary	Pass

Time	Sentence	Chan	Slot
23:43:13	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	B	512
23:46:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	A	512
23:49:13	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	512
23:52:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	512
23:55:13	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*06	B	512
23:58:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	512
00:01:13	!AIVDM,1,1,7,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	B	512
00:04:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512
00:07:13	!AIVDM,1,1,5,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	B	512
00:10:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	A	512
00:13:13	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	B	512
00:16:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	A	512
00:19:13	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	512
00:22:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	512
00:25:13	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*06	B	512
00:28:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	512
00:31:13	!AIVDM,1,1,7,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	B	512
00:34:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512
00:37:13	!AIVDM,1,1,5,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	B	512

c) Change the configuration of the EUT to be a synthetic AIS AtoN.		
Requirement	Result	Verdict
Message 21 repeat indicator is 1;	The Message 21 repeat indicator sent by the EUT was set to 1	Pass



c) Message Decode	
!AIVDM,1,1,8,B,ENiD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*77	
Parameter	Decoded Value
Message ID	21
Repeat Indicator	1
MMSI	991234567
Type of aids-to navigation	20 - Floating AtoN - Cardinal Mark N
Name of Aids to Navigation	TEST FLOATING AIS A
Position accuracy	0
Longitude	2 0 W
Latitude	51 50 N
Dimension/reference for position	5,5,5,5
Type of EPFS	1 - GPS
Time stamp	61
Off Position indicator	1 - Off position
AtoN Status	0
RAIM flag	0
Virtual AtoN flag	0 - Real AtoN at indicated position
Assigned mode flag	0 - Station operating in autonomous and continuous mode (Default)
Spare	0
Name of Aid to Navigation Extension	ON STATION



d) Change the configuration of the EUT to be a virtual AIS AtoN		
Requirement	Result	Verdict
Message 21 virtual flag is set.	The virtual flag is correctly set on all message 21 transmission during the test.	Pass

d) Message Decode	
!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh13k`4m0E2CkP,0*05	
Parameter	Decoded Value
Message ID	21
Repeat Indicator	0
MMSI	991234567
Type of aids-to navigation	20 - Floating AtoN - Cardinal Mark N
Name of Aids to Navigation	TEST FLOATING AIS A
Position accuracy	0
Longitude	2 0 W
Latitude	51 50 N
Dimension/reference for position	5,5,5,5
Type of EPFS	1 - GPS
Time stamp	61
Off Position indicator	1 - Off position
AtoN Status	0
RAIM flag	0
Virtual AtoN flag	1 - Virtual AtoN, does not physically exist
Assigned mode flag	0 - Station operating in autonomous and continuous mode (Default)
Spare	0
Name of Aid to Navigation Extension	ON STATION

e) Apply Message 20 on channel A and B reserving the slots assigned for FATDMA transmission		
Requirement	Result	Verdict
EUT continues transmission of Message 21 using the reserved slots	The EUT continues to transmit message 21 on slot 512 on both channels, after it has been reserved by a message 20.	Pass



