Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Conformance test report of an

AIS System

Equipment under test:	**AMEC**
Type:	**Camino-701**
Applying test standards:	**IEC 61993-2 Ed. 2 [Sections 14, 16-21]: 2012**
Test Report No.:	BSH/46121/4322163/13-1
Applicant:	**Alltek Marine Electronics Corp.** **7F, No.605, Ruei-Guang Rd, Neihu District** **Taipei, 11492** **TAIWAN**

Hamburg, 13 May 2013
Federal Maritime and Hydrographic Agency

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D-PL-12084-01-01

Version 3.0

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Bernhard-Nocht-Straße 78
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Registrierungsnummer der Urkunde: **D-PL-12084-01-01**

Frankfurt am Main, 08.03.2013

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Leiter Abteilung 2

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1 General

1.1 Summary

Applicant:	Alltek Marine Electronics Corp., 7F, No.605, Ruei-Guang Rd, Neihu District, Taipei, 11492, TAIWAN
Equipment under test:	
Type:	Camino-701
Manufacturer:	Alltek Marine Electronics Corp., 7F, No.605, Ruei-Guang Rd, Neihu District, Taipei, 11492, TAIWAN
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	06 February 2012
End of test:	13 May 2013

Test standards[1]:

Recommendation ITU-R M.1371-4 (2010)
Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band

IEC 61993-2 Ed. 2 (2012)
Maritime navigation and radiocommunication equipment and systems – Automatic Identification Systems (AIS) –
Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results

IEC 61162-1 Ed. 4.0 (2010) / IEC 61162-2 (1998)
Maritime navigation and radiocommunication equipment and systems – Digital Interfaces –
Part 1: Single talker and multiple listeners **/**
Part 2: Single talker and multiple listeners, high speed transmission

Test No.	Reference IEC 61993-2	Section	Result (passed / not passed / not applicable / not tested)
2	14	Operational tests	Passed
3	15	Physical tests	not included
4	16	Specific tests of link layer	Passed
5	17	Specific tests of network layer	Passed
6	18	Specific tests of transport layer	Passed
7	19	Specific presentation interface tests	Passed
9	20	Long range functionality tests	Passed
8	D.3	DSC functionality tests	Passed

[1] Numbers listed in the titles of the test sections of this report refer to the respective sections of IEC 61993-2 if not stated otherwise.

1.2 Test report editions

Date	Edition	Remark	Author
2013-04-16	1	First edition	Ba
2013-05-13	2	In test section 14.7.5 outstanding test with 300 targets performed	Ba

1.3 Equipment history

For each transponder unit under test a numbered entry is provided here.

1.3.1 EUT system no 1

Transponder				
Type	Camino-701		Part No.:	
Delivery date	2012-01-12		Serial number	BSH Test sample 1
HW Version:	Delivery date	2012-01-12	Version no	
	Installation date	2012-01-12		
SW Version:	Delivery date	2012-01-12	Version no	1.0.0.T3
	Installation date	2012-01-12		
SW Version:	Delivery date	2012-02-20	Version no	1.0.0.T5
	Installation date	2012-02-20		
SW Version:	Delivery date	2012-06-07	Version no	1.0.1-T4
	Installation date	2012-06-08		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Integrated	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	AMEC ANT-21		Part No.:	---
Delivery date	2012-01-12		Serial number	A3K090001
HW Version:	Delivery date	2012-01-12	Version no	---
	Installation date	2012-01-12		

1.3.2 EUT system no 2

Transponder			
Type	Camino-701	Part No.:	---
Delivery date	2012-07-06	Serial number	A2K700012

HW Version:	Delivery date	2012-07-06	Version no	
	Installation date	2012-07-09		
SW Version:	Delivery date	2012-07-09	Version no	1.0.3
	Installation date	2012-07-09		
SW Version:	Delivery date	2012-09-03	Version no	1.0.5
	Installation date	2012-09-03		
SW Version:	Delivery date	2012-09-06	Version no	1.0.5 (new version with same number)
	Installation date	2012-09-06		
SW Version:	Delivery date	2012-09-14	Version no	1.0.5 (new version with same number)
	Installation date	2012-09-14		
SW Version:	Delivery date	2012-10-01	Version no	1.0.6
	Installation date	2012-10-04		
SW Version:	Delivery date	2012-10-26	Version no	1.0.6.1
	Installation date	2012-11-05		
SW Version:	Delivery date	2012-11-09	Version no	1.0.6.2
	Installation date	2012-11-12		
SW Version:	Delivery date	2012-11-13	Version no	1.0.6.2-T1
	Installation date	2012-11-13		
SW Version:	Delivery date	2012-01-07	Version no	1.0.6.7
	Installation date	2012-01-07		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Integrated	Part No.:	
Delivery date		Serial number	

GPS antenna			
Type	AMEC ANT-21	Part No.:	---
Delivery date	2012-01-12	Serial number	A3K090001

HW Version:	Delivery date	2012-01-12	Version no	---
	Installation date	2012-01-12		

1.3.3 EUT system no 3

Transponder				
Type	Camino-701		Part No.:	---
Delivery date	2013-02-01		Serial number	A2K700017
HW Version:	Delivery date	2013-02-01	Version no	
	Installation date	2013-02-01		
SW Version:	Delivery date	2013-02-04	Version no	1.0.6.8
	Installation date	2013-02-04		
SW Version:	Delivery date	2013-02-07	Version no	1.0.6.8 T2
	Installation date	2013-02-07 UTC 15:30		
SW Version:	Delivery date	2013-02-08	Version no	1.0.6.9
	Installation date	2013-02-08 UTC 15:00		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Integrated	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	AMEC ANT-21		Part No.:	---
Delivery date	2012-01-12		Serial number	A3K090001
HW Version:	Delivery date	2012-01-12	Version no	---
	Installation date	2012-01-12		

1.3.4 EUT system no 4

Transponder			
Type	Camino-701	Part No.:	---
Delivery date	2013-03-15	Serial number	A2K700018

HW Version:	Delivery date	2013-03-15	Version no	
	Installation date	2013-03-15		
SW Version:	Delivery date	2013-03-15	Version no	1.0.6.12
	Installation date	2013-03-15		
SW Version:	Delivery date	2013-03-20	Version no	1.0.6.13
	Installation date	2013-03-20		
SW Version:	Delivery date	2013-03-21	Version no	1.0.6.14
	Installation date	2013-03-21		
SW Version:	Delivery date	2013-03-21	Version no	1.0.6.15
	Installation date	2013-03-22		
SW Version:	Delivery date	2013-03-26	Version no	1.0.6.17
	Installation date	2013-03-26		
SW Version:	Delivery date	2013-03-27	Version no	1.0.6.18 Only item 19.9 tested with this version
	Installation date	2013-03-27		
SW Version:	Delivery date	2013-03-28	Version no	1.0.6.19
	Installation date	2013-03-28		
SW Version:	Delivery date	2013-04-02	Version no	1.0.6.20
	Installation date	2013-04-02		
SW Version:	Delivery date	2013-04-05	Version no	1.0.6.22
	Installation date	2013-04-08		
SW Version:	Delivery date	2013-04-08	Version no	1.0.6.23
	Installation date	2013-04-08		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Integrated	Part No.:	
Delivery date		Serial number	

GPS antenna			
Type	AMEC ANT-21	Part No.:	---
Delivery date	2012-01-12	Serial number	A3K090001

HW Version:	Delivery date	2012-01-12	Version no	---
	Installation date	2012-01-12		

1.4 Test environment

Here it is intended to record for which time which EUT system is under test.

1.4.1 Test environment no 1

This Test environment is completely equipped as described in Annex A. Normally mainly VDL related tests and DSC tests are done in this environment

Room	BSH Room 916 (9th floor)
Test engineer	H. Bartels
Location	9°59,103 E 53°32,822 N

Equipment no	Start of test	End of test	Test engineer
1	2012-02-06	2012-02-06	Bartels
1	2012-02-27	2012-03-02	Bartels
1	2012-04-23	2012-04-27	Bartels
1	2012-06-11	2012-06-15	Bartels
2	2012-07-09	2012-07-16	Bartels
2	2012-09-03	2012-09-14	Bartels
2	2012-11-07	2012-11-16	Bartels
2	2013-01-07	2013-01-15	Bartels
3	2013-02-04	2013-02-11	Bartels
4	2013-03-19	2013-03-22	Bartels
4	2013-03-26	2013-03-26	Bartels
4	2013-03-27	2013-03-27	Bartels
4	2013-03-28	2013-03-28	Bartels
4	2013-04-02	2013-04-03	Bartels
4	2013-04-08	2013-04-08	Bartels
4	2013-04-10	2013-04-11	Bartels
4	2013-05-13	2013-05-13	Bartels

1.5 Composition

Minimum Keyboard and Display (MKD)

☒ Internal ☐ Remote ☐ External

Internal GNSS

☐ Sync only ☒ Backup pos. sensor

1.6 Legend

Result marking (in the "result" column)[2]:

Passed	Item is ok, test was successful
Not passed	Test of a required item was not successful, change required
N/T	Not tested
N/A	Not applicable

Specific remarks (in the "remark" column, marked "bold italic"):

REC	Recommendation (in terms of IEC17025 "opinion"): an improvement or change is recommended
Note	Note or comment (in terms of IEC17025 "interpretation"): rationale for specific results or interpretation of requirements as appropriate

Template for additional test notes (copy if required):

Date	Sign	**Result**	**Status**

1.7 General observations

General observations not specific to any test item of the test standard are listed here:

	General problems		
Date	Item	Remark	Result
2012-02-06	Power on switch	It seems that the AIS unit is not switched on automatically if the power is applied. The power on button has to be pressed to switch on the unit. In my understanding the transponder unit has to be activated at power recovery after power fail. This is also a requirement by IEC 60945. <u>Retest 2012-03-02 Ba:</u> The unit is switched on automatically when power is applied	Passed

[2] Test items maybe colour marked in draft versions of the report as follows:

Passed	no colour marking
Not passed	yellow
N/T	blue
N/A	no colour marking
REC	green

2012-03-02	Rescheduling	In all cases of rescheduling (speed change, assignment) there is the following problem: All messages which have time-out 0 in the frame before the rescheduling frame are not transmitted in the rescheduling frame. They should be transmitted using the allocated slots to release the slot for the further frames. Otherwise the slots are blocked for at least further 3 frames.. Retest 2012-04-24 Ba: The problem still exists Retest 2012-07-12 Ba: The problem still exists Retest 2012-09-06 Ba: In several rescheduling tests the slots with time-out 0 in the frame before the rescheduling frame are released during the rescheduling frame.	Passed
2012-03-02	ACA query	I do not get a response on a query for ACA. To be able to perform the channel management tests it is necessary to output the stored ACA settings on query (see IEC 61162-1 §7.3.5, e.g. $ECAIQ,ACA) This function is also required by the standard Retest 2012-04-27 Ba: There is an ACA output on query	Passed
2012-04-25	Slot allocation for message 5	Sometimes the slots fo rmessage 5 are allocated on the wrong channel See frame 10 of both speed change diagrams (Test 14.4.1) Retest 2012-07-10 Ba: Message 5 is allocated on the correct channel (Test over about 1 hour)	Passed
2012-06-15	Rx fail	At the end of the current test phase, perhaps after test 14.8 Transceiver protection, the receiving capability of both channels is reduced. A strong signal of – 30 dBm is still received but message from the VDL tester with –60 dBm and messages from ships in the horbour are not received Retest 2012-07-09 Ba: The EUT has been replaced by a new unit which does not show this problem. It seems that the unit has been damaged during test 14.8 Transceiver protection	Passed
2012-09-14	Proprietary sentences	The proprietary sentences do not follow the rules of IEC 61162-1 section 7.3.6 A proprietary sentence is build up in the following form: $P<aaa><data>*<checksum field> <aaa> = a 3 character manufactuer's mnemonic code registred ad NMEA.	

		The manufacturers code is missing in your proprietary sentences e.g. $PDBG,.... or $PFRQ,... If you have not yet registred a manufacturer code you find the NMEA address in IEC 61162-1 section 7.3.6 (footnote). Reason for this manufacturers code is to make all proprietary sentences unique. Retest 2013-02-11 Ba: The proprietary sentences have been changed to a form: $PAMC,C,DBG,.....	Passed
2013-01-08	MKD connection lost alarm	There was an active ALR 008 MKD connection lost, beginning UTC 13:35. No malfunction of the MKD was observed, it worked in the normal way. After a manual restart of the unit the alarm was no longer active. Retest 2013-02-11 Ba: This problem has not been observed during the current test phase.	Passed
2013-02-05	Change of Navstatus UTC 10:18	When trying to change the incorrect Nav status (Nav status = 0, SOG = 0) from 0 to another value the EUT stopped operation and performed a restart after a few seconds Retest 2013-02-11 Ba: The Nav status can be changed without breakdown.	Passed

1.8 4.3 Manuals

1.8.1 Operating and Installation

(60945) Adequate information shall be provided to enable the equipment to be properly operated and maintained by suitable qualified members of a ship's crew:

(60945) Moreover adequate information shall be provided to allow equipment to be installed so that it operates in accordance with the requirements of the relevant equipment standard, taking into account limitations imposed by the operation of other equipment also required to be installed on the bridge.

(61993-2) In addition to the requirements of IEC 60945, Clause 14, the manuals shall include:

- *the type and details of all external connectors (including the pilot plug) referred to in 19.*
- *the needed information for correct siting of the antennas; and*
- *the requirements for external illumination, as appropriate.*

It is checked that the required documentation items are available.

2013-03-28	**Tester: Ba**	**Test details:** General documentation		
Test item		Check	Remark	Result
Composition of customer documentation		Check the composition of customer documentation	The documentation consists of: • Installation and operation manual	Passed
Description of AIS		Check that an general function description of AIS as a new system is included		Passed
Operating information		Check that an operating manual is included	In the Installation and operation manual	Passed
Technical information		Check that an technical manual is included	In the Installation and operation manual	Passed
Installation information		Check that an installation manual is included	In the Installation and operation manual	Passed
Language		Check that the documentation is written in English		Passed

2013-03-28	**Tester: Ba**	**Test details:** General documentation		
Test item		Check	Remark	Result
Details of installation information				
System overview		Check that an AIS system overview diagram is available	p.3	Passed
Mechanical dimensions		Check that mechanical dimension drawings of transponder are available	p.73	Passed
		Check that mechanical dimension drawings of MKD are available	Internal MKD	N/A
		Check that mechanical dimension drawings of a Connection box available		Passed
		Check that mechanical dimension drawings of GPS antenna are available		Passed
		Check that mechanical dimension drawings of VHF antenna are available		Passed

2013-03-28	**Tester: Ba**	**Test details:** Requirements of IEC 61993-2		
Test item		Check	Remark	Result
Connectors of external display		Check that the type and details of all connectors of external display are included	There is not a special connecter but screw terminals for all wires	Passed
Siting of antennas		Check that information about siting the GPS antenna is included	P.5	Passed
		Check that information about siting the VHF antenna is included	P.5	Passed
RF cable requirements		Check that information about cable requirements for the GPS antenna is included		Passed
		Check that information about cable requirements for the VHF antenna is included		Passed
Illumination		Check that information about external illumination is included if required	External illumination is not required	N/A

1.8.2 Interface documentation

(61993-2 19.1) The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular (see 7.2 19.2 Checking manufacturer's documentation)

(61162-1; -2) Operator manuals or other appropriate literature provided for equipment that is intended to meet the requirements of this standard shall contain the following information:

a) *identification of the A and B signal lines*

b) *the output drive capability as a talker*

c) *a list of approved sentences, noting unused fields, proprietary sentences transmitted as a talker and transmission interval for each sentence*

d) *the load requirements as a listener*

e) *a list of sentences and associated data fields that are required as a listener*

f) *the current software and hardware revision if this is relevant to the interface*

g) *an electrical description of schematic of the listener/talker input/output circuits citing actual components and devices used, including connector type and part number*

h) *the version number and data of update of the standard for which compliance is sought.*

2013-03-28	**Tester: Ba**	**Test details:** Requirements of interface documentation	
Test item	Check	Remark	Result
a) A and B signal lines	Check that identification of A and B signal lines is included		Passed
b) Output driver	Check that the output drive capability is included	Max. 60 mA 2.3 V at 100 Ohm load	Passed
c) Approved Talker sentences	Check that list of approved sentences is included		Passed
	Check that unused fields are noted		Passed
c) Proprietary talker sentences	Check that list of proprietary sentences is included	There are no proprietary output sentenses. • Remark: • Confirmation required (e.g. by e-mail) that no proprietary output sentences which are output autonomously are implemented • Currently there is a $PDSC... sentence. Will this be removed in the final version? If no the format has to be corrected, and it has to be listed in the manual Retest 2013-04-02 Ba: The $PDSC has been modified to $PAMC,R,DSC,... in accordance to IEC61162-1 It has also been included in the manual	Passed Passed
	Check that unused fields are noted		N/A
d) Input load	Check that the input load is included	12 kOhm without and 120 Ohm with termination	Passed
e) Input sentences of PI and LR ports	Check that list of sentences is included		Passed
	Check that required and unused fields are noted		Passed
e) Input sentences of sensor inputs	Check that list of sentences is included		Passed
	Check that required and unused fields are noted		Passed
f) Software version	Check that the relevant software version is included	I have not found information about the software version for which the manual is valid Retest 2013-04-03 Ba: The software version has been added (in vi.)	Passed

f) Hardware version	Check that the relevant hardware version is included	I have not found information about the hardware version for which the manual is valid Retest 2013-04-03 Ba: The hardware version has been added (in vi.)	Passed
g) Hardware input/output circuit	Check that information about hardware interface components is included		Passed
h) Standards	Check that the version number and date of update of the relevant standard is included	Some standards listed in 5.1 do not include the version of the standard, e.g.: 61993-2, 61108, 62288, 62388. Retest 2013-04-03 Ba: The versions have been added to the above standards.	Passed

2 14 Operational tests

2.1 14.1 Identification and operating modes

(See 6.4)

2.1.1 14.1.1 Autonomous mode

2.1.1.1 14.1.1.1 Transmit position reports

Method of measurement

Set up standard test environment. Record the VDL communication and check for messages of the EUT as follows:

a) Operate the EUT with the default MMSI (000000000).

b) Attempt to program an invalid MMSI (outside of the range specified in 6.4).

c) Enable the Message 27 transmission and repeat test with a programmed valid MMSI (see 8.3).

d) Repeat test with a programmed MMSI and after a power down for 12 h.

Required results

Confirm that

a) the EUT does not transmit with the default MMSI and an alarm 001 is activated,

b) the EUT rejects an invalid MMSI programming and does not transmit with the default MMSI and an alarm 001 is activated,

c) the EUT transmits autonomously when programmed with a valid MMSI and that the transmitted data complies with sensor inputs. Confirm that EUT transmits Message 27 as described in 8.3,

d) all static and voyage related data has been retained for at least 12 h.

This is a first more general check that the EUT is continuously transmitting a position report. Special tests regarding reporting rate, message contents and used slot are done in special test items.

2012-03-02	**Tester: Ba**	**Test details:** Transmission of position reports		
Test item		Check	Remark	Result
MMSI = default = 0				
MMSI = 000000000		Check that the EUT does not transmit	2012-07-09 Ba: There is also a warning at power on that transmission is inhibited because the MMSI is 0.	Passed
		Check that ALR 001 is activated	Test 2013-01-15 Ba: The alarm relay is also activated	Passed

Invalid MMSI			
Try to set MMSI to an invalid value	Check that the invalid MMSI is rejected	Test 2013-01-15 Ba:	Passed
	Check that the EUT does not transmit		Passed
	Check that ALR 001 is activated		Passed
Apply valid MMSI Enable Message 27 transmission			
MMSI	Check MMSI		Passed
Message 1	Check that the Message 1 is transmitted continuously		Passed
Message 27	Check that the Message 27 is transmitted continuously		Passed
Switch off for at least 12 h			
Static data	Check that all static data have been retained	2012-11-15 Ba:	Passed
Voyage data	Check that all voyage data have been retained		Passed

2.1.1.2 14.1.1.2 Receive position reports

Method of measurement

Set up standard test environment as follows:

a) switch on test targets, then start operation of the EUT;

b) start operation of the EUT, then switch on test targets.

Check the VDL communication and presentation interface outputs of the EUT.

Required results

Confirm that EUT receives continuously under conditions a) and b) and outputs the received messages via the PI.

2012-03-02	**Tester: Ba**	**Test details:** a) Receive position reports		
Test item		Check	Remark	Result
a) Switch on test targets, then start operation of the EUT. Check the following items on VDM output of the PI compared with the transmitted values.				
Received targets		Check that the received targets are continously output as VDM		Passed
b) Start operation of the EUT, then switch on test targets. Check the following items on VDM output of the PI compared with the transmitted values.				
Received targets		Check that the received targets are continously output as VDM		Passed

2.1.2 14.1.2 Assigned mode

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, transmit an assigned mode command Message 16 to the EUT with

a) slot offset and increment,

b) designated reporting interval.

Record transmitted messages..

Required results

Confirm that the EUT transmits position reports Message 2 according to defined parameters and reverts to SOTDMA Message 1 with standard reporting interval after 4 min to 8 min.

This test identical to test 16.6.6.2 Assigned operation/ Receiving test and is performed under 16.6.6.2.

2.1.3 14.1.3 Polled mode

2.1.3.1 14.1.3.1 Transmit an interrogation

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of an interrogation message (Message 15) by the EUT addressing 1 or 2 destinations according to message table (M.1371/A8-3.13) requesting the following responses:

- *Message 3, 5, 9, 18, 19, 24 from mobile stations*
- *Message 4, 24 from base stations.*

Record transmitted messages.

Required results

Check that EUT transmits the interrogation message (Message 15) as appropriate.

2012-04-23	**Tester: Ba**	**Test details:** Interrogation of message from AIS stations	
Test item	Check	Remark	Result
Request from mobile stations Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,211xxxxxx,3/5/9/18/19/24,,,,,,			
Request Message 3	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,,A,15,,3	Passed
	Check that message is received by the addressed transponder (VDM)		Passed
Request Message 5	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed
	Check that message is received by the addressed transponder (VDM)		Passed
Request Message 9	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed
Request Message 18	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed
Request Message 19	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed
Request Message 24	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed
Request from a base station Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00211xxxx,4/24,,,,,,			
Request Message 4	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed
Request Message 24	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement		Passed

2012-04-23	**Tester: Ba**	**Test details:** Interrogation with 2 requests		
Test item		Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_35_5.sst: $AIAIR,ID1,3,,5,,ID2,5,,				
VDO output of EUT		Check the VDO output on PI		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgement		Passed
R_X of request		Check that message is received by the VDL analyser		Passed

2.1.3.2 14.1.3.2 Interrogation response

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (Message 15; EUT as destination) to the VDL according to message table (M.1371/A8-3.11) for responses with Message 3, Message 5 and slot offset set to a defined value which is greater than 10 slots. Record transmitted messages and frame structure.

Required results

Check that the EUT transmits the appropriate interrogation response message as requested after defined slot offset. Confirm that the EUT transmits the response on the same channel as where interrogation was received.

2012-04-23	**Tester: Ba**	**Test details:** Interrogation of Message 3		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 5, slot offset = 0 (auto select), on channel A. A response shall automatically be transmitted by the EUT.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)		Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check the response on VDL with the VDL analyser, note slot offset		Passed
Response channel		Check that the response is transmitted on the request channel		Passed

2012-04-23	**Tester: Ba**	**Test details:** Interrogation of Message 5		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 3 with given slot offset = 10, on channel B A response shall automatically be transmitted by the EUT.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)	UTC 11:40	Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check the response on VDL with the VDL analyser	6, 13, 19	Passed
Slot selection		Check that the slot offset defined in the request is used	Message 5 is transmitted on both channels. Remark: A response on both channels increases the channel load unnecessarily and should therefore be avoided. Retest 2012-07-09 Ba: UTC 09:37 Message 5 is transmitted on the request channel.	Passed
Response channel		Check that the response is transmitted on the request channel		N/T

More detailed interrogation tests are made in 6.2 18.2 Interrogation responses.

2.1.4 14.1.4 Addressed operation

2.1.4.1 14.1.4.1 Transmit an addressed message

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Initiate the transmission of an addressed binary Message 6; EUT as source according to message table (M.1371/A8-3.4) by the EUT. Record the transmitted messages.

b) Repeat test with the addressed safety related Message 12.

c) Repeat test with the addressed unstructured binary Message 25.

d) Repeat test with the addressed structured binary Message 25.

e) Repeat test with a single addressed unstructured binary Message 26.

f) Repeat test with a single addressed structured binary Message 26.

Required results

Check that

a) the EUT transmits the Message 6 as appropriate,

b) the EUT transmits the Message 12 as appropriate,

c) the EUT transmits the Message 25 as appropriate.

d) the EUT transmits the Message 25 as appropriate.

e) the EUT transmits the Message 26 as appropriate.

f) the EUT transmits the Message 26 as appropriate.

More detailed tests of addressed message including channel use and transmission retry are made in 6.1 18.1 Addressed messages.

The field contents of this test should be checked in 4.7.2.

Remark regarding addressed message 25 and 26:
IEC 61993-2 Ed.2 references ITU-R M.1371-4 which is currently the valid published version. In this version the addressed messages 25 and 26 are defined with a 70 bit header.

In the draft revision of ITU-R M.1371-4 (which may be published as ITU-R M.1371-5 within one year) the addressed messages 25 and 26 have been changed to having a 72 bit header. 2 spare bits have been added after the destination field for byte alignment. The other existing addressed messages 6 and 12 also have a 72 bit header. So the change seems to be reasonable.

Additionally there are 4 spare bits in front of the communication state. So the block of 4 spare bits and the 20 bit comm state is in total 24 bits which is with byte boundaries and also gives 4 characters of encapsulated data.

The problem is that messages 25/26 with 70 bit header and 72 bit header are completely incompatible. So if we approve AIS Class A equipment which transmits message 25/26 with a

70 bit header according to 1371-4 until the next revision of 1371 is published it will be incompatible to the future equipment.

Therefore we recommend to design the equipment for message 25/26 transmission as defined in the draft revision of ITU-R M.1371-4 with a 72 bit header and additional 4 spare bits before the comm stat and approve it with this design.

Formally it would be correct to approve the AIS Class A equipment with 70 bit header according to ITU-R M.1371-4. Therefore we also have to accept implementations with 70 bit header.

The following tests have been performed with the 70 bit header according to ITU-R M.1371-4

2012-04-23	**Tester: Ba**	**Test details:** a) Addressed binary message 6		
Test item		Check	Remark	Result
Transmit an addressed binary message 6 by sending an ABM sentence to the PI PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,211000001,1,6,06P0test,0 An acknowledgement is automatically transmitted by the addressed transponder.				
VDO output of EUT		Check the VDO output on PI		Passed
Message sequence number		Check that sequence number in VDL message = Sequential message identifier of ABM sentence		Passed
R_X of message 6 (VDM)		Check that message is received by addressed transponder (VDM)		Passed
R_X of Message 7 (VDM)		Check that the ackn. Message 7 is received by EUT (VDM)		Passed
AIABK acknowledgement		Check AIABK. sentence	$AIABK,1028,A,6,2,0	Passed

2012-04-23	**Tester: Ba**	**Test details:** b) Addressed safety related message 12		
Test item		Check	Remark	Result
Transmit an addressed safety related message 12 by sending an ABM sentence to the PI PI sentence: File AIABM_safety.sst: !AIABM,1,1,2,MMSI,1,12,D5CD,0 (D5CD = „TEST“) An acknowledgement is automatically transmitted by the addressed transponder.				
VDO output of EUT		Check the VDO output on PI	UTC 09:12	Passed
Channel		Check T_X on channel A		Passed
Message sequence number		Check that sequence number in VDL message = Sequential message identifier of ABM sentence		Passed
R_X of message 12 (VDM)		Check that message is received by addressed transponder (VDM)		Passed
R_X of Message 13 (VDM)		Check that the ackn. Message 13 is received by EUT (VDM)		Passed
Acknowledgement		Check AIABK	$AIABK,1028,A,12,2,0	Passed

2013-01-07	Tester:	**Test details:** c) Addressed unstructured message 25		
Test item		Check	Remark	Result
Transmit an addressed message 25 by sending an ABM sentence with message type 70 to the PI PI sentence: File AIABM_msg70.sst: There is no acknowledgement expected.				
VDO output of EUT		Check the VDO output on PI		Passed
Channel		Check T_X on channel according to ABM		Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier in ABK sentence		Passed
Acknowledgement		Check AIABK with message type 70		Passed
Message content		Check message content	The message content (binary data part) seems to be incorrect (checked with reference with 70 and 72 bit header) <u>Retest 2013-02-04 Ba:</u> The message content is correct according to ITU-R M.1371-4 (70 bit header)	Passed

2013-01-07	Tester:	**Test details:** d) Addressed structured message 25		
Test item		Check	Remark	Result
Transmit an addressed message 25 by sending an ABM sentence with message type 25 to the PI PI sentence: File AIABM_msg25.sst: There is no acknowledgement expected.				
VDO output of EUT		Check the VDO output on PI	No VDO output, message is not transmitted <u>Retest 2013-02-04 Ba:</u> There is a VDO outpu	
Channel		Check T_X on channel according to ABM		Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier in ABK sentence		Passed
Acknowledgement		Check AIABK with message type 25	With type of ackn. = 2 (no Tx) <u>Retest 2013-02-04 Ba:</u> The acknowledge type is 3	Passed
Message content		Check message content	<u>Retest 2013-02-04 Ba:</u> The message content is correct according to ITU-R M.1371-4 (70 bit header)	Passed

2013-01-07	**Tester:**	**Test details:** e) Addressed unstructured message 26		
Test item		Check	Remark	Result
Transmit an addressed message 25 by sending an ABM sentence with message type 71 to the PI PI sentence: File AIABM_msg71.sst: There is no acknowledgement expected.				
VDO output of EUT		Check the VDO output on PI		Passed
Channel		Check T_X on channel according to ABM		Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier in ABK sentence		Passed
Acknowledgement		Check AIABK with message type 70		Passed
Message content		Check message content	The message content (binary data part) seems to be incorrect (checked with reference with 70 and 72 bit header). The length is also not correct <u>Retest 2013-02-04 Ba:</u> The message content is correct according to ITU-R M.1371-4 (70 bit header)	Passed

2013-01-07	**Tester:**	**Test details:** f) Addressed structured message 26		
Test item		Check	Remark	Result
Transmit an addressed message 26 by sending an ABM sentence with message type 26 to the PI PI sentence: File AIABM_msg26.sst: There is no acknowledgement expected.				
VDO output of EUT		Check the VDO output on PI		Passed
Channel		Check T_X on channel according to ABM		Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier in ABK sentence		Passed
Acknowledgement		Check AIABK with message type 26		Passed

Message content	Check message content	The message content (binary data part) seems to be incorrect (checked with reference with 70 and 72 bit header). The length is also not correct Retest 2013-02-04 Ba: The message content and length is correct according to ITU-R M.1371-4 (70 bit header)	Passed

2.1.4.2 14.1.4.2 Receive addressed message

Method of measurement

Set up standard test environment and operate EUT in autonomous mode, as follows:

a) Apply an addressed message (Message 6, 12, 25, 26; EUT as destination) to the VDL.

b) Apply an addressed message (Message 6, 12, 25, 26; other station as destination) to the VDL.

Record transmitted messages and frame structure.

Required results

Check that EUT transmits the appropriate acknowledgement message. Confirm that

a) EUT outputs the received message via the presentation interface,

b) EUT does not output the received message via the presentation interface.

Detailed tests of acknowledgements of received addressed messages are tested in 6.1.2.

2012-04-23	**Tester: Ba**	**Test details:** Addressed binary message 6		
Test item		Check	Remark	Result
Apply an addressed binary message on VDL.				
a) Addressed to EUT		Check that VDM output on PI of EUT		Passed
		Check DAC		Passed
		Check FI		Passed
		Check binary data		Passed
Transmission of ackn. Message 7		Check transmission of ackn. by VDO output of EUT		Passed
		Check that the ackn. message is received by transmitter (VDM/ABK)		Passed
b) Addressed to other AIS		Check that no VDM output on PI		Passed
		Check that the EUT does not transmit an acknowledgement		Passed

2012-04-23	**Tester: Ba**	**Test details:** Addressed safety related message 12		
Test item		Check	Remark	Result
Apply an addressed safety related message on VDL				
a) Addressed to EUT		Check that VDM output on PI of EUT		Passed
		Check message text		Passed
Transmission of ackn. Message 13		Check transmission of ackn. by VDO output of EUT		Passed
		Check that the ackn. message is received by transmitter (VDM/ABK)		Passed
b) Addressed to other AIS		Check that no VDM output on PI		Passed
		Check that the message is not displayed on the MKD		Passed
		Check that the EUT does not transmit an acknowledgement		Passed

2013-01-07	**Tester: Ba**	**Test details:** Addressed message 25		
Test item		Check	Remark	Result
Apply an addressed message 25 on VDL				
a) Addressed to EUT		Check that VDM output on PI of EUT		Passed
		Check message content		Passed
Acknowledgement		Check that the EUT does not transmit an acknowledgement		Passed
b) Addressed to other AIS		Check that no VDM output		Passed

2013-01-07	**Tester: Ba**	**Test details:** Addressed message 26		
Test item		Check	Remark	Result
Apply an addressed message 26 on VDL				
a) Addressed to EUT		Check that VDM output on PI of EUT		Passed
		Check message content		Passed
Acknowledgement		Check that the EUT does not transmit an acknowledgement		Passed
b) Addressed to other AIS		Check that no VDM output		Passed

2.1.5 14.1.5 Broadcast operation

2.1.5.1 14.1.5.1 Transmit a broadcast message

Method of measurement

Set up standard test environment and operate EUT in autonomous mode as follows:

a) Initiate the transmission of a broadcast binary Message 8; EUT as source according to message table (M.1371/ A8-3.6) by the EUT. Record the transmitted messages.

b) Repeat test with the broadcast safety related Message 14.

c) Repeat test with the broadcast unstructured binary Message 25.

d) Repeat test with the broadcast structured binary Message 25.

e) Repeat test with a single broadcast unstructured binary Message 26.

f) Repeat test with a single broadcast structured binary Message 26.

Required results

Check that

a) the EUT transmits the Message 8 as appropriate,

b) the EUT transmits the Message 14 as appropriate,

c) the EUT transmits the Message 25 as appropriate.

d) the EUT transmits the Message 25 as appropriate.

e) the EUT transmits the Message 26 as appropriate.

f) the EUT transmits the Message 26 as appropriate.

2012-04-23	**Tester: Ba**	**Test details:** a) Binary broadcast message 8		
Test item		Check	Remark	Result
Apply a BBM sentences for transmission of message 8 to the PI. PI sentence: File AIBBM_bin.sst: AIS channel for broadcast is 0: autoselect				
VDO output of EUT		Check the VDO output on PI	UTC 09:36 Test has been performed with a sequence of 5 binary messages (Ed.1 section 18.3)	Passed
Channel		Check that the T_X channel is alternating between A and B		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 70		Passed

Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence	Some sequence numbers in the ABK sentences are not correct: Test 1: BBM: 7, 8, 9, 0, 1 ABK: 7, 0, 1, 0, 1 Test 2: BBM: 7, 8, 9, 0, 1 ABK: 7, - , 9, 1, 0 Retest 2012-07-12 Ba: The sequence numbers are correct.	Passed
Message content	Check message content	The transmitted message (VDO) is too short. See Note) Retest 2012-07-12 Ba: The message length is correct.	Passed

2012-04-23	**Tester: Ba**	**Test details:** b) Broadcast safety related text message 14		
Test item		Check	Remark	Result
Apply a BBM sentences for transmission of message 14 to the PI. PI sentence: File AIBBM_bin.sst: AIS channel for broadcast is 0: autoselect				
VDO output of EUT		Check the VDO output on PI	UTC 09:37 Test has been performed with a sequence of 5 binary messages (Ed.1 section 18.3)	Passed
Channel		Check that the T_X channel is alternating between A and B		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 25		Passed
Message sequence number		Check that message sequence number in ABK = Sequential message identifier of BBM sentence	Some sequence numbers in the ABK sentences are not correct: BBM: 6, 7, 8, 9, 0, ABK: 0, 9, 0, 9, 0 Retest 2012-07-12 Ba: The sequence numbers are correct.	Passed
Message content		Check message content	The last character of the 5 input messages is different (1...5) but all 5 VDOs are identical, according to the last BBM input. It seems that the text content of the 5 messages is overwritten by the last BBM input. Retest 2012-07-12 Ba: The content of message 14 is correct.	Passed

2013-01-07	**Tester: Ba**	**Test details:** c) Unstructured binary broadcast message 25		
Test item		Check	Remark	Result
Apply a BBM sentences with message type 70 for transmission of unstructured message 25 to the PI. PI sentence: File AIBBM_bin_70.sst: AIS channel for broadcast is 0: autoselect				
VDO output of EUT		Check the VDO output on PI		Passed
Channel		Check that the T_X channel is alternating between A and B		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 70		Passed
Message sequence number		Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message content		Check message content		Passed

2013-01-07	**Tester: Ba**	**Test details:** d) Structured binary broadcast message 25		
Test item		Check	Remark	Result
Apply a BBM sentences with message type 25 for transmission of structured message 25 to the PI. PI sentence: File AIBBM_bin_25.sst: AIS channel for broadcast is 0: autoselect				
VDO output of EUT		Check the VDO output on PI		Passed
Channel		Check that the T_X channel is alternating between A and B		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 25		Passed
Message sequence number		Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message content		Check message content		Passed

2013-01-07	**Tester: Ba**	**Test details:** e) Unstructured binary broadcast message 26		
Test item		Check	Remark	Result
Apply a BBM sentences with message type 71 for transmission of unstructured message 26 to the PI. PI sentence: File AIBBM_bin_71.sst: AIS channel for broadcast is 0: autoselect				
VDO output of EUT		Check the VDO output on PI		Passed
Channel		Check that the T_X channel is alternating between A and B		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 71		Passed
Message sequence number		Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message content		Check message content	The content is correct. There is a problem with the message length: It should be 168 bit. Depending on the binary data length it is either 164 bit (104 bit binary data) or 172 bit (108 bit binary data). See Note) <u>Retest 2013-02-04 Ba:</u> The length of the message is correct according to ITU-R M.1371-4 (no 4 spare bits)	Passed Passed

2013-01-07 / **Tester: Ba**	**Test details:** f) Structured binary broadcast message 26		
Test item	Check	Remark	Result
Apply a BBM sentences with message type 26 for transmission of structured message 26 to the PI. PI sentence: File AIBBM_bin_26.sst: AIS channel for broadcast is 0: autoselect			
VDO output of EUT	Check the VDO output on PI		Passed
Channel	Check that the T_X channel is alternating between A and B		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements with message type 26		Passed
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message content	Check message content	The content is correct. There is a problem with the message length: It should be 168 bit. Depending on the binary data length it is either 164 bit (104 bit binary data) or 172 bit (108 bit binary data). See Note) <u>Retest 2013-02-04 Ba:</u> The length of the message is correct according to ITU-R M.1371-4 (no 4 spare bits)	Passed Passed

Note)
The message length problem may depend on the implementation:
1) according to ITU-R M.1371-4
2) according to draft revision of ITU-R M.1371-4 (future ITU-R M.1371-5)

In the implementation according to 1) the maximum binary data for a single slot message is 108. So with binary data of 108 bit length the total message length should be 40 bit header + 108 bit binary data + 20 bit comm state = 168 bit.

In the implementation according to 2) it is not really clear who has to provide the 4 spare bits at the end of the binary data, before the comm state. Because the binary data part in the message definition is limited to 104 bit for a single slot message it seems that the 4 spare bit have to be provided by the AIS transponder, not by the BBM input sentence.

Depending on this question either 104 (preferable) or 108 bit binary data should result in 168 bit message length. In the test both binary data length did not result in 168 bit message length.

2.1.5.2 14.1.5.2 Receive broadcast message

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Apply a broadcast message (Message 8, 14, 25, 26) to the VDL.

Required results

Confirm that the EUT outputs the received message via the presentation interface.

2013-01-07	**Tester: Ba**	**Test details:** Broadcast binary messages		
Test item		Check	Remark	Result
Apply an broadcast binary message 8 on VDL.				
Message 8		Check that Message 8 is output as VDM on the PI port		Passed
		Check the content of message 8		Passed
Message 14		Check that Message 14 is output as VDM on the PI port		Passed
		Check the content of message 14		Passed
Message 25		Check that Message 25 is output as VDM on the PI port		Passed
		Check the content of message 25		Passed
Message 26		Check that Message 26 is output as VDM on the PI port		Passed
		Check the content of message 26		Passed

2.1.6 14.1.6 Multiple slot messages

2.1.6.1 14.1.6.1 5 slot messages

Method of measurement

Apply a BBM sentence to the PI of EUT with a maximum of 121 data bytes of binary data in order to initiate transmission of a binary message (Message 8).

Required results

Check that the message is transmitted in up to 5 slots accordingly.

2012-04-23	**Tester: Ba**	**Test details:** Binary broadcast message 8		
Test item		Check	Remark	Result
Transmit a binary broadcast messages 8 with 121 data bytes of binary data by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin.sst: The file contains 4 BBM sentences with in total 121 data bytes or 162 characters.				
VDO output of EUT		Check the VDO output on PI	UTC 10:46	Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements		Passed
Sequential message identifier in VDO		Check that message sequence number in ABK = sequential message identifier of BBM sentence		Passed
Message on VDL		Check that the broadcast message is received on the VDL		Passed
Message content		Check that the message content is correct		Passed

Note)
Section 16.6.4 requires: ...*that messages using more than 3 slots are rejected.*
This is a discrepancy to this test. Has to be clarified

2.1.6.2 14.1.6.2 Longer messages

Method of measurement

Apply a BBM sentence to the PI of the EUT with an information content not fitting in 5 slots (i.e. more than 121 data bytes of binary data containing only binary bits with value one).

Required results

Check that the message is not transmitted. Check that a negative acknowledgement is given on the presentation interface.

2012-04-23	**Tester: Ba**	**Test details:** Binary broadcast message 8		
Test item		Check	Remark	Result
Transmit a binary broadcast messages 8 with 122 data bytes of binary data, all bits “1”, by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin_1.sst: The file contains 4 BBM sentences with in total 121 data bytes or 162 characters.				
VDO output of EUT		Check that no VDO is output on PI	UTC 10:46	Passed
Message on VDL		Check that no message is received by VDL analyser		Passed
AIABK acknowledgement		Record the AIABK output, check that type = 2 (could not be broadcast)		Passed

2.2 14.2 Information

(See 6.5)

2.2.1 14.2.1 Information provided by the AIS

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode.

Apply all static, dynamic and voyage related data to the EUT.

Record all messages on VDL and check the content of position report Message 1 and static data report Message 5.

Required results

Confirm that data transmitted by the EUT complies with manual and sensor inputs.

The dynamic information content of Message 1,2,3 provided by external sensors is checked in detail in 7.5 19.5 Test of sensor input

Information content provided by internal GNSS receiver – if used as backup position source – are tested here.