Time	Sentence	Chan	Slot	MMSI
13:07:13	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*06	B	512	991234567
13:10:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*04	A	512	991234567
13:11:00	!AIVDM,1,1,3,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4A	A	1	2402500
13:11:00	!AIVDM,1,1,5,B,D02B`i0NhN00,0*45	B	20	2402500
13:12:00	!AIVDM,1,1,1,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*48	A	1	2402500
13:12:00	!AIVDM,1,1,3,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*78	B	20	2402500
13:13:00	!AIVDM,1,1,9,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*40	A	1	2402500
13:13:00	!AIVDM,1,1,1,B,D02B`i0NhN00,0*41	B	20	2402500
13:13:13	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*0C	B	512	991234567
13:14:00	!AIVDM,1,1,9,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*72	B	20	2402500
13:15:00	!AIVDM,1,1,5,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4C	A	1	2402500
13:15:00	!AIVDM,1,1,7,B,D02B`i0NhN00,0*47	B	20	2402500
13:16:00	!AIVDM,1,1,3,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4A	A	1	2402500
13:16:00	!AIVDM,1,1,5,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*7E	B	20	2402500
13:16:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*0B	A	512	991234567
13:17:00	!AIVDM,1,1,2,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4B	A	1	2402500
13:17:00	!AIVDM,1,1,4,B,D02B`i0NhN00,0*44	B	20	2402500
13:18:00	!AIVDM,1,1,0,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*49	A	1	2402500
13:18:00	!AIVDM,1,1,2,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*79	B	20	2402500
13:19:00	!AIVDM,1,1,8,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*41	A	1	2402500
13:19:00	!AIVDM,1,1,0,B,D02B`i0NhN00,0*40	B	20	2402500
13:19:13	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*0D	B	512	991234567
13:20:00	!AIVDM,1,1,7,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4E	A	1	2402500
13:20:00	!AIVDM,1,1,9,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*72	B	20	2402500
13:21:00	!AIVDM,1,1,5,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4C	A	1	2402500
13:21:00	!AIVDM,1,1,7,B,D02B`i0NhN00,0*47	B	20	2402500
13:22:00	!AIVDM,1,1,3,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4A	A	1	2402500
13:22:00	!AIVDM,1,1,5,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*7E	B	20	2402500
13:22:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*0B	A	512	991234567
13:23:00	!AIVDM,1,1,2,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4B	A	1	2402500
13:23:00	!AIVDM,1,1,4,B,D02B`i0NhN00,0*44	B	20	2402500
13:24:00	!AIVDM,1,1,0,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*49	A	1	2402500
13:24:00	!AIVDM,1,1,2,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*79	B	20	2402500
13:25:00	!AIVDM,1,1,8,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*41	A	1	2402500
13:25:00	!AIVDM,1,1,0,B,D02B`i0NhN00,0*40	B	20	2402500
13:25:13	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*0D	B	512	991234567
13:26:00	!AIVDM,1,1,7,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4E	A	1	2402500
13:26:00	!AIVDM,1,1,9,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*72	B	20	2402500
13:27:00	!AIVDM,1,1,5,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4C	A	1	2402500
13:27:00	!AIVDM,1,1,7,B,D02B`i0NhN00,0*47	B	20	2402500
13:28:00	!AIVDM,1,1,3,A,D02B`i001N2i0EN2i0aN2i0uN2i,2*4A	A	1	2402500
13:28:00	!AIVDM,1,1,5,B,D02B`i005N2i0MN2i0iN2i1AN2i,2*7E	B	20	2402500
13:28:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sk20>m6<050``vh03k`4m0E2CkP,0*0B	A	512	991234567



13:29:00	!AIVDM,1,1,2,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4B	A	1	2402500
13:29:00	!AIVDM,1,1,4,B,D02B`i0NhN00,0*44	B	20	2402500
13:30:00	!AIVDM,1,1,0,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*49	A	1	2402500
13:30:00	!AIVDM,1,1,2,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*79	B	20	2402500
13:31:00	!AIVDM,1,1,7,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4E	A	1	2402500
13:31:00	!AIVDM,1,1,9,B,D02B`i0NhN00,0*49	B	20	2402500
13:31:13	!AIVDM,1,1,1,B,E>ID:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	512	991234567
13:32:00	!AIVDM,1,1,6,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4F	A	1	2402500
13:32:00	!AIVDM,1,1,8,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*73	B	20	2402500
13:33:00	!AIVDM,1,1,4,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4D	A	1	2402500
13:33:00	!AIVDM,1,1,6,B,D02B`i0NhN00,0*46	B	20	2402500
13:34:00	!AIVDM,1,1,2,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4B	A	1	2402500
13:34:00	!AIVDM,1,1,4,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7F	B	20	2402500
13:34:13	!AIVDM,1,1,6,A,E>ID:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512	991234567
13:35:00	!AIVDM,1,1,1,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*48	A	1	2402500
13:35:00	!AIVDM,1,1,3,B,D02B`i0NhN00,0*43	B	20	2402500
13:36:00	!AIVDM,1,1,9,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*40	A	1	2402500
13:36:00	!AIVDM,1,1,1,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7A	B	20	2402500
13:37:00	!AIVDM,1,1,7,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4E	A	1	2402500
13:37:00	!AIVDM,1,1,9,B,D02B`i0NhN00,0*49	B	20	2402500
13:37:13	!AIVDM,1,1,1,B,E>ID:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	512	991234567
13:38:00	!AIVDM,1,1,6,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4F	A	1	2402500
13:38:00	!AIVDM,1,1,8,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*73	B	20	2402500
13:39:00	!AIVDM,1,1,4,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4D	A	1	2402500
13:39:00	!AIVDM,1,1,6,B,D02B`i0NhN00,0*46	B	20	2402500
13:40:00	!AIVDM,1,1,2,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4B	A	1	2402500
13:40:00	!AIVDM,1,1,4,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7F	B	20	2402500
13:40:13	!AIVDM,1,1,6,A,E>ID:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512	991234567
13:41:00	!AIVDM,1,1,1,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*48	A	1	2402500
13:41:00	!AIVDM,1,1,3,B,D02B`i0NhN00,0*43	B	20	2402500
13:42:00	!AIVDM,1,1,9,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*40	A	1	2402500
13:42:00	!AIVDM,1,1,1,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7A	B	20	2402500
13:43:00	!AIVDM,1,1,7,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4E	A	1	2402500
13:43:00	!AIVDM,1,1,9,B,D02B`i0NhN00,0*49	B	20	2402500
13:43:13	!AIVDM,1,1,1,B,E>ID:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	512	991234567
13:44:00	!AIVDM,1,1,6,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4F	A	1	2402500
13:44:00	!AIVDM,1,1,8,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*73	B	20	2402500
13:45:00	!AIVDM,1,1,4,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4D	A	1	2402500
13:45:00	!AIVDM,1,1,6,B,D02B`i0NhN00,0*46	B	20	2402500
13:46:00	!AIVDM,1,1,2,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4B	A	1	2402500
13:46:00	!AIVDM,1,1,4,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7F	B	20	2402500
13:46:13	!AIVDM,1,1,6,A,E>ID:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512	991234567
13:47:00	!AIVDM,1,1,1,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*48	A	1	2402500
13:47:00	!AIVDM,1,1,3,B,D02B`i0NhN00,0*43	B	20	2402500
13:48:00	!AIVDM,1,1,9,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*40	A	1	2402500