2012-04-23	**Tester: Ba**	**Test details:** Content of Message 1		
Test item		Check	Remark	Result
Internal GNSS is in use, no external sensor inputs.				
MMSI		Check MMSI		Passed
Navigational status		See below		
Position		Check the values of lat and lon		Passed
Speed		Check the values of SOG and COG		Passed
Heading/ROT		Check that the values of heading and ROT are default		Passed
Position accuracy flag		Is verified in special tests		
Time stamp		Check time stamp		Passed
Comm state		Check for availability, detailed test in 5		Passed
Default values		Check that default values for LAT, LON, SOG, COG are transmitted if internal GNSS is unavailable		Passed

2012-04-23	**Tester: Ba**	**Test details:** Navigational status	
Test item	Check	Remark	Result
Test of navigational status on VDL message. Check some different navigational status values. Change the navigational status using MKD or VSD input.			
Status = 0 (under way using engine)	Check Status in VDL message 1		Passed
Status = 1 (at anchor)	Check Status in VDL message 1		Passed
Status = 7 (fishing)	Check Status in VDL message 1		Passed
Status = 15 (undefined)	Check Status in VDL message 1		Passed
Other status values	Check some other values		Passed

2012-04-26	**Tester: Ba**	**Test details:** Content of Message 5	
Test item	Check	Remark	Result
Check of the contents of Message 5 (static and voyage related data). Data can be changed using MKD or VSD/SSD input at PI.			
MMSI	Check value in Message 5		Passed
AIS version indicator	Check that version is 1		Passed
IMO number	Check value in Message 5		Passed
Call sign	Check value in Message 5		Passed
Name of ship	Check value in Message 5		Passed
Type of ship and cargo type	Check value in Message 5		Passed
Reference point for internal GPS			
Reference point A	Check value in Message 5		Passed
Reference point B	Check value in Message 5		Passed
Reference point C	Check value in Message 5		Passed
Reference point D	Check value in Message 5		Passed
Reference point for EPFS			
Reference point A	Check value in Message 5		Passed
Reference point B	Check value in Message 5		Passed
Reference point C	Check value in Message 5		Passed
Reference point D	Check value in Message 5		Passed
Voyage related data			
ETA	Check value in Message 5		Passed
Maximum present static draught	Check value in Message 5		Passed
Destination	Check value in Message 5		Passed
DTE flag can be checked in connection with 2.5.2.5 14.6.2.5 Remote MKD disconnection, when so configured. Check the flag during that test and enter result here.			
DTE on	Check that DTE flag = 0		Passed
DTE off	Check that DTE flag = 1		Passed

Type of EPFS			
Apply simulated GLL,VTG, GDT and ROT sentence to the sensor input. File name: ais01_gll_vtg_hdt_rot.sst Change talker according to test item.			
Talker = GP	Check type of EPFS = 1		Passed
Talker = GL	Check type of EPFS = 2		Passed
Talker = GN	Check type of EPFS = 3		Passed
Talker = LC	Check type of EPFS = 4		Passed
Talker = IN	Check type of EPFS = 6		Passed
Talker = other	Check type of EPFS = 0		Passed
Stop external position Use internal GPS	Check type of EPFS = 15		Passed

2.2.2 14.2.2 Reporting intervals

2.2.2.1 14.2.2.1 Speed and course change

Method of measurement

Set up standard test environment and operate EUT in autonomous mode as follows:

a) *Start with own speed of 10 kn; record all messages on VDL for 10 min and evaluate reporting interval for position report of EUT by calculating average slot offset over test period.*

b) *Increase speed and change course (ROT > 10°/min, derived from heading).*

c) *Reduce speed and rotation rate to values below those given in Table 1.*

d) *Make speed sensor unavailable.*

e) *Apply continuously changing heading data. Make heading sensor unavailable.*

For b), c), d) record all messages on VDL and check slot offset between two consecutive transmissions.

Required results

The following results are required.

a) *Reporting interval shall comply to Table 1 (10 s with a tolerance of ± 10 %).*

b) *Confirm that the new reporting interval has been established.*

c) *Confirm that the reporting interval is increased after 4 min (speed reduction) or 20 s (ROT reduction).*

d) *Check that with unavailable speed sensor the reporting interval reverts to default.*

e) *Check that with unavailable heading sensor the reporting interval reverts to autonomous reporting interval for the given speed.*

Apply simulated GNSS sentence to the sensor input. Set Navigation status to 0 (under way).
File name: ais01_gll_vtg_hdt_rot.sst
Record the VDL data of the procedure according to the following test items, generate appropriate diagram and check the items using the diagrams.

2012-02-06	**Tester: Ba**	**Test details:** Average values		
Test item		Check	Remark	Result
Modify speed to establish the required reporting intervals. Run the test of each reporting interval for at least 10 min (preferable 1 hour minimum).				
a) Speed = 10 kn		Check that the average reporting interval is 10 s	2012-02-06 Ba See Test diagram of test 16.6.1	Passed
		Check that the transmission slots are randomly distributed over the selection interval of 10s +/- 10% = 2 s = 75 slot		Passed
		Check that the slot offsets are in a range of 10 s +/- 2s = 375 +/- 75 slots		Passed
b) Speed = 15 kn		Check that the average reporting interval is 6 s	2012-03-01 Ba See Test diagram of test 16.6.1	Passed
		Check that the transmission slots are randomly distributed over the selection interval of 6s +/- 10% = 1.2 s = 45 slots		Passed
		Check that the slot offsets are in a range of 6 s +/- 1.2s = 225 +/- 45 slots		Passed
b) Speed = 25 kn		Check that the average reporting interval is 2 s	2012-03-02 Ba See Test diagram of test 16.6.1	Passed
		Check that the transmission slots are randomly distributed over the selection interval of 2s +/- 10% = 0.4 s = 15 slots		Passed
		Check that the slot offsets are in a range of 2 s +/- 0.4s = 755 +/- 15 slots		Passed

2012-02-06	**Tester: Ba**	**Test details:** Change of reporting rate by speed, 10 / 6 s interval		
Test item		Check	Remark	Result
Change speed according to the test items.				
a) Speed = 10 kn		Check that reporting interval is 10 s		Passed
b) Speed = 15 kn		Check slot allocation using Message 3 for new reporting rate	<u>Retest 2012-04-25 Ba:</u> It seems that the slots of the old reporting interval are not released if the time-out in the preveous frame and in the frame before the previous frame was 0. It may be that this problem automatically disappears if the problem with consecutive time-out 0 is solved (see 16.6.2) <u>Retest 2012-06-11 Ba:</u> In 2 tests the slot of the message with time-out 0 in the previous frame is not released. <u>Retest 2012-07-10 Ba:</u> Still slots of messages with time-out 0 in the previous frame are not released. In some cases the slots are released correctly (Frame 2/slot 1919, Frame 7/slot 1419 and 1630), in some cases they are not released (Frame 2, Slot 823 and Frame 7, slot 289). <u>Retest 2012-09-04 Ba:</u> Same problem. Slots with time-out 0 in the previous frame are not released. <u>Retest 2012-09-06 Ba:</u> In all cases the slots with time-out 0 are correctly released.	Passed
		Check that slot allocation for the new reporting rate has started after 2 transmissions	<u>Retest 2012-04-25 Ba:</u> The second message of the new reporting interval is not allocated. I recommend to transmit one more message of the old reporting interval and use it to allocate the second message of the new reporting interval. So the chain of the new reporting interval starts a little bit later but it avoids using an unallocated slot. <u>Retest 2012-06-11 Ba:</u> Not changed <u>Retest 2012-09-04 Ba:</u> Not changed <u>Retest 2013-01-08 Ba:</u> In the frames after a change of reporting rate there are some incorrect slot allocations. See Note) <u>Retest 2013-02-07 Ba:</u> The rescheduling is correct. No unallocated message is transmitted.	Passed

	Check that new rate is established within 1 minute		Passed
	Check that reporting interval is 6 s		Passed
c) Reduction of speed to Speed = 10 kn	Check slot allocation using Message 3 for new reporting rate	<u>Retest 2012-04-25 Ba:</u> In both cases of speed reduction (6s → 2 and 6s –10s) the second message of the new reporting interval is not allocated. A message 1 of the old reporting interval (converted to msg 3) should be used to allocate a slot. (see also similar problem at speed increasing) <u>Retest 2012-06-11 Ba:</u> • The second message is allocated • In 2 tests the slot of the message with time-out 0 in the previous frame is not released. <u>Retest 2012-07-10 Ba:</u> Still slots of messages with time-out 0 in the previous frame are not released. (Frame 7, slot 289) <u>Retest 2012-09-06 Ba:</u> In all cases the slots with time-out 0 are correctly released.	Passed
	Check that new rate starts after 3 min and is established within 4 min		Passed
	Check that reporting interval is 10 s		Passed

2012-02-06	**Tester: Ba**	**Test details:** Change of reporting rate by speed, 6 / 2 s interval		
Test item		Check	Remark	Result
Change speed according to the test items.				
a) Speed = 15 kn		Check that reporting interval is 15 s		Passed
b) Speed = 25 kn		Check slot allocation using Message 3 for new reporting rate	Retest 2012-04-25 Ba: In the second frame after speed increase there are some unnecessary message 3 (4 on channel A and 2 on channel B) which allocate slots which are never used. Retest 2012-06-11 Ba: No unexpected messages found	Passed
		Check that slot allocation for the new reporting rate has started after 2 transmissions		Passed
		Check that new rate is established within 1 minute		Passed
		Check that reporting interval is 2 s		Passed
c) Reduction of speed to Speed = 15 kn		Check slot allocation by deallocation of slots, Message 3 not required for new reporting rate	Retest 2012-04-25 Ba: In some cases (not in all cases) the slots of the old reporting interval are not released if the time-out in the preveous frame was 0. Retest 2012-06-11 Ba: In all cases the slots of messages with time-out 0 in the previous frame are released. Retest 2012-09-04 Ba: Same problem. Slots with time-out 0 in the previous frame are not released. Retest 2012-09-06 Ba: In all cases the slots with time-out 0 are correctly released.	Passed
		Check that new rate starts after 3 min and is established within 4 min		Passed
		Check that reporting interval is 6 s		Passed

2012-03-01	**Tester: Ba**	**Test details:** Change of reporting interval by heading change, 10 s	
Test item	Check	Remark	Result
Set speed = 10 kn Change heading according to the test items			
a) Heading not changing	Check that reporting interval is 10 s		Passed
b) Increase heading 18°/min	Check that the reporting interval is 10 s	2012-11-07 Ba: Retest 2013-01-08: Still ok	Passed
b) Increase heading 22°/min	Check that the reporting interval is 3 1/3 s	2012-11-07 Ba: The EUT starts decreasing the reporting interval between 32°/min and 35 °/min In my calculation the condition of ITU-R M.1371-4 section 4.3.1.2 (new heading value 5°> average of last 30s) is fulfilled for ROT > 20°/min	Passed
c) Stop heading change	Check that the reporting interval is 10 s		Passed

c) Increase heading -50°/min	Check that new rate starts within 150 slots (first transmission) after difference > 5°. That is 10 s after start of heading change.	• The new reporting interval is established within 150 slots • It seems that not in all possible cases a message 1 is used to allocate a slot for the first addtional message. (message 1 in slot 490 in the diagram of 10s basic interval could allocate message 3 in slot 740. The condition is fulfilled at 7.. 8 s of the frame) Retest 2012-06-11 Ba: Now the new reporting interval is not established within 150 slots. Retest 2012-07-10 Ba: There are some unallocated message 3 Retest 2012-09-04 Ba: The slot allocation is correct, there are no unallocated slots.	Passed
	Check slot allocation by inserting ITDMA slots (Message 3) for new reporting rate	Pretest 2012-03-01 Ba: The decreasing of the reporting interval is done in the same way as for speed change. That is incorrect. See Note) Retest 2012-04-25 Ba The reporting interval decreasing methode is correct. Addtional messages are inserted between the messages of the basic reporting interval	Passed
	Check that the additional message 3 are randomly distributed in a selection interval of 25 slots	2012-04-24 Ba	Passed
	Check that the NS of the SI of the additional messages is +/- 125 slot of the basic NS	2012-04-24 Ba	Passed
c) Stop increasing heading	Check slot allocation by stopping insertion of ITDMA slots (Message 3)		Passed
	Check that increased interval is maintained for 30 s (10 s until diff < 5°+20 s delay)		Passed
	Check that reporting interval is 10 s		Passed

2012-03-01 **Tester: Ba**	**Test details:** Change of reporting interval by heading change, 6 s		
Test item	Check	Remark	Result
Set speed = 15 kn Change heading according to the test items			
a) Heading not changing	Check that reporting interval is 6 s		Passed
b) Increase heading 18°/min	Check that the reporting interval is 10 s	<u>2012-11-07 Ba:</u>	Passed
b) Increase heading 22°/min	Check that the reporting interval is 2 s	<u>2012-11-07 Ba:</u> The EUT starts decreasing the reporting interval between 32°/min and 35 °/min for ROT > 20°/min <u>Retests 2013-01-08 Ba:</u> At 22°/min the EUT starts decreasing the reporting interval	Passed
c) Stop heading change	Check that the reporting interval is 6 s		Passed
b) Increase heading 50°/min	Check that new rate starts within 150 slots (first transmission) after the difference > 5°. That is 10 s after start of heading change		Passed
	Check slot allocation by inserting ITDMA slots (Message 3) for new reporting rate		Passed
	Check that the additional message 3 are randomly distributed in a selection interval of 15 slots	<u>2012-04-24 Ba</u>	Passed
	Check that the NS of the SI of the additional messages is +/- 75 slot of the basic NS	<u>2012-04-24 Ba</u>	Passed
c) Stop increasing heading	Check slot allocation by stopping insertion of ITDMA slots (Message 3)		Passed
	Check that increased interval is maintained for 30 s (10 s until diff < 5°+20 s delay)		Passed
	Check that reporting interval is 6 s		Passed

2012-03-01	**Tester: Ba**	**Test details:** Change of reporting interval by heading change, 2 s		
Test item		Check	Remark	Result
Set speed = 25 kn Change heading according to the test items				
a) Heading not changing		Check that reporting interval is 2 s		Passed
b) Increase heading 50°/min		Check that reporting int erval is 2 s		Passed
c) Stop heading change		Check that reporting interval is 2 s		Passed

2012-04-25	**Tester: Ba**	**Test details:** d) Reporting rate: sensor unavailable		
Test item		Check	Remark	Result
Change speed according to the test items and record VDL data.				
Speed = 10 kn		Check that reporting interval is 10 s		Passed
Speed = 15 kn		Check that reporting interval is 6 s		Passed
Speed sensor unavailable (internal source made unavailable)		Check that reporting interval of 6 s is maintained for 3 min	UTC 14:48 The reporting interval is immediately changed to 10 s. I recommend to change the reporting interval to 10 s after 3 min, according to the 3 min delay for increasing interval when speed is decreasing. Retest 2013-01-08 Ba: UTC 10:07 / 10:10 The reporting interval of 6 s is maintained for 3 minutes	Passed Passed
		Check that reporting interval after 3 min is 10 s		Passed

2013-01-08	**Tester: Ba**	**Test details:** e) Reporting rate: Heading sensor unavailable		
Test item		Check	Remark	Result
Change speed according to the test items and record VDL data.				
Speed = 10 kn		Check that reporting interval is 10 s		Passed
Change heading with > 20°/min		Check that reporting interval is 3 1/3 s	UTC 10:13	Passed
Make heading unavailable		Check that reporting interval reverts to 10 s	UTC 10:15	Passed

2.2.2.2 14.2.2.2 Change of navigational status

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Change Navigational status by applying voyage data message to the presentation interface of the EUT as follows:

a) set NavStatus to "at anchor" and speed <3 kn;

b) set NavStatus to "at anchor" and speed >3 kn;

c) set NavStatus to other values

Record all messages on VDL and evaluate reporting interval of position report of EUT.

Required results

The following results are required.

a) Reporting interval shall be 3 min.

b) Reporting interval shall be 10 s.

c) Reporting interval shall be adjusted according to speed and course (see Table 1).

NOTE Alarm conditions associated with NavStatus are tested in 14.6.3.6

2013-01-08	**Tester: Ba**	**Test details:** Reporting interval depending on Nav. status		
Test item		Check	Remark	Result
Apply simulated sensor data to the sensor input. File name: ais01_gll_vtg_hdt_rot.sst Change Navigation status and speed according to test items.				
a) Speed = 2 kn Nav. status = 1 (at anchor)		Check that reporting rate is 3 min	UTC 15:17	Passed
b) Speed = 4 kn Nav. status = 1 (at anchor)		Check that reporting rate is 10 s	UTC 15:21	Passed
c) Speed = 2 kn Nav. status = 5 (moored)		Check that reporting rate is 3 min	UTC 15:01	Passed
c) Speed = 2 kn Nav. status = 2 (not under command)		Check that reporting rate is 10 s		Passed
c) Speed = 2 kn Nav. status = 6 (aground)		Check that reporting rate is 10 s	UTC 15:07	Passed
c) Speed = 2 kn Nav. status = 3 or other		Check that reporting rate is 10 s	UTC 15:12	Passed

2.2.2.3 14.2.2.3 Assigned reporting intervals

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, transmit an assigned mode command Message 16 to the EUT with

a) initial slot offset and increment,

b) designated reporting rate.

Change course, speed and NavStatus. Record transmitted messages.

Required results

Confirm that the EUT transmits position reports Message 2 according to the parameters defined by Message 16 if the reporting interval of the assignment is shorter than the autonomous reporting interval. The EUT shall revert to Message 1 or 3 in autonomous mode with the autonomous reporting interval

- *after a period of 4 min to 8 min or*
- *if a change of course, speed and NavStatus require a shorter autonomous reporting interval.*

More detailed assigned mode tests are performed in 4.6.6 16.6.6 Assigned operation

In this test it is only checked how the assigned reporting schedule is affected by course, speed and navigation status.

Only if the speed or course change requires an higher report rate the EUT has the revert to autonomous mode and obtain the higher report rate.

2012-03-01	**Tester: Ba**	**Test details:** a) Slot offset and increment, course change		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn: Send assignment cmd Incr = 2 (375 slot = 10 s)		Check that EUT changes to slot assigned mode with 10 s reporting interval	2012-11-07 Ba: UTC 12:40	Passed
In assigned mode: • Change heading		Check that reporting interval is decreased to 3 1/3 s	2012-11-07 Ba:	Passed
		Check that 2 Message 3 are inserted between Message 2	2012-11-07 Ba:	Passed
		Check that message type of the basic message is 2	2012-11-07 Ba:	Passed

Speed = 10 kn: Send assignment cmd Incr = 3 (225 slot = 6 s)	Check that EUT changes to slot assigned mode with 6 s reporting interval	<u>Test 2012-06-11 Ba:</u>UTC UTC 11:00 The reporting rate is not increased Tested with slot assignment 3 (6s=225 slot) and 4 (3 1/3 s =125 slot) <u>Retest 2012-07-10 Ba:</u> The reporting rate is increased to 3 times the assigned reporting rate. Tested with slot assignment 3 and 4.	Passed
In assigned mode: • Change heading	Check that reporting interval is decreased to 2 s	<u>Retest 2012-07-10 Ba:</u> The additional messages are inserted between the messages of the assigned interval	Passed
	Check that 2 Message 3 are inserted between Message 2		Passed
	Check that message type of the basic message is 2		Passed
Speed = 15 kn: Send assignment cmd Incr = 4 (125 slot = 3.333 s)	Check that EUT changes to slot assigned mode with 125 slot reporting interval	<u>Test 2012-06-11 Ba:</u> UTC 11:00	Passed
In assigned mode: • Change heading	Check that reporting interval is decreased to 1.111 s	<u>Test 2012-06-11 Ba:</u>UTC UTC 11:00 The reporting rate is not increased Tested with slot assignment 3 (6s=225 slot) and 4 (3 1/3 s =125 slot) <u>Retest 2012-07-10 Ba:</u> The reporting rate is increased to 3 times the assigned reporting rate. Tested with slot assignment 3 and 4.	Passed
	Check that 2 Message 3 are inserted between Message 2		Passed
	Check that message type of the basic message is 2		Passed

2012-11-07	**Tester: Ba**	**Test details:** a) Slot offset and increment, longer interval		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn		Check that reporting interval = 10 s		Passed
Send assignment: Incr. = 1 (1125 slots = 30 s)		Check that the assignment command is ignored	UTC 12:46 The message type is changed to 2, but the reporting interval continues with 10 s	Passed
Speed = 15 kn		Check that reporting interval = 6 s		Passed
Send assignment: Incr. = 2 (375 slots = 10 s)		Check that the assignment command is ignored	UTC 12:56 The message type is changed to 2, but the reporting interval continues with 6 s	Passed
Speed = 25 kn		Check that reporting interval = 2 s		Passed
Send assignment: Incr. = 4 (125 slots = 3 1/3 s)		Check that the assignment command is ignored	UTC 13:06 The message type is changed to 2, but the reporting interval continues with 2 s	Passed

2012-11-07	**Tester: Ba**	**Test details:** a) Slot offset and increment, higher speed		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn • Send assignment: Incr. = 2 (375 slots = 10 s)		Check that assignment command is executed with a reporting interval of 10 s	UTC 12:50	Passed
• Increase speed to 15 kn		Check that EUT returns to autonomous mode with a reporting interval of 6 s	UTC 12:52 The EUT continues the slot assigned mode with 10 s reporting interval <u>Retest 2013-01-08 Ba:</u> UTC 11:58 EUT returns to autonomous mode with 2 s reporting interval. The message type is still 2	Passed
Speed = 15 kn • Send assignment: Incr. = 3 (225 slots = 6s)		Check that assignment command is executed with a reporting interval of 6 s	UTC 12:59	Passed
• Increase speed to 25 kn		Check that EUT returns to autonomous mode with a reporting interval of 2 s	UTC 13:01 The EUT continues the slot assigned mode with 6 s reporting interval <u>Retest 2013-01-08 Ba:</u> UTC 11:54 EUT returns to autonomous mode with 2 s reporting interval. The message type is still 2	Passed

2012-03-01	**Tester: Ba**	**Test details:** a) Slot offset and increment, Nav status change		
Test item		Check	Remark	Result
Assignment message 16: Slot offset A = 40 Slot increment parameter = 3 (increment = 225 = 6 s).				
NavStatus = 0 Speed = 2 kn • Send assignment cmd		Check that assignment command is executed with a reporting interval of 6 s	<u>Test 2012-06-11 Ba:</u> UTC 09:28	Passed
In assigned mode: • change NavStatus to 1 (at anchor)		Check that the EUT maintains the assigned mode	UTC 09:29	Passed
NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd		Check that assignment command is executed with a reporting interval of 6 s	<u>Test 2012-06-11 Ba:</u> UTC 09:44 After end of the slot assignment the EUT enters a very irregular state transmitting a few message 1 (about 2 per frame). There should be a message 3 every 3 minutes according to Nav status and speed. Remark: after a following rate assignment the EUT transmits a message 3 every 3 minutes as required <u>Retest 2012-07-10 Ba:</u> After the end of the assignment the EUT continues correctly with the 3 minutes reporting interval, including the correct allocation of the first message 3. Verified with two tests.	Passed

2012-03-01	**Tester: Ba**	**Test details:** b) Rate assignment, course change	
Test item	Check	Remark	Result
Nav status = 0, Offset A = Reporting interval is set according to the test item			
Speed = 10 kn: Send assignment cmd Offset = 60 (10s)	Check that EUT changes to slot assigned mode with 10 s reporting interval	Test 2012-11-07 Ba: UTC 13:14	Passed
In assigned mode: • Change heading	Check that reporting interval is decreased to 3 1/3 s	UTC 13:16	Passed
	Check that 2 Message 3 are inserted between Message 2		Passed
	Check that message type of the basic message is 2		Passed
Speed = 10 kn: Send assignment cmd Offset = 100 (6s)	Check that EUT changes to slot assigned mode with 6 s reporting interval	Test 2012-11-07 Ba: UTC 13:20	Passed
In assigned mode: • Change heading	Check that reporting interval is decreased to 2 s	UTC 13:22	Passed
	Check that 2 Message 3 are inserted between Message 2		Passed
	Check that message type of the basic message is 2		Passed
Speed = 15 kn: Send assignment cmd Offset = 200 (3s)	Check that EUT changes to slot assigned mode with 3 s reporting interval	UTC 11:17	Passed
In assigned mode: • Change heading	Check that reporting interval is decreased to 1 s		Passed
	Check that 2 Message 3 are inserted between Message 2		Passed
	Check that message type of the basic message is 2		Passed

2012-11-07	**Tester: Ba**	**Test details:** b) Rate assignment, longer interval		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn		Check that reporting interval = 10 s		Passed
Send assignment: Offset = 40 (15 s)		Check that the assignment command is ignored	UTC 13:28 The message type is changed to 2, but the reporting interval continues with 10 s	Passed
Speed = 15 kn		Check that reporting interval = 6 s		Passed
Send assignment: Offset = 60 (10 s)		Check that the assignment command is ignored	UTC 14:17 The message type is changed to 2, but the reporting interval continues with 6 s	Passed
Speed = 25 kn		Check that reporting interval = 2 s		Passed
Send assignment: Offset = 100 (6 s)		Check that the assignment command is ignored	UTC 14:22 The message type is changed to 2, but the reporting interval continues with 2 s	Passed

2012-03-01	**Tester: Ba**	**Test details:** b) Rate assignment, higher speed		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn • Send assignment: Offset = 60 (10 s)		Check that assignment command is executed with a reporting interval of 10 s		Passed
• Increase speed to 15 kn		Check that EUT returns to autonomous mode with a reporting interval of 6 s		Passed
Speed = 15 kn • Send assignment: Offset = 100 (6s)		Check that assignment command is executed with a reporting interval of 6 s		Passed
• Increase speed to 25 kn		Check that EUT returns to autonomous mode with a reporting interval of 2 s		Passed

2012-03-01	**Tester: Ba**	**Test details:** b) Rate assignment, Nav status change	
Test item	Check	Remark	Result
Assignment message 16:			
NavStatus = 0 Speed = 2 kn • Send assignment cmd Offset = 100 (6 s)	Check that assignment command is executed with a reporting interval of 6 s	UTC 10:47	Passed
In assigned mode: • change NavStatus to 1 (at anchor)	Check that the EUT maintains the assigned mode	UTC 10:50	Passed
NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd Offset = 20 (30 s)	Check that assignment command is executed with a reporting interval of 30 s	UTC 10:26	Passed

2.2.2.4 14.2.2.4 Static data reporting intervals

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Record the transmitted messages and check for static and voyage related data (Message 5).

a) *Change static and/or voyage related station data. Record the transmitted messages and check for static and voyage related data (Message 5).*

b) *Apply SSD and VSD sentences with the same static parameters several times.*

Required results

Confirm that the EUT transmits Message 5 with a reporting interval of 6 min alternating Channel A and Channel B.

a) *Confirm that the EUT transmits Message 5 within 1 min reverting to a reporting interval of 6 min.*

b) *Confirm that the EUT transmits Message 5 within 1 min after the first SSD sentence was received and revert to a reporting interval of 6 min. Subsequent identical SSD and VSD sentences shall not generate a further Message 5.*

2012-04-26	**Tester: Ba**	**Test details:** Static data reporting rates	
Test item	Check	Remark	Result
Record Message 5 and check repetition rate.			
Default update rate	Check that update rate is 6 min		Passed
a) Change static data using SSD sentence	Check that Message 5 is transmitted within 1 min		Passed
b) Repead SSD input with same data	Check that no Message 5 is transmitted	UTC 07:30 Message 5 is transmitted on each input of SSD Retest 2012-06-12 Ba: Message 5 is transmitted only if data have been changed.	Passed
a) Change voyage related data using VSD sentence	Check that Message 5 is transmitted within 1 min		Passed
b) Repead VSD input with same data	Check that no Message 5 is transmitted		Passed
Change position source with different ref. point data (see 61993 6.10.3.4)	Check that Message 5 with ref point of new source is transmitted before next transmission of position report. Remark: f this is not done before next transmission of position report there will be a position jump on the display system of near targets.	UTC 09:08 Message 5 is transmitted after change of position soure but not fast enough. It has to be transmitted before the next position report, otherwise the position of a ship may be displayed at the wrong place. Retests 2012-06-11 Ba: UTC 12:07 Message 5 is transmitted before the next position report.	Passed

2.3 14.3 Event log

(See 6.6)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Switch the EUT off for more than 15 min and on again at least ten times. Recover and readout recorded data.

Switch the EUT to receive only mode if implemented. Recover and readout recorded data.

Required results

Confirm that the EUT records and displays times and events correctly.

2012-04-26	**Tester: Ba**	**Test details:** Security	
Test item	Check	Remark	
Switch EUT off for 16 minutes and on again.			
Read out means	Check that there are means to readout recorded data	The non transmitting times are displayed on the MKD. Rec: A output of the recorded data by optional TRL sentence is not implemented. For compatibility to external equipment I recommend to output the recorded data as TRL sentences as response on a query.	Passed
Read out recorded data	Check that all switch off times > 15min are correctly recorded	a) The start times are logged b) Most start times have an incorrect date (2002/02/12) c) The End times are not recorded ("No record"). Retest 2012-06-15 Ba: The recorded times are correct now: Also short power of times are recorded. Power off times for less than 15 minutes should not be recorded to avoid that the list is exceeded to fast (or can be exceeded very fast be switching on and off the power rather fast to delete a relevant record). Retest 2012-07-13 Ba: Switchoff times of 5 and 10 minutes are recorded Retest 2012-09-10 Ba: Power off times of 5 and 10 minutes are not recorded, time > 15 min are recorded	Passed Passed

If the EUT supplies a "silent mode" (no transmission)	Check that all silent mode times > 15min are correctly recorded	2012-09-13 Ba: A silent mode by setting "Transceiver / AIS Tx" to off is not logged in the security log. Silent mode was activated for 42 minutes Retest 2012-11-07 Ba: The silent time is noted but the "End time" (beginning of the silent period) is identical to the correct "Start time" (End of silend periode). Retest 2013-01-08 Ba: The silent times (begin and end) are noted correctly	Passed

2.4 14.4 Initialization period

(See 6.7)

Method of measurement

Set up standard test environment with all sensors available.

Switch on EUT with EUT operating in autonomous mode.

Switch off EUT for approximately 0.5 s. Record transmitted messages.

Required results

Confirm that the EUT starts transmissions within 2 min after switch on.

2012-06-15	**Tester: Ba**	**Test details:** Initialisation period	
Test item	Check	Remark	Result
Set up standard test environment with all sensors available.			
a) Switch on of EUT	Check that EUT starts transmission within 2 min		Passed
b) Switch off EUT for approx. 0.5 s	Check that EUT starts transmission within 2 min	UTC 14:39 After 1 min 16s	Passed

14.5 Technical characteristics

(See 6.9)

2.4.1 14.5.1 Channel selection

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Switch the EUT to different channels randomly selected from the maritime mobile band as specified by ITU-R M.1084-5, Annex 4 using 25 kHz channel spacing:

a) manually;

b) by transmission of channel management message (Message 22) broadcast and addressed to EUT using a base station MMSI;

c) by application of ACA sentence to the presentation interface;

d) by transmission of DSC telecommand to EUT using a base station MMSI.

Record the VDL messages.

Required results

Confirm that the EUT uses the appropriate channels as commanded in the tests..

Confirm that the EUT delivers a single TXT sentence with ID 036, followed by the ACA sentences needed to inform of changes in the AIS use of regional operating settings.

<table>
<tr><td>2012-06-15</td><td>Tester: Ba</td><td colspan="3">Test details: Channel selection</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Select channels and bandwidth according to the test items in a regional area around the actual position so that is in use.
The VDL analyser has to be switched to the selected channels.</td><td></td></tr>
<tr><td colspan="2" rowspan="3">a) Enter <u>manually</u>:
2 simplex channels
25 kHz spacing
25 kHz bandwidth</td><td>Check that channels are used</td><td>No manual channel management found.
<u>Retest 2012-09-14 Ba:</u>
A change of the channels by MKD was not accepted
<u>Retest 2012-11-07 Ba:</u>
UTC 14:39
-The channels are used.</td><td>Passed</td></tr>
<tr><td>Check TXT output at PI</td><td>Retest 2012-11-07 Ba:
UTC 14:27
No TXT output
<u>Retest 2013-01-09 Ba:</u>
UTC 10:16
There is a TXT 036 output</td><td>Passed</td></tr>
<tr><td>Check ACA output at PI</td><td>ACA output with the correct values
The in-use of the area flag in a requested ACA is set to 0
After a restart (UTC 14:54) the in-use flag is set correctly to 1.
<u>Retest 2013-01-09 Ba:</u>
Same problem, the in-use flag of the ACA sentence which is output on response to the setting and on request is 0 but the area settings are in use. The time of “in-use change” is set to 000000 which is also incorrect.
<u>Retest 2013-02-04 Ba:</u>
The in-use flag and the time of in-use change are set correctly</td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="3">b) Enter by <u>using Message 22 to an area</u>:
1 duplex channel
25 kHz spacing
25 kHz bandwidth</td><td>Check that channels are used</td><td></td><td>Passed</td></tr>
<tr><td>Check TXT output at PI</td><td></td><td>Passed</td></tr>
<tr><td>Check ACA output at PI</td><td></td><td>Passed</td></tr>
</table>

b) Enter by using Message 22 MMSI addressed: 1 duplex channel 25 kHz spacing 25 kHz bandwidth	Check that channels are used	Test 2012-11-07 Ba: UTC 15:10 The channels are used	Passed
	Check TXT output at PI	There is no TXT output Retest 2013-01-09 Ba: UTC 10:24 There is a TXT 036 output	Passed
	Check ACA output at PI	There is no ACA output The in-use of the area flag in a requested ACA is set to 0 Retest 2013-01-09 Ba: UTC 10:24 • There is an ACA output • The in-use flag and the time of “in-use change” are 0 Retest 2013-02-11 Ba: UTC 11:50 The in-use flag and the time of “in-use change” are set correctly	Passed Passed
c) Enter by ACA sentence: 2 duplex channel 25 kHz spacing Upper band channels	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
d) Enter by DSC: 2 duplex channel 25 kHz spacing Lower band channels	Check that channels are used	A DSC call with channel settings is not accepted. A DSC call which includes only channel numbers but no corner points should be applied to the area in use Retest 2013-02-11 Ba: UTC 11:57 The channels are set correctly	Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed

2.4.2 14.5.2 Transceiver protection

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Open circuit and short circuit VHF-antenna terminals of the EUT for at least 60 s each.

Required results

The EUT shall be operative again within 2 min after refitting the antenna without damage to the transceiver.

2012-06-15	**Tester: Ba**	**Test details:** Transceiver protection		
Test item		Check	Remark	Result
Open circuit of VHF antenna terminal		Check that EUT starts transmission within 2 min after refitting the antenna	UTC 09:38 EUT continues transmission immediately after refitting the antenna.	Passed
Short circuit of VHF antenna terminal		Check that EUT starts transmission within 2 min after refitting the antenna	UTC 09:40	Passed

2.4.3 14.5.3 Automatic power setting

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode as follows:

a) Set NavStatus to moored, SOG to < 3 kn and ship type to "tanker".

b) Repeat test a) and assign the power level to high via the VDL.

c) Change the NavStatus to underway.

Required results

Verify that

a) the power setting is 1 W and the MKD indicates the correct power setting,

b) the power setting is 1 W and the MKD indicates the correct power setting,

c) the power setting is 12,5 W and the MKD indication reverts to normal.

NOTE Other mechanisms for power setting are tested in 17.5

2012-11-07	**Tester: Ba**	**Test details:** Automatic power setting		
Test item		Check	Remark	Result
Nav status = 5 (moored) SOG = 2 kn				
Ship type not "Tanker" No area setting		Check that Tx power = 12.5 W		Passed
		Check that MKD displays high power setting		Passed
a) Set ship type to "Tanker"		Check that Tx power = 1 W		Passed
		Check that MKD displays low power setting	On the bottom status line in yellow color and under "Own ship"	Passed
b) Apply valid message 22 with high power setting, position inside		Check that Tx power = 1 W		Passed
		Check that MKD displays low power setting		Passed
c) change nav status to 0 (under way)		Check that Tx power = 12.5 W		Passed
		Check that MKD displays high power setting		Passed

2.5 14.6 Alarms and indicators, fall-back arrangements

(See 6.10)

2012-06-15	**Tester: Ba**	**Test details:** General alarm tests		
Test item		Check	Remark	Result
No alarm pending				
Alarm output repetition		Check that the ALR sentence output rate is not < 1 min	Inactive alarms are output with an interval of 60 s	Passed

2.5.1 14.6.1 Loss of power supply

Method of measurement

Disconnect power supplies of the EUT.

Required result

Verify that the relay output is "active" when the power is "off".

2012-04-26	**Tester: Ba**	**Test details:** Loss of power supply		
Test item		Check	Remark	Result
Switch off power supply		Check that alarm relay output is active.	The alarm is inactive Retest 2012-06-11 Ba: At power off the alarm relay has still the same state as in the alarm inactive state. It does not help to connect the alarm indication to the other contact of the relay. The logic of the active alarms has to be reverted! Retest 2012-07-10 Ba: Not fixed. The alarm relay does not become active at power off of the EUT Retests 2012-09-07 Ba: The alarm relay output is active when power is off. The alarm line had to be reconnected to the NC port.	Passed

2.5.2 14.6.2 Monitoring of functions and integrity

2.5.2.1 14.6.2.1 T_x malfunction

Method of measurement

Check the manufacturer's documentation details how the EUT detects T_x malfunction.

Required result

Confirm that the requirements of 4.1.5 and 6.10.2.2 are fulfilled and that an ALR sentence with alarm ID 1 is sent to the PI.

2013-04-11	**Tester: Ba**	**Test details:** Tx malfunction		
Test item		Check	Remark	Result
Check the manufactuer's documentation				
Transmitter shutdown function (4.1.5)		Check that documentation describes how the transmitter shutdown function works	Document, file name: TCF_CAMINO-701_WD_R2 20130322.docx	Passed
		Verify that the shutdown function is indepedent of the software control		Passed
		Check that an ALR 001 is output on PI		Passed
Transmitter malfunction (6.10.2.2)		Check that the documentation describes how the AIS detects Tx malfunction	Document, file name: TCF_CAMINO-701_WD_R2 20130322.docx	Passed
		Check that an ALR 001 is output on PI		Passed

2.5.2.2 14.6.2.2 Antenna VSWR

Method of measurement

Prevent the EUT from radiating with full power by mismatching the antenna for a VSWR of 3:1. During the mismatch the output power is not required to be at the rated output power.

Required result

Verify that the EUT continues operating. Verify that an alarm sentence ALR with alarm ID 002 is sent and the relay output signals the failure state.

Verify that relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated.

2012-06-15	**Tester: Ba**	**Test details:** Antenna VSWR		
Test item		Check	Remark	Result
Test with acknowledgement				
Connect a mismatched dummy load with a VSWR of 3:1 to the VHF antenna terminal		Check that transmission continues	<u>Retest 2013-03-19 Ba:</u> UTC 12:00 and 12:07 The EUT does not continue the normal transmission (see IEC61993-2 Ed.2 6.10.2.2 Table 2, ALR 002) There is only one transmission every minute on one channel, not the required 10s reporting interval on both channels. The Tx channel may depend on the channel on which the VSWR exceeding has been detected. <u>Retest 2013-03-21 Ba:</u> The EUT continues with the regular transmission.	Passed
		Check that ALR sentence ID 002 is output on PI	<u>Retest 2012-07-16 Ba:</u> There is no ALR ID 002 output. I tried it with 16 Ohm and 150 Ohm dummy load directly at the antenna connector and at the end of 1 m coax cable but no there was no alarm. It seems that the alarming threshold has been changed to fix the previous error at reconnection of the antenna (see below) and now the VSWR 1:3 is not recognized. <u>Retest 2012-09-14 Ba:</u> With 150 Ohm and 16 Ohm directly at the antenna connector and at 1.5 m cable there is no ALR 002. <u>Retest 2012-02-11 Ba:</u> Each time when the EUT tries a transmission it performs a restart. <u>Retest 2013-03-19 Ba:</u> ALR ID 002 is output on PI Tested with150 and 16 Ohm load.	Passed
		Check that the alarm relay is activated		Passed
Send an ACK sentence		Check that the alarm relay is deactivated		Passed
		Check that ALR sentence is updated		Passed
Reconnect a matching antenna		Check that ALR sentence is updated		Passed

Test without acknowledgement			
Connect a mismatched dummy to the VHF antenna terminal	Check that alarm relay activated		Passed
	Check that ALR sentence is updated		Passed
	Check that alarm is display on the MKD		Passed
Reconnect a matching antenna	Check that the alarm relay is deactivated	UTC 13:26 The relay is not deactivated Waited for about 10 min <u>Retest 2013-03-19 Ba:</u> UTC 12:11 The alarm relay is deactivated	Passed
	Check that ALR sentence is updated	The ALR sentence is not updated <u>Retest 2013-03-19 Ba:</u> The ALRl sentence is updated	Passed
	Check that alarm display on the MKD is updated (the alarm indication is cleared)	The Alarm is not cleared <u>Retest 2013-03-19 Ba:</u> The alarm is removed from the alarm list.	Passed

2.5.2.3 14.6.2.3 R_x malfunction

Method of measurement / Required result

Manufactures shall provide documentation describing how the AIS detects R_x malfunction and that an ALR sentence with alarm ID as appropriate is sent.

2013-04-11	**Tester: Ba**	**Test details:** R_x malfunction		
Test item		Check	Remark	Result
Check the documentation				
Detection of R_X malfunction		Check that documentation describes how the AIS detects R_x malfunction	Document, file name: TCF_CAMINO-701_WD_R2 20130322.docx	Passed
ALR output		Check that documentation describes that an ALR sentence with ID 003 (RX1), ID 004 (RX2) and ID 005 (DSC) is sent.		Passed

2.5.2.4 14.6.2.4 Loss of UTC

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Disconnect the GNSS antenna (UTC synch invalid).

b) Reconnect the GNSS antenna.

Required result

a) Verify that the system continues to operate and changes sync state to indirect synchronisation and that an ALR sentence with ID 007 is sent and the relay output is activated.

b) Verify that the EUT outputs ALR sentence ID 007 with status deactivated and the relay output is deactivated. The EUT shall change sync state to UTC direct synchronisation.

2012-11-08	**Tester: Ba**	**Test details:** UTC clock lost		
Test item		Check	Remark	Result
Disconnect GNSS antenna				
Continuation of operation		Check that transmission of position report continues		Passed
Synchronisation		Check that EUT switches to indirect synchronisation		Passed
ALR output		Check that an ALR sentence with ID 007 is output at PI		Passed
Alarm relay		Check that the alarm relay output is activated	The alarm relay is not activated The MKD and ALR show an active, unacknowledged alarm but the alarm relay is not activated. Remark: This error may not be detected if external sensor data are not supplied because in this case the alarm relay is activated by other alarms (no position, no SOG/COG). <u>Retest 2013-01-08 Ba:</u> UTC 12:27 The alarm relay is activated	Passed
Reconnect the GNSS antenna				
Synchronisation		Check that EUT changes sync state to UTC direct synchronisation		Passed
ALR output		Check that the ALR sentence with ID 007 is updated		Passed
Alarm relay		Check that the alarm relay output is deactivated	<u>Retest 2013-01-08 Ba:</u> UTC 12:28 The alarm relay is inactivated	Passed

2.5.2.5 14.6.2.5 Remote MKD disconnection, when so configured

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Disconnect the remote MKD or stop the HBT sentence.

b) Provide an alarm acknowledgement, ACK sentence with ID 008, to the PI.

c) Reconnect the remote MKD, apply the HBT sentence with status indication ok.

d) Apply the HBT sentence with status indication not ok.

e) Apply SSD sentence with DTE flag set to 1.

Required result

Verify that:

a) after two times the specified repeat interval defined in HBT plus 1 s that an alarm sentence, alarm ID 008, is sent and the relay output signals the failure. Verify that the AIS continues operation, with the DTE value "1" in Message 5. If the configured repeat interval field is null, treat it as 30 s;

b) the relay deactivates when the EUT receives an ACK and that the status field in the ALR sentence is updated;

c) the AIS continues operation with the DTE value set to "0";

d) an alarm sentence, alarm ID 008, is sent and the relay output signals the failure. Verify that the AIS continue operation, with the DTE value "1" in Message 5;

e) the AIS uses the DTE parameter in the SSD sentence and continues operation with the DTE value set to "1".

2012-04-26	**Tester: Ba**	**Test details:** Remote MKD disconnection	
Test item	Check	Remark	Result
This test is applicable only with a remote or external MKD			
Disconnect the connection to the remote MKD.			
a) after two times the specified repeat interval defined in HBT plus 1 s:	Check that transmission continues	Not applicable, internal MKD	N/A
	Check that the DTE flag in Message 5 is set to 1		N/A
	Check that ALR sentence ID 008 is output at PI		N/A
	Check that alarm relay is activated		N/A
b) Send an ACK sentence	Check that alarm relay deactivated		N/A
	Check that ALR sentence is updated		N/A
Apply SSD sentence with DTE flag set to 0 to the PI port	Check that the DTE flag in Message 5 is set to 0		N/A
c) Reconnect MKD	Check that ALR sentence is updated		N/A
	Check that the DTE flag in Message 5 is set to 0		N/A
Apply SSD sentence with DTE flag set to 1 to the PI port	Check that the DTE flag in Message 5 is set to 0		N/A
d) Apply HBT sentence with status “Not ok” on the MKD connection	Check that transmission continues		N/A
	Check that the DTE flag in Message 5 is set to 1		N/A
	Check that ALR sentence ID 008 is output at PI		N/A
	Check that alarm relay is activated		N/A
e) Apply HBT sentence with status “Passed” on the MKD connection Apply SSD sentence with DTE flag set to 1 on the MKD connection	Check that the DTE flag in Message 5 is set to 1		N/A
Apply SSD sentence with DTE flag set to 0 to the PI port	Check that the DTE flag in Message 5 is set to 0		N/A

2.5.2.6 14.6.2.6 Status query

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Send a query sentence to the EUT ($xxAIQ,TXT).

Required result

Verify that a set of TXT sentences representing the current status is output on the PI.

2012-07-11	**Tester: Ba**	**Test details:** Status query		
Test item		Check	Remark	Result
Send a query sentence to the EUT ($xxAIQ,TXT).		Check that there is a TXT output for position status (ID21 ... 25)	Remark: No TXT output if no position available	Passed
		Check that there is a TXT output for SOG/COG status (ID27,28)	Remark: ID 28 output if no SOG/COG available	Passed
		Check that there is a TXT output for Heading status (ID31)	Remark: No TXT output if no heading available	Passed
		Check that there is a TXT output for ROT status (ID33, 34)	Remark: No TXT output if no ROT available	Passed

2.5.3 14.6.3 Monitoring of sensor data

2.5.3.1 14.6.3.1 Priority of position sensors

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Verify the manufacturer's documentation to ascertain the configuration implemented on the EUT for position sensors.

Apply position sensor data in a way that the EUT operates in the states defined below :

a) external DGNSS in use (corrected);

b) internal DGNSS in use (corrected; Message 17) if implemented;

c) internal DGNSS in use (corrected; beacon) if implemented;

d) external EPFS in use (uncorrected);

e) internal GNSS in use (uncorrected) if implemented

f) no sensor position in use

Check the ALR sentence and the position accuracy flag in the VDL msg 1.

Required result

Verify that the use of position source, position accuracy flag, RAIM flag and position information complies with Table 4 and Table 5. Verify that the "type of electronic fixing device" in Message 5 is set accordingly.

Verify that when the status is changed, an ALR (025, 026, 029, 030), or TXT (021, 022, 023, 024, 025, 027, 028) sentence is sent according to Table 2 or Table 3, respectively.

Verify that the status is changed after 5 s when switching downwards and 30 s when switching upwards.

<table>
<tr><td>2012-06-11</td><td>Tester: Ba</td><td colspan="3">Test details: Position priority: Basic test without internal DGNSS</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Connect sensor inputs and correction data according to the test items.
Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst
Internal GPS: RAIM, external: no RAIM</td><td></td></tr>
<tr><td colspan="5">No sensor data: Changing upwards</td></tr>
<tr><td colspan="2" rowspan="4">f) Start with:
• No external GNSS input
• No internal GNSS</td><td>Check that default position is used</td><td></td><td>Passed</td></tr>
<tr><td>Check that position accuracy flag = 0</td><td></td><td>Passed</td></tr>
<tr><td>Check that RAIM flag = 0</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR message with ID 026 (No sensor position) is output on PI every 30 s</td><td>There is no ALR ID 026
<u>Retest 2012-07-13 Ba:</u>
There is an ALR ID 026</td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="7">e) Change from f:
• No external GNSS input
• Activate internal GNSS</td><td>Check that internal position is used</td><td></td><td>Passed</td></tr>
<tr><td>Check that position accuracy flag = 0</td><td>PA flag = 1</td><td>Passed</td></tr>
<tr><td>Check that RAIM flag is according to internal sensor (= 1)</td><td>RAIM flag = 0
<u>Retest 2012-07-13 Ba:</u>
RAIM flag = 1</td><td>Passed</td></tr>
<tr><td>Check that msg 5 is output with new (internal) ref. point</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR message with ID 026 is updated</td><td>There is no ALR 026 output
<u>Retest 2012-07-13 Ba:</u>
There is an ALR 026 output with status V,V</td><td>Passed</td></tr>
<tr><td>Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI</td><td></td><td>Passed</td></tr>
<tr><td>Check that status has been changed after 30 s</td><td>After 66 s. This included the GPS aquisition time</td><td>Passed</td></tr>
</table>

d) Change from e: • Internal GNSS is available • Apply external GNSS input	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is according external sensor (= 0)		Passed
	Check that Message 5 is output with new (external) ref. point		Passed
	Check that ALR message with ID 025 is updated		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status has been changed after 30 s		Passed
a) Change from d: • Internal GNSS • Change external mode to DGNSS	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 021 is output on PI		Passed
	Check that status has been changed after 30 s		Passed
Highest Level: Changing downwards			
d) Change from a: • Internal GNSS available • Change external sensor mode to GNSS	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that TXT sentence with ID 022 is output on PI		Passed
	Check that status has been changed after 5 s		Passed
e) Change from d: • Internal GNSS available • Remove external GNSS input	Check that internal position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to documentation of internal GPS (= 1)	RAIM flag = 0 <u>Retest 2012-07-13 Ba:</u> RAIM flag = 1	Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that ALR message with ID 025 (external EPFS lost) is output on PI		Passed
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that an alarm according to ALR message is displayed on MKD		Passed
	Check that status has been changed after 5 s		Passed

f) Change from e: • No external GNSS input • Disable internal GNSS	Check that default position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
	Check that ALR message with ID 026 (No sensor position) is output on PI	There is no ALR ID 026 <u>Retest 2012-07-13 Ba:</u> There is an ALR 026	Passed
	Check that status has been changed after 5 s		Passed

2013-02-08	**Tester: Ba**	**Test details:** Position priority: DGNSS test Message 17		
Test item		Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: no RAIM				
No correction data: Changing upwards				
d) Start with: • Internal GNSS is available • External GNSS input		Check that external position is used		Passed
		Check that position accuracy flag = 0		Passed
		Check that RAIM flag = 0		Passed
b) Change from d: • External mode is GNSS • Apply correction data by Message 17		Check that internal position is used	<u>2012-06-11 Ba:</u> UTC 13:58 The internal position is not used. Message 17 is received (VDM) but the correction data seem not to be accepted <u>2012-09-14 Ba:</u> UTC 08:25 Message 17 is received but the internal DGNSS is not used. <u>Retest 2012-11-16 Ba:</u> When receiving message 17 the EUT switches to internal DGNSS. Detailled test has to be performed during the next test phase.	Passed
		Check that position accuracy flag = 1		Passed
		Check that RAIM flag is set according to internal GNSS (= 1)		Passed
		Check that Message 5 is output with new (internal) ref. point		Passed

	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI	• TXT sentence ID025 is output. It should be TXT ID 024 • TXT ID 028 is output correctly Remark: On the MKD the sensor status is displayed correctly (“Int. DGNSS Msg.17”). <u>Retest 2013-03-19 Ba:</u> UTC 14:25 TXT ID 024 is output	Passed Passed
	Alarms	The ALR 025 “External EPFS lost” is activated as long as the internal GNSS is used because of higher priority. This is incorrect because the external EPFS is still available. This alarm would be very confusing for the operator. <u>Retest 2013-03-19 Ba:</u> UTC 14:28 ALR 025 is not activated	Passed
	Check that status is changed after 30 s		Passed
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (Message 17)	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that RAIM flag is set according to external GNSS (= 0)		Passed
	Check that msg 5 is output with new (external) ref. point		Passed
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 021 and ID 027		Passed
	Check that status is changed after 30 s		Passed

Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by Message 17 • Change external sensor mode to GNSS	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI	• TXT sentence ID025 is output. It should be TXT ID 024 • TXT ID 028 is output correctly Retest 2013-03-19 Ba: UTC 14:30 TXT ID 024 is output	Passed
	Check that status is changed after 5 s		Passed
d) Change from c: • External GNSS input • Remove Message 17 (correction data for Internal GNSS)	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that the RAIM flag is set according to external sensor input data (= 0)		Passed
	Check that Message 5 is output with new ref. point		Passed
	Alarms	At the transition from internal to external GNSS there is for a short time no valid position, and ALR 026 is activated for the same time Retest 2013-03-19 Ba: There is no “No position” and no ALR 026	Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status is changed after 5 s + max age of correction data		Passed

2013-02-08	**Tester: Ba**	**Test details:** Check of Message 17 from an non-base station MMSI	
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items.			
• External mode is GNSS • Apply correction data by Message 17 from a non-base station MMSI	Check that external position is used	UTC 13:00	Passed
	Check that position accuracy flag = 0		Passed
	Check that no TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		Passed

2012-06-11	**Tester: Ba**	**Test details:** Position priority: DGNSS test beacon	
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: No RAIM.			
No correction data: Changing upwards			
d) Start with: • Internal GNSS is available • External GNSS input	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Check that internal position is used	2012-06-11 UTC 13:58 The internal position is not used. The beacon correction data seem not to be accepted <u>Retest 2013-02-11 Ba:</u> Same result. We have to find out why the correction data are not accepted. The data stream is the same as the data used form message 17. <u>Retest 2013-03-19 Ba:</u> The manufacturer has decided not to implement the beacon input at this time, for this approval	N/A
	Check that position accuracy flag = 1		N/A
	Check that Message 5 is output with new (internal) ref. point		N/A
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		N/A
a) Change from c: • Change external mode to DGNSS • Internal DGNSS (beacon)	Check that external position is used		N/A
	Check that position accuracy flag = 1		N/A
	Check that Message 5 is output with new (external) ref. point		N/A
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		N/A
Status change time	Check that status is changed after 30 s		N/A

Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		N/A
	Check that position accuracy flag = 1		N/A
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		N/A
d) Change from c: • External GNSS input • Remove beacon correction data for Internal GNSS	Check that external position is used		N/A
	Check that position accuracy flag = 0		N/A
	Check that RAIM flag is set according to sensor input data		N/A
	Check that msg 5 is output with new ref. point		N/A
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		N/A
Status change time	Check that status is changed after 5 s		N/A

2013-03-19	**Tester: Ba**	**Test details:** Position priority: DGNSS test beacon + Message 17		
Test item		Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: No RAIM.				
No correction data: Changing upwards				
d) Start with: • Internal GNSS is available • External GNSS input		Check that external position is used	Not implemented	N/A
		Check that position accuracy flag = 0		N/A
		Check that RAIM flag = 0		N/A
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon		Check that internal position is used		N/A
		Check that position accuracy flag = 1		N/A
		Check that Message 5 is output with new (internal) ref. point		N/A
		Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		N/A
b) Change from c: • External mode is GNSS • Correction data for DGNSS by beacon • Apply Message 17 with correction data		Check that internal position is used		N/A
		Check that position accuracy flag = 1		N/A
		Check that TXT sentence with ID 024 is output on PI		N/A

a) Change from b: • Change external mode to DGNSS • Internal DGNSS (Message17)	Check that external position is used		N/A
	Check that position accuracy flag = 1		N/A
	Check that Message 5 is output with new (external) ref. point		N/A
	Check that TXT sentence with ID 021 (position) and ID 027 (SOG/COG) is output on PI		N/A
Status change time	Check that status is changed after 30 s		N/A
Highest Level: Changing downwards			
b) Change from a: • Message 17 for internal DGNSS • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		N/A
	Check that position accuracy flag = 1		N/A
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI		N/A
c) Change from b: • External sensor mode is GNSS • Internal DGNSS by beacon • Stop Message 17	Check that internal position is used		N/A
	Check that position accuracy flag = 1		N/A
	Check that TXT sentence with ID 023 is output on PI		N/A
d) Change from c: • External GNSS input • Remove beacon correction data for internal GNSS	Check that external position is used		N/A
	Check that position accuracy flag = 0		N/A
	Check that RAIM flag is set according to sensor input data (= 0)		N/A
	Check that Message 5 is output with new ref. point		N/A
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		N/A
Status change time	Check that status is changed after 5 s		N/A

2.5.3.2 14.6.3.2 Multiple Message 17 from different DGNSS reference stations

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

When applying Message 17, use a base station MMSI as follows:

a) *Apply Message 17 from a distant DGNSS reference station.*

b) *Apply Message 17 from a near DGNSS reference station in addition to the distant station.*

c) *Switch off Message 17 from the near DGNSS reference station.*

Required Result

Verify the following:

a) *the use Message 17 for position determination;*

b) *the use Message 17 from the near DGNSS reference station;*

c) *the use Message 17 from the distant DGNSS reference station.*

<table>
<tr><td>2013-02-11</td><td>Tester: Ba</td><td colspan="3">Test details: Multiple Messages 17</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Connect sensor inputs and correction data according to the test items.</td><td></td></tr>
<tr><td colspan="2" rowspan="3">Start with:
• Internal GNSS is available
• External GNSS input</td><td>Check that external position is used</td><td>UTC 07:53</td><td>Passed</td></tr>
<tr><td>Check that position accuracy flag = 0</td><td></td><td>Passed</td></tr>
<tr><td>Check that RAIM flag = 0</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="3">a) Change
• External mode is GNSS
• Apply correction data by Message 17 from a distant reference station</td><td>Check that internal position is used</td><td>UTC 07:54</td><td>Passed</td></tr>
<tr><td>Check that position accuracy flag = 1</td><td></td><td>Passed</td></tr>
<tr><td>Check that the reference station in use is the distant station</td><td>Checked by evaluation of GGA output
There are problems at transition, see Note).
<u>Retest 2013-03-21 Ba:</u>
There is no problem at the transition to differential mode</td><td>Passed</td></tr>
</table>

b) • Distant ref. station • Apply additionally correction data by Message 17 from a near reference station	Check that internal position is used	UTC 07:55	Passed
	Check that position accuracy flag = 1		Passed
	Check that the reference station in use is the near station	Checked by evaluation of GGA output There are problems at transition and during reception of 2 reference stations, see Note) <u>Retest 2013-03-27 Ba:</u> There is no problem during the time when message 17 from 2 reference station is received. The problem at the transition from one to another reference station are acceptable (see Note)	Passed Passed
c) • Distant ref. station • Remove message 17 from the near reference station	Check that internal position is used	UTC 07:59	Passed
	Check that position accuracy flag = 1		Passed
	Check that the reference station in use is the distant station	Checked by evaluation of GGA output There are problems at transition, see Note) <u>Retest 2013-03-21 Ba:</u> There is no problem at the transition from differential mode to normal mode	Passed Passed

Note)
The selection of the reference station works basically correct. The nearer reference station is selected.

But at the transition phases
- From no message 17 to message 17
- From messate 17 to no message 17
- Sometimes during the Rx of message 17 from two reference stations

the internal position changes for 5 s to „no position“ (GGA). This causes several alarms, change of position source to external position and VDO with default position for a few seconds.

If the behaviour of the internal GPS module cannot be changed then the AIS software should bridge this „no position“ time to avoid the unintended effects. The unnecessary alarms will not be accepted by the operators.

For details see also the PI port log file.

<u>Retest 2013-03-21 Ba:</u>
The behaviour is rather similar:

There are still the „no position“ times in the GGA as described above, rather often for 2...10 s during the Rx of message 17 from two reference stations. It did not happen during the time when there was only message 17 from one reference station.

There are no „default position“ times in VDO, but still the ALR 007 UTC sync lost is activated, and sometimes the position source changes to „external“.

The selection of the reference station has to be done by the AIS software, not by the GPS module. The AIS unit has to receive message 17, filter it for the nearest reference station and forward only the correction data from this reference station to the GPS module.

For the GPS module there is no difference between message 17 from 1 reference station and message 17 from multiple reference stations because it always receives correction data from one reference station only.

If it is implemented this way it is not understandable why the GPS module behaves different for 1 and 2 reference stations. The correction data for both reference stations are identical in the test except the station ID.

<u>Retest 2013-03-27 Ba:</u>
At the transition from 1 Reference station to another reference station there is still for 5...7 s no position. This seems to be a function of the GPS module and is acceptable because it does not happen often.
During the time when message 17 from 2 reference station is received there is no problem. The position is stable in diffferential mode.

2.5.3.3 14.6.3.3 Heading sensor

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) *Disconnect the inputs for HDG and ROT or set their data to invalid (for example by wrong checksum, ”valid/invalid” flag).*

b) *Reconnect the inputs for HDG and ROT*

c) *Disconnect the input for ROT or set the data to invalid (for example by wrong checksum, “valid/invalid” flag). Establish a rate of heading change that is greater than 5 °in 30 s.*

d) *Reconnect the ROT input*

e) *Apply a SOG less than 5 kn and a difference between COG and HDT greater than 45°for 5 min*

f) *Apply a SOG greater than 5 kn and a difference between COG and HDT greater than 45° for 5 min*

Required Result

Check that:

a) an alarm sentence ALR with alarm ID 032 for invalid HDG and an alarm sentence ID 035 for invalid ROT are sent to the PI and the "default" data is sent in VDL Message 1, 2 or 3;

b) an alarm sentence ALR with alarm ID 032 for valid HDG and ID 035 for valid ROT is sent to the PI . Verify that, in the alarm sentences, the alarm condition flag is set to "V" and that the relay output is not activated;

verify that TXT sentences with ID 031 for valid HDG and ID 033 for ROT indicator in use are sent to the PI;

c) a TXT sentence with ID 034 for "other ROT source in use" is sent to the PI and that the contents of the message's ROT field is the correct "direction of turn" (Table 6 "ROT sensor fall-back conditions" Priority 2);

d) a TXT sentence with ID 033 for ROT indicator in use use and an ALR sentence with ID 035 for valid ROT is sent to the PI, and the alarm condition flag is set to "V" and that the relay output is not activated.

e) no active alarm ID 011 for Heading Sensor Offset is sent to the PI.

f) an alarm sentence ALR with alarm ID 011 for Heading Sensor Offset is sent to the PI after 5 minutes;

2012-06-12	**Tester: Ba**	**Test details:** Heading and ROT		
Test item		Check	Remark	Result
Connect Heading and ROT input according to test items.				
Start with: • Valid heading • Valid ROT		Check that heading and ROT are used in VDL message	UTC 07:26	Passed
		Check that alarm relay is inactive		Passed
		Check that no ALR output is active		Passed
a) Disconnect heading and ROT • No heading • No ROT •		Check that heading in VDL = default		Passed
		Check that ROT in VDL = default		Passed
		Check that ALR message with ID 032 (heading invalid) is output on PI		Passed
		Check that ALR message with ID 035 (ROT invalid) is output on PI		Passed
		Check that alarm relay is active		Passed

b) Reconnect heading and ROT • Valid heading • Valid ROT	Check that heading in VDL ok	UTC 07:28	Passed
	Check that ROT in VDL ok		Passed
	Check that ALR message with ID 032 (heading valid) and status V is output on PI		Passed
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Passed
	Check that TXT message with ID 031 (Heading valid) is output on PI		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI		Passed
	Check that alarm relay is inactive		Passed
c) Disconnect ROT • Valid heading • No ROT Change heading > 5 °/30s	Check that ROT in VDL is + 127 for increasing heading	ROT is set to default Retest 2012-11-08 Ba: UTC 10:10 No change, ROT = default The ROT information is not derived from the heading. Retest 2013-01-08 Ba: UTC 12:40 ROT = +127 (at 11°/min)	Passed
	Check that ROT in VDL is - 127 for decreasing heading	ROT is set to default Retest 2012-11-08 Ba: No change, ROT = default Retest 2013-01-08 Ba: UTC 12:52 ROT = -127 (at -11°/min)	Passed
	Check that TXT message with ID 034 (other ROT in use) is output on PI	Retest 2012-11-08 Ba: No TXT ID 034 output, There is an ALR 035 (no ROT). Retest 2013-01-08 Ba: There is a TXT ID 034 output, ALR 035 is inactive	Passed
d) Reconnect ROT • Valid heading • Valid ROT	Check that ROT in VDL ok		Passed
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI		Passed
	Check that alarm relay is inactive		Passed
e) Check of heading sensor offset SOG = 4 kn Difference SOG to Heading > 45° for > 5 min	Check that ALR 011 is not activated	Test 2012-11-08 Ba: UTC 08:10	Passed

f) SOG = 6 kn Difference SOG to Heading = 40°for > 5 min	Check that ALR 011 is not activated	Test 2012-11-08 Ba: UTC 08:12 UTC 08:16: ALR 011 is activated if 0°is between COG and heading: e.g. COG = 350°, heading = 10°. Difference = 20° → the ALR is activated. Perhaps the simple mathematical difference 350-10 = 340 is calculated but this is wrong! Retest 2013-01-08 Ba: UTC 13:01 ALR 011 is not activated	Passed
f) SOG = 6 kn Difference SOG to Heading > 45°for >5 min	Check that ALR 011 is activated after 5 min	Test 2012-11-08 Ba: UTC 08:03 UTC 08:08: ALR 011 is activated	Passed
	Check that the alarm relay is activated	The alarm relay is not activated Retest 2013-01-08 Ba: UTC 13:07 UTC 13:12 the alarm relay is activated	Passed
Change ROT source back to TI • Valid heading • ROT from TI	Check that ROT in VDL ok		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI	No TXT sentence ID 033 at this occasion. Remark: There is a TXT sentence ID 033 when the ROT sentence is started Retest 2012-07-13 Ba: UTC 09:41 There is an TXT output with ID 033	Passed

2.5.3.4 14.6.3.4 Speed sensors

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Verify the manufacturer's documentation to ascertain the configuration implemented on the EUT for position sensors (see 6.10) as follows:

a) apply valid external DGNSS position and external speed data;

b) disconnect external DGNSS position, disconnect the inputs for SOG, COG or set their data to invalid (e.g. by wrong checksum, "valid/invalid" flag) .

NOTE: Test b) is applicable only if the internal GNSS is used as position source.

Required Result

Check that:

a) a TXT sentence with ID 027 is sent to the PI and the external data for SOG / COG is sent in VDL Message 1, 2 or 3. Verify that the system continues to operate and that the relay output is not activated;

b) a TXT sentence with ID 028 is sent to the PI and the internal data for SOG / COG is sent in VDL Message 1, 2 or 3. Verify that the system continues to operate and that the relay output is not activated.

2012-06-12	**Tester: Ba**	**Test details:** Speed sensor		
Test item		Check	Remark	Result
Connect external speed sensor input according to test items. Internal GPS is available.				
No sensor data: Changing upwards				
a) Start with • No external Position • No external speed • No internal Position • No internal speed		Check that SOG = default	UTC 08:12	Passed
		Check that COG = default		Passed
		Check that alarm relay is active		Passed
b) Activate internal GPS • Internal position • Internal speed		Check that SOG from internal GPS is used in VDL message 1,2,3		Passed
		Check that COG from internal GPS is used in VDL message 1,2,3		Passed
		Check that TXT message with ID 028 (internal speed in use) is output on PI		Passed
		Check that ALR message with ID 29 and 30 (no valid SOG/COG information) with status V is output on PI		Passed
		Check that alarm relay is inactive		Passed

c) Connect external speed • No external Position • External speed	Check that SOG from internal Sensor is used in VDL message 1,2,3	UTC 08:31, 08:42 SOG = 0.0	Passed
	Check that COG from internal Sensor is used in VDL message 1,2,3		Passed
d) Connect position (and speed) • External Position • External speed	Check that SOG from external Sensor is used in VDL message 1,2,3		Passed
	Check that COG from external Sensor is used in VDL message 1,2,3		Passed
	Check that TXT message with ID 027 (external COG/SOG in use) is output on PI	UTC 08:33	Passed
Changing downwards			
c) Disconnect external position • No external Position • External speed	Check that SOG from internal GPS is used in VDL message 1,2,3	0.0	Passed
	Check that COG from internal GPS is used in VDL message 1,2,3	The last valid external COG is transmitted <u>Retest 2012-07-13 Ba:</u> The internal COG (=default) is used <u>Retest 2012-09-05 Ba:</u> The external COG is used	Passed
	Check that TXT message with ID 028 (internal speed in use) is output on PI	UTC 08:34	Passed
b) Disconnect external speed • No external Position • No external speed	Check that SOG from internal GPS is used in VDL message 1,2,3		Passed
	Check that COG from internal GPS is used in VDL message 1,2,3	The last valid external COG is transmitted <u>Retest 2012-07-13 Ba:</u> UTC 10:22 The internal COG (=default) is used	Passed
a) Disable internal GPS • No external Position • No external speed • No internal Position • No internal speed	Check that SOG = default		Passed
	Check that COG = default		Passed
	Check that ALR message with ID 029 (no valid SOG information) is output on PI		Passed
	Check that ALR message with ID 030 (no valid COG information) is output on PI		Passed
	Check that alarm relay is active		Passed

2.5.3.5 14.6.3.5 GNSS position mismatch

Method of measurement

Set up standard test environment and operate EUT with valid internal position available and using valid external position.

a) Apply an external position with an offset of more than 100 m to the internal position for 3 min. Then modify external position to an offset of less than 100 m to the internal position.

b) Modify the external position to an offset of more than 100 m to the internal position for more than 1 h.

c) Then modify external position to an offset of less than 100 m to the internal position.

Required Result

The following checks need to be performed.

a) Check that no alarm sentence ALR is output.

b) Check that an alarm sentence ALR with alarm ID 009 with status active is output 15 min after the modification of the position.

c) Check that the alarm sentence ALR with alarm ID 009 with status inactive is output.

<table>
<tr><td>2012-11-08</td><td>Tester: Ba</td><td colspan="3">Test details: GNSS position mismatch</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Valid internal GNSS and external position sensor data
Dimension/Reference data: Distance between internal and external Position = 80 m
This test does not consider the 80 m offset.</td><td></td></tr>
<tr><td colspan="2">Start with:
• Internal GNSS
• External GNSS input, distance < 75m</td><td>Check that ALR sentence 009 is not active</td><td>• ALT 009 is not active
• The EUT uses an incorrect threshold. See Note)
<u>2013-01-08 Ba:</u>
Retest see extra table below</td><td>Passed

Passed</td></tr>
<tr><td colspan="2">a) for 3 minutes:
• Change external positon to a distance of 110 m</td><td>Check that ALR sentence 009 is not output active</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="2">a) for more than 15 minutes:
• Change external positon to a distance 110 m</td><td>Check that ALR sentence 009 is not active for 15 minutes</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR sentence 009 is active after 15 minutes</td><td></td><td>Passed</td></tr>
<tr><td colspan="2">c)
• Change external positon to a distance of 75 m</td><td>Check that ALR sentence 009 is updated to status “inactive”</td><td></td><td>Passed</td></tr>
</table>

Other failures	- If there is no external position the reporting interval of message 5 is correct, every 6 minute. - If an external position is applied, there is - under certain conditions which could not really identified - a transmission of message 5 every 10...20 s. Additionally there is a similar number of message 5 VDOs without transmissions. This behaviour perhaps depends on the distance between the internal and external position. Retest 2013-01-08 Ba: This problem accured again beginning with this test. Retest 2013-02-07 Ba: There are no additional message 5	Passed

2013-01-08	**Tester: Ba**	**Test details:** GNSS position mismatch		
Test item		Check	Remark	Result
Valid internal GNSS and external position sensor data Dimension/Reference data: Distance between internal and external Position = 80 m				
Start with: • Internal GNSS • External GNSS input, distance < 170 m		Check that ALR sentence 009 is not active		Passed
a) for 3 minutes: • Change external positon to a distance > 190 m		Check that ALR sentence 009 is not output active	UTC 13:23, UTC 13:44 The ALR 009 is set	Passed
a) for more than 15 minutes: • Change external positon to a distance > 190 m		Check that ALR sentence 009 is not active for 15 minutes		Passed
		Check that ALR sentence 009 is active after 15 minutes	• The ALR 009 is set to active • The alarm relay is not active Remark: For all active alarms the alarm relay has to be activated Retest 2013-02-07 Ba: The alarm relay is activated	Passed Passed
c) • Change external positon to a distance of 170 m		Check that ALR sentence 009 is updated to status “inactive”	UTC 14:06	Passed

Note)
IEC 61993-2 Ed.2, section 6.10.3.5:
When the external position source is used and both external and internal positions are valid then the external and internal positions shall be compared once per minute and an alarm generated if the difference between the two positions is greater than 100 m *+ distance*

between the two GNSS antennas, for a period of 15 min.

The test has performed with a distance between the internal and external reference point of 80 m.

So the alarm threshold should be at 100 m + 80 m ref. Offset = 180 m.

Unfortunately the test section is incorrect and does not consider this reference offset. I have send an comment regarding this item to IEC but the TC80 secretary has refused this comment and delayed the correction to a future version of IEC 61993-2.

2.5.3.6 14.6.3.6 Incorrect NavStatus

Method of measurement

Set up standard test environment and operate EUT with valid internal position available and using valid external position then proceed as follows:

a) Set NavStatus to "at anchor" and set SOG to > 3 kn.

b) Repeat test with NavStatus "moored".

c) Repeat test with NavStatus "aground".

d) Set NavStatus to "under way" and set SOG to 0 kn for more than 2 h.

e) Try to set NavStatus to 14.

Required Result

Check that:

a) an ALR sentence with ID 010 is generated. Verify that the system transmits with the reporting interval as appropriate, and that the MKD prompts the user to correct the NavStatus;

b) an ALR sentence with ID 010 is generated. Verify that the system transmits with the reporting interval as appropriate;

c) an ALR sentence with ID 010 is generated. Verify that the system transmits with the reporting interval as appropriate;

d) an ALR sentence with ID 010 is generated after two hours. Verify that the system transmits with the reporting interval as appropriate, and that the MKD prompts the user to correct the NavStatus;

e) setting of NavStatus 14 is rejected.

2012-11-08	**Tester: Ba**	**Test details:** Incorrect Nav status	
Test item	Check	Remark	Result
Valid internal GNSS and external position sensor data NavStatus = 1 (at anchor)			
a) Set SOG = 4 kn	Check that ALR sentence 010 is output on PI port	• The ALR 010 is output • The alarm relay is not active Remark: For all active alarms the alarm relay has to be activated <u>Retest 2013-01-15 Ba:</u> The alarm relay is not active <u>Retest 2013-02-05 Ba:</u> The alarm relay is active	Passed Passed
	Check that the reporting interval is 10 s		Passed
	Check that the MKD prompts the user to correct the NavStatus	There is no prompt on the MKD <u>Retest 2013-01-08 Ba:</u> No prompt found. The alarm is displayed but no prompt ot correct the NavStatus. <u>Retest 2013-02-05 Ba:</u> A prompt is displayed and leads to the input dialog to change the nav status.	Passed
Set SOG = 1 kn	Check that ALR sentence 010 updated to status "Inactive"		Passed
b) Set SOG = 4 kn Set NavStatus = 5 (moored)	Check that ALR sentence 010 is output on PI port		Passed
	Check that the reporting interval is 10 kn		Passed
c) Set SOG = 4 kn Set NavStatus = 6 (aground)	Check that ALR sentence 010 is output on PI port		Passed
	Check that the reporting interval is 10 kn		Passed
d) For more than 2 hours: Set SOG = 0 Set NavStatus to 0 (under way)	Check that there is no active ALR sentence 010 output for 2 hours	Test 2013-02-05	Passed
	Check that ALR sentence 010 is output on PI port after two hours		Passed
	Check that the reporting interval is 10 kn		Passed
	Check that the MKD prompts the user to correct the NavStatus		Passed
e) Try to set NavStatus to 14	Check that Navstatus cannot be set to 14	Nav status 14 cannot be set by MKD and VSD	Passed

2.6 14.7 Display and control

(See 6.11)

2.6.1 14.7.1 Data input/output facilities

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) *Check the MKD indication and, by inspection, check that it is possible to input the entire 6-bit ASCII character set required by Recommendation ITU-R M.1371-4 Table 44.*

b) *Record received messages and check contents of minimum display.*

c) *Input static and voyage related data including the "< and >" brackets in the destination field via the MKD. Consider the full range of input fields, e.g. minimum and maximum.*

d) *Record transmitted messages and check contents of MKD.*

Required results

Confirm that:

a) *the minimum display contains at least three lines of target data, with no horizontal scrolling of elapsed time and the range and bearing data display and that the entire 6-bit character set is supported;*

b) *all messages of Table 7 are displayed and that means to select messages and data fields to be displayed are available;*

c) *all necessary data can be input. Verify that the access to input data required to be protected by section 6.11 is password protected. Check that all data not defined in 6.11 has a different password level or no password;*

d) *all transmitted data is displayed correctly.*

At least bearing, range and name of ship shall be displayed without horizontal scrolling.

2012-06-15	**Tester: Ba**	**Test details:** a) MKD size of display		
Test item		Check	Remark	Result
Target display lines				
a) Size of display		Check that at minimum 3 lines of target data are available		Passed
		Check that target range is displayed without horizontal scrolling	There is no target list, only a graphical display and a list of dangerous targets. The main target display and the only required by the standard is a list of targets. A graphical list is optional and my conflict with some requirements of the display standard (use of symbols ...) <u>Retest 2012-09-05 Ba:</u> • The target list is available • The target list disappears after a few seconds. This is not in accordance with the standard. See Note. • Range and bearing are not calculated. For both it is displayed “N/A”. • Lost targets seem not to be deleted from the target list after a reasonable time. So the list is filled up with more and more lost targets. <u>Retest 2012-11-12 Ba:</u> • The target list does not disappear. • Range and bearing are calculated. See 14.7.5 for check of the correct calculation. • Lost targets are deleted from the list after some time	Passed
		Check that target bearing is displayed without horizontal scrolling	See range	Passed
		Check that elapsed time of target is displayed without horizontal scrolling	The elapsed time since last reception of a target is not displayed in the target list. <u>Retest 2013-01-09 Ba:</u> No change, the elapsed time is not displayed <u>Retest 2013-02-05 Ba</u> The elapsed time is displayed in minutes, and it is displayed in seconds if the time is <1min	Passed
6 bit character set		This is tested under c) Input static and voyage related data		N/A
b) display of received messages		The is tested in 14.7.5 (received targets) and 14.7.8 (received safety related messages.		N/A

2012-09-13	**Tester: Ba**	**Test details:** c) Input of data	
Test item	Check	Remark	Result
MMSI number	Check that number can be input		Passed
IMO number	Check that number can be input		Passed
Call sign	Check that Call sign can be input		Passed
Name of ship	Check that name can be input		Passed
Navigational status	Check that data can be input	Retest 2013-02-05 Ba: The nav status cannot be changed on MKD. The nav status can be changed on the MKD, it says "Data changed" but the new Nav status is not stored. The Nav status can be changed with the VSD sentence.	
		Retest 2013-02-08 Ba: The nav status can be changed on the MKD.	Passed
	Check if input by number or by selection of items	By selection of items	Passed
	If input by selection of items: Check that 14 for AIS SART can not be input		Passed
Type of ship and cargo	Check that data can be input		Passed
	Check if input by number or by selection of items		Passed
	If input by selection of items: Check that the new values for dangerous cargo (X, Y, Z, OS) are used for selection		Passed
Dimension/Reference for position	Check that data for internal EPFS antenna position can be input	• The data can be input.	Passed
		• The newdata are shown in the own data menu and for setting	Passed
		• They are not used in message 5. In message 5 the old values are used. The reason may be that at the time of data input an external position was used.	
		Retest 2012-11-12 Ba: The new data are used in message 5	Passed
	Check that data for external EPFS position can be input		Passed
Maximum static draught	Check that data can be input		Passed

Destination	Check that name of destination can be input	- The destination can be input and is used in message 5. - The destination is not shown in the own ship menu. - The destination is not shown in the Ship setting/Voyage menu <u>Retest 2012-11-12 Ba:</u> - The destination is shown in the own ship menu. - The destination is not shown in the Ship setting/Voyage menu	Passed Passed
	Verify that all 64 characters of ITU-R M.1371-4 Table 44 can be input See a)	The characters [\]^_ cannot be selected for input. This is not only related to the destination but also to other text fields. <u>Retest 2012-11-12 Ba:</u> All characters can be input.	 Passed
	Check that estimated time of arrival can be input		Passed
Remark	The password protection of input is tested in 14.7.4 System control		N/A

2012-09-13	**Tester: Ba**	**Test details:** d) Display of transmitted data		
Test item		Check	Remark	Result
Dynamic data (Message 1,2,3)				
Internal GNSS data		Check Position	The own ship data are continuously display in "Nav status / own ship	Passed
		Check SOG/COG		Passed
		Check PA flag		Passed
		Check RAIM flag		Passed
External GNSS data		Check Position	The own ship data are continuously display in "Nav status / own ship	Passed
		Check SOG/COG		Passed
		Check PA flag		Passed
		Check RAIM flag		Passed
Other dynamic data		Check navigatinal status		Passed
		Check Heading		Passed
		Check ROT		Passed
		Check that the actual source is indicated (external/internal)	The actual source is not displayed Retest 2012-09-05 Ba: The actual source is shown on the Sensor status screen	Passed
Static data (Message 5)				
Static data		MMSI		Passed
		IMO number		Passed
		Call sign		Passed
		Name of ship		Passed
		Type of ship and cargo Check that the new categories according to Clar. 2.2 (X, Y, Z, OS) are displayed		Passed
		Dimension/Reference for position		Passed
		Type of EPFD, external position		Passed
		Type of EPFD, internal position (value = 15)		Passed
		Estimated time of arrival		Passed
		Maximum present static draught		Passed
		Destination		Passed
		DTE flag		Passed

2.6.2 14.7.2 Initiate message transmission

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Initiate the transmission of non-scheduled messages and interrogations as provided by the EUT.

Required results

Confirm that at least the transmission of safety related addressed and broadcast messages (Message 12 and Message 14) can be initiated by means of the minimum display. Confirm that transmission of messages 4, 9, 16, 17, 18, 19, 20, 21, 22, and 23 is not possible.

Confirm, by inspection of manufacturer's documentation, that pre-configured safety related text Messages 12 and 14 are not available.

NOTE: Use of messages 4, 9, 16, 17, 18, 19, 20, 21, 22, and 23 is restricted to other types of AIS stations.

2012-09-13	**Tester: Ba**	**Test details:** Message transmission		
Test item		Check	Remark	Result
Transmission of safety related broadcast message		Check selection between broadcast and addressed message		Passed
		Check selection of T_X channel		Passed
		Check data input		Passed
		Check that pre-configured text messages are not available	Prepared blocks are available. Retest 2012-11-12 Ba: Prepared blocks are not available.	Passed
		Check handling of invalid characters (e.g. lower case letters)	Cannot be selected	Passed
		Check display of transmission status (indication that message is transmitted)	There is no immediage indication if the message has been transmitted. It can only be seen in the outbox. We recommend to display an immediate indication (popup message) See Note)	Passed

Transmission of addressed safety related message	Check selection of T_X channel		Passed
	Check data input		Passed
	Check input of MMSI		Passed
	Note if selection of MMSI from received message (e.g. position report) is possible		Passed
	Check that pre-configured text messages are not available	Retest 2012-11-12 Ba: Prepared blocks are not available.	Passed
	Check display of transmission status (indication that message is transmitted and acknowledged)	There is no immediate indication if the message has been transmitted or acknowledged. In the outbox it is possible to see if the message has been transmitted. It is not possible to see if the message has been acknowledged. This is the much more important information and should be provided to the operator, at least in the outbox, better with a popup message. See Note) Retest 2012-11-12 Ba: The transmission and acknowledgement status is shown in the outbox.	Passed
Transmission of other messages	Check for a sample of Message 4, 16, 17, 18, 19, 20, 21, 22 that a transmission is not possible.	Transmission of other messages is not possible	Passed

2.6.3 14.7.3 Communication test

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. The test environment has to include at least one Class B SO station. Initiate the communication test function (transmit Message 10) by

a) MKD using proposed target;

b) MKD using alternative target;

c) AIR sentence;

d) another transmitter (EUT as destination)

Required results

Confirm that:

a) *the EUT transmits Message 10 addressed to the target and that the communication test result is correct for both a successful and unsuccessful response on the MKD. Verify that only Class A stations are proposed on the MKD;*

b) *the EUT transmits Message 10 addressed to the target and that the communication test result is correct for both a successful and unsuccessful response on the MKD. Verify that only Class A stations can be selected as alternative targets on the MKD;*

c) *the EUT transmits Message 10 addressed to the target;*

d) *the EUT transmits Message 11 as the response.*

In all cases verify that VDO Message 10 and received VDM Message 11 is output to the PI.

Verify that Class B stations are not selected by the MKD.

2012-11-12	**Tester: Ba**	**Test details:** Communicaton test		
Test item		Check	Remark	Result
a) Communication test using proposed target				
Activate Communication test on MKD Only a Class B SO target available		Check that no target is proposed		Passed
Successful test Activate Communication test on MKD Class A and Class B SO targets available Select the proposed target		Check that a Class A target is proposed	- A Class A target is proposed - In the test the nearest target is proposed. According to 6.11.2 preferable targets in a range of 15...25 NM should be used for the test. See Note Retest 2013-02-08 Ba: A class A with a range of 18 NM is proposed. There are several other targets in the target list with lower ranges. Remark: a target is proposed after pressing “Menu”.	Passed
		Check that Message 10 is transmitted		Passed
		Check content of Message 10		Passed
		Check VDO output of message 10		Passed
		Check VDM output of messages 11		Passed
		Check that the successful result is displayed on the MKD	A “Yes” in the list of communication tests	Passed

Unsuccessful test Activate Communication test on MKD Class A and Class B SO targets available Select the proposed target No response from target	Check that a Class A target is proposed		Passed
	Check that Message 10 is transmitted		Passed
	Check that there is no VDM output of messages 11		Passed
	Check that the unsuccessful result is displayed on the MKD	A "No" in the list of communication tests	Passed
b) Communication test using alternate target			
Successful test Activate Communication test on MKD Class A and Class B SO targets available Select an alternate target	Check that a Class A target is proposed		Passed
	Check that it is possible to select an alternate target		Passed
	Check that Message 10 is transmitted		Passed
	Check content of Message 10, address = selected target		Passed
	Check VDO output of message 10		Passed
	Check VDM output of messages 11		Passed
	Check that the successful result is displayed on the MKD		Passed
Unsuccessful test Activate Communication test on MKD Class A and Class B SO targets available Select an alternate target No response from target	Check that a Class A target is proposed		Passed
	Check that it is possible to select an alternate target		Passed
	Check that Message 10 is transmitted to the selected target		Passed
	Check that there is no VDM output of messages 11		Passed
	Check that the unsuccessful result is displayed on the MKD		Passed

c) Communication test using AIR input			
Apply an AIR sentence Requested message = 11	Check that Message 10 is transmitted	UTC 12:11 - If the requested message field = 11 a Message 15 is transmitted, with requested message ID = 0. On this request a message 10 should be transmitted. - If the requested message field = 10, a message 10 is transmitted. In this case no message should be transmitted See Note 2) <u>Retest 2013-01-09 Ba:</u> - Requested message field = 11: Tx message 10 - Requested message field = 10, no Tx	Passed
	Check content of Message 10		Passed
	Check VDO output of message 10		Passed
	Check VDM output of messages 11		Passed
d) Communication test response			
Apply message 10 on VDL, addressed to the EUT	Check that Message 11 is transmitted		Passed

Note 1)
For the communication test targets at a range of 15...25 NM should be prefered and therefore proposed by the AIS unit. In this range the test is only successful if the full transmission power and full sensitivity is available.

If there are no targets in this range of course another target should be proposed, perhaps the target with a range which is nearest to 20 NM even if it is not in the range of 15...25 NM.

Note 2:
The AIR sentence always contains the message ID of the <u>requested</u> message, not the ID of the message which should be transmitted. Normally message 15 is transmitted on AIR but in case of a request for message 11 a message 10 is transmitted.

2.6.4 14.7.4 System control

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Perform system control/ configuration commands as specified. Check indication of system status/alarms.

Required results

Confirm that the configuration level and other functions, not intended for use by the operator, are protected by password or adequate means.

Verify that regional channel management settings can be input via the MKD and that there is no other means of changing the radio parameters.

Remark to password protection:
If only one password is used, no data which may be changed during normal operation should be protected by this password.

If two password levels are used (installation, administrator or level 1 password and operation, user or level 2 password), data which may be changed during normal operation should be protected by the level 2 password, not by the level 1 password.