13:48:00	!AIVDM,1,1,1,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7A	B	20	2402500
13:49:00	!AIVDM,1,1,7,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4E	A	1	2402500
13:49:00	!AIVDM,1,1,9,B,D02B`i0NhN00,0*49	B	20	2402500
13:49:13	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	512	991234567
13:50:00	!AIVDM,1,1,5,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4C	A	1	2402500
13:50:00	!AIVDM,1,1,7,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*7C	B	20	2402500
13:51:00	!AIVDM,1,1,2,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4B	A	1	2402500
13:51:00	!AIVDM,1,1,4,B,D02B`i0NhN00,0*44	B	20	2402500
13:52:00	!AIVDM,1,1,0,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*49	A	1	2402500
13:52:00	!AIVDM,1,1,2,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*79	B	20	2402500
13:52:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	A	512	991234567
13:53:00	!AIVDM,1,1,8,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*41	A	1	2402500
13:53:00	!AIVDM,1,1,0,B,D02B`i0NhN00,0*40	B	20	2402500
13:54:00	!AIVDM,1,1,6,A,D02B`i001N2I0EN2I0aN2I0uN2I,2*4F	A	1	2402500
13:54:00	!AIVDM,1,1,8,B,D02B`i005N2I0MN2I0iN2I1AN2I,2*73	B	20	2402500



2.3 Schedule Mode B FATDMA Message 21 (dual port, dual channel operation)

2.3.1 Specification Reference

IEC 62320-2, Clause 8.1.4

2.3.2 Equipment Under Test and Modification State

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

2.3.3 Date of Test

24-May-2022

2.3.4 Test Results and Methods of Measurement

Purpose – Clause 8.1.4.1

Test that the AIS AtoN station operates in accordance with configured reporting schedule 5.2.5.3.1 and transmits correct data.

Method of Measurement

Setup the standard test environment and use the configuration as defined in 8.1.2.

a) Configure reporting of Message 21 to have the following parameters:

- start channel 1: start slot 512;
- channel 2: start slot: 612;
- reporting interval: 3 min,
- frame for the first transmission in every UTC hour: UTC minute 2;
- start the EUT 2 min ahead of a schedule transmission.

b) Run the test over the hour and day boundary.

Required Results

Verify that the:

a) EUT transmits Test Message 21 in the configured slots on both channels. EUT starts transmission in the correct UTC frame and continues with the correct increment within one reporting interval and should not wait until UTC minute 2;

b) reporting behaviour is consistent through the hour and day boundaries and transmitted data is correct.