2012-07-13	**Tester: Ba**	**Test details:** Password protection			
Input item		Level 1 Requirement	Level 2 Recommendation	Implemented type of protection	Result
Static data					
MMSI		Required	---	Protected	Passed
IMO-Number		Required	---	Protected	Passed
Call sign		Required	---	Protected	Passed
Name of ship		Required	---	Protected	Passed
Dimension/Reference for position		Required	---	Protected	Passed
Type of ship		Required	---	Protected	Passed
Tx off switching		Required, if function available	---	Not protected We recommend to protect this by password but it is not clear if it is required. Retest 2012-11-07 Ba: The Tx silent mode switching is proceted by password	Passed

Voyage data				
Navigational status	Not allowed	Not recommended	Not protected	Passed
Type of cargo	Not allowed	Not recommended	Not protected	Passed
Destination	Not allowed	Not recommended	Not protected	Passed
ETA	Not allowed	Not recommended	Not protected	Passed
Maximum static draught	Not allowed	Not recommended	Not protected	Passed
Persons on board	Not allowed	Not recommended	Not protected	Passed
Other operational data				
Area settings	Not allowed	Recommended if a level 2 password is implemented	Not protected	Passed
Message transmission	Not allowed	Not recommended	Not protected	Passed
Long range confirmation	Not allowed	Not recommended	Not protected	Passed
Configuration data				
Interface configuration	Required	---	2012-06-15 Ba: Serial port setting is not protected by password Retest 2012-07-13 Ba: Serial port setting is protected by password	Passed
Message 27 tx channels	Required		Protected	Passed
Change of passwords	Required		Protected	Passed
Long range autoackn.	Not required	Recommended if a level 2 password is implemented	Not protected	Passed

2013-01-10	**Tester: Ba**	**Test details:** Regional area entry		
Test item		Check	Remark	Result
Presentation of the existing areas		Check that the 8 existing areas can be selected and displayed		Passed
		Check display of Channel A and B		Passed
		Check display of R_X/T_X mode		Passed
		Check display transmission power		Passed
		Check display of bandwidth		Passed
		Check display of NE point of area		Passed
		Check display of SW point of area		Passed
		Check display of transitional zone		Passed
Entry of a new area		Check selection between changing an existing area and creating a new regional area entry	If selecting an existing area the EUT offers “Edit region?”. If selecting a not defined area the EUT offers “New region?”	Passed
		Check input of Channel A and B		Passed
		Check input of R_X/T_X mode		Passed
		Check input transmission power		Passed
		Check input of NE point of area		Passed
		Check input of SW point of area		Passed
		Check input of transitional zone		Passed
		Check that the user has to confirm a second time that the new data shall be stored	Area is not stored See 17.7.2 Retest 2013-01-09 Ba: The new area is stored (check by ACA)	Passed
Enter invalid channel		Check that entry is refused	There is no warning but invalid channels are ignored Some channel ranges cannot be selected when entering the data.	Passed
Enter too small area (<20 NM)		Check that entry is refused	EUT says: Data refused	Passed
Enter too large area (> 200 NM)		Check that entry is refused	EUT says: Data refused	Passed

Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused	EUT says: Data refused Area is not output as ACA on request Area is not used when position inside But the area is displayed on MKD. This is very confusing and inconsistant. After restart of the unit it is not displayed on MKD. If the refused area is not removed it should at least marked as invalid/ inactive. Retest 2013-02-05 Ba: The invalid area is not displayed	Passed
Changing an existing area	Check that existing area for changes can be selected		Passed
	Check change of Channel A and B		Passed
	Check change of R_X/T_X mode		Passed
	Check change transmission power		Passed
	Check change of NE point of area		Passed
	Check change of SW point of area		Passed
	Check change of transitional zone		Passed
	Check that the user has to confirm a second time that the new data shall be stored		Passed
Changing of default values	Check that the default Channels (AIS1 and AIS2) cannot be changed without entering a complete area		Passed
	Check that the T_X/R_x mode cannot be changed without entering a complete area		Passed
	Check that the transmission power cannot be changed without entering a complete area		Passed
Erase of area settings	Check that areas cannot be deleted manually		Passed

2.6.5 14.7.5 Display of received targets

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Apply messages from the following targets to the VDL:

- *Class A with Messages 1 and 5, 10 s reporting interval;*
- *Class A with Messages 3 and 5, 3 min reporting interval;*
- *Base station with Message 4, 10 s reporting interval;*
- *Airborne AIS with Messages 9 and 5, 10 s reporting interval;*
- *Class B SO with Messages 18 and 19, 30 s reporting interval;*
- *Class B CS with Messages 18 and 24A,B, 3 min reporting interval;*
- *AIS AtoN with Message 21, 1 min reporting interval;*
- *AIS-SART under test with Messages 1 and 14, 1 TDMA burst;*
- *AIS-SART under test with Messages 1 and 14, 1 TDMA burst with enabling testing AIS-SART indication;*
- *active AIS-SARTs with Messages 1, 1 min reporting interval.*

b) Remove all targets from VDL.

c) Apply again all targets after 17 min, without static data Messages 5, 19 and 24.

d) Switch off one AIS-SART.

e) Apply 200 targets to the EUT.

f) Apply 300 targets to the EUT.

Required results

The following results are required.

a) Confirm that all targets are displayed on the target list with name, range, bearing and minutes from last received position report.

Confirm that the nearest active AIS-SART is displayed on top of the list and the name is SART ACTIVE.

Confirm that an Alarm ID 014 is sent to the PI.

Confirm that testing AIS-SART is not displayed; however, it is displayed only when enabling testing AIS-SART indication.

Confirm that the other targets are displayed in an order according to the range, nearest target first.

Confirm that all targets can be selected for detailed view.

Confirm that all information required by Table 7 is displayed in the detailed view if not displayed in the target list.

Confirm that all target information which is displayed on the MKD is displayed correctly.

b) Confirm that the time from the last received message is counting down every minute for all targets. Confirm that all targets except the active SARTs are removed from display 7 min after the last received message.

c) Confirm that all targets are displayed again. Confirm that all static data from all targets are displayed correctly.

d) Confirm that the time from the last received message is counting down every minute for SART. Confirm that the SART is removed from display 18 min after the last received message.

e) Confirm that the MKD displays 200 targets.

f) Confirm that the MKD displays 200 nearest targets as a minimum.

2012-09-13	**Tester: Ba**	**Test details:** a) Display of target list	
Test item	Check	Remark	Result
Receive messages and check target list			
General requirements of the target list	Confirm that the targets (except SART) are displayed in an order according to the range, nearest target first		Passed
	Confirm that all targets can be selected for a detailled view -> The detailled view is checked in a separate list		Passed
Message 1 + 5 Class A station, 10 s interval	Check that received target is displayed in the target list		Passed
	Name of ship		Passed
	Position (RNG, BRG)	Range and bearing is not available ("N/A") Retest 2012-11-16 Ba: Range and bearing are displayed. For correct values see a separate test below	Passed
	Time since last position report	2012-11-16 Ba: Not displayed This is also valid for all other message types. Retest 2013-01-10 Ba: Not displayed, see Note 1) Retest 2013-02-05 Ba: The time since last position report is displayed.	Passed

Message 3 + 5 Class A station, 3 min interval	Check that received target is displayed in the target list		Passed
	Name of ship		Passed
	Position (RNG, BRG)	Range and bearing is not available ("N/A") Retest 2012-11-16 Ba: Range and bearing are displayed.	Passed
	Time since last position report	Retest 2013-02-05 Ba: The time since last position report is displayed	Passed
Message 4 Base station	Check that received target is displayed in the target list		Passed
	MMSI	MMSI + [BASE] Retest 2013-01-11 Ba: Only MMSI, not "BASE" Retest 2013-02-05 Ba: No change, only the MMSI is displayed According to Table 7 of IEC 61993 the EUT should show: "**BS:MMSI".** Retest 2013-03-19 Ba: The EUT shows: "BS:MMSI"	Passed
	Position (RNG, BRG)	Retest 2012-11-16 Ba: Range and bearing are displayed.	Passed
	Time since last position report	Retest 2013-02-05 Ba: The time since last position report is displayed	Passed
Message 9 + 5 Airborne station, 10 s interval	Check that received target is displayed in the target list		Passed
	Name = "SAR"	[SAR] Retest 2013-01-11 Ba: Only MMSI, [SAR] has been removed Retest 2013-02-05 Ba: The MKD shows "SAR"	Passed
	Position (RNG, BRG)	Range and bearing is not available ("N/A") Retest 2012-11-16 Ba: Range and bearing are displayed.	Passed
	Time since last position report	Retest 2013-02-05 Ba: The time since last position report is displayed	Passed

Message 18 + 19 Class B SO station, 30 s interval	Check that received target is displayed in the target list		Passed
	Name of ship		Passed
	Position (RNG, BRG)	Range and bearing is not available ("N/A") <u>Retest 2012-11-16 Ba:</u> Range and bearing are displayed.	Passed
	Time since last position report	<u>Retest 2013-02-05 Ba:</u> The time since last position report is displayed	Passed
Message 18 + 24 Class B CS station, 3 min interval	Check that received target is displayed in the target list		Passed
	Name of ship		Passed
	Position (RNG, BRG)	Range and bearing is not available ("N/A") <u>Retest 2012-11-16 Ba:</u> Range and bearing are displayed.	Passed
	Time since last position report	<u>Retest 2013-02-05 Ba:</u> The time since last position report is displayed	Passed
Message 21 AtoN station, 1 min interval	Check that received target is displayed in the target list		Passed
	Name of AtoN station		Passed
	Position (RNG, BRG)	Range and bearing is not available ("N/A") <u>Retest 2012-11-16 Ba:</u> Range and bearing are displayed.	Passed
	Time since last position report	<u>Retest 2013-02-05 Ba:</u> The time since last position report is displayed	Passed
Message 1 + 14 SART under test, 1 TDMA burst SART test disabled	Check that received target is not displayed in the target list	Test 2013-01-10 Ba	Passed
	Check that received message 1 is not output as VDM		Passed
	Check that message 14 is not displayed on the MKD	Msg 14 is displayed <u>Retest 2013-02-05 Ba:</u> Message 14 is not displayed	Passed
	Check that received message 14 is not output as VDM		Passed

Message 1 + 14 SART under test, 1 TDMA burst SART test enabled	Check that received target is displayed in the target list		Passed
	Check that message 1 is output as VDM		Passed
	Name = "SART TEST"		Passed
	Position (RNG, BRG)		Passed
	Time since last position report	Not displayed Retest 2013-02-05 Ba: The time since last position report is displayed	Passed
	Check that message 14 is output as VDM		Passed
	Check that message 14 is displayed on the MKD		Passed
Message 1 + 14 Active SART, 1 min reporting interval	Check that received target is displayed in the target list		Passed
	Check that the SART is displayed on top of the list Range of other targets must be lower in the test.	• The SART is displayed on top of the list. • The SART is only identified as active SART if the manufacturer ID part of the ID is not 00.	Passed Passed
	Check that ALR ID 014 is output on PI		Passed
	Name of ship = "SART ACTIVE"		Passed
	Position (RNG, BRG)		Passed
	Time since last position report	Not displayed Retest 2013-02-05 Ba: The time since last position report is displayed	Passed

Note 1)
The UTC time of the last received message from a target is displayed In the detailed view of this target.
This is not the requirement of the standard.

The standard requires that in the target list (not the detailled target view) the time since last position report is displays (see a) "*minutes from last received position report").* The reason for this requirement is that the operator can easily detect if a target is outdated.

So e.g. if a target has not been received for 2 minutes it shall display "2 min". It is also ok to display the time since last received message in seconds if the time is less than a minute. It is done this way by other manufactures.

To get enough space for this information in the target list the MMSI can be removed from the target list. The MMSI is not required for the list. It is possible to display the MMSI if the name of ship is not yet available (msg 5 not yet received) and to show the name as soon as available.

2013-01-10	**Tester: Ba**	**Test details:** Target time-outs		
Test item		Check	Remark	Result
Receive messages and check target list				
b) Remove all targets from VDL		Confirm that the time from the last received message is counting down every minute for all targets	The time since last received message is not displayed Retest 2013-02-05 Ba: The time since last position report is displayed	Passed
		Confirm that all targets except SART are removed from the list after 7 min.		Passed
		Confirm that the SART is not removed after 7 min	UTC 13:40 SART message UTC 13:47	Passed
c) Apply again all targets after 17 min, without static data Messages 5, 19 and 24		Confirm that all targets are displayed again.		Passed
		Confirm that all static data from all targets are displayed correctly		Passed
d) Remove a SART from VDL		Confirm that the time from the last received message is counting down every minute for all targets	Has to be tested when an active SART can be identified	Passed
		Confirm that ALR 014 is deactivated		Passed
		Confirm that the SART is removed after 18 min		Passed

2013-02-05	**Tester: Ba**	**Test details:** Multiple targets		
Test item		Check	Remark	Result
Receive messages and check target list				
e) Apply 200 targets to the EUT		Confirm that 200 targets are displayed in the list		Passed
f) Apply 300 targets to the EUT		Confirm that at least the 200 nearest targets are displayed in the list	Tested with 253 targets because of problems with the test environment. All targets were displayed. I will repeated the test with 300 targets when the test environment is able to produce 300 targets but I don't expect problems with 300 targets. Test 2013-05-13 Ba: Test performed with 300 Targets. All 300 targets are displayed in the target list.	Passed

2013-01-10	**Tester: Ba**	**Test details:** a) Detailled target view	
Test item	Check	Remark	Result
Receive messages and check display of data.			
Selection of target from target list for detailled view	The details of a target cannot be displayed from the target list If only one target is in the target list. The own ship data are displayed instead. From the radar view it is possible <u>Retest 2013-02-05 Ba:</u> The details of a target can be displayed from the target list also if only one target is in the target list		Passed
Message 1,2,3 Class A station,	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Not provided Same problem for all message types: See Note) <u>Retest 2013-02-05 Ba:</u> The position quality is displayed	Passed
	SOG and COG		Passed
	True heading and ROT		Passed
	Navigational status		Passed
	Special manoeuvre indicator		Passed
Message 5 Display of static and voyage related ship data	IMO number		Passed
	Call sign		Passed
	Type of ship and cargo (With categories X, Y, Z, OS)		Passed
	Dimension/Reference for position		Passed
	Type of EPFD Verify value 15 for internal GNSS		Passed
	Estimated time of arrival		Passed
	Maximum present static draught		Passed
	Destination		Passed
	DTE flag	Shows always “Available”, independent of the DTE flag in message 5 <u>Retest 2013-02-05 Ba:</u> The DTE flag is displayed correctly (“No” / “Available”)	Passed
Message 4 Base station report	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Not provided <u>Retest 2013-02-05 Ba:</u> The position quality is displayed	Passed

Message 9 SAR aircraft position report	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Not provided <u>Retest 2013-02-05 Ba:</u> The position quality is displayed	Passed
	SOG and COG SOG must be in kn, not 0.1 kn as in other message!		Passed
	Altitude	Not displayed	Passed
Message 18,19 Class B position report - required -	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Not provided <u>Retest 2013-02-05 Ba:</u> The position quality is displayed	Passed
	SOG and COG		Passed
	True heading		Passed
	Name		Passed
	Type of ship and cargo		Passed
	Dimension/Reference for position		Passed
	Type of EPFD		Passed
	DTE flag	DTE flag is ok, different to message 5	Passed
Message 18,24 Class B CS	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Not provided <u>Retest 2013-02-05 Ba:</u> The position quality is displayed	Passed
	SOG and COG		Passed
	True heading		Passed
	Type of ship and cargo		Passed
	Dimension/Reference for position		Passed
	The Navigational status is displayed as “Under way using engine” (value 0). It should be displayed as “N/A” because it is not available in message 18 or 24 <u>Retest 2013-02-05 Ba:</u> The Nav status is displayed as “N/A”		Passed

Message 21 Aids to navigation report	MMSI		Passed
	Type of Aids to navigation		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Not provided	Passed
	Virtual/Pseudo AtoN flag		Passed
	Dimension/Reference for position		Passed
	Type of EPFD		Passed
	Off position indicator	Required	Passed

Note)
There should be a dedicated position quality display field which combines several information about the position quality. It shall one of text descriptions as defined in 6.11.1 Table 8.
It combines the information from
- **RAIM flag**
- **PA flag**
- **Time stamp**
- **Time since last receive position report**

2.6.5.1 Range and Bearing calculation

2012-11-12 **Tester: Ba**	**Test details:** Range and bearing values **Test 1: NE quadrant**		
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.			
Own ship position on standard position in NE quadrant (Lat = 53°30 N Lon = 10°E			
Target in NE direction 54°00 N 010°30 E	Check range = 34.9 NM	34.85 NM	Passed
	Check bearing = 30.6 °	31°	Passed
Target in N direction 54°00 N 010°00 E	Check range = 30 NM	30 NM	Passed
	Check bearing = 0°	0°	Passed
Target in NW direction 54°00 N 009°30 E	Check range = 34.9 NM	34.85 NM	Passed
	Check bearing = 329.4°	329°	Passed
Target in W direction 53°30 N 009°30 E	Check range = 17.8 NM	17.84 NM	Passed
	Check bearing = 270°	270°	Passed
Target in SW direction 53°00 N 009°30 E	Check range = 35 NM	34.96 NM	Passed
	Check bearing = 210.9°	211	Passed
Target in S direction 53°00 N 010°00 E	Check range = 30 NM	30 Nm	Passed
	Check bearing = 180°	180°	Passed
Target in SE direction 53°00 N 010°30 E	Check range = 35 NM	34.96 NM	Passed
	Check bearing = 149,1°	149°	Passed
Target in E direction 53°30 N 010°30 E	Check range = 17.8 NM	17.84 NM	Passed
	Check bearing 0 90°	90°	Passed

2013-03-22 Retest	**Tester: Ba**	**Test details:** Range and bearing values **Test 2: Lat=0°, Lon=180°**		
Test item		Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.				
Own ship position on standard position in NE quadrant (Lat = 00°00 N Lon = 179°59.9999 E)				
Target in NE direction		Check range = 42,4 NM	42.43 NM	Passed
00°30 N 179°30 W		Check bearing = 45 °	45°	Passed
Target in N direction		Check range = 30 NM	30 NM	Passed
00°30 N 179°59.9999 W		Check bearing = 0°	0°	Passed
Target in NW direction		Check range = 42.4 NM	42.43 NM	Passed
00°30 N 179°30 E		Check bearing = 315°	315°	Passed
Target in W direction		Check range = 30 NM	30 NM	Passed
00°00 N 179°30 E		Check bearing = 270°	270°	Passed
Target in SW direction		Check range = 42.4 NM	42.43 NM	Passed
00°30 S 179°30 E		Check bearing = 225°	225°	Passed
Target in S direction		Check range = 30 NM	30 NM	Passed
00°30 S 179°59.9999 E		Check bearing = 180°	180°	Passed
Target in SE direction		Check range = 42.4 NM	42.43 NM	Passed
00°30 S 179°30 W		Check bearing = 135°	135°	Passed
Target in E direction		Check range = 30 NM	30 NM	Passed
00°00 S 179°30 W		Check bearing 90°	90°	Passed

2012-11-12	**Tester: Ba**	**Test details:** Range and bearing values **Test 3: SW quadrant**	
Test item	Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.			
Own ship position on standard position in NE quadrant (Lat = 30°30S Lon = 012°00 W)			
Target in NE direction	Check range = 39.6 NM	39.64 NM	Passed
30°00 S 11°30 W	Check bearing = 40.8°	41°	Passed
Target in N direction	Check range = 30 NM	30 NM	Passed
30°00 S 12°00 W	Check bearing = 0°	0°	Passed
Target in NW direction	Check range = 39.6 NM	39.64 NM	Passed
30°00 S 12°30 W	Check bearing = 319.2°	319°	Passed
Target in W direction	Check range = 25.8 NM	25.85 NM	Passed
30°30 S 12°30 W	Check bearing = 270°	270°	Passed
Target in SW direction	Check range = 39.6 NM	39.56 NM	Passed
31°00 S 12°30 W	Check bearing = 220.7°	221°	Passed
Target in S direction	Check range = 30 NM	30 NM	Passed
31°00 S 12°00 W	Check bearing = 180°	180°	Passed
Target in SE direction	Check range = 39.6 NM	39.56 NM	Passed
31°00 S 11°30 W	Check bearing = 139.3°	139°	Passed
Target in E direction	Check range = 25.8 NM	25.85 NM	Passed
30°30 S 11°30 W	Check bearing 90°	90°	Passed

2.6.6 14.7.6 Display of position quality

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

Apply Class A transmissions with the following data to the VDL and observe the position quality display on the MKD:

a) Time stamp = 63;

b) Time stamp = 61;

c) Time stamp = 62;

d) Time stamp = 60

e) Time stamp 0... 59, PA = 0, RAIM = 0;

f) PA = 0, RAIM = 1;

g) PA = 1, RAIM = 0;

h) PA = 1, RAIM = 1;

i) Set SOG = 10 kn, then stop target transmissions;

j) Start transmission again, set SOG = 20 kn, then stop transmission.

Required results

Confirm that:

a) the position quality "No position" is displayed;

b) the position quality "Manual position" is displayed;

c) the position quality "Dead reckoning position" is displayed;

d) the position quality "valid position with no time stamp" is displayed;

e) the position quality "Position > 10m" is displayed;

f) the position quality "Position with RAIM > 10 m" is displayed;

g) the position quality "Position <= 10 m" is displayed;

h) the position quality "Position with RAIM <= 10 m" is displayed;

i) 40 s after the last transmission the position quality is changed to "Outdated position > 200 m";

j) 20 s after the last transmission the position quality is changed to "Outdated position > 200 m"

2013-02-05	**Tester: Ba**	**Test details:** Display of position quality		
Test item		Check	Remark	Result
Apply message 1 with settings according to the test item				
a) Time stamp = 63		Check position quality = "No position"	The position quality is not displayed Retest 2013-01-10 Ba: No display of position quality found Retest 2013-02-05 Ba: The position quality is displayed with "No position"	Passed
b) Time stamp = 61		Check position quality = "Manual position"		Passed
c) Time stamp = 62		Check position quality = "Dead reakoning position"		Passed
d) Time stamp = 60		Check position quality ="valid position with no time stamp"		Passed
e) Time stamp = 0..59, PA = 0, RAIM = 0		Check position quality ="Position > 10m"		Passed
f) Time stamp = 0..59, PA = 0, RAIM = 1		Check position quality ="Position with RAIM > 10m"		Passed
g) Time stamp = 0..59, PA = 1, RAIM = 0		Check position quality ="Position <= 10m"		Passed
h) Time stamp = 0..59, PA = 1, RAIM = 1		Check position quality ="Position with RAIM <= 10m"		Passed
i) SOG = 10 kn Stop transmission		Check that 40 s after stop of transmission position quality = "Outdated position > 200 m"	UTC 11:52:00	Passed

j) SOG = 20 kn Stop transmission	Check that 20 s after stop of transmission position quality = “Outdated position > 200 m”		Passed

2.6.7 14.7.7 Display of targets if optional filter is implemented

Method of measurement / Required results

The methods of test and the required results are as follows:

a) *confirm by observation that the user can filter the presentation of AIS targets according to the manufacturer’s documentation;*

b) *confirm by observation that an indication is provided when sleeping targets are filtered from the presentation according to the manufacturer's documentation;*

c) *confirm by observation that the indication remains while the filter is active according to the manufacturer's documentation;*

d) *confirm by observation that the filter criteria in use is readily available according to the manufacturer's documentation;*

e) *confirm by observation that the user cannot remove individual AIS targets from the presentation according to the manufacturer's documentation .*

2013-04-11	**Tester: Ba**	**Test details:** Test of optional filter		
Test item		Check	Remark	Result
Observe the display of targets and check if it is according to the manufacturer’s documentation				
a) Filtering of targets		Check if targets can be filtered according to the documenation	According to the manufacturers declaration no filtering function is implemented.	N/A
b) Indication of filtering		Check that an indication is provided when targets are filtered		N/A
c) Indication remaining		Check that the indication remains while filtering		N/A
d) Filter criteria		Check that the filter criteria in use is readily available		N/A
e) Individual targets		Check that the user cannot remove individual targets from presentation		N/A

2.6.8 14.7.8 Display of received safety related messages

Method of measurement

Set up standard test environment and operate EUT in autonomous mode.

a) Transmit 20 Message 12 addressed to the EUT.

b) Acknowledge displayed message on the MKD.

c) Transmit 20 Message 12 addressed to the EUT.

d) Transmit Message 14.

Required results

Confirm that:

a) the most recently received Message 12 is displayed foremost and all 20 messages are available for display;

b) the acknowledged Message 12 is removed from foremost display on the MKD;

c) the most recently received Message 12 is displayed foremost and all 20 messages are available for display;

d) there is an indication that the Message 14 has been received and that Message 14 is available for display.

2012-11-13	**Tester: Ba**	**Test details:** Multiple safety related text messages		
Test item		Check	Remark	Result
Transmit addressed safety related text message (Msg 12) to the EUT and evaluate display				
a) Transmit 20 Message 12		Check that all 20 messages are available for display	UTC 11:24, 11:36 Only 5 of the 20 messages are in the inbox for display (msg no. 20, 17, 10, 03, 02) Retest 2013-01-11 Ba: All 20 messages are in the inbox available for display	Passed
		Check that the most recently received Message 12 is displayed foremost	In the inbox list the most recently received message is on top. The popup window first shows message 17, then 20 I need more information about the function of the popup message. It is not explained in the manual. Retest 2013-01-11 Ba: If a new message is received a popup box is shown that a message has been received if it is not yet on the screen. After ok the content of the most recent message is displayed.	Passed Passed

b) Acknowledge the displayed message	Check that the message is removed from the foremost display	There is an popup window asking to read a received message. When pressing “Passed” the popup disappears and the associated message is displayed. If the displayed message is left (button “ESC”) a second popup is displayed in the same way.	Passed
c) Transmit further 20 Message 12	Check that all new 20 messages are available for display	UTC 11:31, Only 4 messages (20, 13, 5, 1) are in the inbox Retest 2013-01-11 Ba: All 20 messages are in the inbox available for display	Passed
	Check that the most recently received Message 12 is displayed foremost	There was only one popup, displaying the most recent message	Passed
d) Filter criteria	Check that there is an indication that the Message 14 has been received		Passed
	Check that the Message 14 is available for display		Passed
Furthe problems	After receiving about 50 addressed message the EUT completely stopped acknowledgement of addressed messages. After power cycle acknowledgement was ok again. Retest 2013-01-11 Ba: There is no problem if more messages than the maximum number of messages in the inbox. Tested with up to 60 messages		Passed

2.6.9 14.7.9 Presentation of navigation information

Method of measurement / Required results

Verify compliance with the general requirements for the presentation of navigation-related information in accordance with the test methods and required results specified in IEC 62~~3~~288.

Verify compliance with requirements for graphical presentation of targets in accordance with the test methods and required results of IEC 62288, if display of graphical symbols for AIS data is provided.

Provide input of the messages listed below and confirm by observation that the MKD displays graphical symbology as described in IEC 62288, if display of graphical symbols for AIS data is provided.

- *Messages 1, 2, 3 and 5 (Class A AIS, AIS-SART);*
- *Messages 18, 19 and 24 (Class B AIS);*
- *Message 4 (AIS Base Stations);*
- *Message 9 (AIS on Airborne SAR-craft);*
- *Message 21 (AIS AtoN)*

Symbols not described in IEC 62288 may be defined by the manufacturer.

Verify compliance in accordance with the test methods and required results of IEC 62388 (Radar) for calculation of CPA/TCPA, if provided.

2013-01-11	**Tester: Ba**	**Test details:** a) Display of target list		
Test item		Check	Remark	Result
Receive messages and check graphical target display				
Message 1 + 5 Class A station,		Check that received target is displayed		Passed
		Check that the position on the screen is correct		Passed
		Check that the correct symbol (IEC 62288) is used	A triangle is displayed but with blue filling. The filling should be removed. <u>Retest 2013-02-05 Ba:</u> The correct symbol without filling is used	Passed
Message 4 Base station		Check that received target is displayed		Passed
		Check that the position on the screen is correct		Passed
		Check the symbol No symbol defined in IEC 62288	A symbol like a simplified VTS tower is displayed	Passed

Message 9 + 5 Airborne station,	Check that received target is displayed		Passed
	Check that the position on the screen is correct		Passed
	Check the symbol No symbol defined in IEC 62288	A symbol like a simplified airplane is displayed	Passed
Message 18 + 19 Class B SO station, 30 s interval	Check that received target is displayed		Passed
	Check that the position on the screen is correct		Passed
	Check that the correct symbol (IEC 62288) is used	A triangle is displayed but with blue filling <u>Retest 2013-02-06 Ba:</u> The correct symbol without filling is used	Passed
Message 18 + 24 Class B CS station, 3 min interval	Check that received target is displayed		Passed
	Check that the position on the screen is correct		Passed
	Check that the correct symbol (IEC 62288) is used	A triangle is displayed but with blue filling <u>Retest 2013-02-06 Ba:</u> The correct symbol without filling is used	Passed
Message 21 AtoN station, 1 min interval	Check that received target is displayed		Passed
	Check that the position on the screen is correct		Passed
	Check that the correct symbol (IEC 62288) is used	The correct symbol but with red filling is displayed. The filling should be removed. Mainly a red colour is reserved for alarms <u>Retest 2013-02-06 Ba:</u> The correct symbol without filling is used. The colour of the outline is red/orange	Passed
Message 1 + 14 Active SART,	Check that received target is displayed		Passed
	Check that the position on the screen is correct		Passed
	Check that the correct symbol (IEC 62288) is used	The correct symbol is used. It is drawn in red color	Passed

2.6.9.1 CPA/ TCPA alarm

Remark: This test can be deleted, if a CPA/ TCPA alarming is not implemented.

2013-03-22	**Tester: Ba**	**Test details:** CPA and TCPA check		
Test item		Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.				
Set positions and speed according to IMO test 1 Set CPA limit = 0,5 and TCPA limit = 25				
CPA/TCPA limits		Check that the CPA/TCPA limits are stored	The limits are stored but after a restart the CPA setting of 0.5 NM is re-set to 0.0 NM. Other values like 1.0 NM/ 24 min are permanently stored. Retest 2013-04-10 Ba: The value 0.5 is permanently stored and not reset to 0.0 after restart	Passed
Set positions to 3 min before		Check no CPA/TCPA alarm		Passed

Set positions to defined values according to IMO	Check CPA = 0 Nm +/- 0.5 Nm	No alarm, CPA = "pass" Retest 2013-03-27 Ba: CPA = 0.00 Question: The dangerous target is not marked red in the "AISTarget list", only in the list of dangerous targets! This is different to the other 3 tests where the target is marked red also in the "AISTarget List" Retest 2013-03-28 Ba: The dangerous target is marked red in the list of dangerous targets and on the two graphical screens It is still not marked red in the "AISTarget list". This is not an explicite requirement of the standard but it is strange that e.g. in test IMO 3 below the dangerous target is marked red in the "AISTarget list" but not in this test. Retest 2013-04-02 Ba: Same result: Retest 2013-04-10 Ba: The dangerous target is marked red also in the "AIS target list".	Passed Passed
	Check TCPA = 24 min +/- 1 min	No alarm, TCPA = "pass" Retest 2013-03-27 Ba: TCPA = 24:00	Passed
Set position to 3 min after	Check that CPA/TCPA alarm is still active	No alarm Retest 2013-03-27 Ba: The alarm remains active.	Passed
Set position again to 3 min before	Check no CPA/TCPA alarm		Passed

Set positions and speed according to IMO test 2 Set CPA limit = 1.1 and TCPA limit = 1			
Set positions to 3 min before	Check no CPA/TCPA alarm		Passed
Set positions to defined values according to IMO	Check CPA = 1 Nm +/- 0.5 Nm	1.0 NM	Passed
	Check TCPA = 0 min +/- 1 min	0.02	Passed
Set position to 3 min after	Check no CPA/TCPA alarm		Passed
Set positions and speed according to IMO test 3 Set CPA limit = 0,7 and TCPA limit = 25			
Set positions to 3 min before	Check no CPA/TCPA alarm		Passed
Set positions to defined values according to IMO	Check CPA = 0 Nm +/- 0.7 Nm	0.01	Passed
	Check TCPA = 24 min +/- 1 min	14:05	Passed
Set position to 3 min after	Check that CPA/TCPA alarm is still active	0.00 / 21:04	Passed
Set position again to 3 min before	Check no CPA/TCPA alarm		Passed
Set positions and speed according to IMO test 4 Set CPA limit = 0,7 and TCPA limit = 25			
Set positions to 3 min before	Check no CPA/TCPA alarm		Passed
Set positions to defined values according to IMO	Check CPA = 0 Nm +/- 0.7 Nm	0.01	Passed
	Check TCPA = 24 min +/- 1 min	24:00	Passed
Set position to 3 min after	Check that CPA/TCPA alarm is still active	0.01 / 20:99	Passed
Set position again to 3 min before	Check no CPA/TCPA alarm		Passed

3 15 Physical tests

Physical tests are not part of this test report, they are documented separately.

4 16 Specific tests of link layer

(See 7.3)

NOTE In this clause "CommState" is used as an abbreviation for "communication state" as defined in Recommendation ITU-R M.1371. Communication state is structured with a number of parameters for "Sync state", "Slot time-out", "Slot increment", "Number of slots", "Sub-message (Received stations, slot number, UTC hour and minute, slot offset)", and "Keep flag".

4.1 16.1 TDMA synchronisation

4.1.1 16.1.1 Synchronisation test using UTC

Method of measurement

Set up standard test environment; choose test conditions in a way that the EUT operates in the following synchronisation modes:

a) UTC direct;

b) UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronised);

c) UTC indirect (internal GNSS disabled; base station with UTC direct synchronisation within range). Verify that the correct UTC date and time is derived from message 4 of the base station;

d) base direct (internal GNSS disabled; base station with semaphore qualified within range);

e) UTC indirect (internal GNSS receiver disabled; only Class B station UTC direct synchronised).

Check CommState parameter Sync state in position report and reporting interval.

Required result

The following results are required:

a) transmitted communication state shall fit the synchronisation mode;

b) the EUT shall synchronise to the other station;

c) the EUT shall go to syncstate 3.

d) the SynchState = 2;

e) the EUT does not synchronise to the Class B station, SynchState = 3.

2012-02-06	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn				
To c) Start EUT without GPS		Check that the EUT does not have correct UTC date and time	<u>Test 2012-11-13 Ba</u> EUT does not have correct date and time. Message 11 does not contain the correct default values. • Year = 2012 (0) • Month = 1 (0) • Day = 1 (0) • Hour = 0 (24) • Minute = 1 (60) • Second = 52 (60) In () the default values according to ITU-R M.1371-4 are shown. As long as no valid UTC date and time is available the default values should be transmitted. <u>Retest 2013-01-08 Ba:</u> The default values are transmitted in message 24 when the correct UTC is not available.	Passed Passed
Apply a base station with UTC (msg 4) to VDL		Check that the EUT derives the correct UTC date and time from Message 4		Passed
a) Operate with GPS		Check that sync state is 0 (UTD direct)	The sync state is 1 It seems the sync state value in the comm state is always 1, independent of the actual sync state <u>Retest 2012-03-02 Ba:</u> The sync state in UTC direct mode is 0	Passed
		Check that report rate is 10 s		Passed

b) Disable GPS by disconnection of GPS antenna, at least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect	Retest 2012-03-02 Ba: Sometimes the unit switches to sync state 1 but in most cases it remains on 0. In this case the unit does not synchronize to another station. Additionally the unit did not get a position when GPS was connected again. After a restart the EUT got a position. Retest 2012-06-12 Ba: The sync state is stable at 1. The EUT has no problem to get a position when the GPS antenna is connected atain	Passed
	Check that report rate is 10 s		Passed
c) GPS disabled, one base station with UTC direct within range	Check that sync state is 1 (UTC indirect)		Passed
	Check that report rate is 10 s		Passed
d) GPS disabled, one base station without GPS within range	Check that sync state is 2 (base station indirect)		Passed
	Check that report rate is 10 s		Passed
e) GPS disabled, Class B SO with UTC direct within range	Check that sync state is 3 (no UTC source)	Sync state = 1 Retest 2013-01-08 Ba: UTC 14:35 Sync state = 3	Passed
	Check that EUT does not syncronize to the Class B	EUT does synchronize to the Class B SO Retest 2013-01-08 Ba: EUT does not synchronize to the Class B message	Passed Passed

4.1.2 16.1.2 Synchronisation test using UTC with repeated messages

Method of measurement

Set up a test environment where all messages have a SyncState 0; choose test conditions in a way that the EUT operates in the following synchronisation modes:

a) UTC direct;

b) UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronised);

c) UTC indirect (internal GNSS receiver disabled; all other stations UTC direct synchronised and syncstate 0, repeat indicator 1).

Check CommState parameter Sync state in position report and reporting interval.

Required results

The following results are required:

a) transmitted communication state shall fit the synchronisation mode;

b) the EUT shall synchronise to the other station;

c) the EUT shall go to syncstate 3.

2012-11-13	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn				
a)	Operate with GPS	Check that sync state is 0 (UTD direct)		Passed
b)	Disable GPS, At least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect		Passed
c)	GPS disabled, at least one other AIS station with UTC direct within range, RI = 1	Check that sync state is 3		Passed
		Check that report rate is 10 s		Passed

4.1.3 16.1.3 Synchronisation test without UTC, semaphore

Method of measurement

Set up standard test environment without UTC available. Let EUT be semaphore qualified (sync mode 1 or 3) as follows:

a) Simulate other semaphore qualified stations with a different number of received stations.

b) Simulate other semaphore qualified stations with the same number of received stations.

Check CommState parameter Sync state in position report and reporting interval.

Required results

Transmitted CommState shall fit the synchronisation mode. Check that

a) EUT acts as semaphore only if it has the highest number of received stations,

b) EUT acts as semaphore only if it has the lowest MMSI.

The EUT shall decrease reporting interval to 2 s when acting as a semaphore and shall remain in this state until the semaphore qualifying conditions have been invalid for 3 min.

2012-06-13	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate EUT without GPS, other transponders all without GPS, SOG = 10 kn a) different number of received stations				
EUT has highest number of received stations		Check that sync state is 3		Passed
		Check that report rate is 2 s		Passed
Apply another station with higher number of received stations than EUT		Check that sync state is 3		Passed
		Check that report rate changes to 10 s after 3 min	11:28:45 s	Passed
b) Same number of received stations				
EUT has lowest MMSI		Check that sync state is 3		Passed
		Check that report rate is 2 s		Passed
Apply another station whith lower MMSI than EUT		Check that sync state is 3		Passed
		Check that report rate changes to 10 s after 3 min		Passed

NOTE[1)] An AIS transponder becomes semaphore, if it has the highest number of received stations. If there are more than one station with the highest number of received stations the transponder with the lowest MMSI number becomes semaphore.

4.1.4 16.1.4 Synchronisation test without UTC

Method of measurement

Set up standard test environment; choose test conditions in a way that EUT operates in following sync modes:

a) base indirect (internal GNSS disabled; no station with UTC direct synchronisation or base station within range);

b) mobile indirect (internal GNSS disabled; other station with UTC direct synchronisation or base station without range);

c) internal GNSS enabled in synchronisation modes other than UTC direct.

Check CommState parameter sync state in position report and reporting interval.

Required results

The following results are required:

a) transmitted communication state shall fit the synchronisation mode;

b) transmitted communication state shall fit the synchronisation mode;

d) synchronisation mode shall revert to UTC direct

2012-06-13	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn				
a)	Disable GPS, one base station without GPS within range	Check that sync state is 2 (base station indirect)		Passed
		Check that report rate is 10 s	The reporting interval is 2 s Remark: the test started with 2 s reporting interval from a previous test (semaphore mode). It seems there is no event which changes the reporting interval back to 10 s. Even if the GPS antenna is connected again the EUT does not revert to 10 s reporting interval. The only way I found to get back to 10 s interval was restarting the unit. <u>Retest 2012-07-13 Ba:</u> UTC 11:42 replaced msg 4 by msg 1 UTC 11:46 reporting interval = 10 s.	Passed

GPS disabled, remove base station	Check that sync state is 3 (no UTC source)	• The sync state is 3 • The reporting rate is 2 s, should be 10 s Retest 2012-07-13 Ba: Reporting interval = 10 s	Passed Passed
a) Operate without GPS, other transponders all without GPS, not semaphore[1)]	Check that sync state is 3		Passed
	Check that report rate is 10 s		Passed
b) Enable GPS, other transponders all without GPS	Check that sync state is 0		Passed
	Check that report rate is 10 s		Passed

NOTE[1)] An AIS transponder becomes semaphore, if it has the highest number of received stations. If there are more than one station with the highest number of received stations the transponder with the lowest MMSI number becomes semaphore.

4.1.5 16.1.5 Reception of un-synchronised messages

Method of measurement

Set up standard test environment and operate EUT in UTC direct mode.

Transmit un-synchronised test messages (more than ±10 ms away from the slot boundary).

Required results

Verify that the transmitted test messages are received and processed

2012-11-13	**Tester: Ba**	**Test details:** a) Receive un-synchronised messages	
Test item	Check	Remark	Result
Apply position reports with a timing offset of more than +/- 10 ms			
Received targets	Check that the received targets are continously output as VDM	UTC 14:12	Passed

4.2 16.2 Time division (frame format)

Method of measurement

Set the EUT to reporting interval of 2 s by applying a speed of >23 kn and a ROT of >20°/s. Record VDL messages and check for used slots. Check parameter slot number in CommState of position report. Check slot length (transmission time).

Required results

Slot number used and slot number indicated in CommState shall match. Slot number shall not exceed 2249. Slot length shall not exceed 26,67ms.

2012-04-26	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Check the data recorded in 2.2.2.1 14.2.2.1 Speed and course change according to the test items. Check the frames with 2 s reporting rate.				
Slot number		Check that slot number used and slot number indicated in CommState match		Passed
Slot count		Check that slot number does not exceed 2249		Passed
Slot length		Check that slot length does not exceed 26,67 ms		Passed

4.3 16.3 Synchronisation and jitter accuracy

Definition

Synchronisation jitter (transmission timing error) is the time between nominal slot start as determined by the UTC synchronisation source and the initiation of the "transmitter on" function (T_o see Figure M.1371/A2-3.2.2.10).

Method of measurement

Set up standard test environment, reporting interval of 2 s and using

a) UTC direct synchronisation,

b) UTC indirect synchronisation by disconnecting the GNSS antenna of the EUT.

Record VDL messages and measure the time between the nominal beginning of the slot interval and the initiation of the "transmitter on" function. Alternative methods, for example by evaluating the start flag and calculating back to T_o are allowed.

Required results

The synchronisation, including its jitter, shall not exceed

a) ±104 µs using UTC direct synchronisation,

b) ±312 µs relative to the synchronisation source using UTC indirect synchronisation .

2012-02-06	**Tester: Ba**	**Test details:** Synchronisation jitter		
Test item		Check	Remark	Result
Operate device at 25 kHz bandwidth at a reporting rate of 2 s (speed = 25 kn). Check the slot start time T2 using the VDL analyser.				
UTC direct		Check that T2 is in the range of 3.328 ms +/- 0.108 ms	• If the unit is running with internal position the sync jitter is within the limits. • If the unit is running with external position there is often and rather regular an offset of 1 second which results in an timing offset 13.3 ms which is a half slot. See Note) <u>Retest 2012-03-02 Ba:</u> The sync jitter is within the limits, there is no offset of 1 s	Passed Passed
UTC indirect		Check that T2 is in the range of +/- 0.312 ms compared to the T2 value of the sync source	The sync jitter is less than 0.1 ms and therefore within the limits	Passed

4.4 16.4 Data encoding (bit stuffing)

Method of measurement

Setup standard test environment as follows:

a) *Apply a binary broadcast message (Message 8) to the VDL containing the HEX-values "7E 3B 3C 3E 7E" in the data portion and check presentation interface output of EUT.*

b) *Apply a BBM message to the EUT initiating the transmission of Message 8 containing the HEX-values as above in the data portion and check the VDL*

Required results

Confirm that

a) *data output on the presentation interface conforms to transmitted data,*

b) *transmitted VDL message conforms to data input on the presentation interface.*

The data sequence 7E 3B 3C 3E 7E is appended to an application identifier of 16 bit with the value 00 68 h (DAC = 001, FI=40). So the complete sequence is:

Data in Hex	7E 3B 3C 3E 7E
Data in 6 bit ASCII text (Table 14 of 1371)	_#,<O'
Hex including DAC/FI	00 68 7E 3B 3C 3E 7E
Coded in 6 bit ASCII (Table B-1)	06Qv>khvOP,4
Content of VDO/VDM (incl. 40 bit header)	80003sh0J7ps?3qv,0

2012-04-26	**Tester: Ba**	**Test details:** Data encoding (bit stuffing)		
Test item		Check	Remark	Result
File name for BBM sentence: AIBBM_bin_stuffing.sst				
a) R_X of BBM message Transmit Message 8 from VDL generator		Check that VDM is according transmitted data		Passed
b) T_X of BBM message Apply BBM sentence to the PI		Check that VDO output of PI is according to BBM sentence		Passed
		Check that the VDL message is according to BBM		Passed

4.5 16.5 Frame check sequence

Method of measurement

Apply a simulated position report message with wrong CRC bit sequence to the VDL.

Required results

Confirm thatby observing the MKD and by inspecting the PI output that this message is not processed.

2012-04-26	**Tester: Ba**	**Test details:** Frame check sequence		
Test item		Check	Remark	Result
Transmit position report message from VDL generator.				
Set CRC bit sequence to ok		Check that the target is displayed on the MKD		Passed
		Check that the position reports are output as VDM on the PI port		Passed
Set CRC bit sequence to false		Check that the target is not displayed on the MKD		Passed
		Check that the position reports are not output as VDM on the PI port		Passed

4.6 16.6 Slot allocation (Channel access protocols)

4.6.1 16.6.1 Network entry

Method of measurement

Set up standard test environment; switch on EUT. Record transmitted scheduled position reports for the first 3 min of transmission after initialization period. Check CommState for channel access mode.

Required results

EUT shall start autonomous transmissions of Message 3 (position report) with ITDMA CommState with KeepFlag set true for the first minute of transmission and Message 1 with SOTDMA CommState thereafter.

Record the VDL data of the first 12 frames after switching on the EUT, 3 frames for this test and 8 frames for test 4.6.2. Generate a table and diagram from that data and check the following test items using the recorded data.

2012-02-06	**Tester: Ba**	**Test details:** Channel access protocol		
Test item		Check	Remark	Result
Switch on EUT and record data with VDL analyser. Note the switch on time in UTC.				
Transmission time		Check that first transmission of position report is within 2 min after switch on		Passed
Initial message type		Check that the network entry is done with Message 3	• The first message is always incorrect. Message type is 0, and all data are 0. It seems that the message content is not yet initialised when the message is sent. • The further messages are correct Retest 2012-04-23 Ba The first message is correct.	Passed
Keep flag		Check that the keep flag is set in Message 3		Passed
Slot offsets		Check that the slot offsets of Message 3 are in the range 750 +/- 75= 675 ... 825		Passed
Slot use		Check that the allocated slots are used in the next frame		Passed
Message type		Check that the message type is changed to 1 after initial frame		Passed

Timeout	Check that the timeout in the 2nd frame is between 2 and 6 (decremented from initial 3..7)	It is between 3 and 7. In the first frame a value between 3 and 7 should be assigned. This will be decremented by 1 for the next frame. So in the second frame the time-out should be between 2 and 6 Retest 2012-03-01 Ba: The time-out is between 2 and 6	Passed

2012-04-24	**Tester: Ba**	**Test details:** Channel access at increased reporting rate		
Test item		Check	Remark	Result
Supply external speed data of 15 kn. Switch on EUT and record data with VDL analyser.				
Initial reporting rate		Check that the EUT performs network entry with a reporting rate of 6s		Passed
Slot offsets		Check that the slot offsets of Message 3 are in the range 450 +/- 45 = 405....495		Passed
Supply external speed data of 25 kn. Switch on EUT and record data with VDL analyser.				
Initial reporting rate		Check that the EUT performs network entry with a reporting rate of 2 s		Passed
Slot offsets		Check that the slot offsets of Message 3 are in the range 150 +/- 15 = 135...165		Passed

4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode as follows:

a) *Record transmitted scheduled position reports Message 1 and check frame structure. Check CommState of transmitted messages for channel access mode and parameters number of received stations, slot timeout, slot number and slot offset*

b) *Repeat the test with 50% channel loading ensuring there are at least 4 free slots in each SI.*

c) *Repeat the test with 50% channel loading by message 26 ensuring there are at least 4 free slots in each SI.*

Required results

Check that

a) nominal reporting interval is achieved ±20% (allocating slots in selection interval SI). Confirm that the EUT allocates new nominal transmission slots (NTS) within selection interval (SI) after 3 min to 8 min. Check that slot offset indicated in CommState matches slots used for transmission. Check that Class B "CS" are not included in the number of received stations;

b) only free slots are used for transmission.

c) only free slots are used for transmission.

2012-02-06	**Tester: Ba**	**Test details:** a) Autonomous scheduled transmissions (SOTDMA)		
Test item		Check	Remark	Result
Record the VDL data of 8 frames operating with autonomously scheduled transmissions. Generate a table and diagram from that data and check the following test items using the recorded data. Set the condition so that the reporting rate is 10 s.				
Reporting rate		Check that the reporting rate is 10 s, 6 messages per frame		Passed
Nominal increment and selection interval		Check that the allocated slots match the nominal and selection interval of 10 s reporting rate		Passed
Slot interval		Check that the slot intervals are in the range 375 +/- 75 = 300 ... 450		Passed
Timeout		Check that the timeout is counting down from 3...7 to 0	Retest 2012-04-23 Ba • Normally the initial time-out after time-out 0 is in the range from 3...7. • Rather often the time-out in the next frame is 0 which is not allowed.In the test there are up to 4 frames with time-out 0 in the same SI. Retest 2012-07-10 Ba: The initial time-out after time-out 0 is always in the range from 3...7	Passed
Slots used		Check that the slots indicated in CommState match the slots used		Passed
Slots allocated at timeout 0		Check that the slots are used in the next frame		Passed
		Check the slot offset is 2250 +/- Selection Interval (2175...2325)		Passed

CommState sub message	Check that for timeout 3,5,7 the number of received stations is indicated		Passed
	Check that Class B CS stations are not counted as received stations		Passed
	Check that for timeout 2,4,6 the slot number is indicated		Passed
	Check that for timeout 1 the correct value of UTC is indicated		Passed
	Check that for timeout 0 the slot increment is indicated		Passed
Alternating channels	Check that the position reports are transmitted on alternating channels		Passed
Others	Check the recorded data for other possibly incorrect items	No other items found	Passed

2012-11-13	**Tester: Ba**	**Test details:** SOTDMA at 50% channel load	
Test item	Check	Remark	Result
Set the condition so that the reporting rate is 2 s. b) Apply 50% channel load with position reports			
Slot usage	Check that only free slots are used for transmission		Passed
c) Apply 50% channel load with scheduled messages 26			
Slot usage	Check that only free slots are used for transmission	<u>Test 2013-02-06 Ba:</u> The slots used and reserved by scheduled message 26 are used for own transmissions. Remark: the comm state of message 26 is identical to the comm state of the position reports used in b). The length of the message 26 is 168 bit. <u>Retest 2013-03-19 Ba:</u> Only free slots are used for transmission	Passed

4.6.3 16.6.3 Autonomous scheduled transmissions (ITDMA)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Set NavStatus of EUT to "at anchor" giving a reporting interval of 3 min. Record transmitted scheduled position reports.

Required results

Check that EUT transmits Message 3 and allocates slots using ITDMA and that slot offset indicated in CommState matches slots used for transmission.

Check that nominal reporting interval is achieved ±20 %.

2012-02-06	**Tester: Ba**	**Test details:** Autonomous scheduled transmissions (ITDMA)	
Test item	Check	Remark	Result
Record the VDL data of at least 20 frames operating with autonomously scheduled transmissions. Generate a table and diagram from that data and check the following test items using the recorded data. Set the condition so that the reporting rate is 3 min (at anchor, SOG < 3 kn)			
Reporting rate	Check that the reporting rate is 3 min	There are no transmissions during the "at anchor" phase Retest 2012-04-25 Ba: The EUT is transmitting with a reporting interval of 3 min	Passed
Message type	Check that Message 3 is used		Passed
Slot interval	Check that the slot intervals are 3 min +/- 20 %		Passed
Slot increment	Check that the slot increment = 13500 +/- 10 %		Passed
Number of slots	Check that the number of slots = 1 (value in comm state = 5)		Passed
Keep flag	Check that the keep flag = 0		Passed
Alternating channels	Check that the position reports are transmitted on alternating channels		Passed

4.6.4 16.6.4 Safety related/binary message transmission

Method of measurement

Set up standard test environment and operate EUT in autonomous mode as follows:

a) Apply a 1 slot binary broadcast message (Message 8) to the PI of the EUT less than 4 s before the next scheduled transmission. Record transmitted messages. Retry with a 90 % channel load.

b) Apply a 1 slot binary broadcast message (Message 8) to the PI of the EUT more than 4 s before the next scheduled transmission. Record transmitted messages. Retry with 90 % channel load.

c) Apply combinations of binary broadcast message (Message 8), addressed binary message (Message 6), broadcast safety related message (Message 14) and addressed safety related message (Message 12) to the PI of the EUT. Record transmitted messages and output of the PI of the EUT.

d) Apply more than 5 AIR sentence per minute to the PI.

Required results

Confirm that:

a) the EUT transmits this Message 8 within 4 s using ITDMA;

b) the EUT transmits this Message 8 within 4 s using RATDMA;

c) maximum 20 slots can be used per frame for Messages 6, 8, 12, 14, 25 and 26 and that messages using more than 3 slots are rejected. Confirm that sentence ABK is sent with acknowledge type 2 (Message could not be broadcast) when the message is rejected;

d) the EUT transmits not more than 5 Messages 15 per minute. Confirm that sentence ABK is sent with acknowledge type 2 (Message could not be broadcast) when the message is rejected.

2012-04-26	**Tester: Ba**	**Test details:** ITDMA transmission	
Test item	Check	Remark	Result
Apply an binary broadcast message 8 to the PI port of the EUT < 4 s before next scheduled transmission. File name: AIBBM_bin.sst.			
Standard test environment	Check that Message 8 is transmitted within 4 s		Passed
	a) Check that **ITDMA** is use, if there is a position report in the next **4 s** The position report is changed from Message 1 to 3 to announce the Message 8 slot		Passed
	b) Check that **RATDMA** is used if there is no position report within **4 s**		Passed
90 % channel load Generate channel load as described below 1).	Check that Message 8 is transmitted within 4 s		Passed
	a) Check that **ITDMA** is used, if there is a position report in the next **4 s**		Passed
	b) Check that **RATDMA** is used if there is no position report within **4 s**		Passed

2012-04-26	**Tester: Ba**	**Test details:** c) Multi RATDMA transmissions		
Test item		Check	Remark	Result
Apply more than 20 Messages 6,8,12,14, 25, 26 to the PI port of the EUT within one frame. File name: AIBBM_25.sst.				
Maximum transmissions per frame		Check that only 20 messages are transmitted in one frame. Further message in a frame have to be rejected		Passed
		Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		Passed
Apply a message longer then 3 slots		Check that the message is not transmitted	See Note)	N/A
		Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		N/A

Note)
In 14.1.6.1 it is required:

14.1.6.1.2 Required results
Check that the message is transmitted in up to 5 slots accordingly.

This is a discrepancy to the requirement that *that "messages using more than 3 slots are rejected."* Therefore this test is not applicable. A transmission of messages longer then 3 slots is accepted.

2012-11-14	**Tester: Ba**	**Test details:** d) Multi message 15		
Test item		Check	Remark	Result
Apply more than 5 AIR sentences to the PI port of the EUT within one frame.				
Maximum message 15 transmissions per frame		Check that only 5 message 15 are transmitted in one frame. Further message in a frame have to be rejected		Passed
		Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		Passed

4.6.5 16.6.5 Transmission of Message 5 (ITDMA)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Record transmitted messages.

Required results

Confirm that EUT transmits Message 5 using the ITDMA access scheme. The ITDMA access scheme shall replace a scheduled position report Message 1 with a Message 3.

2012-02-06	**Tester: Ba**	**Test details:** ITDMA transmission of Message 5		
Test item		Check	Remark	Result
Record the VDL data of at least 20 frames operating with autonomously scheduled transmissions. Set the condition so that the reporting rate is 10 s.				
Reporting rate		Check that the reporting rate of msg 5 is 6 min	See diagram of test 14.4.4	Passed
Message type for allocation		Check that a Message 1 before Message 5 on the same channel is changed to Message 3 to allocate the slots for Message 5	The slots for Message 5 are not allocated Retest 2012-03-01 Ba:	Passed
Number of slots		Check that the number of slots = 2 (value in commstate = 1)	Retest 2012-03-01 Ba:	Passed
Keep flag		Check that the keep flag = 1	Retest 2012-03-01 Ba:	Passed
Slot allocation		Check that the slots allocated by Message 3 are used for T_X of Message 5	Retest 2012-03-01 Ba:	Passed
Alternating channels		Check that Message 5 is transmitted on alternating channels	If the positon reporting interval is 3 min message 5 is transmitted alternating on both channels. If the position reporting interval is not 3 min the channel selection is irregular, sometimes alternating, sometimes not. Additionally the selection interval exceed sometimes 6 min +/- 10% (+/- 36s) and the time from one message 5 to the next exceeds 6 min +/- 20% (+/- 72s). It seems that the position reporting affects the reporting of message 5. Retest 2012-07-13 Ba: Message 5 is transmitted regular within the selection interval	Passed

4.6.6 16.6.6 Assigned operation

4.6.6.1 16.6.6.1 Assigned mode using reporting rates

Method of measurement

Operate standard test environment and EUT in autonomous mode. Transmit an assigned mode command message (Message 16) using a base station MMSI to the EUT with:

a) the number of reports per 10 min which is not a multiple of 20;

b) the number of reports per 10 min which is higher than 600.

Required results

Confirm that

a) the EUT transmits position reports Message 2 at a report rate that corresponds to the next highest multiple of 20 reports per 10 min;

b) the EUT transmits position reports Message 2 at a reporting interval of 1s.

2012-04-27	**Tester: Ba**	**Test details:** Assigned Mode	
Test item	Check	Remark	Result
Send a Message 16 rate assignment with invalid offset values.			
a) Offset value = 110 (not a multiple of 20) EUT = destination ID A	Check that the reporting rate is 120/10min = 12/min = 5 s	UTC 08:22	Passed
b) Offset value = 1000 (> 600 messages/10 min) EUT = destination ID B	Check that the reporting rate is 600/10min = 60/min = 1 s	UTC 08:32	Passed

4.6.6.2 16.6.6.2 Receiving test

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit an assigned mode command (Message 16) using a base station MMSI to the EUT with

- *slot offset and increment,*
- *designated reporting interval.*

Record transmitted messages.

Required results

Confirm that EUT transmits position report Message 2 according to defined parameters and reverts to SOTDMA Message 1 with standard reporting interval after 4 min to 8 min.

2012-03-01	**Tester: Ba**	**Test details:** a) Slot offset and increment		
Test item		Check	Remark	Result
Send an assignment message 16 with offset A = offset to first assigned slot = 40 and slot increment parameter = 4 (increment = 125). Within the timeout time repeat the Message 16. Record VDL messages and evaluate record.				
VDM output		Check VDM output of Message 16	There is no VDM output of message 16 <u>Retest 2012-07-10 Ba:</u> There is a VDM output of message 16	Passed
First message		Check that first message is sent after 40 slots	The first message is sent after 40 slots The first message is sent on the wrong channel. Message 16 is sent on channel A but the first message is sent on channel B <u>Retest 2012-07-10 Ba:</u> The first message is sent on the right channel A.	Passed
Message type		Check that message type of position report is 2		Passed
Initialisation phase		Check that EUT starts immediately (after offset slots) with Message 2		Passed
Deallocation of previously used slots		Check that the slot used before assignment are deallocated using timeout value = 0 and slot offset = 0		Passed
Alternating channels		Check that position report is sent alternating on channel A and B		Passed
Increment		Check that the increment is 125 slots		Passed

Timeout	Check that all slots of the first Message 2 frame have the same timeout		Passed
	Check that the timeout is between 3 and 7	Time-out = 7	Passed
	Check that the timeout is decremented after 1 min	Remark: The time-out is re-set to a random value at each received message 16	Passed
Comstate	Check that the ComState is like the ComState of Message 1		Passed
Switch back to autonomous mode	Check that the EUT deallocates all msg 2 slots with timeout 0		Passed
	Check that the EUT changes slots with timeout 0 on each channel to ITDMA slot message 3 to start autonomous mode	The slots of the first messages of the autonomous mode (msg 3) are not allocated Retest 2012-07-10 Ba: The slots of the first messages of the autonomous mode (msg 3) are correctly allocated	Passed
	Check that EUT initialises autonomous mode like network entry		Passed

2012-03-01	**Tester: Ba**	**Test details:** b) Rate assignment		
Test item		Check	Remark	Result
Send an assignment message 16 with offset=reporting rate of 300 messages/10 min, increment=0 Within the timeout time repeat the Message 16. Record VDL messages and evaluate record.				
VDM output		Check VDM output of Message 16	There is no VDM output of message 16 Retest 2012-07-10 Ba: There is a VDM output of message 16	Passed
Initialisation phase		Check that EUT starts immediately with rescheduling to the new reporting rate		Passed
Message type		Check that message type of position report is 2 instead of Message 1		Passed
Reporting rate		Check that the reporting is 300 messages/10 min = 30 messages/frame = 2 s		Passed
Alternating channels		Check that position report is sent alternating on channel A and B		Passed
Initialisation		Check that the Initialisation is according to changing reporting rate using Message 3 to allocate new slots		Passed
Timeout		Check that the assigned timeout is between 2 and 6		Passed
Assignment repetition		Check that the timeout is extended by repetition of Message 16.		Passed
Switch back to autonomous mode		Check that the EUT reverts to normal reporting rate between 4 and 8 min after last Message 16	After 5 minutes	Passed

2012-11-14	**Tester: Ba**	**Test details:** non-base station MMSI		
Test item		Check	Remark	Result
Send an assignment message 16 with a non-base station MMSI				
Slot assignment with: offset A = 40 and slot increment parameter = 4 (increment = 125).		Check that the assignment command is ignored		Passed
Rate assignment with: offset=reporting rate of 300 messages/10 min, increment=0		Check that the assignment command is ignored		Passed

4.6.6.3 16.6.6.3 Slot assignment to FATDMA reserved slots

Definition

A test to check the combined operation of Message 16 assignment to slots reserved by Message 20.

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode. Transmit a data link management message (Message 20) using a base station MMSI to the EUT with slot offset and increment. Transmit an assigned mode command (Message 16) using a base station MMSI to the EUT and command it to use one or more of those FATDMA allocated slots. Record transmitted messages.

Required results

Confirm that the EUT uses the slots commanded by Message 16 for own transmissions.

2012-04-27	**Tester: Ba**	**Test details:** Slot assignment to FATDMA reserved slots		
Test item		Check	Remark	Result
Send a Message 20 from VDL Generator with slot offset and increment for slot reservation: Offset = 23, slots = 5, time-out = 7, incr. = 25 Send a Message 16 from VDL Generator assigning one or more of these reserved slots: Offset = 25, incr. = 5 (= 75 slots)				
R_x of Message 20		Check that Message 20 has been received by EUT (VDM output)	UTC 13:34	Passed
Slot use		Check that slots assigned by the Message 16 are used by the EUT	UTC 13:35	Passed

4.6.7 16.6.7 Group assignment

4.6.7.1 16.6.7.1 Assignment priority

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode with 10 s reporting interval, and use a base station MMSI to transmit Message 23 as follows:

a) *Transmit a Message 22 defining a region with the EUT inside that region. Transmit a Message 22 to the EUT individually addressed and specifying T_x/R_x mode 2.*

b) *Transmit a Message 23 to the EUT with T_x/R_x mode 1 within 10 min of test a).*

c) *Repeat transmission of Message 23 to the EUT with T_x/R_x mode 1 after 15 min of test a).*

d) *Repeat the test, clear the region defined by Message 22 under a), and transmit Message 22 to the EUT with regional settings specifying T_x/R_x mode 2.*

NOTE This can be carried out using the method used in 17.8.1.1 b) step 2 or by assigning a new simulated position to the EUT.

Record transmitted messages.

Required results

Confirm that:

a) *the T_x/R_x mode field setting of Message 22 takes precedence over the T_x/R_x mode field setting of Message 23;*

b) *the EUT ignores the assignment by Message 23 and the setting of Message 22 takes precedence for 10 min;*

c) *the EUT applies the T_x/R_x mode setting of Message 23;*

d) *the T_x/R_x mode field setting of Message 23 takes precedence over the T_x/R_x mode field setting of Message 22. The receiving station shall revert to its previous T_x/R_x mode after a timeout value randomly chosen between 240 s and 480 s.*

2012-04-27	**Tester: Ba**	**Test details:** Assignment priority		
Test item		Check	Remark	Result
The test sequence is modified to improve testability (Test d) before a)..c)). Set up EUT in autonomous mode.				
Transmit Message 23 with Tx/Rx mode = 1		Verify that Message 23 is received and content is correct.	UTC 10:53	Passed
Reporting rate		Check that reporting rate is as expected by Message 23.		Passed
T_x/R_x mode		Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).		Passed
Message 22 to an area				
d) Transmit Message 22 (T_x/R_x mode = 0)		Verify that Message 22 is received (ACA output).	UTC 10:56	Passed
T_x/R_x mode		Check T_x/R_x mode = 1 (T_x on channel A) according to Message23		Passed
		Check that the reporting interval is 10 s	<u>Retest 2012-09-05 Ba:</u> The reporting interval is incorrect (20 s instead of 10 s) <u>Retest 2012-11-14 Ba:</u> The reporting interval is 10 s	Passed

Wait for time-out of Message 23			
Reporting rate	Check that reporting rate = autonomous reporting rate.		Passed
Transition to Tx/Rx mode 0	Check that the transmission on channel B is initiated according to the network entry procedure	Retest 2012-09-05 Ba: The transmissions on channel B start without slot allocation, using unallocated slots. Retest 2012-11-14 Ba: The transmissions on channel B start correctly, according to the network entry procedure	Passed
T_x/R_x mode	Check T_x/R_x mode = mode of Message 22 = 0 (T_x on channel A and B).	Retest 2012-07-11 Ba: UTC 12:02, 12:29 The EUT does not revert to Tx/Rx mode 0 after time-out Retest 2012-09-05 Ba: The EUT reverts to Tx/Rx mode 0 after time-out	Passed
Message 22 individually addressed			
Transmit Message 23 (T_x/R_x mode = 1)	Verify that Message 23 is received and content is correct.	UTC 11:04	Passed
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).		Passed
a) Transmit Message 22 individually addressed (MMSI) (T_x/R_x mode = 2)	Verify that Message 22 is received and content is correct.	UTC 11:06	Passed
T_x/R_x mode	Check T_x/R_x mode = mode of Message 22 = 2 (T_x on channel B)	Retest 2012-07-11 Ba: UTC 12:04, 12:21, 13:36 See Note 1) Retest 2012-09-05 Ba: Message 22 is accepted also if the area setting has been applied before last power on. The EUT transmits on channel B only The reporting interval is incorrect (20s instead of 10 s). Retest 2012-11-14 Ba: The reporting interval is 10 s	Passed Passed Passed

b) Transmit Message 23 with T_x/R_x mode 1 within 10 min after Message 22	Verify that Message 23 is received and content is correct.	UTC 11:08	Passed
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 22 (T_x on channel B).	EUT transmits on channel A only according to message 23 Message 23 with an Tx/Rx mode setting should be ignored for 10 minutes after receiving an addressed message 22. <u>Retest 2012-07-11 Ba:</u> Could not be retested because the EUT did not change to transmission on channel B only (Tx/Rx mode 2). See Note) <u>Retest 2012-09-05 Ba:</u> After receiving message 23 the EUT immediately used the Tx/Rx mode specified in message 23. Msg 23 should be ignored for the first 10 min after the addressed message 22. See Note 2) <u>Retest 2012-11-14 Ba:</u> Msg 23 is ignored for 12 minutes.	Passed
c) Transmit Message 23 with T_x/R_x mode 1 at 15 min min after Message 22	Verify that Message 23 is received and content is correct.	<u>Retest 2012-11-14 Ba:</u>	Passed
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).	<u>Retest 2012-11-14 Ba:</u>	Passed

Note 1)

1) An MMSI addressed message 22 is not accepted if the EUT has not received a message 22 to an area before. It seems that an area which has been applied before the last power on is not accepted as area in use for the addressed message 22.

2) If the EUT has received a message 22 to an area before the addressed message 22 is accepted and the Tx/Rx mode of the area in use is modified to 2 (ACA output).

But the EUT does not change to transmission on channel B only (Tx/Rx mode 2). There is some strange re-allocation on channel A including allocation of slots which are not used and the use of slots which are not allocated. Finally, after about 5 minutes, the EUT continues regular transmission on channel A.

This seems to be a general problem of rescheduling to Tx/Rx mode 3. See also the diagram of 17.2 Tx/Rx mode setting.

Note 2

Assignment priorities
For Tx/Rx mode there are the following priorities:

Priority	Message	Time-out	Restricted time
1 highest	Msg 22, MMSI addressed	no	10 min
2	Message 23	4...8 min	4... 8 min, same as time-out
3 Lowest	Message 22, area adressed	no	No

Time-out:
After the time-out time the EUT reverts to the mode defined by the area setting.
Restricted time:
During this time no settings of lower priority are accepted.

This means that for 10 minutes after an addressed message 22 an message 22 to an area (overlapping or identical to the area in use) and message 23 shall be ignored.

The reason is to avoid that settings for a specific station are overwritten by the normal regular transmission for all or a group of stations.

4.6.7.2 16.6.7.2 Increased reporting interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode, and use a base station MMSI to transmit Messages 22 and 23. Transmit an assigned mode command (Message 23) to the EUT with T_x/R_x mode 1 as follows:

a) Transmit a group assignment message (Message 23) to the EUT with a reporting interval that is longer than the autonomous reporting interval.

b) Transmit a group assignment message (Message 23) to the EUT with a quiet time command.

c) Set the Nav status to "moored" and "at anchor" and SOG < 3 kn. Transmit a group assignment message (Message 23) to the EUT with a reporting interval that is shorter than the autonomous reporting interval.

d) Set the Nav status to "moored" and "at anchor" and SOG > 3 kn. Transmit a group assignment message (Message 23) to the EUT with a reporting interval that is shorter than the autonomous reporting interval.

Record transmitted messages.

Required results

Verify that:

a) the EUT ignores the assignment command and transmits position reports with the autonomous reporting interval;

b) the EUT ignores the assignment command and transmits position reports with the autonomous reporting interval;

c) the EUT ignores the assignment command and transmits position reports with the autonomous reporting interval;

d) the EUT transmits position reports with the assigned reporting interval.

2012-04-27	**Tester: Ba**	**Test details:** Increased reporting interval		
Test item		Check	Remark	Result
SOG = 10 kn, reporting interval = 10 s				
Reporting rate		Check VDO output and verify that the reporting interval is as given by autonomous mode (10 s)		Passed
a) Transmit Message 23 (reporting interval > 10 s)		Verify that EUT receives the msg 23		Passed
Report rate		Check that transponder declines Message 23 command: Reporting interval = 10 s	Reporting interval = 10 s Message type is 2 instead of 1. It should be 1 to indicate that it is not in assigned mode <u>Retest 2012-07-12 Ba:</u> Message type = 1 <u>Retest 2012-07-12 Ba:</u> Message type = 1 Test has to be repeated because the message type is also 1 for an accepted message. <u>Retest 2012-09-06 Ba:</u> Message type = 1	Passed Passed
b) Transmit Message 23 with quiet time		Verify that EUT receives the Message 23	UTC 12:04	Passed
Report rate		Check that transponder declines Message 23 command, EUT continues transmission with 10 s reporting interval	Reporting interval = 10s, EUT continues transmission Message type is 2 instead of 1. It should be 1 to indicate that it is not in assigned mode <u>Retest 2012-07-12 Ba:</u> Message type = 1 Test has to be repeated because the message type is also 1 for an accepted message. <u>Retest 2012-09-06 Ba:</u> Message type = 1	Passed Passed
Nav status = moored or at anchor, SOG < 3 kn, reporting interval = 3 min				
Reporting rate		Check that the reporting interval = 3 min	UTC 11:32	Passed
c) Transmit Message 23 (reporting interval < 3 min)		Verify that EUT receives the msg 23		Passed
		Check that transponder declines Message 23 command: Reporting interval = 3 min		Passed

Nav status = moored or at anchor, SOG > 3 kn, reporting interval = 3 min			
Reporting rate	Check that the reporting interval 10 s		Passed
d) set SOG > 3 kn Transmit Message 23 (reporting interval 5s)	Verify that EUT receives the msg 23	UTC 11:36	Passed
	Check reporting interval = 5s		Passed

4.6.7.3 16.6.7.3 Entering interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s Use a base station MMSI to transmit Message 23.

a) *Transmit a group assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned.*

b) *Repeat test with a reporting interval of 2 s assigned.*

c) *Transmit a group assignment command (Message 23) to the EUT with a reporting interval field setting 10 (next longer autonomous reporting interval).*

d) *Operate EUT in autonomous mode with a reporting interval of 6 s. Transmit a group assignment command (Message 23) to the EUT with a reporting interval field setting 9 (next shorter autonomous reporting interval).*

Monitor the VDL.

Required results

Verify that:

a) *EUT enters assigned operation mode and transmits position report Message 2 with 5 s reporting interval. EUT builds up the assigned transmission scheduled according to network entry procedure; verify that unused slots of the previous reporting schedule are released;*

b) *EUT enters assigned operation mode and transmits position report Message 2 with 2 s reporting interval;*

c) *EUT does not enter assigned operation mode and transmits position report Message 1 with 10 s reporting interval;*

d) *EUT enters assigned operation mode and transmits position report Message 2 with 2 s reporting interval.*

2012-04-27	**Tester: Ba**	**Test details:** Entering interval assignment		
Test item		Check	Remark	Result
Operate the EUT with a autonomous reporting interval of 10 s. Send a group assignment message 23 with a reporting interval of 5 s (value 8). Record VDL messages and evaluate record.				
VDM output		Check VDM output of Message 23	UTC 09:21	Passed
Initialisation phase		Check that EUT starts immediately with rescheduling to the new reporting rate		Passed
Message type		Check that message type of position report is 2 instead of Message 1	Retest 2012-07-12 Ba: Message type = 1 Perhaps there was a missunderstanding of the error report in 16.6.7.2 a) and b): The message type shall be 1 if a group assignment is ignored. It shall be 2 if a group assignment is accepted and performed. Retest 2012-09-06 Ba: Message type = 2	Passed
Reporting rate		Check that the reporting interval = 5 s		Passed
Alternating channels		Check that position report is sent alternating on channel A and B		Passed
Slot deallocation		Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0	Slots with time-out 0 in the previous frame are not released. The other slots are released Retest 2012-07-12 Ba: No change, Slots with time-out 0 in the previous frame are not released Retest 2012-09-06 Ba: There were not messages with time-out 0 in the previous frame. If in other tests this general problem is fixed, it is ok also for this test.	Passed Passed
Initialisation/ Slot allocation		Check that the slot of the autonomous reporting interval (10 s) are allocated according to the network entry procedure	There is an unallocated, unexpected and unnecessary message 2 in frame UTC 09:21, slot 660. Retest 2012-07-12 Ba: There are no unexpected messages.	Passed Passed

Timeout	Check that the assigned timeout is between 2 and 6		Passed
Send a group assignment message 23 with a reporting interval of 2 s (value 11).			
VDM output	Check VDM output of Message 23	UTC 09:36	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 2 s		Passed
Send a group assignment message 23 with reporting interval = next longer interval (value 10).			
VDM output	Check VDM output of Message 23	UTC 12:32	Passed
Message type	Check that message type of position report is 1	Message type is 2 instead of 1 <u>Retest 2012-07-12 Ba:</u> UTC 10:44 Message type = 1 <u>Retest 2012-07-12 Ba:</u> Message type = 1 Test has to be repeated because the message type is also 1 for an accepted message. <u>Retest 2012-09-06 Ba:</u> Message type = 1	Passed
Reporting rate	Check that the reporting interval = 10 s		Passed
Operate the EUT with a autonomous reporting interval of 6 s. Send a group assignment message 23 with reporting interval = next shorter interval (value 9).			
VDM output	Check VDM output of Message 23	UTC 10:42	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval =		Passed

4.6.7.4 16.6.7.4 Assignment by region

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s and use a base station MMSI to transmit Message 23 as follows:

a) Transmit a group assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is inside this region). Set the reporting rate to 2 s and apply message to VDL.

b) Transmit a group assignment command (Message 23) to the EUT (define station type 0 and geographic region so that the EUT is outside this region). Set the reporting rate to 2 s and apply message to VDL.

Required result

Verify that:

a) EUT switches to assigned mode and transmits position reports with 2 s intervals. Verify that EUT reverts to normal operation mode after timeout period.

b) EUT declines Message 23.

2012-04-27 / **Tester: Ba**	**Test details:** Assignment by region		
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that the reporting interval is 10 seconds (SOG = 10 kn).			
a) Transmit Message 23, EUT inside region (Reporting interval value = 11 = 2s)	Check that Message 23 is received (VDM output)		Passed
	Check that the reporting interval is changed to 2 s		Passed
	Verify that EUT reverts to normal operation mode after 4... 8 min		Passed
EUT outside the addressed region			
Transmit Message 23, EUT outside region (Reporting interval = 2 s)	Verify that EUT declines Message 23 Reporting interval = 10 s	<u>Retest 2012-07-12 Ba:</u> UTC 11:29, 11:58 after power cycle Reporting interval = 2 s Position: LAT = 53°32, LON = 09°58 Region: 10°30, 55°/ 09°30, 54° <u>Retest 2012-09-06 Ba:</u> Message 23 is ignored	Passed
Message 23 from a non-base station MMSI			
Transmit Message 23, EUT inside region (Reporting interval = 2 s) MMSI is a non-base station MMSI	Verify that EUT declines Message 23 Reporting interval = 10 s	UTC 12:39	Passed

4.6.7.5 16.6.7.5 Assignment by station type

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s and use a base station MMSI to transmit Message 23 as follows:

a) EUT switches to assigned mode and transmits position reports with 2 s reporting interval. Verify that EUT reverts to autonomous mode after timeout period;

b) EUT declines Message 23;

c) EUT switches to assigned mode and transmits position reports with 5 s reporting interval. Verify that EUT reverts to autonomous operation mode after timeout period of second transmitted group assignment.

Record VDL and check reaction of the EUT.

Required results

Verify that:

a) EUT switches to assigned mode and transmits position reports with 2 s reporting interval. Verify that EUT reverts to autonomous mode after timeout period;

b) EUT declines Message 23;

c) EUT switches to assigned mode and transmits position reports with 5 s reporting interval. Verify that EUT reverts to autonomous operation mode after timeout period of second transmitted group assignment.

2012-04-27	**Tester: Ba**	**Test details:**		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that reporting interval is 10 s (SOG).				
a) Transmit Message 23 EUT inside area, station type = 0, Reporting interval = 2 s		Check that Message 23 is received (VDM output)		Passed
Reporting rate		Check that the reporting interval is changed to 2 s		Passed
Message 23 timeout		Verify that EUT reverts to normal operation mode after 4... 8 min		Passed

b) Transmitt Message 23 with station types not valid for EUT, Reporting interval = 2 s			
station type = 2 (all types of Class B mobile stations),	Check that Message 23 has been received (VDM output)	UTC 12:48	Passed
	Check reporting interval = 10 s		Passed
station type = 3 (SAR airborne mobile station),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 4 (Class B SO mobile stations only),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 5 (Class B CS mobile stations only),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 6 (Inland Waterways),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
c) Transmitt Message 23 with station types valid for EUT, Reporting interval = 2 s			
station type = 1 (Class A mobile stations only),	Check that Message 23 has been received (VDM output)	UTC 12:56	Passed
	Check reporting interval = 2 s		Passed
Apply message 23 again within 4 min	Check that Message 23 has been received (VDM output)	Tested in 16.6.7.3/7	Passed
	Verify that EUT reverts to normal operation mode at 4... 8 min after the last Message 23		Passed

4.6.7.6 16.6.7.6 Addressing by ship and cargo type

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 s and use a base station MMSI to transmit Message 23 as follows:

a) *Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the ship and cargo value to a desired value. Make sure that this value is also configured in the EUT.*

b) *Transmit a group assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the ship and cargo value to a desired value. Make sure that a different value is configured in the EUT.*

Required results

Verify that:

a) *EUT switches to assigned mode and transmits position reports with 2 s reporting interval. Verify that EUT reverts to autonomous mode after timeout period;*

b) *EUT declines Message 23.*

2012-04-27	**Tester: Ba**	**Test details:** a) Matching type of ship		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG). Set EUT to ship and cargo type = 72.				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 72		Check that Message 23 is received (VDM output)	UTC 13:06	Passed
		Check that the reporting interval is changed to 2 s		Passed
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 70		Check that Message 23 is received (VDM output)	UTC 13:05	Passed
		Check that the reporting interval is changed to 2 s	Assignment is ignored. x0 means: “All ships of this type”. So in case of 70 all cargo vessels (70, 71, 72,...,79) should be addressed <u>Retest 2012-07-12 Ba:</u> Ship and cargo type = 70 is accepted and group assignment performed.	Passed

2012-04-27	**Tester: Ba**	**Test details:** b) Type of ship not matching		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG). Set EUT to ship and cargo type = 72.				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 82		Check that Message 23 has been received (VDM output)	UTC 13:05	Passed
Reporting rate		Check that EUT transmit position reports with autonomous reporting interval..		Passed

4.6.7.7 16.6.7.7 Reverting from interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, transmit a group assignment command (Message 23) to the EUT with a reporting interval of 5 s assigned. Monitor the VDL until at least 1 min after timeout occurred. Repeat 10 times (transmissions of Message 23 shall not be synchronised to the initial transmission schedule of the EUT).

Measure the time T_{rev} between the reception of Message 23 and first transmission after timeout.

Required results

Verify that the EUT enters autonomous mode after a timeout of 4 min to 8 min and transmits position report Message 1 and releases unused slots from previous schedule.

2012-04-27	**Tester: Ba**	**Test details:** Reverting from interval assignment		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG).				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 5 s		Check that Message 23 has been received. Record R_x time		Passed
Reporting rate		Check that EUT transmit position reports with reporting interval of 5 s.		Passed
Time-out		Check that the EUT reverts to 10 s reporting rate after 4.. 8 min		Passed
Slot deallocation		Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0	Slots with time-out 0 in the previous frame are not released. The other slots are released <u>Retest 2012-07-12 Ba:</u> No change <u>Retest 2012-09-06 Ba:</u> There were not messages with time-out 0 in the previous frame. If in other tests this general problem is fixed, it is ok also for this test.	Passed Passed
Slot allocation		Check that the slot of the autonomous reporting interval (10 s) are allocated according to the network entry procedure		Passed

4.6.8 16.6.8 Fixed allocated transmissions (FATDMA)

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply Message 4 to the VDL. A base station shall use a base station MMSI as follows:

a) Transmit a data link management message (Message 20) on Channel A from a base station within 120 NM to the EUT with slot offset and increment. Record transmitted messages.

b) Repeat the test when the EUT has no position.

c) Repeat the test with a base station beyond 120 NM.

d) Repeat the test without base station report (Message 4).

e) Repeat the test with a base station within 120 NM and maintain transmissions of Message 20. Stop transmission of Message 4.

Required results

Confirm that:

a) for the base station within 120 NM, the EUT does not use slots allocated by Message 20 for own transmissions until timeout of 4 min to 8 min. Confirm that the EUT does not use the same slots on Channel B;

b) the EUT does not use slots allocated by Message 20 for own transmissions until the timeout given in the Message 20.

c) for the base station beyond 120 NM the EUT treats the slots as free;

d) the EUT treats the slots as free;

e) the EUT does not use slots allocated by Message 20 for own transmissions until the target timeout of the EUT occurs after Message 4 was stopped.

2012-04-25	**Tester: Ba**	**Test details:** FATDMA reserved slots		
Test item		Check	Remark	Result
a) Send base station report Message 4 with distance < 120 NM. Send a Message 20 from VDL Generator with slot offset and increment for slot reservation according to the description below. To get enough new slot allocations within timeout time set reporting rate to 2 s (speed > 25 kn).				

Record VDL messages	Check that the reserved slots are not used by the EUT within a timeout of 4-8 min	• The slots are immediately not used. See Note 2) • The slot allocation is incorrect. There are some incorrect allocations, and several slots are used without allocation. See slot allocation diagram <u>Retest 2012-07-11 Ba:</u> The reserved slots are released in the frame following the received message 20. The time-out is forced to 0 and the EUT changes to a not reserved slot.	Passed
End of reservation	Check that after end of reservation all slots are used again.		Passed
Other channel	Check that the reserved slots are also not used on the other channel because of priority rules See Note)	The transmission on the slots on the other channel is immediately stopped. This is incorrect. It is not forbidden to use these slots, they only get lower priority. That means that at the next time-out 0 these slots should not be selected because of low priority. So after up to 8 minutes they should not be used any more. So it is not necessary to implement a special function for this case. The normal priority rules for slot selection will give the correct result. <u>Retest 2012-07-11 Ba:</u> The slots which are reserved on the other channel are not used at the next time-out 0.	Passed
b) Repeat the test when EUT has no position	Check that the reserved slots are not used by the EUT within a timeout of 4-8 min	<u>Test 2012-11-15 Ba:</u>	Passed
c) Repeat test with base station, distance > 120 NM	Check that all slots are used		Passed
d) Repeat test without Message 4	Check that all slots are used		Passed
e) Send message 4, distance < 120 NM, and message 20	Check that the reserved slots are not used by the EUT within a timeout of 4-8 min	<u>Test 2012-11-15 Ba:</u>	Passed

Stop message 4	Check that messages 20 which are received after the target time-out of message 4, are ignored and all slots are used	After a target time-out of 30 minutes for message 4 message 20 is ignored.	Passed
Check with non-base station MMSI			
Send base station report Message 4 with distance < 120 NM and a Send a Message 20 with slot offset and increment for slot reservation according to the description below			
MMSI of message 4 and 20 is a non-base station MMSI	Check that the reservation is ignored and all slots are used	Test 2012-11-15 Ba: The reservation is not ignored. The reserved slots are not used Retest 2013-01-08 Ba: The reservation from a mobile station (non-base station) MMSI is ignored.	Passed

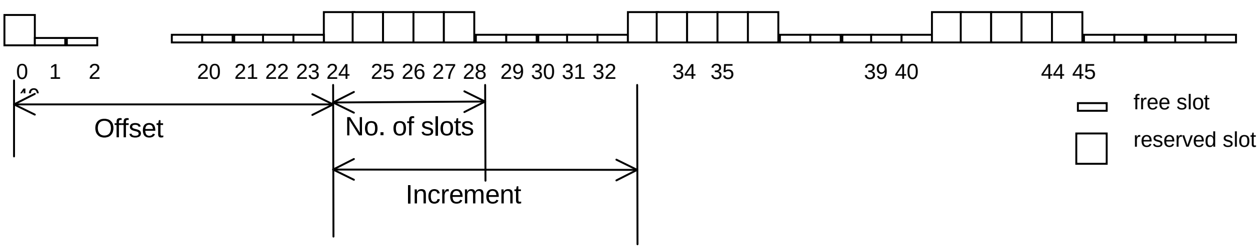
NOTE According to ITU-R M1371-4, §4.4.1 and clarification 2.56 a slot reserved by a base station on the other channel has got the lowest possible priority, that means it can be used for candidate slots, but only if no other slot with higher priority is available.

In the actual test scenario there are normally at minimum 5 free slots (free on both channels – highest priority) available. Therefore there is no reason to use one of the low priority slots for candidates.

Test scenario:
Message 20 transmission by test system.
Message 20 reserves slots which should not be used by mobile stations.

Message 20 parameters:
Message 20 is transmitted in slot 0 in each frame
Offset number 1: 25
Number of slots: 5
Time out 1: 3
Increment: 10

FATDMA reservation:



4.6.9 16.6.9 Randomisation of message transmissions

Method of measurement

Set up standard test environment. Power on the EUT and monitor the autonomous transmissions for 3 min. Restart the EUT and monitor the autonomous transmissions for another 10 min. Repeat this process for at least 10 times, starting at different seconds within a frame.

NOTE The Nominal Start Slot (NSS) should at network entry phase be randomised between the current slot and Nominal Increment (NI) slots forward. The first Nominal Slot (NS) is always the NSS.

Required results

Verify that the nominal slots are not always within the same selection interval after a power cycle by monitoring the transmissions slots. After a number of power cycles the EUT should finally start transmissions in slots that are not within the same selection interval.

2013-01-10	**Tester: Ba**	**Test details:** Randomisation of message transmissions		
Test item		Check	Remark	Result
Switch on the EUT for 3 minutes, switch it on and record the transmissions for 10 minutes. Repeat this procedure 10 times Evaluate the selection intervals for each of the on periods.				
Random check		Check that the selection intervals are randomly distributed over the reporting interval		Passed

4.7 16.7 Message Formats

4.7.1 16.7.1 Received messages

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 12 to the VDL including multiple slot messages up to 5 slots. Record messages output by the PI of EUT.

Required results

Confirm that EUT outputs corresponding message with correct field contents and format via the PI or responds as appropriate.

Even if most received messages are already tested in special sections a complete receiving test over all messages is provided here.