Test Results

a) Apply a BBM Message in Dependent Mode		
Requirement	Result	Verdict
EUT transmits Test Message 21 in the configured slots on both channels. EUT starts transmission in the correct UTC frame and continues with the correct increment within one reporting interval and should not wait until UTC minute 2.	The EUT correctly maintains its reporting interval with the correct slots of 512 for channel A and 612 for channel B.	Pass

Time	Sentence	Chan	Slot
12:44:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	A	512
12:44:16	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	B	612
12:47:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	A	512
12:47:16	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	B	612
12:50:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	A	512
12:50:16	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	B	612
12:53:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	A	512
12:53:16	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	B	612
12:56:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	A	512
12:56:16	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	B	612
12:59:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	A	512
12:59:16	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	B	612
13:02:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2B	A	512
13:02:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2B	B	612
13:05:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2B	A	512
13:05:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2B	B	612
13:08:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	A	512
13:08:16	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	B	612
13:11:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	A	512
13:11:16	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	B	612
13:14:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	A	512
13:14:16	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	B	612
13:17:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	A	512
13:17:16	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	B	612
13:20:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*28	A	512
13:20:16	!AIVDM,1,1,3,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``Ph03k`4m0E2CkP,0*2A	B	612



b) Run the test over the hour and day boundary.		
Requirement	Result	Verdict
reporting behaviour is consistent through the hour and day boundaries and transmitted data is correct.	The EUT maintains same reporting rate after the hour and day boundary.	Pass

Time	Sentence	Chan	Slot
23:47:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
23:47:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
23:50:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
23:50:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
23:53:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
23:53:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
23:56:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
23:56:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
23:59:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
23:59:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:02:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:02:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:05:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:05:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:08:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:08:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:11:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:11:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:14:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:14:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:17:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:17:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:20:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512
00:20:16	!AIVDM,1,1,2,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	B	612
00:23:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050````Ph03k`4m0E2CkP,0*2B	A	512



2.4 Schedule Mode C FATDMA Message 21 (single port, single channel operation)

2.4.1 Specification Reference

IEC 62320-2, Clause 8.1.5

2.4.2 Equipment Under Test and Modification State

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

2.4.3 Date of Test

22-April-2022

2.4.4 Test Results and Methods of Measurement

Purpose – Clause 8.1.5.1

The purpose is to test that the AIS AtoN station operates in accordance with the configured reporting.

Method of Measurement

Setup the standard test environment and use the configuration as defined in 8.1.2.

a) Configure reporting of Message 21 to have the following parameters:

- transmit channel: A or B;
- start slot: 512;
- reporting interval: 3 min;
- frame for the first transmission in every UTC hour: UTC minute: 1;
- start the EUT 2 min ahead of a schedule transmission.

b) Run the test over the hour and day boundary.

Required Results

Verify that the:

- a) EUT transmits test Message 21 in the configured slots on the designated transmit channel, EUT starts transmission in the correct UTC frame on the designated transmit channel at the reporting interval within one reporting interval and should not wait until UTC minute 1;
- b) reporting behaviour is consistent through the hour and day boundaries and transmitted data is correct.



Test Results

a) Configure reporting of Message 21		
Requirement	Result	Verdict
EUT transmits test Message 21 in the configured slots on the designated transmit channel, EUT starts transmission in the correct UTC frame on the designated transmit channel at the reporting interval within one reporting interval and should not wait until UTC minute 1;	The EUT correctly maintains its reporting interval with the correct slot of 512 for channel A	Pass

Time	Sentence	Chan	Slot
17:31:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	A	512
17:34:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0F	A	512
17:37:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	A	512
17:40:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	A	512
17:43:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	512
17:46:13	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*05	A	512
17:49:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	512
17:52:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0B	A	512
17:55:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512
17:58:13	!AIVDM,1,1,5,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*09	A	512
18:01:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	A	512
18:04:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0F	A	512
18:07:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	A	512
18:10:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	A	512
18:13:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	512
18:16:13	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*05	A	512
18:19:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	512
18:22:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0B	A	512
18:25:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0A	A	512
18:28:13	!AIVDM,1,1,5,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*09	A	512
18:31:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*08	A	512
18:34:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0F	A	512
18:37:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	A	512
18:40:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0D	A	512
18:43:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	512



b) Run the test over the hour and day boundary.		
Requirement	Result	Verdict
reporting behaviour is consistent through the hour and day boundaries and transmitted data is correct.	The reporting rate remains the same after the hour and day boundary	Pass

Time	Sentence	Chan	Slot
23:46:13	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*05	A	512
23:49:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*04	A	512
23:52:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0B	A	512
23:55:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0A	A	512
23:58:13	!AIVDM,1,1,5,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*09	A	512
00:01:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*08	A	512
00:04:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0F	A	512
00:07:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0E	A	512
00:10:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0D	A	512
00:13:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0C	A	512
00:16:13	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*05	A	512
00:19:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*04	A	512
00:22:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0B	A	512
00:25:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0A	A	512
00:28:13	!AIVDM,1,1,5,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*09	A	512
00:31:13	!AIVDM,1,1,4,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*08	A	512
00:34:13	!AIVDM,1,1,3,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0F	A	512
00:37:13	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0E	A	512
00:40:13	!AIVDM,1,1,1,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0D	A	512
00:43:13	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0C	A	512
00:46:13	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*05	A	512
00:49:13	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*04	A	512
00:52:13	!AIVDM,1,1,7,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0B	A	512
00:55:13	!AIVDM,1,1,6,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*0A	A	512
00:58:13	!AIVDM,1,1,5,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050`vh03k`4m0E2CkP,0*09	A	512



2.5 Schedule Mode A RATDMA Message 21 (Type 3) (single report, alternating channel operation)

2.5.1 Specification Reference

IEC 62320-2, Clause 8.1.6

2.5.2 Equipment Under Test and Modification State

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

2.5.3 Date of Test

29-April-2022 – 01-June-2022

2.5.4 Test Results and Methods of Measurement

Purpose – Clause 8.1.6.1

The purpose of this test is to ensure that the EUT can be configured to operate in accordance with 5.2.4.2, ensuring the selection interval is random within the 1 min interval and that the slot reuse algorithm is properly implemented.

Method of Measurement

Set up the standard test environment and use the configuration as defined in 8.1.2 with a VDL loading of 10 %.

- a) Configure reporting of Message 21 with the following parameters:
 - FATDMA setup or RATDMA setup: RATDMA;
 - UTC minute for CH1: 1;
 - UTC minute for CH2: 4;
 - time interval CH1: 360 (6 min);
 - time interval CH2: 360 (6 min).
- b) Apply a VDL load that necessitates intentional slot reuse and repeat the test;
- c) Apply invalid RATDMA reporting intervals for transmission of Message 21. The valid intervals are defined in 5.2.3;
- d) Configure the AtoN with the highest possible reporting rate. Apply Message 20 reserving 50 % of the slots including the RATDMA selection interval. Run the test for 12 hours;
- e) Apply an SPO sentence to activate a VSI and FSR sentence. Apply some targets to the VDL.



Required Results

Verify that the:

- a) EUT transmits test Message 21:
- using RATDMA so that the slot selection is random within the correct frames, and alternates the transmission channel between successive reports;
 - with the correct reporting intervals;
 - with the correct data.

EUT selects its slots randomly;

b) EUT applies the slot reuse algorithm as defined in Recommendation ITU-R M.1371;

c) invalid reporting intervals are not accepted;

d) slots reserved by Message 20 are not used for the transmission of Message 21 for at least 12 h. Using means declared by the manufacturer, verify that the receiver remains on for 7 min at least once every 12 h;

e) Verify that the information provided in the VSI and FSR sentences are in accordance with the manufacturer's documentation.

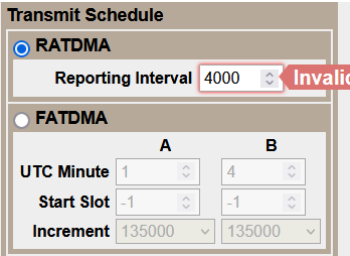
Test Results

a) Configure reporting of Message 21		
Requirement	Result	Verdict
EUT transmits test Message 21	EUT successfully transmits Message 21	Pass
EUT continues to transmit with 10% VDL load.	The EUT continues to transmit to the schedule set by the AtoN settings, under 10% VDL load.	Pass
using RATDMA so that the slot selection is random within the correct frames, and alternates the transmission channel between successive reports;	The Message 21 transmission alternates between channels A and B. There is a 185-slot difference between the highest and lowest slot transmission, which confirms that the reporting rate is consistent for a RATDMA transmission.	Pass
with the correct reporting intervals;	EUT reports every 6 minutes	Pass
with the correct data.	The message contains the correct data that was setup in test in Clause 8.1.2	Pass
EUT selects its slots randomly;	There is no indication of slots being selected in an order and each slot is different with no indication of a pattern.	Pass