2012-06-13 Ba	Test details – Content of msg 1,2,3 Position report		
Test item	Check	Remark	Result
Transmit a message 1,2 or 3 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 4 Base station report		
Test item	Check	Remark	Result
Transmit a msg 4 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 5 Static data		
Test item	Check	Remark	Result
Transmit a message 5 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 2		Passed
Check sentence number	Check that value = 1,2		Passed
Sequential message ident.	Check that counting from 0...9 modulo 10		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 6 Addressed binary message		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (msg length = 112 bit)		Passed
Message content	Check the the message content is correct.		Passed
Transmit a message 6 addressed to other AIS. Message shall not be output on PI.			
Msg6 to other AIS	Check PI , no VDM		Passed

2012-06-13 Ba	Test details – Content of msg 7 Binary acknowledge		
Test item	Check	Remark	Result
Transmit a message 7 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 8 Binary broadcast message		
Test item	Check	Remark	Result
Transmit a message 8 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 4 (msg length = 80 bit)		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 9 SAR aircraft position report		
Test item	Check	Remark	Result
Transmit a message 9 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 10 UTC and data inquiry		
Test item	Check	Remark	Result
Transmit a message 10 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed
Msg11 response	Check for response with msg 11 if EUT is addressed		Passed
Msg11 response	No response if addressed to other station		Passed

2012-06-13 Ba	Test details – Content of msg 11 UTC date response		
Test item	Check	Remark	Result
Transmit a msg 11 from VDL generator Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 12 Addressed safety related message		
Test item	Check	Remark	Result
Transmit a message 12 from other AIS transponder or VDL generator addressed to EUT. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 138 bit)		Passed
Message content	Check the the message content is correct.		Passed
Transmit a message 12 addressed to other AIS. Message shall not be output on PI.			
Msg12 to other AIS	Check PI , no VDM		Passed

2012-06-13 Ba	Test details – Content of msg 13 Safety related acknowledge		
Test item	Check	Remark	Result
Transmit a message 13 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 14 Safety related broadcast message		
Test item	Check	Remark	Result
Transmit a message 8 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (length = 144 bit)		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 15 Interrogation		
Test item	Check	Remark	Result
Transmit a message 15 from other AIS transponder or VDL generator . Response on this msg is tested under 6.2 18.2 Interrogation responses			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 16 Assigned mode command		
Test item	Check	Remark	Result
Transmit a message 16 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 96 bit (1 dest.)		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 17 GNSS binary broadcast message		
Test item	Check	Remark	Result
Transmit a msg 17 from VDL generator Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 192 bit)		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 18 Standard Class B position report		
Test item	Check	Remark	Result
Transmit a msg 18 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 19 Extended Class B position report		
Test item	Check	Remark	Result
Transmit a msg 19 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 20 Data link management message		
Test item	Check	Remark	Result
Transmit a message 20 from VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (msg length = 160 bit)		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 21 ATON report		
Test item	Check	Remark	Result
Transmit a msg 21 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 22 Channel management to an area		
Test item	Check	Remark	Result
Transmit a msg 22 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 22 Channel management, MMSI addressed		
Test item	Check	Remark	Result
Transmit a msg 22 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 23 Group assignment command		
Test item	Check	Remark	Result
Transmit a msg 23 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 24 A Class B CS static data report		
Test item	Check	Remark	Result
Transmit a msg 23 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of msg 24 B Class B CS static data report		
Test item	Check	Remark	Result
Transmit a msg 23 from VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of addressed messages 25		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 4 (msg length = 104 bit)		Passed
Message content	Check the the message content is correct.		Passed
Transmit a message 25 addressed to other AIS. Message shall not be output on PI.			
Msg 25 to other AIS	Check PI , no VDM		Passed

2012-06-13 Ba	Test details – Content of broadcast messages 25		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 168 bit)		Passed
Message content	Check the the message content is correct.		Passed

2012-06-13 Ba	Test details – Content of addressed messages 26		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 4 (msg length = 200 bit)		Passed
Message content	Check the the message content is correct.		Passed
Transmit a message 26 addressed to other AIS. Message shall not be output on PI.			
Msg26 to other AIS	Check PI , no VDM		Passed

2012-06-13 Ba	Test details – Content of broadcast messages 26		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 168 bit)		Passed
Message content	Check the the message content is correct.	The end of the maximum length message is not received correctly. The last 2 characters are replaced by a much longer string <u>Retest 2012-09-06 Ba:</u> No change <u>Retest 2013-02-06 Ba:</u> The maximum length message is received correctly	Passed

2012-06-13 Ba	Test details – Long range position report message 27		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 96 bit)		Passed
Message content	Check the the message content is correct.		Passed

4.7.2 16.7.2 Transmitted messages

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a mobile station according to Table 12 by the EUT.

Record transmitted messages.

Required results

Confirm that the EUT transmits messages with correct field contents and format or responses as appropriate. Confirm that messages 4, 9,16, 17, 18, 19, 20, 21, 22 and 23 are NOT being transmitted by the EUT.

The message contents are checked using the VDL analyser.

2012-06-13	**Tester: Ba**	**Test details:** Message 1,2,3 Position report		
Test item		Check	Remark	Result
The message content of Message 1,2,3 is checked in 14.2.1				
Number of sentences		Check that value = 1		Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
		Check that the channel field is empty (NULL) if not T_x		Passed
Fill bits		Check that value = 0		Passed

2012-06-13	**Tester: Ba**	**Test details:** Message 5 Static data	
Test item	Check	Remark	Result
The message content of Message 5 is checked in 14.2.1			
Number of sentences	Check that value = 2		Passed
Check sentence number	Check that value = 1,2		Passed
Sequential message ident.	Check that counting from 0...9 modulo 10		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 6 Addressed binary message	
Test item	Check	Remark	Result
This test can be done in combination with test 2.1.4.1 14.1.4.1 Transmit an addressed message Apply PI sentence: File AIABM_bin.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 112 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Sequence number	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Retransmit flag	Check the field content		Passed
DAC	Check the field content		Passed
FI	Check the field content		Passed
Binary data	Check the field content		Passed

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 7 Binary acknowledge		
Test item		Check	Remark	Result
This test can be done in combination with test 6.1.2 18.1.2 Acknowledgement. Message 6 has to be transmitted by other AIS or VDL generator. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1		Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination ID 1 (MMSI)		Check the field content		Passed
Sequence number 1		Check the field content		Passed
Destination ID 2 (MMSI)		Omitted		
Sequence number 2		Omitted		
Destination ID 3 (MMSI)		Omitted		
Sequence number 3		Omitted		
Destination ID 4 (MMSI)		Omitted		
Sequence number 4		Omitted		

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 8 Binary broadcast message		
Test item		Check	Remark	Result
Apply PI sentence: File AIBBM_bin.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1		Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 4(message length = 80 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
DAC		Check the field content		Passed
FI		Check the field content		Passed
Binary data		Check the field content		Passed

2012-11-12	**Tester: Ba**	**Test details:** Content of Message 10 UTC and date inquiry	
Test item	Check	Remark	Result
This test can be done in combination with 14.7.3 Communication test Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 11 UTC date response	
Test item	Check	Remark	Result
Transmit a Message 10 from VDL generator to request transmission of Message 11 by EUT. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
UTC year, month, day, hour, minute, second	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
Type of EPFD	Check the field content		Passed
RAIM flag	Check the field content		Passed

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 12 Addressed safety related message	
Test item	Check	Remark	Result
This test can be done in combination with test 2.1.4.1 14.1.4.1 Transmit an addressed message Apply PI sentence: File AIABM_safety.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (message length = 96bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Sequence number	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Retransmit flag	Check the field content		Passed
Safety related text	Check the field content		Passed

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 13 Safety related acknowledge	
Test item	Check	Remark	Result
This test can be done in combination with test 6.1.2 18.1.2 Acknowledgement. Send Message 12 from other transponder or VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Sequence number 1	Check the field content		Passed
Destination ID 2 (MMSI)	Omitted		
Sequence number 2	Omitted		
Destination ID 3 (MMSI)	Omitted		
Sequence number 3	Omitted		
Destination ID 4 (MMSI)	Omitted		
Sequence number 4	Omitted		

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 14 Safety related broadcast message	
Test item	Check	Remark	Result
Apply PI sentence: File AIBBM_safety..sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 64 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Safety related text	Check the field content		Passed

2012-06-13	**Tester: Ba**	**Test details:** Content of Message 15 Interrogation	
Test item	Check	Remark	Result
This test can be done in combination with 6.2 18.2 Interrogation responses. Apply PI sentence: File AIAIR_35_5_bin.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 160 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Message ID 1.1	Check the field content		Passed
Slot offset 1.1	Check the field content = 0		Passed
Message ID 1.2	Check the field content		Passed
Slot offset 1.2	Check the field content = 0		Passed
Destination ID 2 (MMSI)	Check the field content		Passed
Message ID 2.1	Check the field content		Passed
Slot offset 2.1	Check the field content = 0		Passed

2013-01-07	**Tester: Ba**	**Test details:** Content of addressed messages 25		
Test item		Check	Remark	Result
Transmit Message 25 by applying an ABM PI sentence: File AIABM_msg25.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1	See also 14.1.4.1	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 168 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination indicator		Check that value = 1		Passed
Binary data flag		Check the field content		Passed
Destination ID (MMSI)		Check the field content		Passed
Binary data		Check the field content	See 14.1.4.1	Passed

2013-01-07	**Tester: Ba**	**Test details:** Content of broadcast messages 25		
Test item		Check	Remark	Result
Transmit Message 25 by applying an BBM PI sentence: File AIBBM_msg25.sst. Check the field content of the fields listed under Test item				
Number of sentences		Check that value = 1	See also 14.1.5.1	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 168 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination indicator		Check that value = 0		Passed
Binary data flag		Check the field content		Passed
Binary data		Check the field content		Passed

2013-01-07	**Tester: Ba**	**Test details:** Content of addressed messages 26		
Test item		Check	Remark	Result
Transmit Message 26 by applying an ABM PI sentence: File AIABM_msg26.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1	See also 14.1.4.1	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 2 (message length = 112 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination indicator		Check that value = 1		Passed
Binary data flag		Check the field content		Passed
Destination ID (MMSI)		Check the field content		Passed
Binary data		Check the field content	See 14.1.4.1	Passed
Comm. state		Check the field content		Passed

2013-01-07	**Tester: Ba**	**Test details:** Content of broadcast messages 26		
Test item		Check	Remark	Result
Transmit Message 26 by applying an BBM PI sentence: File AIBBM_msg26.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1	See also 14.1.5.1	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 2 (message length = 112 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination indicator		Check that value = 0		Passed
Binary data flag		Check the field content		Passed
Binary data		Check the field content		Passed
Comm. state		Check the field content	Set to all 0	Passed

2013-01-11	**Tester: Ba**	**Test details:** Message 27 Long range broadcast		
Test item		Check	Remark	Result
The message content of Message 27 is checked in				
Number of sentences		Check that value = 1	UTC 14:21:32	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value C and D is output	UTC 14:18: channel D UTC 14:21: channel C	Passed
Fill bits		Check that value = 0		Passed
Message ID		Check the field content	RI = 3	Passed
User ID (MMSI)		Check the field content		Passed
Position accuracy		Check the field content		Passed
RAIM flag		Check the field content		Passed
Navigational status		Check the field content		Passed
Longitude (1/10 min)		Check the field content		Passed
Latgitude (1/10 min)		Check the field content		Passed
SOG (kn)		Check the field content		Passed
COG (degree)		Check the field content		Passed
GNSS position status		Check the field content		Passed

5 17 Specific tests of network layer

(See 7.4)

5.1 17.1 Dual channel operation - Alternate transmissions

Method of measurement

Set up standard test environment and operate the EUT in autonomous mode on default channels AIS 1, AIS 2. Record transmitted scheduled position reports on both channels. Check CommState for slot allocation.

Required results

Confirm that the EUT allocates slots in alternating both channels. Repeat check for data link access period.

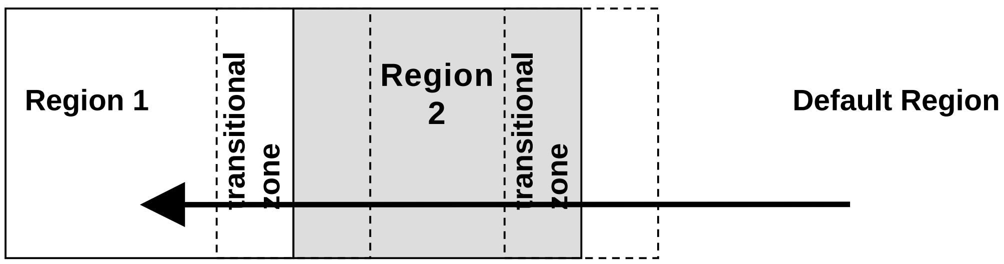
2012-06-13	**Tester: Ba**	**Test details:** Alternate transmissions	
Test item	Check	Remark	Result
Set up EUT in autonomous mode, set report rate to 10 s with external sensor input. Record transmitted scheduled position reports on both channels. Check CommState for slot allocation.			
Alternate transmissions	Check that the EUT transmission is alternating		Passed
CommState	Check that the slots of each channel are allocated on the same channel		Passed
Same test on network entry (data link access period)			
Alternate transmissions	Check that the EUT transmission is alternating		Passed
CommState	Check that the slots of each channel are allocated on the same channel		Passed

5.2 17.2 Regional area designation by VDL message

Method of measurement

Set up standard test environment and operate the EUT in autonomous mode.

a) *Using a base station MMSI, apply channel management messages (Message 22) to the VDL defining two adjacent regional areas 1 and 2 with different channel assignments for both regions and a transitional zone extending 4 NM on either side of the regional boundary. Let the EUT approach region 1 from outside region 2 more than 5 NM away from region boundary transmitting on default channels. Record transmitted messages on all 6 channels.*



	Primary channel	*Secondary channel*
Region 1	*CH A 1*	*CH B 1*
Region 2	*CH A 2*	*CH B 2*
Default region	*AIS 1*	*AIS 2*

Figure 13 – Regional area scenario

b) *Operate the unit in an area with T_x/R_x mode 1.*

c) *Operate the unit in an area with T_x/R_x mode 2.*

d) *Transmit Message 22 using a base station transmitting Message 4 with a position which is more than 120 NM away from the position of the EUT.*

e) *Transmit Message 22 using a base station which is not transmitting Message 4.*

Required results

Check that:

a) *the EUT transmits and receives on the primary channels assigned for each region (see Table 24) alternating channels and doubles the number of transmissions when passing through the transitional zones. The EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones;*

Table 24 – Primary channels for each region

	Area	Channels in use
1	Default region	AIS 1, AIS 2
2	First transitional zone	AIS 1, CH A 2
3	Region 2	CH A 2, CH B 2
4	Second transitional zone	CH A 2, CH A 1
5	Region 1	CH A 1, CH B 1

the number of transmissions doubles on the active channel when transmitting on one channel only;

TXT and ACA sentences are output when defining the area, crossing the boundary of the area and on request. The in-use flag shall be set to "1" if the position is inside the area which is defined by the two corner points of the area setting (e.g. the grey area defining region 2 in Figure 13);

b) the EUT transmits on channel A only with the nominal reporting rate;

c) the EUT transmits on channel B only with the nominal reporting rate.

d) the EUT does not accept the channel management.

e) the EUT does not accept the channel management.

This test is divided in 2 parts:

- The first part checks the general behaviour including check of ACA and TXT output, check of the borders of area an transitional zone, check of the correct frequency use.

2012-06-14	**Tester: Ba**	**Test details:** a) Part 1 - Channel management by VDL message 22		
Test item		Check	Remark	Result
Set up EUT in autonomous mode transmitting on channel AIS 1/AIS 2, send 2 Messages 22 by VDL generator, defining 2 adjacent areas with channels A 1, B 1 and A 2, B 2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 4 NM. Set the position outside the areas. "TZ" is used for "transitional zone". Set the positions near the limits of the transitional zones to check the dimensions.				
PI output		Check that the Message 22 are output on PI		Passed

Display of defined area	Check that the defined area is correctly stored (displayed on MKD)	The ACA settings are deleted if the there is no valid position. This is incorrect. The areas have to be stored until there is a valid position more than 500 NM away. Perhaps the distance to 91°N, 181°E is calculated and the areas are deleted because it is more than 500 NM. The unit also has to continue using the area settings when the position is lost inside an area. <u>Retest 2012-03-02 Ba:</u> The problem still exists <u>Retest 2012-06-14 Ba</u>: UTC 09:34 The areas are not deleted at default position.	Passed
	Check ACA and TXT output on PI (Not required but recommended)	The ACA output sentence exceeds the maximum length defined by IEC 61162-1 (80/83 characters). To reduce the length the corner LAT and LON resolution should be 1/10 min (resolution of message 22) instead of 1/100 min. Additionally the time of in-use could be in full seconds instead of 1/100 s. <u>Retest 2012-03-02 Ba:</u> The problem still exists <u>Retest 2012-06-14 Ba</u>: UTC 09:34 If more than 2 areas are output on PI the ACA sentences are output incomplete and incorrect. Only parts of the sentence are output. <u>Retest 2012-09-10 Ba:</u> • The 2 areas are output on PI port. • The TZ size is incorrect. It is 3 but should be 4. 3 is the value of message 22 but the TZ size has to be the value of message 22 + 1. The following test have been performed with TZ = 4 (4 in message 22) <u>Retest 2013-02-06 Ba:</u> The TZ = 4 with value 3 in message 22.	Passed
	ACA: check in use flag and time of in use flag	In-use flag: 0 Time of in use flag: 000000 It would also be ok to include the time when the area has been stored.	Passed
<u>Item 1</u>: In high sea area	Check that channels AIS 1 and AIS 2 are in use		Passed

Item 2: Move position into outer TZ of region 2	Check ACA and TXT output (Not required)	There is a lot of TXT ID 036 output. There should be only one TXT 036 output when entering the TZ, together with an ACA output Retest 2012-09-10 Ba: There is one output of TXT ID 036.	Passed
	If ACA output: check in use flags and time of in use flag	In use flag = 0	Passed
	Check the limit of the TZ (5 NM = 8.8 minutes)		Passed
	Check that channels AIS 1 and A 2 are used		Passed
	Check that reporting rate is doubled		Passed
Item 3: Move position into inner TZ of region 2 (crossing the area border)	Check ACA and TXT output (Required)	UTC 11:22 Retest 2012-09-11 Ba: There is no ACA and TXT output (UTC 06:46, 07:23) Instead of this time there is an ACA output when leaving the transitional zone into the area (06:48, 07:25) Retest 2013-02-06 Ba: There is a correct ACA and TXT output	Passed
	ACA: check in use flag = 1		Passed
	ACA: check time of in use flag		Passed
	Check the border of area		Passed

Item 4: Move position into region 2 (out of TZ)	Check ACA and TXT output (Not required)	There is only a TXT 036 output	Passed
	Check the limit of the TZ (4 NM = 7 minutes)	The limit is between 5.5 minutes from the border and 5 minutes from the border. Perhaps a value of 3 NM (5.3 min) is used as border according to the value 3 in message 22 which represents a TZ size 4 NM Retests 2012-09-10 Ba: The limit is still between 5.5 minutes and 5 minutes from the border. The TZ size in the ACA output is 4. Retest 2013-02-06 Ba: The limit is correct	Passed
	Check that channels A 2 and B 2 are used		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed
Item 5: Move position into TZ between region 1 and 2, inside area 2	Check that channels A 2 and A 1 are used		Passed
	Check that reporting rate is doubled		Passed
Item 6: Move position into area 1 (inside the TZ) (crossing the area border)	Check ACA and TXT output (Required)	Retest 2012-09-10 Ba UTC 10:41 There is no TXT and ACA output Retest 2013-02-06 Ba: There is a correct ACA and TXT output	Passed
	Check the border of area		Passed
Item 7: Move position into region 1 (out of TZ)	Check that channels A 1 and B 1 are used		Passed
	Check the limit of the TZ (4 NM = 7 minutes)	At 5 minutes from area border Retests 2012-09-10 Ba: The limit is between 5.5 minutes and 5 minutes from the border (3 NM = 5.3 min) Retest 2013-02-06 Ba: The limit is correct	Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

Item 8: Move position into TZ of region 1 to high sea	Check that channels A 1 and AIS 1 are used		Passed
	Check that reporting rate is doubled		Passed
Move position out of the TZ of region 1, into high sea	Check that channels AIS 1 and AIS 2 are used	UTC 11:52	Passed
	ACA: check in use flags and time of in use flag		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

- The second part concentrates on the correct slot allocation and use during a transition from one (high sea) area into another on the different channels.

Remark:
Channel A and B of High sea (AIS1 and AIS2) are marked in the diagram with an orange frame.
Channel A and B of area 2 are marked in the diagram with a black frame.

Retest 2013-02-06 Ba:
The behaviour during the area border transition is rather incorrect and very difficult to describe. In the previous tests it was much better and much more correct.
I provide a diagram with a correct behaviour. So you can compare it with the test of the Camino-701. Perhaps this helps to understand the procedure.

2012-06-14	**Tester: Ba**	**Test details:** a) Part 2 - Channel management by VDL message 22	
Test item	Check	Remark	Result
The same area and movement is used as in test part 1.			
Item 1: In high sea area	Record 1 frame before entering the area		
	Check that channels AIS 1 and AIS 2 are in use		Passed

Item 2: Move position into transitional area of region 2, first frame after transition	Check that EUT continues T_X on AIS 1 and AIS 2 for 1 frame	Retest 2013-02-08 Ba: The EUT continues transmission on both channels	Passed
	Check that EUT releases the slots on AIS 2 by Message 1 with time-out 0 and no slot offset	The slots on AIS2 are not released in this frame. See Note 1) Retest 2012-09-11 Ba: - The slots are released in the first frame. - They are released on the wrong channel (A2) as described in Note 1) Retest 2013-02-08 Ba: The slots are released	Passed Passed
	Check that channels AIS 1 and **A 2** are used for $\mathbf{R_x}$	UTC 13:42 A2 is not used for Rx. Rx continues on AIS1 and AIS2. So the slot table on channel A2 cannot be build up and the EUT starts in the next frame the transmission on channel A2 without valid slot table. Retest 2012-09-10 Ba: UTC 09:32 AIS1 and A2 are used for Rx	Passed
Item 3: In outer transitional area of region 2, next frames after transition	Check allocation of additional slots on channel A (AIS 1) using Message 3	Retest 2013-02-08 Ba: The EUT builds up a new Tx schedule	Passed
	Check complete slot allocation on channel B (A 2) using Message 3		Passed
	Check that channels AIS 1 and A 2 are used for T_x		Passed
	Check that channels AIS 1 and A 2 are used for R_x	See UTC 13:43	Passed
	Check that reporting rate is doubled		Passed
	Check that messages on AIS 1 are output on PI (VDM/VDO) as channel A and A 2 as channel B		Passed

Item 4: Move into inner transitional area of region 2, crossing the area border	Check that messages on AIS 1 are output on PI (VDM/VDO) as channel B and A 2 as channel A (channels reverted)	• The PI port output is correct, • The transmission of the messages is incorrect: Retest 2012-09-11 Ba: • AIS1 is output as A and A2 is output as B, like outside the area. • The transmission continues correctly. Retest 2013-02-08 Ba: • AIS1 is output as B • A2 is output as A	Passed

Item 5: Move position into the area of region 2 (out of TZ), first frame after transition	Check that EUT continues T_X on AIS 1 and A 2 for 1 frame	• The EUT continues transmission on channel A2 for 1 frame and releases the slots which are no longer required. • The EUT changes the transmissions on channel AIS1 to channel A2 using the same slots. This is incorrect and uses unallocated slots. It should continue for one frame on AIS2 and release the slots. Retest 2012-09-11 Ba: Test 1: UTC 06.48 The EUT stops transmission with ALR 001 Tx malfunction and ALR 006 General failure. See Note 3) Test 2: UTC 07:19 Channel A2: • The EUT continues for 1 frame and releases the slots which are no longer required. • In case of time-out = 0 in the previous frame the slot is not released Channel AIS1: • The EUT continous the transmissions of channel AIS1 on channel B2. See above Retest 2013-02-08 Ba: Channel AIS1 (orange): • The EUT releases the slots. Channel A2 (black): • The EUT continues transmission but does not release the slots which do not continue Retest 2013-03-20 Ba: The EUT continues transmisson one both channels for one frame.	Passed

	Check that EUT releases all slots on AIS 1 by Message 1 with timeout 0 and no slot offset	The same problem as in item 2. The slots are on the wrong channels using unallocated slots. See above! Retest 2012-09-11 Ba: No change, see above! Retest 2013-02-08 Ba: Channel AIS1 (orange): The EUT releases the slots.	Passed
	Check that EUT releases every second slot on channel A 2 by Message 1 (for reversion to normal reporting rate)	Retest 2013-02-08 Ba: Channel A2 (black): The EUT does not release the slots which do not continue. The time-out is set to 0 but the slot offset is set to an value not 0 Retest 2013-03-20 Ba: The EUT releases every second slot on channel A2 in the next frame.	Passed
	Check that channels A 2 and **B 2** are used for $\mathbf{R_x}$	UTC13:54	Passed
Item 6: Inside area of region 2, next frames after transition	Check allocation of slots on channel B (B 2) using Message 3	The allocation of slots on channel B2 is already done in the previous frame (item 2). This is incorrect because in that frame there is not yet a valid slot table of channel B2. Therefore the slot allocation of channel B2 has to be done in this frame. Retest 2012-09-11 Ba: The network entry on channel B2 is done in the correct frame. Retest 2013-02-08 Ba: The Tx schedule is build up correctly	Passed
	Check that channels A 2 and B 2 are used for T_x		Passed
	Check that channels A 2 and B 2 are used for R_x		Passed
	Check that reporting rate is back to normal reporting rate		Passed
	Check that messages on A 2 are output on PI (VDM/VDO) as channel A and B 2 as channel B		Passed

2012-06-14	**Tester: Ba**	**Test details:** Check of T_x/R_x-Mode		
Test item		Check	Remark	Result
b) Set T_x/R_x-Mode in Message 22 to 1		Check that mode is correctly stored	UTC 14:05	Passed
		Check that channel A only is used for T_x		Passed
		Check that channels A and B are used for R_x		Passed
		Check that the reporting rate is correct		Passed

c) Set T_x/R_x-Mode in Message 22 to 2	Check that mode is correctly stored	UTC 14:15	Passed
	Check that channel B only is used for T_x	<u>Retest 2012-07-11 Ba:</u> The EUT transmits on channel A only. This applies if the Tx/Rx mode is changed from mode 0 and from mode 1 <u>Retest 2012-09-11 Ba:</u> • The EUT transmits on channel B only. • The reporting interval is 20s but should be 10 s, the normal autonomous transmission interval. • At the transition to mode 2, frame UTC 09:06, slot 776: the slot is released. But it should not be released because the transmission in this slot continues in the next frame. • At the transition back to mode 0 the slots on channel A are not allocated according to the network entry procedure but transmission starts in unallocated slots. <u>Retest 2013-02-11 Ba:</u> • The reporting interval in Tx/Rx mode 2 is correct (10s). • At the time when the ACA or message 22 with Tx/Rx mode 2 is applied the EUT seems to perform a restart. There is no transmission for about 90s. • After the restart the EUT transmits with the correct schedule. • The rescheduling back to Tx/Rx mode 0 is correct. <u>Retest 2013-03-20 Ba:</u> The rescheduling is correct	Passed Passed
	Check that channels A and B are used for R_x		Passed

2013-02-07	**Tester: Ba**	**Test details:** Check of message 22 acceptance		
Test item		Check	Remark	Result
Transmit message 22 with a new area setting				
d) Transmit message 22 from a base station transmitting message 4, distance > 120 NM		Check that the area setting is not stored	UTC 07:53	Passed
e) Transmit message 22 from a base station not transmitting message 4		Check that the area setting is not stored	UTC 07:52	Passed
Check of message 22 from a non-base station MMSI				
Transmit message 22 from a base station transmitting message 4, distance < 120 NM MMSI of message 4 and 22 is a non-base station MMSI		Check that the area setting is not stored	UTC 07:55	Passed

5.3 17.3 Regional area designation by serial message

Repeat the test of 17.2 using ACA sentence for channel assignment.

2013-03-20	**Tester: Ba**	**Test details:** Channel management by ACA sentence on PI		
Test item		Check	Remark	Result
Set up EUT in autonomous mode transmitting on channels AIS 1/AIS 2, send 2 ACA sentences to the PI, defining 2 adjacent areas with channels A 1, B 1 and A 2, B 2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 1 NM. Set the position outside the areas. Areas are in SW quadrant. File name: AIACA_Region_17_3_SW.sst Set the positions near the limits of the transitional zones to check the dimensions.				
Display of defined area		Check that the defined area is correctly stored (displayed on MKD)		Passed
		Check ACA and TXT output on PI (Not required but recommended)		Passed
Item 1: In high sea area		Check that channels AIS 1 and AIS 2 are in use		Passed
Item 2: Move position into outer TZ of region 2		Check ACA and TXT output (Not required)	UTC 15:13 There is an ACA and TXT of area 2, not in use	Passed
		Check the limit of the TZ (5 NM = 5.8 minutes)		Passed
		Check that channels AIS 1 and A 2 are used		Passed
		Check that reporting rate is doubled		Passed
Item 3: Move position into inner TZ of region 2 (crossing the area border)		Check ACA and TXT output (Required)	UTC 15:25 There is an ACA and TXT of area 2, in use	Passed
		Check the border of area		Passed
Item 4: Move position into region 2 (out of TZ)		Check ACA and TXT output (Not required)	UTC 15:27 There is an ACA and TXT of area 2, in use	Passed
		Check the limit of the TZ (2 NM = 2.3 minutes)		Passed
		Check that channels A 2 and B 2 are used		Passed
		Check that reporting rate is changed back to normal reporting rate		Passed
Item 5: Move position into TZ between region 1 and 2, inside area 2		Check that channels A 2 and A 1 are used		Passed
		Check that reporting rate is doubled		Passed
Item 6: Move position into area 1 (inside the TZ) (crossing the area border)		Check ACA and TXT output (Required)	UTC 15:25 There is an ACA and TXT of area 1, in use	Passed
		Check the border of area		Passed

Item 7: Move position into region 1 (out of TZ)	Check that channels A 1 and B 1 are used		Passed
	Check the limit of the TZ 1 NM = 1.15 minutes)		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed
Item 8: Move position into TZ of region 1 to high sea	Check that channels A 1 and AIS 1 are used	UTC 15:38	Passed
	Check that reporting rate is doubled		Passed
Move position out of the TZ of region 1, into high sea	Check that channels AIS 1 and AIS 2 are used		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

2012-03-20	**Tester: Ba**	**Test details:** Check of T_x/R_x-Mode	
Test item	Check	Remark	Result
Set T_x/R_x -Mode to 1	Check that mode is correctly stored		Passed
	Check that channel A only is used for T_x		Passed
	Check that channels A and B are used for R_x		Passed
	Check that the reporting rate is correct		Passed
Set T_x/R_x -Mode to 2	Check that mode is correctly stored		Passed
	Check that channel B only is used for T_x		Passed
	Check that channels A and B are used for R_x		Passed
Set T_x/R_x -Mode to 3	Check that mode is correctly stored	UTC 16:52	Passed
	Check that EUT is not transmitting		Passed
	Check that channels A and B are used for R_x		Passed

5.4 17.4 Regional area designation with lost position

Method of measurement

Repeat the test of 17.2 using ACA sentence for channel assignment as follows:

a) Disable position information; apply new addressed Message 22 using a base station MMSI.

b) Make position information available again and query for area settings (ACA request).

Required result

Verify that:

a) the settings of the current area are still being used; check that settings of new addressed Message 22 are adopted;

b) all area settings are still available.

2013-02-07	**Tester: Ba**	**Test details:** Regional areas with lost position		
Test item		Check	Remark	Result
Set position inside an area applied by ACA sentence.				
a) • Disable position • Send an addressed message 22 to EUT		Check that the area settings are still used		Passed
		Check that the area settings are modified according to the addressed message 22	The area settings are modified only if message 4 is applied also See Note) <u>Retest 2013-03-20 Ba:</u> the area settings are modified according to the addressed message 22 also if no message 4 is applied	Passed
b) Make position information available again		Check by ACA query that the area settings are still available		Passed

Note)
It does not really make sense to require a message 4 for a MMSI addressed message 22. Like message 16 the message is explicitely addressed to this individual station and therefore does not require a distance check. Additionally an addressed message 22 does only affect an area where the position of the EUT is inside. So a distance check to the base station does not make sense.

IEC 61993-2 requires in 7.4.2 a message 4 only for new area settings. An addressed message 22 can only modify existing area settings, it cannot apply a new area settings.

5.5 17.5 Power setting

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI transmit channel management message (Message 22) defining output power high/low.

Repeat test using ACA sentence and manual input.

Required result

Check that the EUT sets output power as defined and indicates when the low power setting is in operation.

NOTE Automatic power setting for tankers is tested in 14.5.3

2012-06-14	**Tester: Ba**	**Test details:** Power setting by Message 22		
Test item		Check	Remark	Result
The EUT has to be inside an area with regional operating settings Apply a message 22 to the VDL which modifies the power setting to 1 = low power.				
Channel switch		Check that the EUT doesn't switch channels		Passed
Power low		Check that the transmitting power is changed from high to low	UTC 14:52	Passed
MKD		Check the low power settings are displayed on MKD	No display of area settings on MKD Retest 2012-09-11 Ba: • The power level is displayed correctly in the regional area settings.. • The bottom status line displays 1 W Tx power	Passed Passed
Transmit the same Message 22, but power setting to 0 = high power				
Power high		Check that EUT reverts to high power	UTC 14:53 There is no change in Tx power level Retest 2012-09-11 Ba: • The power level is set back to high power. • The power level is displayed correctly in the regional area settings.. • The bottom status line still displays 1 W Tx power Retest 2013-02-07 Ba: • The bottom status line displays 12.5 W power	Passed Passed Passed

2012-06-14	**Tester: Ba**	**Test details:** Power setting by ACA	
Test item	Check	Remark	Result
Apply the following message to the PI: File name: AIACA_region_in_ch86.sst Set power flag to 1 = low power			
Power low	Check that the transmitting power is changed from high to low	UTC 14:35 There is no change in Tx power level Retest 2012-09-11 Ba: UTC 10:22 The power level is set to low power	Passed
MKD	Check the low power settings are displayed on MKD	No display of area settings on MKD Retest 2012-09-11 Ba: • The power level is displayed correctly in the regional area settings. • The bottom status line still displays 12.5 W power Retest 2013-02-07 Ba: The bottom status line displays 1 W power	Passed Passed
Transmit the same ACA sentence, but power setting to 0 = high power.			
Power high	Check that EUT reverts to high power	UTC 14:39 There is no change in Tx power level Retest 2012-09-11 Ba: The power level is set back to high power.	Passed

2012-09-11	**Tester: Ba**	**Test details:** Power setting by manual input	
Test item	Check	Remark	Result
Set the power level of the region in use to low power.			
Power low	Check that the transmitting power is changed from high to low	The Tx power level is changed from high to low	Passed
Set power level back to high power.			
Power high	Check that EUT reverts to high power	The Tx power level is changed from high to low	Passed

5.6 17.6 Message priority handling

Method of measurement

Set up standard test environment and operate test equipment with 90% channel load. Set the EUT to a reporting interval of 2 s by applying a speed of >23 kn and a ROT of >20°/sec. Record VDL messages and check for used slots. Initiate the transmission of two 3 slot messages (Message 12 and Message 8) by the EUT. Record transmitted messages on both channels.

Required results

Check that the EUT transmits the messages in correct order according to their priority as given in ITU-R Recommendation M.1371/ A8-2.

This test is modified in that way that first a BBM sentence is sent to make the EUT busy with a transmission process. Then the 2 test sentences with Message 8 and Message 12 are applied.

Otherwise the EUT has already started the transmission process of the first message, has allocated slots or even has already transmitted the message before the input of the ABM sentence with the Message 12 has been completed. In this case it would not be possible to transmit the Message 12 first.

2012-06-14	**Tester: Ba**	**Test details:** Message priority handling		
Test item		Check	Remark	Result
Simulate a channel load of 90% on both channels, set reporting rate to 2 s. Apply an BBM sentence with a 3 slot message 8 and immediately following an ABM sentences with a 3 slot message 12 to the PI port. File name: AIBBM_ABM_17_6.sst				
Transmission order		Check that Message 12 is transmitted first because of higher priority	See Note) Retest 2013-04-02 Ba: All message have been transmitted in the correct order, with the correct ABK	Passed

Note)

Test 2012-06-14

Under 90% load conditions message 8 and 12 are not transmitted.

There is also no ABK output except for one message

Retest 2012-09-11 Ba:

- Under 90% load conditions message 8 and 12 are not transmitted.
- There is an ABK output with status 2 for all not transmitted message 12
- There is no ABK output for all not transmitted message 8 (except one ABK at the beginning)

Retests 2013-04-02 Ba:

UTC	Tx Msg 12	ABK Msg 12	Tx Msg 8	ABK Msg 8	VDL load
11:58:16	Passed	Passed	Passed	Passed	0 %
12:00:21	Passed	Passed	Passed	Passed	90%, first frame
12:02:26	Passed	Passed	Passed	Passed	90%
12:04:33	Passed	Passed	Passed	Passed	90%
12:06:17	Passed	Passed	Passed	Passed	90%
12:08:23	Passed	Passed	Passed	Passed	0 %

5.7 17.7 Slot reuse and FATDMA reservations

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from the test transmitter as follows:

NOTE Free slots are: Slots not used, Slots used by a mobile station under way that has not been received for 3 min or more, Slots used by a base station (Message 20 and Message 4) beyond 120 NM, garbled slots.

Available slots are: Distant station slots.

Unavailable slots are: Near station slots, Slots used by a base station (Message 20 and Message 4) within 120 NM, Slots used by mobile stations reporting without position information, Slots used by mobile stations with a reporting interval of 1 min or more.

a) Transmit test targets on channel A with 50 % channel load. Channel B is free. This test covers Rule 0 and 1.

b) Transmit near and distant test targets with 100 % channel load on channel A in all selection intervals which are under observation. Channel B is free. There shall be enough different targets to allow the EUT to meet the requirement to reuse only one slot of each target per frame.

c) Transmit near and distant test targets with 100 % channel load on channel B in all selection intervals which are under observation. Channel A is free.

d) Transmit Message 4 with a position distance <120 NM and Message 20 with slot reservations on channel A.

e) Transmit Message 4 with a position distance >120 NM and Message 20 with slot reservations on channel A.

f) Transmit no Message 4 and Message 20 with slot reservations on channel A.

g) Transmit Message 4 with a position distance <120 NM and Message 20 with slot reservations on channel A. Transmit near and distant test targets in the unreserved slots on channel A. Channel B is free.

Required results

Confirm that:

a) only free slots are used for transmission on channel A, confirm that only slots which are free on channel A are used for transmissions on channel B;

b) slots of the most distant test targets are used for transmission on channel A. Check that not more than one slot of a station is reused in a frame;

c) for transmission on channel A that the candidate slots on channel A are organized according to the most distant station on channel B;

d) only unreserved slots are used on channel A. Confirm that at start of Message 20 the time-out of all reserved slots is forced to 0 and the slots are changed to free slots within one frame. Confirm that for transmissions on channel B only slots which are not reserved on channel A are used after the next regular time-out 0. Confirm that after the reservation timeout all slots on channel A and B are used again;

e) all slots are used for transmission on channels A and B;

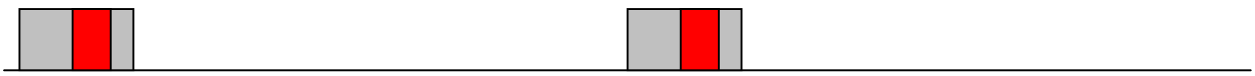
f) all slots are used for transmission on channels A and B;

g) only unreserved slots are used on channel A. Confirm that slots of the most distant test targets are used for transmission. Confirm that for transmissions on channel B only slots which are not reserved on channel A are used after the next regular time-out 0.

Used test procedure for b):

In one frame 3 blocks of 60 targets are transmitted in consecutive slot. The 3 blocks start at slot 1, 751 and 1501.

The EUT is set to 2 s reporting rate to increase the probability that the relevant selection intervals are completely covered by targets.



The grey area is covered by targets, the red area is the selection interval of 15 slots.

The targets are numbered from 1 to 60 and transmitted in the order of the IDs. They are divided into 2 groups:

- The even numbered targets have a low distance (1..2 NM),
- the odd numbered targets have a high distance to the EUT (about 30 NM).

This test have to be run for at minimum 30 min to observe a sufficient number of slot allocations (every 3-8 min). The selected slots of the selection intervals covered by targets have to be checked.

2013-01-14	**Tester: Ba**	**Test details:** Slot reuse	
Test item	Check	Remark	Result
Operate the EUT with 2 s reporting interval a) Test for using free slots if available			
• Apply 50% VDL load on channel A • Apply 0% VDL load on channel B	Check that only free slots are used on channel A		Passed
	Check that only slots which are free on channel A are used on channel B		Passed
b) Test for using slots of most distant targets See description above for test arrangement			
• Apply 100% VDL load on channel A • Apply 0% VDL load on channel B	Check that only the slots of odd numbered targets are used	Slots of near and distant targets are used. The EUT stops changing the slot in the slot interval after 4...8 minutes. Over the complete test time of 40 minutes the same slots have been used on channel A Retest 2013-02-07 Ba: • The EUT changed the slot after 4...8 minutes. But the slots are not selected randomly but incremented by 1 for each slot change • The slots of near and distant targets are used. Retest 2013-03-21 Ba: Only slots of distant targets are re-used	Passed
	Check that the slot of a target is not used twice in a frame	Retest 2013-03-21 Ba: No targets are re-used more than once in a frame	Passed
	Check transmission of message 5	Transmission of message 5 has completely stopped during the test Retest 2013-02-07 Ba: The EUT continues Tx of message 5, but the EUT stops alternating the channels. All message 5 are transmitted on the free channel. Retest 2013-03-21 Ba: The transmission of message 5 continues with the normal rate on alternating channels	Passed

c) Test for using slots of most distant targets See description above for test arrangement			
• Apply 0% VDL load on channel A • Apply 100% VDL load on channel B	Check that only the slots of odd numbered targets are used on channel A	Result from test b) on channel B: On the channel with free slots only (but all slots on the other channel occupied) the slots of near and distant targets are used. According to the priority rules only slots of distant targets should be used. <u>Retest 2013-02-07 Ba:</u> No change, slots of near and distant targets are selected <u>Retest 2013-03-21 Ba:</u> On channel A slots with near targets on the other channel are used. Remark: With 100% load on channel A the EUT uses on channel B only slots with distant targets on channel A as required. (see test b). So it seems that channel A and B are not handled in the same way. <u>Retest 2013-03-26 Ba:</u> On channel A only slots of distant targets on the other channel are used.	Passed

d) Check for slot reservation by message 20 < 120 NM			
Apply message 20 with slot reservations, apply message 4 with distance < 120 NM	This test is performed in 16.6.8 a)		Passed
e) Check for slot reservation by message 20 > 120 NM			
Apply message 20 with slot reservations, apply message 4 with distance > 120 NM	This test is performed in 16.6.8 c)		Passed
f) Check for slot reservation by message 20, no message 4			
Apply message 20 with slot reservations, no message 4	This test is performed in 16.6.8 d)		Passed
g) Check for slot reservation by message 20 < 120 NM incombination with near and distant targets			
• Apply message 20 with slot reservations on channel A and message 4 with distance < 120 NM • Transmit near and distant test targets in the unreserved slots on channel A	Check that only unreserved slots are used on channel A	Test 2013-03-21 Ba	Passed
	Check that the most distant targets are reused on channel A		Passed
	Check that on channel B only slots which are not reserved on channel A are selected at time-out 0		Passed

Note)
In SOTDMA mode the EUT has to select at least 4 candidate slots from the available slots. Available slots can be free slots or slots of the most distant stations.

After selection of at least 4 candidate slots the EUT has to randomly select 1 of the 4 slots for transmission. So even if the current transmission slot is treated as free because the EUT cannot receive other stations in this slots is can only be one of 4 candidate slots. So the statistical probability to select the same slot again at time-out 0 is only 25%. In the test the actual transmission slot is selected again in all cases. This indicated that the slot reuse procedure is not implemented correctly.

5.8 17.8 Management of received regional operating settings

5.8.1 17.8.1 Test for replacement or erasure of dated or remote regional operating settings

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode. Using a base station MMSI, send a valid regional operating setting to the EUT by Message 22 with the regional operating area, including the own position of the EUT (area 1). Consecutively, send another seven valid regional operating settings to the EUT, using both Messages 22 and DSC telecommands, with regional operating areas neither overlapping with the first nor with one another. Perform the following in the order shown.

f) Send another Message 22 to the EUT, with a ninth regional operating area (area 9) not overlapping with the previous eight regional operating areas.

g) Send a tenth telecommand to the EUT, with a regional operating area (area 10) which partly overlaps a regional operating area.

h) Move own position of EUT to a distance of more than 500 NM from one region defined by previous commands.

i) Move own position of EUT to a distance of more than 500 NM from all regions defined by previous commands.

j) Restart the EUT and make sure it cannot receive UTC. Apply a channel management area setting by message 22 and by ACA input. Wait for 24 hours.

Query for area settings (ACA request) after a), b), c) and d).

Required results

Check that, after the initialisation, the EUT operates according to the regional operating settings defined by area 1 and:

a) the most distant area is deleted and the other areas are available;

b) area 10 is stored and that the old overlapped area is deleted;

c) this area is deleted by the output of TXT and ACA sentences showing the remaining area settings;

d) all areas are deleted by the output of a single TXT and ACA sentences showing high sea settings.

e) all area settings have been removed.

2013-02-08	**Tester: Ba**	**Test details:** Test of replacement or erasure of dated or remote regional operating settings		
Test item		Check	Remark	Result
The following check of area entries can be done by MKD or by request of ACA				
Send by message 22 • 1 area including own position • 7 areas not overlapping, not including own position		Check that area 1...7 are displayed on MKD		Passed
		Check that all 8 areas are output on PI after request by sentence xxAIQ,ACA		Passed

a) Send a ninth Message 22 to the EUT	Check that the most distant area is deleted	Area 7 is deleted	Passed
	Check that the other areas are available		Passed
b) Send an area overlapping the area of step 1 not including own position	Check the overlapped area is deleted and replaced by the new one	UTC 08:36	Passed
	Check that the EUT reverts to the default operating settings		Passed
c) Erasure by distance: Move own position of EUT to a distance of more than 500 miles from one region	Check by TXT and ACA output that this area is deleted		Passed
d) Erasure by distance: Move own position of EUT to a distance of more than 500 miles from all regions	Check by TXT and ACA output that all areas are deleted		Passed
e) Erasure by time • Restart EUT without UTC • Apply area settings by message 22 and ACA • Wait for 24 hours	Check that all areas have been deleted after 24 hours	See Note)	Passed
Deleting overlapped areas	An existing area which had been input by MKD was not deleted when an overlapping area (area 5) was applied by message 22 This resulted in two overlapping areas, indicated by ACA output and displayed on MKD Retest 2013-03-21 Ba The existing area has been deleted.		Passed

Note)

2013-02-11 Ba:
It seems that the areas are not deleted after 24 hours.

2013-04-02 Ba:
At power on in the morning the area settings were deleted.

The area settings are deleted in several situations where they should not be deleted:
- Sometimes the area settings are deleted without a observable reason (see 2013-03-28 10:24:43 and 2013-04-02 12:16:03)
- Sometimes the area settings are deleted after power on (see 2013-04-02 13:47)
- The area settings are reproducable deleted after receiving a message 4 (see 2013-04-02 UTC 14:25, 14:26 and 14:32)

At UTC 14:33 a new area setting has been applied to be checked on 2013-04-03.

2013-04-03 Ba:
After power on the area setting applied on 2013-04-02 UTC 14:33 was still stored.

At UTC 14:33 the area setting has been deleted (ok)
This result is correct but has to be verified when the above errors have been fixed.

2013-04-08 Ba:
The area setting is not deleted after receiving a message 4 with an incorrect (old) time.
After a start with external sensor date the area settings are not deleted within 12 minutes.

5.8.2 7.8.2 Test of correct input via presentation interface or MKD

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, perform the following tests in the following order.

a) *Send Message 22 or a DSC telecommand with valid regional operating settings to the EUT with a regional operating area, which contains the current position of own station.*

b) *Input a different, valid regional operating setting (not overlapping the area defined under a)) via the MKD.*

c) *Send a different regional operating setting with a regional operating area which partly overlaps the regional operating area input via the MKD to the EUT via the presentation interface in the previous step, and which contains the present position of own station.*

d) *Input the default operating settings via the MKD for the regional operating area, which was received by the previous command via the presentation interface.*

e) *Send Message 22 or a DSC telecommand with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station.*

f) *Within two hours, after e), send a different regional operating setting to the EUT via the presentation interface with a valid regional operating area overlapping the regional operating area sent to the EUT by Message 22 or a DSC telecommand.*

Required results

The following results are required.

a) *Confirm that the EUT uses the regional operating settings commanded by Message 22 or DSC telecommand.*

b) *Step 1: Confirm that the regional operating settings of the previous Message 22 or DSC telecommand are displayed to the user on the MKD for editing.*

Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings. Check, that the EUT does not accept incomplete or invalid regional operating settings. Check, that the EUT accepts a complete and valid regional operating setting.

Step 3: Check, that the EUT prompts the user to confirm the intended change of regional operating settings. Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.

Step 4: Check, that the EUT uses the regional operating settings input via the MKD.

c) *Check, that the EUT uses the regional operating settings received via the presentation interface.*

d) *Check, that the EUT accepts the default operating settings for the regional operating area received in c). Check, that the EUT uses the default operating settings.*

e) *Check, that the EUT uses the regional operating settings commanded to it by Message 22 or DSC telecommand.*

f) *Check, that the EUT does not use the regional operating setting commanded to it via the presentation interface.*

2012-09-14	**Tester: Ba**	**Test details:** Correct input via presentation interface or MKD		
Test item		Check	Remark	Result
Send a valid Message 22, set position of own ship into this area.				
a) Use of settings		Confirm that the EUT uses the regional operating settings commanded by Message 22		Passed

<u>b) MKD input</u> Entering new area by MKD	<u>Step 1:</u> Confirm that the regional operating settings of the previous Message 22 is displayed to the user on the MKD for editing		Passed
	<u>Step 2:</u> Check, that the EUT allows the user to edit the displayed regional operating settings		Passed
	Check, that the EUT does not accept incomplete or invalid regional operating settings		Passed
	Check, that the EUT accepts a complete and valid new regional operating setting	I could not manage any region to be accepted. A reason is not displayed, and I could not recognize any error in the setting <u>Retest 2013-01-09 Ba:</u> The EUT accepts the new area	Passed
	<u>Step 3:</u> Check, that the EUT prompt the user to confirm the intended change of regional operating settings	Only yes and no are possible	Passed
	Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings	It is only possible to abort all changes, it is not possible to return to the editing menu and continue and correct the values. It is always necessary to input all values again. <u>Retest 2013-01-09 Ba:</u> No change, if "No" is selected all changes are deleted and the MKD jumps back to the Main menu. There should be a 3rd selection (in addition to Yes or No) like "Back" to go back to the Area editing screen. <u>Retest 2013-02-08 Ba:</u> In case of "No" all inputs are stored in the background. If then again a new area is started the new area is set to the previously entered values	Passed
Move position inside the new area	<u>Step 4:</u> Check, that the EUT uses the regional operating settings input via the MKD	<u>Retest 2013-01-09 Ba:</u> The area settings are used	Passed

c) New area by ACA Input a new area via PI (ACA sentence) overlapping area of b), position inside	Check, that the EUT uses the regional operating settings received via PI	Retest 2013-01-09 Ba: UTC 14:56 The old area (from b)) is not deleted. The ACA and MKD shows 2 overlapping areas. The settings of area b) are used Retest 2013-02-08 Ba: The old area is deleted	Passed
d) Default settings via MKD Input the default operating settings via the MKD for the regional operating area of c)	Check, that the EUT accepts the default operating settings for the regional operating area	Test 2013-01-09 Ba:	Passed
	Check, that the EUT uses the default operating settings		Passed
e) Area setting by VDL Send Message 22 with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station	Check, that the EUT uses the regional operating settings commanded to it by Message 22		Passed
f) Priority of VDL message Apply a new area via ACA, overlapping the area of e) within 2 hours	Check, that the EUT does not accept the regional operating setting commanded to it via the presentation interface within 2 hours	- The EUT accepts areas applied by ACA which overlapp an area applied by message 22 addressed to an area. - Areas which have been applied or changed by a message 22 addressed to an MMSI cannot be changed by an ACA sentence. Retest 2013-01-09 Ba: UTC 15:13 The new, overlapping area is stored in addition to the existing, applied in e) by message 21. The new area should be refused Retest 2013-02-08 Ba: UTC 09:30 The new are has been ignored	Passed Passed

5.8.3 17.8.3 Test of addressed telecommand

Method of measurement

Set up a standard test environment and operate EUT in autonomous mode. Using a base station MMSI, perform the following tests in the following order:

a) Send Message 22 or a DSC telecommand with valid regional operating settings, that are different from the default operating settings, to the EUT with a regional operating area, which contains the current position of own station.

b) Send an addressed Message 22 or an addressed DSC telecommand to the EUT with different regional operating settings than the previous command.

c) Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

Required results

Check, that:

a) the EUT uses the regional operating settings commanded to it in a).

b) the EUT uses the regional operating settings commanded to it in b).

c) the EUT reverts to default.

2012-09-14	**Tester: Ba**	**Test details:** Test of addressed telecommand		
Test item		Check	Remark	Result
a) Send a valid Message 22, position inside		Check, that the EUT uses the regional operating settings		Passed
b) Send an addressed message 22 to the EUT with different regional operating settings		Check, that the EUT uses the regional operating settings		Passed
b) Send an addressed Message 22, addressed **as ID 2**, to the EUT with different regional operating settings		Check, that the EUT uses the regional operating settings		Passed
c) Move the EUT out of the regional operating area defined by the previous addressed telecommand		Check, that the EUT reverts to default		Passed

5.8.4 17.8.4 Test for invalid regional operating areas

Purpose

This test simulates invalid regional operating areas (three regional operating areas with the same corner).

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

a) Send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by Message 22 or DSC telecommand, presentation interface input and manual input via MKD. The current own position of the EUT shall be within the regional operating area of the third regional operating setting.

b) Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

Required test results

Check, that:

a) the EUT uses the operating settings that were in use prior to receiving the third regional operating setting;

b) the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

2012-09-14	**Tester: Ba**	**Test details:** Test for invalid regional operating areas		
Test item		Check	Remark	Result
ACA input				
a) Send three different valid regional with adjacent corners by ACA. File name: AIACA_region_17_7_4.sst Position inside third area.		Check, that the third area is refused and settings are not used		Passed
b) Move own position to the first 2 areas		Check, that the EUT uses the operational settings of these areas		Passed
MKD input				
a) Input three different valid regional with adjacent corners by MKD. Position inside third area.		Check, that the third area is refused and settings are not used		Passed
b) Move own position to the first 2 areas		Check, that the EUT uses the operational settings of these areas		Passed

Message 22 input			
a) Send three different valid regional with adjacent corners by message 22 Position inside third area.	Check, that the third area is refused and settings are not used	Retest 2013-02-08 Ba: UTC 09:36	Passed
b) Move own position to the first 2 areas	Check, that the EUT uses the operational settings of these areas		Passed

5.9 17.9 Continuation of autonomous mode reporting interval

Method of test

When in the presence of an assigned mode command and in a transition zone, check that the EUT continues to report at the autonomous mode reporting interval.

Required result

Ensure that the autonomous reporting rate is maintained.

2012-06-15	**Tester: Ba**	**Test details:** Continuation of autonomous mode reporting rate		
Test item		Check	Remark	Result
Set the EUT into a transitional zone Send assignment commands message 16 with an higher update rate to the EUT				
Rate assignment command in a transitional zone		Check that an rate assignment command is ignored in a transitional zone	UTC 08:38 The rate assignment is accepted Retest 2012-09-10 Ba: UTC 08:55 Message 16 is ignored	Passed
Slot assignment command in a transitional zone		Check that an slot assignment command is ignored in a transitional zone	UTC 08:59 The rate assignment is accepted Retest 2012-09-10 Ba: UTC 08:57 Message 16 is ignored	Passed

6 18 Specific tests of transport layer

(See 7.5)

6.1 18.1 Addressed messages

6.1.1 18.1.1 Transmission

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Set up a test target for scheduled transmissions on channel AIS 1 only. Initiate the transmission of an addressed binary message (Message 6) by the EUT (test target as destination). Record transmitted messages on both channels.

Required results

Check that the EUT transmits Message 6 on channel AIS 1. Repeat test for AIS 2.

Basic test of addressed message is made in 2.1.4.1 14.1.4.1 Transmit an addressed message**.**

2012-04-23	**Tester: Ba**	**Test details:** Addressed binary message 6		
Test item		Check	Remark	Result
Transmit an addressed binary message 6 by sending an ACA sentence to the PI. PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,<MMSI>,x,6,06P0test,0 Change transmission channel x according to test item. The addressed target is transmitting on channel A only				
Channel = 0 (autoselect)		Check T_x on channel A		Passed
Channel = 2 (ch. B)		Check T_x on channel B		Passed
Channel = 3 (ch. A+B)		Check T_x on channels A+B		Passed
The addressed target is transmitting on channel B only				
Channel = 0 (autoselect)		Check T_x on channel B		Passed
Channel = 1 (ch. A)		Check T_x on channel A		Passed

6.1.2 18.1.2 Acknowledgement

Method of measurement

Operate standard test environment and EUT in autonomous mode. Apply up to 4 addressed binary messages (Message 6; EUT as destination) to the VDL on channel AIS 1. Record transmitted messages on both channels. Repeat with AIS 2.

Required results

Confirm that EUT transmits a binary acknowledge message (Message 7) with the appropriate sequence numbers within 4 s on the channel where the Message 6 was received. Confirm that EUT transmits the result with an appropriate message to PI.

2012-04-23	**Tester: Ba**	**Test details:** Acknowledgement of binary message 6		
Test item		Check	Remark	Result
Transmit 4 addressed binary message with consecutive sequential message identifiers from other transponder. File name: AIABM_4_bin.sst				
RX of messages (VDM)		Check that the messages are received by VDM output on PI of EUT	UTC 09:26/27	Passed
Transmission of ackn. Message 7		Check transmission of ackn. by VDO output of EUT		Passed
Sequence numbers		Check that sequence number in ackn. = sequence number of R_X message		Passed
Ackn. channel		Check that ackn. T_X channel = R_x channel		Passed

<u>6.1.3 18.1.3 Transmission retry</u>

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of up to 4 addressed binary messages by the EUT which will not be acknowledged (i.e. destination not available). Record transmitted messages.

Required results

Confirm that EUT retries the transmission up to 3 times (configurable) for each addressed binary message. Confirm that the time between transmissions is 4 s to 8 s. Confirm that EUT transmits the overall result with an appropriate message to PI.

2012-04-23	**Tester: Ba**	**Test details:** Addressed binary message 6		
Test item		Check	Remark	Result
Transmit an addressed binary message 6 by sending an ABM sentence to the PI. PI sentence: File AIABM_bin.sst The message is addressed to a not available transponder. So no acknowledgement is received. Record the VDO output of VDE with time stamp.				
VDO output of EUT		Check the transmission by VDO	UTC 09:31	Passed
Number of repetitions		Note and check the number or repetitions	3 repetitions	Passed
Repetition timing		Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	5, 4, 9 7, 5, 6	Passed

ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)	There is a ABK after each transmission. The ABK is a response to the ABM input. There is only one ABM input, so there should be one ABK 5 s after the last transmission. The Type of acknowledgement is correct (1) Retest 2012-07-12 Ba: UTC 12:00 There is only one ABK about 4 s after the last repetition.	Passed Passed
Message sequence numbers	Check message sequence numbers of transmissions and ABK		Passed

6.1.4 18.1.4 Acknowledgement of addressed safety related messages

Repeat test under 18.1.2 with addressed safety related message.

2012-04-23	**Tester: Ba**	**Test details:** Acknowledgement of safety related text message 12		
Test item		Check	Remark	Result
Transmit 4 safety related text messages 12 with consecutive sequential message identifiers from other Transponder				
R_x of messages (VDM)		Check that the messages are received by VDM output on PI of EUT	UTC 09:34	Passed
Transmission of acknowledgement message 13		Check transmission of ackn. by VDO output of EUT		Passed
Sequence numbers		Check that sequence number in ackn. = sequence number of R_x message		Passed
Ackn. channel		Check that ackn. T_x channel = R_x channel		Passed

6.1.5 18.1.5 Behaviour of NavStatus 14 reception

Purpose

This test verifies the correct behaviour of the received Message 1 with NavStatus 14.

Method of measurement

Set up standard test environment and operate EUT in autonomous mode as follows:

a) Initiate the transmission of a Message 1 with NavStatus 14.

b) Acknowledge the alarm.

c) Initiate the transmission of a Message 1 from the same user ID with NavStatus 14 within the time out.

d) Initiate the transmission of a Message 1 from the same user ID with NavStatus other than 14 within the time out.

e) Initiate the transmission of a Message 1 from different user ID with NavStatus 14.

Required results

Check that:

a) the MKD indicates the received message at the top of the target list and the EUT activates the alarm relay and output an ALR sentence with alarm ID 14 via the PI;

b) the EUT deactivates alarm relay and changes the alarm status in the ALR sentence;

c) the EUT does not activate the alarm relay and does not change the alarm status in the ALR sentence;

d) the EUT does not activate the alarm relay and does not output an ALR sentence with alarm ID 14;

e) the MKD indicates the received message at the top of the target list and the EUT activates the alarm relay and output an ALR sentence with alarm ID 14 via the PI.

2013-01-11	**Tester: Ba**	**Test details:** Navstatus 14 reception		
Test item		Check	Remark	Result
Apply some test targets to the VDL, distance to the EUT less than the AIS SART position				
a) apply message 1 with nav status 14 on VDL		Check that there is a VDM on PI port		Passed
		Check that the MKD displays the AIS SART on top of the target list		Passed
		Check that the alarm relay is activated		Passed
		Check that there is an ALR ID 014 output on PI		Passed
b) Acknowledge the alarm		Check that the alarm relay is deactivated		Passed
		Check that the ALR ID 014 is updated		Passed
c) apply message 1 with nav status 14 on VDL from same user ID within the time-out of 18 minutes		Check that the alarm relay is not activated	UTC 13:53	Passed
		Check that the ALR ID 014 is not changed	Remains on A,A	Passed

d) apply message 1 with nav status not 14 on VDL from same user ID.	Check that the alarm relay is not activated		Passed
	Check that there is no ALR ID 014 output on PI		Passed
e) apply message 1 with nav status 14 from different user ID	Check that the MKD displays the AIS SART on top of the target list	UTC 13:56	Passed
	Check that the alarm relay is activated	The alarm relay is not activated. The alarm should be activated to indicate the operator, that there is a new, additional AIS SART Retest 2013-02-07 Ba: The alarm relay is activated	Passed
	Check that there is an ALR ID 014 output on PI	The ALR sentence remains in status A,A It should change to status A,V because the new alarm is not yet acknowledged Retest 2013-02-07 Ba: The ALR status is changed to A,V	Passed

6.2 18.2 Interrogation responses

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (Message 15; EUT as destination) to the VDL according to Table 12 for responses with Message 5 and slot offset set to 10 on channel AIS 1. Record transmitted messages on both channels.

Required results

Check that EUT transmits the appropriate interrogation response message as requested on channel AIS 1. Repeat test for AIS 2.

2012-04-23	**Tester: Ba**	**Test details:** Interrogation of Message 5, ch. A		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 5 with given slot offset = 10. A response shall automatically be transmitted by the EUT. Request is transmitted on channel B.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)	UTC 11:44	Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check that the response is transmitted in the correct slot	= 10	Passed
Response channel		Check that the response is transmitted on the request channel		Passed

2012-04-23	**Tester: Ba**	**Test details:** Interrogation of Message 5, ch. B		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 5 with given slot offset = 10. A response shall automatically be transmitted by the EUT. Request is transmitted on channel B.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)	11:43	Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check that the response is transmitted in the correct slot		Passed
Response channel		Check that the response is transmitted on the request channel		Passed

7 19 Specific presentation interface tests

(See 7.6)

7.1 19.1 General

The EUT including all necessary test equipment shall be set-up and checked that it is operational before testing commences.

The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular.

Where appropriate, tests according to various subclauses of this clause as well as other Clauses of this standard may be carried out simultaneously.

2012-06-12	**Tester: Ba**	**Test details:** General interface tests		
Test item		Check	Remark	Result
Checksum		Check that the output sentences include a checksum		Passed
		Check that the checksum is correct		Passed

7.1.1 New general tests introduced in IEC 61162-1 Ed. 4

7.1.1.1 Test for B.4.10 Correct use of special characters starting a sentence

The AIS Class A has to implement sentences with “$” and “!”.
It has to be checked that there is no malfunction when valid sentences are interleaved with tag block starting character “\”.

2012-06-12 Ba	Test details - Position input with tag blocks		
Test item	Check	Remark	Result
Apply a set of position input data interleaved with lines containing tag blocks to a sensor input			
Sensor data	Verify that the sensor data are correctly used		Passed
	Confirm that no malfunction is observed		Passed
Apply a set of position input data to a sensor input. The sensor data sentences are headed by tag blocks			
Sensor data	Check if the sensor data are correctly used	The sensor data are not used Remark: exactly the same data without tag blocks are used <u>Retest 2012-07-12 Ba:</u> The sensor data are not used <u>Retest 2012-09-10 Ba:</u> The sensor data are used	Passed

7.1.1.2 Test for B.4.11 Correct parsing of received sentences

It has to be checked that any characters between the end of a valid line and the starting character of the next line are ignored

2012-06-12 Ba	Test details - Positon input with additional characters		
Test item	Check	Remark	Result
Apply a set of position input data interleaved with lines containing a number of valid and invalid characters.			
Sensor data	Verify that the sensor data are correctly used		Passed
	Confirm that no malfunction is observed		Passed
Apply a set of position input data to a sensor input. The sensor data sentences are headed by a number of valid or invalid characters			
Sensor data	Verify that the sensor data are correctly used	The sensor data are not used Retest 2012-07-12 Ba: The sensor data are not used Retest 2012-09-10 Ba: The sensor data are used	Passed
	Confirm that no malfunction is observed		Passed

7.1.1.3 Test for B.4.12 Future extensions of received sentences

It has to be checked that known input sentences are accepted if additional fields are added at the end. The additional fields can be ignored.

This test does not check all possible sentences. It is assumed that there is a general methode to ignore additional fields.

2012-06-12 Ba	Test details - Positon input with future extensions		
Test item	Check	Remark	Result
Apply know PI port input sentences with additional fields			
SSD input	Verify that the SSD input data are correctly used		Passed
VSD input	Verify that the VSD input data are correctly used		Passed
ACA input	Verify that the ACA input data are correctly used		Passed
Apply known sensor input sentences with additional fields			
GLL input	Verify that the GLL input data are correctly used		Passed
GNS input	Verify that the GNS input data are correctly used		Passed
RMC input	Verify that the RMC input data are correctly used		Passed
VTG input	Verify that the VTG input data are correctly used		Passed
HDT input	Verify that the HDT input data are correctly used		Passed
ROT input	Verify that the HDT input data are correctly used		Passed

7.2 19.2 Checking manufacturer's documentation

The following checks for formal consistency and compliance shall be made for all ports:

- *approved sentences against the IEC 61162-1;*
- *proprietary sentences against the IEC 61162-1;*
- *usage of fields as required for different functions including provided default values or settings;*
- *transmission intervals against the IEC 61162-1 and IEC 61162-2;*
- *configuration of hardware and software if this is relevant to the interface performance and port selection.*

The following checks shall be made for compliance with the IEC 61162-1 and IEC 61162-2:

- *output drive capability;*
- *load on the line of inputs;*
- *electrical isolation of input circuits.*

This test does not check the documentation, this is done in 1.8 4.3 Manuals.
Here the function of the EUT is checked using the documentation information, the content of the documentation is checked if the EUT complies with the requirements.

2012-03-28	**Tester: Ba**	**Test details:** Check of manufacturers documentation	
Test item	Check	Remark	Result
Approved sentences	Check approved sentences against IEC 61162	The description of some sentences have to be corrected. See Note) Retest 2013-04-03 Ba: Not changed Retest 2013-04-11 Ba: The description has been corrected.	Passed
Proprietary sentences	Check proprietary sentences against IEC 61162		N/A
Usage of Fields	Check usage of fields		Passed
Transmission intervals	Check transmission intervals	In section A.4 the ALR intervals are incorrect: Should be 30 s for active and 60 s for inactive alarms Retest 2013-04-03 Ba: Not changed Retest 2013-04-11 Ba: The transmission intervals have been corrected.	Passed
Hardware configuration	Check hardware configuration		Passed
Output drive capability	Check output drive capability	Max 60 mA, 2.3 V / 100 Ohm	Passed
Input load	Check input load		Passed
Electrical Isolation	Check electrical isolation		Passed

Note)
Errors found in the sentence description:

A5.1 ABM: the ABM can initiate a transmission of message 6, 12, 25 and 26.

A5.4 AIQ: In the list of sentences which are sent in response to a query following sentences are missing (at least): EPV, SSD, VSD. Please check if there are other sentences which are sent in response on a query.

A5.5: The AIR can initiat the transmission of message 15 and 10

A5.6 BBM: the BBM can initiate a transmission of message 8, 14, 25 and 26.

7.3 19.3 Electrical test

Method of test

Input/output ports configured in accordance with IEC 61162-1 or IEC 61162-2 shall be tested according to the relevant standard with regard to minimum and maximum voltage and current at the input terminals.

Required results

The interfaces shall fulfil the requirements of the relevant standards.

2013-01-14	**Tester: Ba**	**Test details:** Electrical test of sensor inputs		
Test item		Check	Remark	Result
Minimum voltage		Check that input works with minimum input voltage	The inputs do not work with the minimum voltage of 0.3 V It seems that the sensor inputs are defined as IEC 61162-1 ports, not –2 ports as required in IEC 61993-2 section 7.6.2.1 “Each port shall meet the requirements of IEC 61162-2” Retest 2013-02-08 Ba: All 3 sensor inputs accept the sensor data with the minimum voltage of 0.3 V.	Passed
Maximum voltage		Check that input is not damaged by maximum input voltage		Passed
Input current		Check the input current against the IEC 61162-1 or IEC 61162-2	Measured without termination 2V: 6 / -2 mA 5 V: 19/ -15 mA 10 V: 41/ -37 mA 15 V: 63/ -59 mA The maximum receiver input current is according to V.11 section 6.2 is exceeded (about 3 mA at 10 V). Even the maximum current of IEC 61162-1 (2 mA at 2 V) is exceeded. Retest 2013-02-08 Ba: Input current: 5 V: 0.1/ -0.1 mA 10 V: 0.2/ -0.2 mA 15 V: 0.3/ -0.3 mA	Passed
Electrical Isolation		Check that sensor inputs are electrically isolated	Retest 2013-02-08 Ba: The sensor inputs are electrically isolated	Passed

2013-01-14	**Tester: Ba**	**Test details:** Electrical test of high speed ports		
Test item		Check	Remark	Result
Minimum voltage		Check that input works with minimum input voltage		Passed
Maximum voltage		Check that input is not damaged by maximum input voltage		Passed
Input current		Check the input current against the IEC 61162-1 or IEC 61162-2	5 V: +/- 0.03 mA 10 V: +/- 0.07 mA 15 V: +/- 0.11 mA	Passed
		Check that high speed inputs are electrically isolated		Passed

7.4 19.4 Test of input sensor interface performance

Method of measurement

Connect all inputs and outputs of the EUT as specified by the manufacturer and simulate VDL-messages using the test system. Operate inputs with simulated sensor data that are both the relevant data and additional data with formatters not provided for the relevant input. Each sensor input shall be loaded with 70 % to 80 % of the interface's capacity. Record the VDL and output from the EUT's high speed port.

Required results

Verify that the output on the VDL and the presentation interface agree with the simulated input and that all output data is transmitted without loss or additional delay

2012-06-12	**Tester: Ba**	**Test details:** Test of input sensor interface performance		
Test item		Check	Remark	Result
Load all 3 sensor inputs with 70-80 % of the interface's capacity. 1 Sensor input at 4800 with position data 1 Sensor input at 4800 with log data 1 Sensor input at 38400 with heading and ROT data				
VDL contents		Check that the VDL contents agree with in input data		Passed
VDO output		Check that VDO outputs on both high speed ports agree with the sensor input data		Passed
Loss of data		Check that VDL messages are transmitted without loss of sensor data		Passed
		Check that output data at VDO output are sent without loss of sensor data		Passed
Delay of data		Check that there is no delay from sensor input change to VDL messages		Passed
		Check that there is no delay from sensor input change to VDO output		Passed

7.5 19.5 Test of sensor input

7.5.1 19.5.1 Test of GNS input

Method of measurement

Set up standard test environment and apply a GNS sentence with simulated sensor data. Record VDL output as follows:

a) Set mode indicator to AA (Autonomous).

b) Set mode indicator to AD, DA and DD (Differential).

c) Set mode indicator to P (Precise)

d) Set mode indicator to E (Estimated).

e) Set mode indicator to M (Manual).

f) Set mode indicator to S (Simulator).

g) Set mode indicator to N and NN (Data not valid).

h) Set mode indicator to A (GPS Autonomous) and time stamp field null.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag and time stamp).

Required results

Confirm that:

a) all of the content is correct and PA flag = 0.

b) all of the content is correct and PA flag = 1.

c) all of the content is correct and PA flag = 1.

d) external position is not used or time-stamp = 62.

e) external position is not used or time-stamp = 61.

f) the external position is not used.

g) the external position is not used.

h) all of the content is correct and PA flag = 0 and time stamp = 60.

2012-06-12	**Tester: Ba**	**Test details:** GNS satellite position input		
Test item		Check	Remark	Result
Apply simulated GNS sentence to the sensor input, check on VDL. File name: ais03_gns_vtg_hdt_rot.sst				
a) Set Mode = **AA** (autonomous GPS/GLONASS) Check on VDL		Check latitude		Passed
		Check longitude		Passed
		Check RAIM-Flag = 0		Passed
b) Set Mode = **DA** (differential GPS/ autonomous GLONASS)		Short check data ok		Passed
		Check **PA-Flag = 1** on VDL	PA flag = 0 Retest 2012-07-10 Ba: PA flag = 1	Passed
Set Mode = DD (differential GPS/ differential GLONASS)		Check data ok		Passed
		Check PA-Flag = 1 on VDL	PA flag = 1	Passed
Set Mode = DN (differential GPS/ no GLONASS)		Check data ok		Passed
		Check PA-Flag = 1 on VDL	PA flag = 0 Retest 2012-07-10 Ba: PA flag = 1	Passed
Set Mode = AD (autonomous GPS/ differential GLONASS)		Check data ok		Passed
		Check PA-Flag = 1 on VDL	PA flag = 1	Passed

c) Set mode = P(Precise position.)	Check PA-Flag = 1 on VDL	Test 2012-11-09 Ba:Mode P is not accepted, internal GNSS is used Retest 2013-01-14 Ba: PA-Flag = 1	Passed
d) Set mode = E (estimated position.)	Check that timestamp = 62 Or data = default	• Position is used • Time stamp = 60, derived from the internal GNSS Retest 2012-07-10 Ba: • Position is used Time stamp = 62	Passed
e) Set mode = M (manual position)	Check that timestamp = 61 Or data = default	• Position is used • Time stamp = 60, derived from the internal GNSS Retest 2012-07-10 Ba: • Position is used • Time stamp = 61	Passed
f) Set mode = S (simulated position)	Check that timestamp = 63 Check default data	• Position is used • Time stamp = 60, derived from the internal GNSS Retest 2012-07-10 Ba: • Position is used. A simulated position should never be used for transmissions • Time stamp = 63 Retest 2012-09-06 Ba: The simulated position is not used	Passed
g) Set Mode = **NN** (no GPS/ no GLONASS)	Check data = default		Passed
	Check PA-Flag = 0		Passed
Set Mode = **N** (no GPS/ no GLONASS)	Check data = default		Passed
	Check PA-Flag = 0		Passed
h) Set Mode = **A** UTC of position field = null	Check latitude	Test 2012-11-09 Ba:	Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
	Check time stamp = 60	Actual time stamp is used, perhaps from the internal GNSS Retest 2013-01-14 Ba: Time stamp = 60	Passed

7.5.2 19.5.2 Test of RMC input

Method of measurement

Set up standard test environment and apply an RMC sentence with simulated sensor data.

a) Set status to valid and mode indicator to A (Autonomous).

b) Set mode indicator to D (Differential).

c) Set mode indicator to E (Estimated).

d) Set Mode indicator to M (Manual).

e) Set mode indicator to S (Simulator).

f) Set status to invalid and mode indicator to N (Data not valid).

g) Set mode indicator to A (Autonomous) and time stamp field null.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag, time stamp, SOG and COG).

Required results

Confirm that:

a) all of the content is correct and PA flag = 0.

b) all of the content is correct and PA flag = 1.

c) external position and SOG/COG are not used or time-stamp = 62.

d) external position and SOG/COG are not used or time-stamp = 61.

e) external position and SOG/COG are not used.

f) external position and SOG/COG are not used.

g) all of the content is correct and PA flag = 0 and time stamp = 60.

2012-06-12	**Tester: Ba**	**Test details:** RMC position input		
Test item		Check	Remark	Result
Apply simulated RMC sentence to the sensor input. File name: ais04_rmc_hdt_rot.sst				
a) Set status/mode to **A,A** Check on VDL		Check latitude		Passed
		Check longitude		Passed
		Check PA-Flag = 0		Passed
b) Set status/mode to **A,D** (differential mode)		Check data		Passed
		Check PA-Flag = 1		Passed
c) Set status/mode to **A,E** (estimated position)		Check data = default or time stamp = 62	Position from RMC and time-stamp = 61	Passed
d) Set status/mode to **A,M** (Manual position)		Check data = default or time stamp = 61	Default position and time-stamp = 63	Passed
e) Set status/mode to **A,S** (Simulated position)		Check data = default Time stamp = 63	Default position and time-stamp = 63	Passed
f) Set status/mode to **V,N** (invalid data) Check on VDL		Check latitude = 91º		Passed
		Check longitude = 181º		Passed
		Check PA-Flag = 0		Passed
g) Set Mode = **A** UTC of position field = null		Check latitude	Test 2013-04-11 Ba:	Passed
		Check longitude		Passed
		Check PA-Flag = 0		Passed
		Check time stamp = 60		Passed

7.5.3 19.5.3 Test of DTM input

Method of measurement

Set up standard test environment and apply a GNS and DTM sentence with simulated sensor data.

a) Set local datum in the DTM sentence to "W84", set Reference datum to other value than "W84".

b) Set local datum in the DTM sentence to other value than "W84".

c) Set local datum in the DTM sentence to "W84" again.

Repeat the test with RMC input.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag and time stamp).

Required results

Confirm that:

a) the position data from the sensor input are used.

b) the position data from the sensor input are not used.

c) the position data from the sensor input are used.

2012-06-12	**Tester: Ba**	**Test details:** DTM reference datum		
Test item		Check	Remark	Result
Apply simulated position sentences with DTM. Apply **GNS** sentence with DTM, Set Reference datum to other then W84 File name: ais03d_dtm_gns_vtg_hdt_rot.sst				
a) Set Local datum = W84		Check that data are valid		Passed
b) Set Local Datum not W84		Check on VDL that data are default		Passed
c) Set Local datum = W84		Check that data are valid		Passed
Apply **RMC** sentence with DTM, Set Reference datum to other then W84 File name: ais03d_dtm_gns_vtg_hdt_rot.sst				
a) Set Local datum = W84		Check that data are valid		Passed
b) Set Local Datum not W84		Check on VDL that data are default		Passed
c) Set Local datum = W84		Check that data are valid		Passed

7.5.4 19.5.4 Test of GBS input

Method of measurement

Set up standard test environment and apply a GNS and GBS sentence with simulated sensor data.

The expected RAIM error is calculated from expected error in longitude and expected error in latitude of the GBS sentence according to ITU-R M.1371 Table 47 as follows:

a) Set the position sentence to non-differential modeSet expected RAIM error to a value <=10 m.

b) Set expected RAIM error to a value >10 m.

c) Remove the expected error in longitude and/or latitude (null field).

Set the position sentence to differential mode.

d) Set expected RAIM error to a value <=10 m.

e) Set expected RAIM error to a value >10 m.

f) Remove the expected error in longitude and/or latitude (null field).

Repeat the test with RMC input as position sentence.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag and time stamp).

Required results

Confirm that:

a) RAIM flag = 1 and PA flag = 1.

b) RAIM flag = 1 and PA flag = 0.

c) RAIM flag = 0 and PA flag = 0.

d) RAIM flag = 1 and PA flag = 1.

e) RAIM flag = 1 and PA flag = 0.

f) RAIM flag = 0 and PA flag = 1.

2012-11-09	**Tester: Ba**	**Test details:** GBS input	
Test item	Check	Remark	Result
Apply simulated GNS sentence with GBS sentence to the sensor input File name: ais03g_gns_gbs_vtg_hdt_rot.sst Mode indicator = A (non-differential)			
a) Set expected error in GPS sentence to < 10 m	Check that PA flag = 1		Passed
	Check that RAIM-Flag = 1		Passed
b) Set expected lat error in GPS sentence to > 10 m	Check that PA flag = 0		Passed
	Check that RAIM-Flag = 1		Passed
Set expected lon error in GPS sentence to > 10 m	Check that PA flag = 0		Passed
Set expected lon error and lon error in GPS sentence to 8 m	Check that PA flag = 0	PA flag = 1 Retest 2013-01-14 Ba: PA-Flag = 0	Passed
c) Fields with expected error of Lat and Lon are empty (NULL fields)	Check that PA-Flag = 0		Passed
	Check that RAIM-Flag = 0		Passed
Mode indicator = D (differential)			
d) Set expected error in GPS sentence to < 10 m	Check that PA flag = 1		Passed
	Check that RAIM-Flag = 1		Passed
e) Set expected error in GPS sentence to > 10 m	Check that PA flag = 0		Passed
	Check that RAIM-Flag = 1		Passed
c) Fields with expected error of Lat and Lon are empty (NULL fields)	Check that PA-Flag = 1		Passed
	Check that RAIM-Flag = 0		Passed

7.5.5 19.5.5 Test of VBW input

Method of measurement

Set up standard test environment and apply a GNS, HDT and VBW sentence with simulated sensor data. NOTE The HDT sentence is applied additionally to the VBW sentence in order to make the calculation of SOG and COG.

a) Set status, ground speed, to valid.

b) Set status, ground speed, to invalid.

c) Set status, ground speed, to valid, set heading to invalid.

d) Set status, ground speed, to valid and remove transverse ground speed.

Record the VDL position reports and evaluate the contents (SOG and COG).

Required results

Confirm that:

a) SOG and COG are correctly calculated from VBW and HDT.

b) SOG and COG is set to default.

c) COG is set to default.

d) Confirm that SOG and COG is set to default.

2012-06-12	**Tester: Ba**	**Test details:** VBW input		
Test item		Check	Remark	Result
Apply simulated VBW sentence to the sensor input, GPS disconnected. No VTG speed available. Check on VDL File name: ais08_gns_vbw_hdt_rot.sst				

a) Status of bottom track: **A** (valid) Ahead and across speed available.	Check that SOG = resultant of ahead and across speed	SOG from VTG is used See Note) Retest 2012-09-06 Ba: SOG is calculated from the VBW speed components	Passed
	COG = calculated from SOG vector and heading	COG from VTG is used See Note) Retest 2012-09-06 Ba: COG is calculated from the VBW speed components. • If heading + speed angle exceeds 360°the COG is set to 360°= default. This is incorrect. See Note 2 • If heading - speed angle exceeds 0°COG is set to 0°. This is incorrect. See Note 2) • If heading +- speed angle does not exceed 360°or 0°the COG is correct. Retest 2012-11-09 Ba: The calculation of COG from heading and speed angle is correct.	Passed
b) Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid !	SOG = default	2012-09-06 Ba: SOG is calculated from the invalid VBW speed components Retest 2012-11-09 Ba: SOG = default	Passed
	COG = default	COG is calculated from the invalid VBW speed components Retest 2012-11-09 Ba: COG = default	Passed
c) Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**	SOG valid	From VBW I recommend to use SOG also from VTG to have SOG and COG from the same source.	Passed
	COG = default	From VTG	Passed

d) Status of bottom track: A (valid) Ahead available, **transverse speed empty**	SOG = default	SOG is calculated for transversal speed = 0. This may be incorrect because the transversal speed is unknown. Therefore SOG from VBW should not be used. Retest 2012-11-09 Ba: SOG = default	Passed
	COG = default	COG is calculated for transversal speed = 0. This may be incorrect because the transversal speed is unknown. Therefore COG from VBW should not be used. Retest 2012-11-09 Ba: COG = default	Passed

7.5.6 19.5.6 Test of VTG input

Method of measurement

Set up standard test environment and apply VTG sentence with simulated sensor data.

a) Set mode indicator to a valid value.

b) Set mode indicator to "N" (data not valid).

Record the VDL position reports and evaluate the contents (SOG and COG).

Required results

Confirm that:

a) SOG and COG are correctly used.

b) SOG and COG is set to default.

2012-06-12	**Tester: Ba**	**Test details:** VTG speed input		
Test item		Check	Remark	Result
Apply simulated VTG sentence to the sensor input. File name: ais01_gll_vtg_hdt_rot.sst				
a) Set mode to **A** (autonomous) Check on VDL		Check SOG		Passed
		Check COG		Passed
b) Set mode to **N (**invalid) Check on VDL		Check SOG = 102.3 (default)		Passed
		Check COG = 360 (default)	COG = last valid external COG Retest 2012-07-12 Ba: COG = default (360)	Passed

7.5.7 19.5.7 Test of HDT/THS input

Method of measurement

Set up standard test environment and apply a RMC and a HDT/THS sentence with simulated sensor data.

a) Set valid heading data in HDT/THS.

b) Remove heading data from HDT/THS.

c) Set SOG > 5 kn and heading data different from COG by >45° for 5 min.

Record the VDL position reports and evaluate the contents (heading).

Required results

Confirm that:

a) the heading value is correct.

b) the heading value is set to default.

c) ALR 11 is generated.

2012-06-12	**Tester: Ba**	**Test details:** HDT heading input		
Test item		Check	Remark	Result
Apply simulated RMC and HDT sentence to the sensor input. Check the heading value on VDL File name: ais04_rmc_hdt_rot.sst				
a) Valid Heading		Check heading value		Passed
b) Delete heading value (empty field)		Check that heading = default		Passed

2012-11-09	**Tester: Ba**	**Test details:** THS heading input		
Test item		Check	Remark	Result
Apply simulated RMC and THS sentence to the sensor input. Check the heading value on VDL File name: ais04_rmc_hdt_rot.sst				
a) Valid Heading, mode indicator = A		Check heading value		Passed
b) Mode indicator = V		Check that heading = default		Passed
Mode indicator = A Change talker to “HC” (Magnetic compass)		Check that heading is not used		Passed
c) Difference between course and heading > 45°			c) is tested in 14.6.3.3 Heading sensor	N/A

7.5.8 19.5.8 Test of ROT input

Method of measurement

Set up standard test environment and apply a HDT and ROT sentence with simulated sensor data. Set talker id of ROT = "TI". Set ROT status to valid ("A").

a) Set ROT to several values between 0 and 708 °/mi n turning left and right.

b) Set ROT to a value of more than 708 °/min turnin g left and right.

c) Set ROT status to invalid ("V").

Set the ROT status to valid again and set the ROT talker ID to "HE".

When ROT values are used do as in d), e), and f):

d) Set ROT to 9 °/min turning left and right.

e) Set ROT to 11 °/min turning left.

f) Set ROT to 11 °/min turning right.

When ROT values are not used but are calculated from the HDT data do as in g), h) and i):

g) Change the heading value in HDT with 9 °/min and –9 °/min.

h) Change the heading value in HDT with 11 °/min.

i) Change the heading value in HDT with −11 °/min.

Record the VDL position reports and evaluate the contents (ROT).

Required results

Confirm that:

a) the ROT value is calculated as defined in Table 6.

b) the ROT value is –126 turning left and 126 turning right.

c) ROT = default (-128) or 0 or ±127 if calculated from HDT.

d) ROT = 0.

e) ROT = −127.

f) ROT = 127.

g) ROT = 0.

h) ROT = −127.

i) ROT = 127.