Time	Sentence	Chan	Slot
10:23:11	!AIVDM,1,1,2,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	A	439
10:29:11	!AIVDM,1,1,4,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0B	B	434
10:35:11	!AIVDM,1,1,9,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*05	A	425
10:41:10	!AIVDM,1,1,1,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0E	B	375
10:47:10	!AIVDM,1,1,0,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*0C	A	375
10:53:10	!AIVDM,1,1,9,B,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*06	B	350
10:59:09	!AIVDM,1,1,8,A,E>iD:1r:2ab@367Pb4W3h0Tah0b?sK20>m6<050``vh03k`4m0E2CkP,0*04	A	254

b) Apply a VDL load that necessitates intentional slot reuse		
Requirement	Result	Verdict
EUT applies the slot reuse algorithm as defined in Recommendation ITU-R M.1371	The VDL had 75 targets sent to it with a slot gap of 4 between the first and last transmission. The AtoN used the same slots more than once between slot A and B.	Pass



c) Apply invalid RATDMA reporting intervals for transmission of Message 21		
Requirement	Result	Verdict
invalid reporting intervals are not accepted;	The EUT rejects the proprietary sentences, which contain invalid reporting rates. When an invalid reporting rate is entered and applied, the EUT's Web Interface displays an indication. The Web Interface would not allow the AtoN to be active until the invalid value is corrected.  Proprietary sentences rejected were as follows: \$PSTT,230,4,1,991234567,4000,0,20,1,TEST FLOATING AIS ATON STATION*3F \$PSTT,231,4,5150.0000,N,0200.0000,W,0,1,0,0,0,5,5,5,61,0*37 \$PSTT,233,4,1,-1,135000,4,-1,135000*00 The three sentences were sent to activate the AtoN. The Reporting rate was set to 4000 in the first message which meant the sentences were not actioned by the EUT.	Pass



d) Configure the AtoN with the highest possible reporting rate								
Requirement	Result							Verdict
slots reserved by Message 20 are not used for the transmission of Message 21 for at least 12 h.	The EUT was set with a reporting rate of 1 message a second for message 21.							
	The following slots were reserved by message 20							
	1 46	91	136	181	226	271	316	361
		406						
	2 47	92	137	182	227	272	317	362
		407						
	3 48	93	138	183	228	273	318	363
		408						
	4 49	94	139	184	229	274	319	364
		409						
	5 50	95	140	185	230	275	320	365
		410						
	6 51	96	141	186	231	276	321	366
		411						
	7 52	97	142	187	232	277	322	367
		412						
	8 53	98	143	188	233	278	323	368
		413						
	9 54	99	144	189	234	279	324	369
		414						
	10	55	100	145	190	235	280	325
		370	415					
	11	56	101	146	191	236	281	326
		371	416					
	12	57	102	147	192	237	282	327
		372	417					
	13	58	103	148	193	238	283	328
		373	418					
	14	59	104	149	194	239	284	329
		374	419					
	15	60	105	150	195	240	285	330
		375	420					
	16	61	106	151	196	241	286	331
		376	421					
	17	62	107	152	197	242	287	332
		377	422					
	18	63	108	153	198	243	288	333
		378	423					
	19	64	109	154	199	244	289	334
		379	424					
	20	65	110	155	200	245	290	335
		380	425					
	451	496	541	586	631	676	721	766
		811	856					
	452	497	542	587	632	677	722	767
		812	857					
	453	498	543	588	633	678	723	768
		813	858					
	454	499	544	589	634	679	724	769
		814	859					
	455	500	545	590	635	680	725	770
		815	860					
	456	501	546	591	636	681	726	771
		816	861					
	457	502	547	592	637	682	727	772
		817	862					
	458	503	548	593	638	683	728	773
		818	863					
	459	504	549	594	639	684	729	774
		819	864					
	460	505	550	595	640	685	730	775
		820	865					
	461	506	551	596	641	686	731	776
		821	866					
	462	507	552	597	642	687	732	777
		822	867					
	463	508	553	598	643	688	733	778
		823	868					
	464	509	554	599	644	689	734	779
		824	869					
	465	510	555	600	645	690	735	780
		825	870					
	466	511	556	601	646	691	736	781
		826	871					
	467	512	557	602	647	692	737	782
		827	872					
	468	513	558	603	648	693	738	



783	828	873						
469	514	559	604	649	694	739	784	
	829	874						
470	515	560	605	650	695	740	785	
	830	875						
901	946	991	1036	1081	1126	1171	1216	
	1261	1306						
902	947	992	1037	1082	1127	1172	1217	
	1262	1307						
903	948	993	1038	1083	1128	1173	1218	
	1263	1308						
904	949	994	1039	1084	1129	1174	1219	
	1264	1309						
905	950	995	1040	1085	1130	1175	1220	
	1265	1310						
906	951	996	1041	1086	1131	1176	1221	
	1266	1311						
907	952	997	1042	1087	1132	1177	1222	
	1267	1312						
908	953	998	1043	1088	1133	1178	1223	
	1268	1313						
909	954	999	1044	1089	1134	1179	1224	
	1269	1314						
910	955	1000	1045	1090	1135	1180	1225	
	1270	1315						
911	956	1001	1046	1091	1136	1181	1226	
	1271	1316						
912	957	1002	1047	1092	1137	1182	1227	
	1272	1317						
913	958	1003	1048	1093	1138	1183	1228	
	1273	1318						
914	959	1004	1049	1094	1139	1184	1229	
	1274	1319						
915	960	1005	1050	1095	1140	1185	1230	
	1275	1320						
916	961	1006	1051	1096	1141	1186	1231	
	1276	1321						
917	962	1007	1052	1097	1142	1187	1232	
	1277	1322						
918	963	1008	1053	1098	1143	1188	1233	
	1278	1323						
919	964	1009	1054	1099	1144	1189	1234	
	1279	1324						
920	965	1010	1055	1100	1145	1190	1235	
	1280	1325						
1351	1396	1441	1486	1531	1576	1621	1666	
	1711	1756						
1352	1397	1442	1487	1532	1577	1622	1667	
	1712	1757						
1353	1398	1443	1488	1533	1578	1623	1668	
	1713	1758						
1354	1399	1444	1489	1534	1579	1624	1669	
	1714	1759						
1355	1400	1445	1490	1535	1580	1625	1670	
	1715	1760						
1356	1401	1446	1491	1536	1581	1626	1671	
	1716	1761						
1357	1402	1447	1492	1537	1582	1627	1672	
	1717	1762						
1358	1403	1448	1493	1538	1583	1628	1673	
	1718	1763						
1359	1404	1449	1494	1539	1584	1629	1674	
	1719	1764						
1360	1405	1450	1495	1540	1585	1630	1675	
	1720	1765						
1361	1406	1451	1496	1541	1586	1631	1676	
	1721	1766						
1362	1407	1452	1497	1542	1587	1632	1677	
	1722	1767						
1363	1408	1453	1498	1543	1588	1633	1678	
	1723	1768						
1364	1409	1454	1499	1544	1589	1634	1679	
	1724	1769						
1365	1410	1455	1500	1545	1590	1635	1680	
	1725	1770						
1366	1411	1456	1501	1546	1591	1636	1681	
	1726	1771						
1367	1412	1457	1502	1547	1592	1637	1682	
	1727	1772						
1368	1413	1458	1503	1548	1593	1638	1683	
	1728	1773						
1369	1414	1459	1504	1549	1594	1639	1684	
	1729	1774						
1370	1415	1460	1505	1550	1595	1640	1685	
	1730	1775						
1801	1846	1891	1936	1981	2026	2071	2116	
	2161	2206						
1802	1847	1892	1937	1982	2027	2072	2117	
	2162	2207						
1803	1848	1893	1938	1983	2028	2073	2118	
	2163	2208						
1804	1849	1894	1939	1984	2029	2074	2119	
	2164	2209						
1805	1850	1895	1940	1985	2030	2075	2120	
	2165	2210						
1806	1851	1896	1941	1986	2031	2076	2121	
	2166	2211						
1807	1852	1897	1942	1987	2032	2077	2122	
	2167	2212						
1808	1853	1898	1943	1988	2033	2078	2123	
	2168	2213						
1809	1854	1899	1944	1989	2034	2079	2124	
	2169	2214						
1810	1855	1900	1945	1990	2035	2080	2125	
	2170	2215						
1811	1856	1901	1946	1991	2036	2081	2126	
	2171	2216						
1812	1857	1902	1947	1992	2037	2082	2127	
	2172	2217						
1813	1858	1903	1948	1993	2038	2083	2128	
	2173	2218						
1814	1859	1904	1949	1994	2039	2084	2129	
	2174	2219						
1815	1860	1905	1950	1995	2040	2085	2130	
	2175	2220						
1816	1861	1906	1951	1996	2041	2086	2131	
	2176	2221						
1817	1862	1907	1952	1997	2042	2087	2132	
	2177	2222						



d) Configure the AtoN with the highest possible reporting rate									
Requirement	Result								Verdict
	1818	1863	1908	1953	1998	2043	2088	2133	
		2178	2223						
	1819	1864	1909	1954	1999	2044	2089	2134	
		2179	2224						
	1820	1865	1910	1955	2000	2045	2090	2135	
		2180	2225						
	The message 21's sent by the EUT did not transmit on any of the slots above for 12 hours								
Using means declared by the manufacturer, verify that the receiver remains on for 7 min at least once every 12 h;	The AtoN's are being produced by a base station which is mains powered the base station does not need to stop transmitting to save power.								Pass

e) Apply an SPO sentence to activate a VSI and FSR sentence		
Requirement	Result	Verdict
Apply an SPO sentence to activate a VSI and FSR sentence. Apply some targets to the VDL	20 targets were applied to the VDL and the following message was sent to the EUT: \$ABSPO,0,E,2,2,2,2,2,2,2,1,1,1,1,C this activated the VSI and FSR for the next frame with the correct time and in the right order. The manufacturer has stated "VSI and/or FSR sentence(s) will be output following the rules for those sentence formatters". The sentences follow the format that is in 62320-1-2015	Pass

Time	Sentence	Comment
14:25:39	\$ABSPO,0,E,2,2,2,2,2,2,2,1,1,1,1,C*55	
14:25:58	\$ABFSR,0,142600.00,A,160,3,3,165,0,-123,166*03	
14:25:58	\$ABFSR,0,142600.00,B,160,3,0,165,0,-127,166*07	
14:25:58	\$ABVSI,0,7,142600.670062,25,-80,47*43	
14:25:58	\$ABVSI,0,8,142600.670062,25,-78,48*44	
14:25:59	\$ABVSI,0,9,142600.696728,26,-80,47*4F	Time is correct
14:25:59	\$ABVSI,0,0,142600.696728,26,-78,48*4E	Sentences are correctly incremented
14:25:59	\$ABVSI,0,1,142600.723395,27,-80,47*4B	
14:25:59	\$ABVSI,0,2,142600.723395,27,-78,48*40	
14:25:59	\$ABVSI,0,3,142600.750062,28,-80,47*49	
14:25:59	\$ABVSI,0,4,142600.750062,28,-78,48*46	
14:25:59	\$ABVSI,0,5,142600.776728,29,-80,47*43	
14:25:59	\$ABVSI,0,6,142600.776728,29,-78,48*48	
14:25:59	\$ABVSI,0,7,142601.336728,50,-80,47*4E	



2.6 Schedule Mode B RATDMA Message 21 (Type 3) (dual report, dual channel operation)

2.6.1 Specification Reference

IEC 62320-2, Clause 8.1.7

Note: Test not applicable to R60 VDES Base Station as the AtoN is designed for continuous reporting from higher structures with sufficient energy supply and no sleep modes.



2.7 Schedule Mode C RATDMA Message 21 (Type 3) (single channel operation)

2.7.1 Specification Reference

IEC 62320-2, Clause 8.1.8

Note: Test not applicable to R60 VDES Base Station as the AtoN is designed for continuous reporting from higher structures with sufficient energy supply and no sleep modes.



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
VDES Test Platform	S3C	-	5945	-	TU

Table 20

TU – Traceability Unscheduled

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	$\pm 30 \mu\text{s}$

Table 21

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. (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.