2012-06-12	**Tester: Ba**	**Test details:** ROT Rate of Turn input		
Test item		Check	Remark	Result
Apply simulated ROT sentence to the sensor input, Talker = TI. File name: ais01_gll_vtg_hdt_rot.sst				
a) ROT status = **A** (valid) ROT value = 0.0 degr./min		Check ROT on VDL		Passed
Change rate of turn to different values according to the check column and check the VDL value. The VDL value has to be the nearest value according the conversion formula (see conversion table)		10 converted to 10.0 (15)		Passed
		20 converted to 19.7 (21)		Passed
		60 converted to 61.1 (37)		Passed
		180 converted to 177.2 or 182.8 (63/64)		Passed
		360 converted to 361.6 (90)		Passed
		-20 converted to 19.7 (-21)		Passed
b) Change rate of turn to values > +/- 708.7°/min		720 converted to 708.7 (126)		Passed
		-720 converted to –708.7 (-126)		Passed
c) Set ROT status = **V** (invalid)		Check that ROT = default (default = -731.4 = -128) If ROT is not default check g), h), i)		Passed
If Other ROT source is used				
Change rate of turn to different values according to the check column and check the VDL value. Values have to be according to 6.10.3.6		0 converted to 0		Passed
		d) 9 converted to 0	= 8.7 With Other ROT source (talker not TI) the EUT should only transmit the 3 values –720, 0 and +720 Retest 2012-07-12 Ba: ROT = 0	Passed
		f) 11 converted to 127	= 11.4 Retest 2012-07-12 Ba: ROT = 720	Passed
		d) - 9 converted to 0	= -8.7 Retest 2012-07-12 Ba: ROT = 0	Passed
		e) -11 converted to -127	= -11.4 Retest 2012-07-12 Ba: ROT = -720	Passed

If Other ROT source is not used but ROT value is calculated from heading. Change heading value in HDT or THS sentence			
Heading not changing	ROT = 0	<u>Retest 2012-11-08 Ba:</u> ROT = default <u>Retest 2013-01-08 Ba:</u> ROT = 0	Passed
g) Changing with 9°/min	ROT = 0	ROT is set to default <u>Retest 2012-11-08 Ba:</u> UTC 10:10 No change, ROT = default The ROT information is not derived from the heading. <u>Retest 2013-01-08 Ba:</u> ROT = 0	Passed
h) Changing with 11°/min	ROT = 127	ROT is set to default <u>Retest 2012-11-08 Ba:</u> No change, ROT = default <u>Retest 2013-01-08 Ba:</u> ROT = 127	Passed
g) Changing with -9°/min	ROT = 0	ROT is set to default <u>Retest 2012-11-08 Ba:</u> No change, ROT = default <u>Retest 2013-01-08 Ba:</u> ROT = 0	Passed
i) Changing with -11°/min	ROT = -127	ROT is set to default <u>Retest 2012-11-08 Ba:</u> No change, ROT = default <u>Retest 2013-01-08 Ba:</u> ROT = -127	Passed

7.5.9 19.5.9 Test of different inputs

Method of measurement

Set up standard test environment and apply a GNS, VBW, HDT/THS and ROT sentence with simulated sensor data to the specified sensor inputs.

a) Apply RMC, VBW, HDT and ROT to sensor input 1.

b) Apply RMC, VBW, HDT and ROT to sensor input 2.

c) Apply RMC, VBW, HDT and ROT to sensor input 3.

d) Apply RMC to sensor input 1, VBW to sensor input 2, HDT and ROT to sensor input 3.

Record the VDL position reports and evaluate the contents of SOG and COG.

Required results

Confirm that:

a) all sensor data are correct.

b) all sensor data are correct.

c) all sensor data are correct.

d) all sensor data are correct.

2012-06-12	**Tester: Ba**	**Test details:** Different inputs		
Test item		Check	Remark	Result
Apply simulated sensor sentences to the sensor inputs. File name of 1st part: ais01_gns_vtg_hdt_rot.sst				
a) Apply the sensor input sentences to sensor input 1		Check position		Passed
		Check SOG/COG		Passed
		Check heading		Passed
		Check ROT		Passed
b) Apply the sensor input sentences to sensor input 2		Check position		Passed
		Check SOG/COG		Passed
		Check heading		Passed
		Check ROT		Passed
c) Apply the sensor input sentences to sensor input 3		Check position		Passed
		Check SOG/COG		Passed
		Check heading		Passed
		Check ROT		Passed
• Apply RMC to sensor input 1. • Apply VBW to sensor input 2. • Apply HDT and ROT to sensor input 3.		Check position		Passed
		Check SOG and COG		Passed
		Check heading		Passed
		Check ROT		Passed

7.5.10 19.5.10 Test of multiple inputs

Method of measurement

Check the manufacturer's documentation for the method of handling multiple sensor inputs, for instance:

- *priority of sensor ports,*
- *assigning sensor sentences to ports by configuration.*

Set up standard test environment and apply RMC, VBW, HDT and ROT sentences with different simulated sensor data to 2 or 3 sensor inputs. Record the VDL position reports and evaluate the contents.

Required results

Confirm that for each parameter (position, SOG/COG, heading, ROT) the data from only one sentence is used, according to the manufacturer's definition.

<table>
<tr><td>2013-01-14</td><td>Tester: Ba</td><td colspan="3">Test details: Different inputs</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Apply simulated sensor sentences to the sensor inputs.
File name of 1st part: ais01_gll_vtg_hdt_rot.sst</td><td></td></tr>
<tr><td colspan="2" rowspan="5">Apply the sensor input sentences with different data to sensor input 1, 2 and 3 simultanuously
Check that data from only one sentence is used</td><td>Check position</td><td>The data from one source are used, with a priority:
Sensor1, Sensor 2, Sensor 3</td><td>Passed</td></tr>
<tr><td colspan="2">During this test there was an increased number of message 5 (every 20 s or even more often). The position source was always external, but changed between sensor 1, sensor 2 and sensor 3 input. This does not affect the dimensionl/ref values. So no additional message 5 are necessary
<u>Retest 2013-02-08 Ba:</u>
The problem with message 5 was not observed</td><td>Passed</td></tr>
<tr><td>Check SOG/COG</td><td></td><td>Passed</td></tr>
<tr><td>Check heading</td><td></td><td>Passed</td></tr>
<tr><td>Check ROT</td><td></td><td>Passed</td></tr>
</table>

7.6 19.6 Test of high speed output

Method of measurement

Set up standard test environment and simulate VDL-position reports using the test system. Record output from the EUT high speed port (see Table 16).

Required results

Verify that the recorded message contents agree with the simulated VDL contents (VDM sentence), its own transmitted data (VDO sentence) and its own position, SOG, COG information derived from the internal position sensor and in accordance with the sentence specifications of IEC 61162-1.

This contents of VDM and VDO are checked in

- 4.7.1 16.7.1 Received messages and
- 4.7.2 16.7.2 Transmitted Messages

Date	Result	Status
2012-09-07 Ba	There are no data on the Display port. A constant voltage of – 5 V between the A and B output lines is available, indicating that the connections are correct. But there are no data on the line. Data on the Pilot port are available and correct. Retest 2013-02-07 Ba: With a new hardware unit data are also output on the display port.	Passed

2012-04-26	**Tester: Ba**	**Test details:** Content of received VDM messages	
Test item	Check	Remark	Result
Transmit all types of messages from other AIS transponder or VDL generator. Check the field content of the fields listed under Test item.			
Message ID	8 binary broadcast message, multi slot File name: AIBBM_multi_bin.sst		
Number of sentences	Check that value = 3	UTC 08:52	Passed
Check sentence number	Check that value = 1,2,3 according to length of message		Passed
Sequential message ident.	Check that counting from 0...9 modulo 10		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (message length = 1008 bit)		Passed
Message ID	14 Safety related broadcast message, multi slot File name: AIBBM_multi_safety.sst		
Number of sentences	Check that value = 3		Passed

Check sentence number	Check that value = 1,2,3		Passed
Sequential message ident.	Check that counting from 0...9 modulo 10		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 1000)		Passed
	Additional checks		
Length of sentence	Confirm that no sentence exceeded the length of 82 character (no warning from monitor program)		Passed
Checksum	Confirm that no sentence had a wrong checksum (no warning from monitor program)		Passed

2012-04-26	**Tester: Ba**	**Test details:** Content of transmitted VDO messages		
Test item		Check	Remark	Result
Transmit all applicable types of messages. Check the field content of the fields listed under Test item.				
Message ID		8 binary broadcast message, multi slot File name: AIBBM_multi_bin.sst		
Number of sentences		Check that value = 3		Passed
Check sentence number		Check that value = 1,2,3 according to length of message		Passed
Sequential message ident.		Check that counting from 0...9 modulo 10		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 1008 bit)		Passed
Message ID		14 Safety related broadcast message, multi slot File name: AIBBM_multi_safety.sst		
Number of sentences		Check that value = 3		Passed
Check sentence number		Check that value = 1,2,3		Passed
Sequential message ident.		Check that counting from 0...9 modulo 10		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 2 (message length = 1000 bit)		Passed

	Additional checks		
Length of sentence	Confirm that no sentence exceeded the length of 82 character (no warning from monitor program)		Passed
Checksum	Confirm that no sentence had a wrong checksum (no warning from monitor program)		Passed

7.7 19.7 High speed output interface performance

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Increase the VDL load to >90%. Record transmitted messages and check PI output of EUT on the port for "external display" and the "auxiliary display/pilot port".

Required results

Confirm that EUT outputs all received messages to the PI and the "auxiliary display/pilot port". Verify during VDL load >90 % that the sync timing, the T_x slots and the slot number in the CommState are correct.

2012-03-01	**Tester: Ba**	**Test details:** High speed output interface performance		
Test item		Check	Remark	Result
Apply 90% VDL channel load on channel A and B		Check that all received messages of both channels are output on the external display port	98% <u>Retest 2012-04-27 Ba:</u> 99.9 % on both channels for Disp port and Pilot port.	Passed
		Check that all received messages of both channels are output on the auxiliary display/ pilot port		Passed
		Check that the sync timing is correct		Passed
		Check that the correct Tx slots are used		Passed
		Check that the slot numbers in the CommState are correct		Passed

7.8 19.8 Output of undefined VDL messages

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Verify that AIS messages with undefined data contents according to Table 12 (Message type 28 or higher) are output by the PI. Repeat test for port "auxiliary display/pilot port".

Required results

Confirm that EUT outputs all undefined received messages to the PI.

2013-02-06	**Tester: Ba**	**Test details:** Output of undefined VDL messages	
Test item	Check	Remark	Result
Apply messages with undefined message ID (> 27) to the VDL	Check that the undefined messages are output on the external display port		Passed
	Check that the undefined messages are output on the auxiliary display/ pilot port		Passed

7.9 19.9 Test of high speed input

Method of measurement

Set up standard test environment. Apply simulated input data, in accordance with the sentence specifications of IEC 61162-1 and Table 15 of this standard, to the EUT and record VDL output.

NOTE For the SSD sentence
a) the source identifier "AI" means that the A, B, C, D values are related to the internal EPFS receiver,
b) any other source identifier means that the A, B, C, D values are related to the external EPFS.

Required results

Verify that the VDL message contents agree with simulated input data.

Verify that configuration items which shall be protected according to 6.11.4 are accepted only if the input sentence is preceded by an SPW sentence with a valid password, when using the EPV configuration sentence.

Date	Format	Result	Status
	VSD	See test details below	
	SSD	See test details below	

All other sentences are tested in special test items.

2012-04-26	**Tester: Ba**	**Test details:** Evaluation of SSD sentence	
Test item	Check	Remark	Result
Apply an SSD sentence to an high speed input (PI). A SPW sentence with a valid password shall precede the SSD sentence.			
VDL transmission	Check that Message 5 is transmitted after change of data by SSD sentence		Passed
Call sign	Check that the new call sign is transmitted in Message 5		Passed
Ship's name	Check that the new ship's name is transmitted in Message 5		Passed
Source identifier = "AI" (internal GNSS) A – Distance from bow B – Distance from stern C – Distance from port D – Distance from starboard	Check that the new dimensions are transmitted in Message 5		Passed
Source identifier not "AI" (external EPFS) A – Distance from bow B – Distance from stern C – Distance from port D – Distance from starboard	Check that the new dimensions are transmitted in Message 5	Dim/ Ref = 0, 0, 0, 0 Retest 2012-06-12 Ba: The new dimensions are used in message 5	Passed
DTE indicator flag	Check if the DTE flag is entered in VDL message 5 if appropriate, depending on the presence of an MKD	DTE flag is set to 0 according to the avaiable MKD	Passed
Apply an SSD sentence without SPW sentence			
Password protecting	Check that the new values of call sign, ship's name and dimension/reference are not accepted	The SSD data are accepted without SPW sentence. This is accepted because IEC 61993-2 Ed.2 does not clearly require this for the SSD sentence	Passed
Apply an SSD sentence with preceding SPW sentence with invalid password			
Password protecting	Check that the new values of call sign, ship's name and dimension/reference are not accepted	The SSD data are accepted with SPW with incorrect password. This is accepted because IEC 61993-2 Ed.2 does not clearly require password protection for the SSD sentence	Passed

2012-04-26	**Tester: Ba**	**Test details:** Evaluation of VSD sentence	
Test item	Check	Remark	Result
Apply an VSD sentence to an high speed input (PI).			
VDL transmission	Check that Message 5 is transmitted after change of data by VSD sentence		Passed
Navigational status	Check that the new Navigational status is transmitted in Message 1		Passed
Type of ship and cargo	Check that the new type is transmitted in Message 5		Passed
Maximum actual static draught	Check that the new draught is transmitted in Message 5		Passed
Destination	Check that the new destination is transmitted in Message 5	The Coded delimiter character “^” is not evaluated but used directly in the destination. e.g. an input “^2A” is used as “^2A” but should be used as “*” according to the ASCII code 2A. See also IEC 61162-1 Section 8.1 table 1. I expect that this is not only a problem of the destination input but of all character input <u>Retest 2012-06-12 Ba:</u> The Coded delimiter character “^” is evaluated correctly	Passed
Estimated Time of Arrival (ETA)	Check that the new ETA is transmitted in Message 5		Passed
Regional application flag	Check if the regional application flag is entered in VDL message 1	Not entered, = 0 <u>Retest 2012-06-12 Ba:</u> The Regional application flag are used in message 1	Passed

2013-03-27	**Tester: Ba**	**Test details:** Evaluation of EPV sentence		
Test item		Check	Remark	Result
Apply EPV sentences to an high speed input (PI). A SPW sentence with a valid password shall precede the SSD sentence.				
Query for EPV		Check that an EPV sentence for all configuration data is output	There is no response on query for EPV ($xxAIQ,EPV). This is not explicitely required in the standard but without a response to a query for EPV an external display unit cannot really present the actual settings to the operator. Remark: on a query EPV sentences for all settings except the passwords (111 and 112) should be output. <u>Retest 2013-03-28 Ba:</u> There is a correct response for all settings except the passwords (111 and 112)	Passed
101 Sensor 1 baud		Check that the baud rate of Sensor 1 is correctly set	With password level 1 (user)	Passed
102 Sensor 2 baud		Check that the baud rate of Sensor 2 is correctly set	With password level 1 (user)	Passed
103 Sensor 3 baud		Check that the baud rate of Sensor 3 is correctly set	With password level 1 (user)	Passed
104 Long-range baud		Check that the baud rate of the Long range port is correctly set.	With password level 1 (user)	Passed
105 DGNSS Baud		Check that the baud rate of DGNSS port (correction data) is correctly set	With password level 1 (user)	Passed
106 MMSI		Check that the MMSI has been correctly set	There is an EPV output as response indication that the MMSI has been changed, but the MMSI has not really been changed (msg 1, EPV on request) <u>Retest 2013-04-02 Ba:</u> UTC 14:23 The MMSI has been changed With level 2 (admin) password	Passed

107 IMO number	Check that the IMO number has been correctly set	Not changed Tried with admin and user password This item is under clarification by e-mail Retest 2013-03-28 Ba: The IMO number has been set correctly with level 2 (admin) password	Passed
108 Long-range interface configuration	Check that the MMSI has been set ot A or M according to the EPV sentence	With password level 1 (user)	Passed
109 Long-range AIS broadcast channel 1	Check that Long-range broadcast channel 1 is correctly set		Passed
110 Long-range AIS broadcast channel 2	Check that Long-range broadcast channel 2 is correctly set		Passed
111 Administrator password	Check that the Administrator password has been correctly set		Passed
112 user password	Check that the User password has been correctly set		Passed
113 AIS-SART test mode	Check that the AIS-SART test mode has been correctly set.	Not implemented Retest 2013-04-08 The funktion is implemented. Protected by password level 1 (user)	Passed
Apply an EPV sentence, 106 MMSI, without SPW sentence			
Password protecting	Check that the MMSI is not changed	• The MMSI is not changed • There is no NAK output to indicate that the setting was not successfull (see IEC 61993-2 Ed.s Annex E.2) Retest 2013-04-02 Ba: UTC 13:59 There is an NAK output: ***REC:*** • The Reason code is 10. In this case (no password) I think the Reason code 5 (access denied) seems to be more appropriate. • The descriptive text is missing. I recommend to add a text like “No password” or “Password required” to clarify the reason.	Passed

Apply an EPV sentence, 106 MMSI, with preceding SPW sentence with invalid password			
Password protecting	Check that the MMSI is not changed	• The MMSI is not changed • There is no NAK output to indicate that the setting was not successfull Retest 2013-04-02 Ba: UTC 14:13 There is an NAK output for both sentences. A NAK for the combinations of both sentences would also be ok or even more appropriate. See also the recommendations for the EPV without SPW.	Passed Passed Rec

8 20 Long-range functionality tests

8.1 20.1 Long-range application by two-way interface

(See 8.2)

8.1.1 20.1.1 LR interrogation

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply a LR addressed interrogation message to the LR-interface port of EUT. Record LR output port and AIS high-speed output port Set EUT to

a) automatic response,

b) manual response via MKD,

c) manual response via PI.

Required results

Check that EUT displays LR interrogation messages and sends them to PI. Check that EUT outputs a LR position report message

a) automatically (and indicates action on display),

b) after manual confirmation via MKD,

c) after manual confirmation via PI.

2012-06-15	**Tester: Ba**	**Test details:** a) LR automatic response, all data		
Test item		Check	Remark	Result
Set EUT to automatic response. Apply an addressed request to the LR port of EUT requesting all possible information. File name: LRI_LRF_MMSI_all.sst				
Response		Check that a response is output on LR port		Passed
Display on MKD		Check that the request is displayed on MKD	Not on the main screen but in Message/ LR inbox	Passed
		Check that replay status is displayed on MKD		Passed
PI output		Check that LR interrogation and response is output on PI		Passed

Contents of LRF response	Check output of LRF sentence	In addition to the LRF sentence with talker AI there is an exact copy of the input LRF sentence. This is not necessary	Passed
	Check that sequence number = request		Passed
	Check MMSI = requestor		Passed
	Check name of requestor		Passed
	Check function request = request		Passed
	Check that function reply is according to the availability of data (2 = avail., 3 = not avail.)		Passed
Contents of LR1 response	Check output of LR1 sentence		Passed
	Check that sequence number = request = LRF		Passed
	Check MMSI of responder = own MMSI		Passed
	Check MMSI of requestor		Passed
	Check ship's name	Ships name, callsign and IMO number are not provided if the IMO number is not available. I recommend to provide at least the available information	Passed
	Check Call sign		Passed
	Check IMO number		Passed

Contents of LR2 response	Check output of LR2 sentence		Passed
	Check that sequence number = request = LRF		Passed
	Check MMSI of responder = own MMSI		Passed
	Check date, UTC	The date should be provided with 4 characters (2012) according to the sentence definition but it is provided only with 2 characters (12) <u>Retest 2013-01-14 Ba:</u> The year is output with 4 characters.	Passed
	Check Lat, Lon	Lat is ok, The Lon is incorrect: Instead of the correct value 1001.23 it is output 0961.23. It seems the carry from 61 min to 1°01 min is not considered I recommend to provide the Lat and Lon with the full available resolution of 1/10000 min. <u>Retest 2012-07-13 Ba:</u> The LON is correctly output as 1001.23 The position is output with a resolution of 1/100 minutes.	Passed Passed
	Check COG	I recommend to supply the SOG and COG only with 1/10 resolution (350.0°, 10.0 kn) because higher resolution is not avaiable.	Passed
	Check SOG		Passed

Contents of LR3 response	Check output of LR3 sentence	The sentence exceeds the maximum length See length and beam of ship and draught Retest 2012-07-13 Ba: The maximum length is not exceeded (with destination length 20 char).	Passed
	Check that sequence number = request = LRF		Passed
	Check MMSI of responder = own MMSI		Passed
	Check destination		Passed
	Check ETA	I recommend to shorten the time to full seconds to make the sentence shorter	Passed
	Check draught	The draught is provided with 1/1000000 m resolution. That does not make sense because the values are available only in 1/10 m I recommend to output the values in 1/10 meters (e.g. 11.5) Retest 2012-07-13 Ba: The draught is output with 1/10 meter resolution	Passed
	Check ship/cargo		Passed
	Check length of ship	Length and beam are provided with 1/1000000 m resolution. That does not make sense because the values are available only in full meters. I recommend to output the values in full meters Retest 2012-07-13 Ba: The draught is output with full meter resolution	Passed
	Check breadth of ship		Passed
	Check ship type		Passed
	Check persons		Passed

2012-06-15	**Tester: Ba**	**Test details:** a) LR automatic response, selected data	
Test item	Check	Remark	Result
Set EUT to automatic response. Apply an addressed request to the LR port of EUT requesting selected information. File name: LRI_LRF_MMSI_all.sst, modified by deleting not requested information			
Request A Name Call sign IMO number	Check that only LF and LR1 is transmitted		Passed
	Check that function request field = request		Passed
	Check that function reply status field matches request and data availability		Passed
	Check that the requested fields are not empty		Passed
Request A,E,F Name Call sign IMO number COG SOG	Check that LRF, LR1 and LR2 is transmitted		Passed
	Check that function request field = request		Passed
	Check that function reply status field matches request and data availability		Passed
	Check that requested fields are provided		Passed
	Check that only requested fields are not empty		Passed
Request C,E,F Position COG SOG	Check that LRF, LR1 and LR2 are transmitted		Passed
	Check that function request field = request		Passed
	Check that function reply status field matches request and data availability		Passed
	Check that requested fields are provided		Passed
	Check that only requested fields are not empty		Passed
Request P,W Ship/cargo Persons	Check that LRF, LR1 and LR3 is transmitted		Passed
	Check that function request field = request		Passed
	Check that function reply status field matches request and data availability		Passed
	Check that requested fields are provided		Passed
	Check that only requested fields are not empty		Passed

2012-06-15	**Tester: Ba**	**Test details:** b) Manual Confirmation	
Test item	Check	Remark	Result
Set EUT to manual response. Apply an addressed request to the LR port of EUT requesting all possible information. File name: LRI_LRF_MMSI_all.sst			
Display on MKD	Check that the request for manual response is displayed on MKD	It is displayed in the Messages/ Inbox. But there should be also an indication on the main screen (status line) to make the operator aware that there is a request <u>Retest 2012-07-13 Ba:</u> The there is a indication "LR Manual response" in the bottom line of the MKD every 10 s for about 4 s.	Passed Passed
	Check that response is transmitted after manual confirmation on MKD		Passed

2012-06-15 **Tester: Ba**	**Test details:** c) Confirmation via PI		
Test item	Check	Remark	Result
Set EUT to external or manual confirmation as implemented. Apply an addressed request to the LR port of EUT requesting all possible information. File name: LRI_LRF_MMSI_all.sst			
Confirmation via PI	Check that the request for manual response is output on PI (copy of long range request input)		Passed
	Check that response is transmitted after external confirmation via PI using the LRF sentence	No response Please provide information about the expected confirmation. I expect that the LRF sentence is accepted as confirmation <u>Retest 2012-09-13 Ba:</u> No response, and no information received about the acknowledgement sentence <u>Retest 2013-01-08 Ba:</u> No response Please send me information which sentence activates the response. I tested it with an LRF sentence identical to the interrogation LRF sentence. <u>Retest 2013-02-07 Ba:</u> No direct response Information required about the acknowledgement sentence on PI !!! I expect an LRF sentence identical to the interrogation LRF sentence. In manual mode there is an automatic LR response on every second interrogation but there should not be an automatic response <u>Retest 2013-03-21 Ba:</u> • There is a response after confirmation on PI port. • There is still an automatic LR response on every second interrogation without confirmation <u>Retest 2013-03-22 Ba:</u> • There is a response after confirmation on PI port. • There is no automatic LR response on every second interrogation	Passed Passed

8.1.2 20.1.2 LR “all ships” interrogations

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply a LR “all ships” interrogation message to the LR-interface port of EUT defining a geographical area which contains own ships position; Record LR output port. Set EUT to

a) automatic response,

b) manual response.

Repeat check with own ship outside specified area.

Required results

Check that EUT outputs a LR position report message

a) automatically (and indicates action on display),

b) after manual confirmation.

No response shall be output on the repeat check.

2012-06-15	**Tester: Ba**	**Test details:** a) Area addressing: Automatic response		
Test item		Check	Remark	Result
Set EUT to automatic response. Apply an area addressed request to the LR port of EUT requesting position and speed information.				
Own position in area File name: LRI_LRF_area_CEF.sst		Check that the request is automatically responded		Passed
		Check that the request and response status is displayed on MKD		Passed
		Check that the request and response is output on PI		Passed
Own position not in area File name: LRI_LRF_out_area_CEF.sst		Check that the request is not responded	A copy of the LRF sentence is output	Passed
		Check that the request is not displayed on MKD	The request is displayed on the MKD <u>Retest 2012-07-13 Ba:</u> No change <u>Retest 2012-09-13 Ba:</u> Not displayed	Passed
		Check that the request is not output on PI	The request is output on the PI <u>Retest 2012-07-13 Ba:</u> No change <u>Retest 2012-09-13 Ba:</u> Only the LRF is output, no LRI	Passed

2012-06-15	**Tester: Ba**	**Test details:** b) Area addressing: Manual confirmation	
Test item	Check	Remark	Result
Set EUT to manual response. Apply an area addressed request to the LR port of EUT requesting position and speed information.			
Own position in area File name: LRI_LRF_area_CEF.sst	Check that the request is displayed on MKD	It is displayed in the Messages/ Inbox. But there should be also an indication on the main screen (status line) to make the operator aware that there is a request <u>Retest 2012-07-13 Ba:</u> The there is a indication “LR Manual response” in the bottom line of the MKD	Passed Passed
	Check that response is transmitted on confirmation on MKD		Passed
	Check that the request and response is output on PI		Passed
Own position not in area File name: LRI_LRF_out_area_CEF.sst	Check that the request is not displayed on MKD	The request is displayed on the MKD <u>Retest 2012-07-13 Ba:</u> No change <u>Retest 2012-09-13 Ba:</u> Not displayed	Passed
	Check that the request is not output on PI	The request is output on the PI <u>Retest 2012-07-13 Ba:</u> There is only a LRF output, no LRI	Passed

8.1.3 20.1.3 Consecutive LR “all ships” interrogations

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Set EUT to automatic mode. Apply 5 LR “all ships” interrogation messages to the LR-interface port of EUT defining a geographical area which contains own ship’s position;

Set the control flag in the LRI message to

a) 0 (reply on first interrogation only),

b) 1 (reply on all applicable interrogations).

Record LR output port.

Required results

Check that EUT outputs a LR position report message

a) on the first interrogation only,

b) on all interrogations.

2012-06-15	**Tester: Ba**	**Test details:** Area addressing: Automatic response		
Test item		Check	Remark	Result
Set EUT to automatic response. Apply some area addressed requests to the LR port of EUT requesting position and speed information. File name: LRI_LRF_area_CEF.sst				
a) Control flag = 0 (reply only on first request) Change MMSI to get the first response		Check that the 1. request is automatically responded		Passed
		Check that the following interrogations are not responded		Passed
		Check that the following interrogations are not displayed on MKD	The request is displayed on the MKD <u>Retest 2012-07-13 Ba:</u> No change <u>Retest 2012-09-13 Ba:</u> Not displayed	Passed
		Check that the following interrogations are not output on PI	The request is output on the PI <u>Retest 2012-07-13 Ba:</u> No change <u>Retest 2012-07-13 Ba:</u> There is only a LRF output, no LRI	Passed
b) Control flag = 1 (reply on all requests)		Check that the 1. request is automatically responded		Passed
		Check that the following interrogations are responded		Passed

8.2 20.2 Long-range application by broadcast

(See 8.3)

8.2.1 20.2.1 Long-range broadcast

Method of measurement

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT. The designated long-range channels are defined in 8.3.

a) *Do not apply Message 4 and Message 23.*

b) *Apply the Message 4 with the long range control bit set to 1 and 0. Place the EUT inside the RF footprint (Message 4 receiving area) of a base station.*

c) *Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the RF footprint area, but outside the base station coverage area.*

d) *Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. Repeat the test d) using different MMSIs for Message 4 and Message 23.*

e) *Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 minutes, remove transmissions of Message 23.*

f) *Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 min., remove transmissions of Message 4.*

Required results

Check that EUT transmits the appropriate messages, e.g. in addition to the normal transmission of Messages 1 and 5 with adequate reporting interval on AIS 1 and AIS2, confirm that:

a) *EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

b) *Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

c) *Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the designated long-range channels] with 3 min reporting interval.*

d) *EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval when the Message 4 long-range control bit is set to 1. EUT stops transmitting Message 27 when the Message 4 long-range control bit is set to 0. Verify fields after station type in received Message 23 are ignored.*

e) *Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

f) *EUT begins transmission of Message 27 no sooner than 4 minutes and no later than 8 minutes after Message 23 was removed.*

g) *EUT begins transmission of Message 27 beyond 3 minutes after Message 4 was removed.*

2012-06-15	**Tester: Ba**	**Test details:** Long range broadcast		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Enable the EUT to transmit Message 27, e.g. by configuring the long range broadcast channels, Message 4 and 23 in the following test steps are transmitted with from the same base station MMSI.				
a) no message 4 and message 23		Check that message 27 is transmitted	<u>2012-09-14 Ba:</u> When the long range frequency configuration sentence was applied either to the Pilot port or to the Mini USB the EUT rebooted, but there was no transmission of message 27 <u>Retest 2012-11-16 Ba:</u> The behavior is very strange. <u>Retest 2013-01-11 Ba:</u> Message 27 is regular transmitted every 3 minutes	Passed
		Check Tx channels C and D		Passed
		Check that the transmission is alternating between C and D		Passed
		Check reporting interval = 3 min		Passed
		Check message 27 content	- SOG = 36 at a speed of 10 kn - COG = 416 at a course of 350° - The other data are correct. <u>Retest 2013-01-11 Ba:</u> The message content is correct	Passed
b) Apply message 4 only				
Apply message 4 with long range control bit set to 0		Check that message 27 is transmitted with 3 min interval	UTC 14:53 MSG 27 at 14:54 and 14:57	Passed
Apply message 4 with long range control bit set to 1		Check that message 27 is transmitted with 3 min interval	UTC 14:58 MSG 27 at 15:00 and 15:03	Passed
c) Apply message 23 with station type 10 (long range coverage area), EUT outside the coverage area				
Apply message 4 with long range control bit set to 0		Check that message 27 is transmitted with 3 min interval	UTC 16:28 Msg 27 at 16:30 and 16:33	Passed
Apply message 4 with long range control bit set to 1		Check that message 27 is transmitted with 3 min interval	UTC 16:22 Msg 27 at 16:24 and 16:27	Passed

d) Apply message 23 with station type 10 (long range coverage area), EUT inside the coverage area			
Apply message 4 with long range control bit set to 0	Check that EUT stops transmission of message 27	UTC 15:15 Msg 27 at 15:15, 15:18, 15:21, 15:24 are not transmitted	Passed
	Verify that the information of message 23 after station type is ignored		Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 15:07 Msg 27 at UTC 15:09, 15:12	Passed
e) Apply message 23 with station type 10 (long range coverage area), transmit message 4 with a different MMSI than message 23 EUT inside the coverage area			
Apply message 4 with long range control bit set to 0	Check that message 27 is transmitted with 3 min interval	Test 2013-01-14 UTC 12:07	Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 12:14	Passed
f) Apply message 23 with station type 10 (long range coverage area), EUT inside the coverage area			
Apply message 4 with long range control bit set to 0	Check that message 27 is not transmitted	UTC 12:24 MSG 23: 12:24 – 12:29	Passed
Stop messages 23 after 6 minutes	Check that EUT starts transmission of Message 27 after the time-out of message 23 (4... 8 min)	UTC 12:37 Start of transmission msg 27:	Passed
g) Apply message 23 with station type 10 (long range coverage area), EUT inside the coverage area			
Apply message 4 with long range control bit set to 0	Check that message 27 is not transmitted	UTC 13:29	Passed
Stop message 4 after 6 minutes	Check that EUT starts transmission of Message 27 later than 3 minutes after end of message 4	UTC 13:38: Last message 4 UTC 13:41: Msg 27	Passed

8.2.2 20.2.2 Multiple assignment operation

Method of measurement

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode with a reporting interval of 10 s. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT.

a) *Transmit a Group Assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the station type to 0 (all stations).*

b) *Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping their RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas not overlapping. Place the EUT inside the overlapped RF footprint area.*

c) *Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas partially overlapping the base station coverage areas. Place the EUT inside the overlapped base station coverage area.*

d) *Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from one base station with station type 10 to define the base station coverage areas. Do not broadcast Message 23 from other base stations. Place the EUT inside the RF footprint area of base station not broadcasting Message 23.*

Required results

Verify that:

a) *EUT switches to assigned mode and transmits position reports with 2 s reporting interval. EUT reverts to autonomous mode after timeout period*

b) *Irrespective of the Message 4 long-range control bit status of both base stations, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

c) *EUT transmits Message 27*

d) *Irrespective of the Message 4 long range control bit status of both base stations, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

2013-02-08	**Tester: Ba**	**Test details:**		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Enable the EUT to transmit Message 27, e.g. by configuring the long range broadcast channels, SOG = 10 kn, reporting interval = 10 s				
a) Transmit Message 23 EUT inside area, station type = 0, Reporting interval = 2 s		Check that Message 23 is received (VDM output)	Covered by 16.6.7.3	Passed
Reporting rate		Check that the reporting interval is changed to 2 s		Passed
Message 23 timeout		Verify that EUT reverts to normal operation mode after 4... 8 min		Passed
b) Apply message 4 and 23 with station type 10 (long range coverage area) from two different base station, the coverage area not overlapping EUT outside the coverage areas				
• Long range control bit of station 1 is set to 0 • Long range control bit of station 2 is set to 1		Check that message 27 is transmitted with 3 min interval	Covered by 20.2.1 c)	Passed
c) Apply message 4 and 23 with station type 10 (long range coverage area) from two different base station, the coverage areas are overlapping EUT inside the overlapping part of the coverage areas				
• Long range control bit of station 1 is set to 0 • Long range control bit of station 2 is set to 1		Check that message 27 is transmitted with 3 min interval	UTC 10:30	Passed
d) Apply message 4 and 23 with station type 10 (long range coverage area) from one base station and message 4 from a second base station EUT is outside the message 23 coverage area of base station 1				
• Long range control bit of station 1 is set to 0 • Long range control bit of station 2 is set to 1		Check that message 27 is transmitted with 3 min interval	Covered by 20.2.1 c)	Passed
• Long range control bit of station 1 is set to 1 • Long range control bit of station 2 is set to 0		Check that message 27 is transmitted with 3 min interval		Passed

9 Annex D DSC functionality

(normative)

9.1 D.1 DSC compatibility

The Class A AIS shall be capable to receive and process DSC channel management telecommands conforming to the provisions of Recommendations ITU-R M.493, ITU-R M.541, ITU-R M.825 (see M.1371/A3). In order to accomplish this performance, the AIS device shall contain a dedicated DSC receiver that is tuned permanently to channel 70. However, the AIS device shall not accept the channel management command sent by stations with invalid base station MMSI as defined in 6.12. For DSC channel management using geographical area calls, the end of sequence (EOS) character shall be EOS = 127 (no response requested). However for compatibility, Class A AIS receivers shall respond to DSC channel management commands ending in "EOS = 127" and "EOS = 117 (RQ) even though they are not capable of transmitting DSC acknowledgements.

9.2 D.2 DSC receiver tests

NOTE For DSC receiver test signal refer to Clause 10 test signal 1.

The DSC receiver tests are not part of this test report but part of the Physical radio tests.

9.1 D.3 DSC functionality tests

Definition

The EUT shall correctly process the channel management command by DSC messages addressed to the stations in the designated geographical area or the stations individually designated.

Method of measurement

For the tests in this clause, set the EUT into autonomous mode using channels AIS 1 and AIS 2 with a reporting interval of 2 s. Standard AIS channel management by DSC calls consisting of format specifier 103 and message symbol number 104 with expansion symbols 09, 10, 12, 13 shall be applied to the EUT using a base station MMSI as follows:

a) Apply a geographical channel management call using symbol constructions: "103" "geographical coordinates" "103" "source MMSI" "104" "primary CH No" "secondary CH No" "NE of CH management area" "SW of CH management area". Apply the call with EOS = 117 and EOS = 127.

b) Move the EUT outside the channel management area.

c) Apply an individual channel management call using symbol constructions: "120" "EUT MMSI" "103" "source MMSI" "104" "primary CH No" "secondary CH No" "NE of CH management area" "SW of CH management area". Apply the call with EOS = 117 and EOS = 127.

d) Move the EUT outside the channel management area.

e) Apply incorrect MMSI, position outside addressed geographic area, different course, or ship's type.

f) Apply an extraneous call using symbol constructions: "120" "EUT MMSI" "103" "source MMSI" "104" "03" "01" "120". (Active alternative system with group number 1 and sequence number 120).

Transmit a DSC telecommand using a non-base station MMSI.

Required results

The following items shall be verified.

a) Verify that the EUT operates on the designated channels with the transition boundary of 5 NM.

b) Verify that the EUT reverts to the operation on AIS 1 and AIS 2 channels.

c) Verify that the EUT operates on the designated channels with the transition boundary of 5 NM.

d) Verify that the EUT reverts to the operation on AIS 1 and AIS 2 channels.

e) Verify that the EUT operation is not affected.

f) Verify that the EUT operation is not affected.

2012-04-27	**Tester: Ba**	**Test details:** Regional area designation	
Test item	Check	Remark	Result
a) Send a area addressed region setting call	Check that an ACA sentence is output at PI port	There is no ACA output when the position is outside the region	Passed
	Check that new region is stored in the region list of the EUT		Passed
	Check that the transitional zone size is 5 NM		Passed
	Check that the area settings are used.		Passed
b) Move the position of EUT out of the area	Check that the default channels are used		Passed
c) Set Position of EUT inside the area Send a selective region setting call	Check that an ACA sentence is output at PI port	UTC 14:13	Passed
	Check that new region is stored in the region list of the EUT		Passed
	Check that the transitional zone size is 5 NM		Passed
	Check that the area settings are used.	The channels are correct but the corner points are the corner points of the area in use. Retest 2012-06-15 Ba: A new area with correct data is stored	Passed
d) Move the position of EUT out of the area	Check that the default channels are used		Passed
e) check of additional selection			
e) Set Position of EUT inside the area Send a selective region setting call with incorrect MMSI	Check that the new settings of the selective call are ignored		Passed
Send a area addressed region setting call, EUT outside the addressing area	Check that the new area is ignored and not stored	UTC 14:30	Passed
Send a area addressed region setting call including a course, matching the course of the ship.	Check that the new area is stored	UTC 14:33The new area is stored but the corner points are not correct Retest 2012-06-15 Ba: UTC 09:12 The new area is stored with correct corner points	Passed

Send a area addressed region setting call including a course, not matching the course of the ship.	Check that the new area is ignored and not stored	UTC 13:39 and 13:41 The area settings are stored Retest 2012-06-15 Ba: The new area is not stored	Passed
Send a area addressed region setting call including a ship's type, matching the ship's type of EUT	Check that the new area is stored	UTC 14:44 The new area is stored but the data are not correct Additonally the EUT start to output the TXT sentence 036 up to 10 times per second Retest 2012-06-15 Ba: The new area is stored with correct data	Passed
Send a area addressed region setting call including a ship's type, not matching the ship's type of EUT	Check that the new area is ignored and not stored Check that the new area is stored		Passed
f) extraneous call			
Apply a call : "120" "EUT MMSI" "103" "source MMSI" "104" "03" "01" "120".	Check that the EUT operation is not affected	Retest 2012-06-15 Ba:	Passed
e) check of additional selection			
Send a area addressed region setting call, EUT inside the addressing area Source MMSI is a non-base station MMSI	Check that the new area is ignored and not stored	UTC 14:29	Passed

Annex A Test equipment

A.1 Test equipment summary

#	description	type	identification
1	VDL Analyser / Generator	AIS Test unit MKII	S/N AA08PN Bund BSH/2012, 7200002112 BSH PC10745 SW AISterm V1.0rev47 AISmain V1.47011120R
2	Target simulator software	Furuno Navintra	BSH PC 9169
3	Presentation Interface Monitor	BSH	BSH PC 8441 BSH PC 9457 SW NewMoni V3.1
4	GMDSS-AIS-Testbox (DSC)	Futronic I/S	200 30 405
5	16 Port Serial Device Server	Moxa DE-303	06698, BSH Nr. 6084
6	Connection box for Moxa serial server With 8 converters RS 232 to RS 422	----	----
7	Active retransmitting GPS antenna	RA - 48	4800199
8	Trimble GPS reference receiver	4000RS, Part number 21000-76	S/N 3428A06700
	Auxiliaries:		
9	True RMS Multimeter DMM 916	Tektronix	S/N 138531
10	2-Kanal-Digital-Oszilloskop	Le Croy Wavesurfer 422	LCRY 0301 J 15673
11	Unbalanced Standard Attenuator	Rhode & Schwarz DPR BN 18024/50	BUND KK 11201
12	2 fixed voltage power supply (24 V/10A)	SITOP	BUND 102452, 102453
13	1 fixed voltage power supply (12 V/4,5A)	Siemens	
14	2 adjustable power supplies (30 V/5 A)	PS 405 D	S/N 2737, 2768

Reserve equipment

#	description	type	identification
15	VDL Analyser / Generator	AIS equipment tester	S/N 218 Bund 102710/2002 Prüfgerät Nr. 1
16	VDL Analyser / Generator	AIS equipment tester	Prüfgerät Nr. 2

A.1.1 VDL Analyser / Generator

The VDL analyser/generator:

- receives the radio data telegrams transmitted by the AIS under test, slotwise evaluates their radio parameters (field strength, SNR, etc.) and provides a transparent display of the decoded radio data telegrams (VDL messages).
- transmits radio data telegrams which have been entered/edited via a control panel. The AIS under test receives these messages and either passes the received data to it's presentation interface and/or responds as appropriate.
- records all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- simulates AIS targets by transmitting position reports of virtual targets up to the maximum channel capacity of 100% channel load on both channels (4500 messages / minute). The data are provided via serial interface to the VDL analyser/ Generator.

A.1.2 Target simulator

The target simulator consists of a standard PC with a special AIS Target Simulator software.

For tests of AIS transponders the data of up to 75 moving targets defined in text file in plain language are transferred to the „TS" input of the VDL Analyser/ Generator as VDM sentences and transmitted on the VHF data link (VDL) . Thus the AIS VHF data link is loaded with simulated AIS targets in fixed slots or in slots selected by the VDL Analyser/ Generator.

A.1.3 Presentation Interface Monitor

The Presentation Interface Monitor is a PC software running on four standard PCs.
It is used to

- analyse the AIS high speed input / output
- analyse the AIS long range function
- generate DSC calls for the DSC test box and to display, log and evaluate the received DSC calls from EUT.

For that purpose it includes the functions:

- coding / decoding of NMEA 6-bit data fields
- online AIS message filtering
- online AIS message editing
- load and transmit predefined sequences
- online modification of transmitted sequences

A.1.4 Sensor Data Simulator

The Sensor Data Simulator provides simulated sensor data to the serial sensor data inputs of the EUT. The sensor data are provided in text files to the Sensor Data Simulator which modifies the sensor data sentences e.g. adding the actual UTC time, modify some time-varying data and by adding a checksum.

The Sensor Data Simulator is basically the same software as the Presentation Interface Monitor using a special part of the functionality of the software.

A.1.5 DSC Testbox

The DSC test box is a standard GMDSS-AIS Test box used for the survey of ship stations.

For the DSC testing of AIS equipment in includes a software extension that provides a remote control input/output facility

- to transmit DSC calls according to ITU 825-3 generated in an external PC on DSC channel 70 and
- to output received DSC calls from the EUT to the external PC.

A special PC software is used to generate the DSC calls and to display, log and evaluate received DSC calls. It communicates via the serial remote control interface to the DSC Testbox.

A.1.6 Serial Interface Server

The Serial Interface Server provides 16 serial lines which can be connected in a flexible way to the EUT and to equipment of the test environment like the DSC Testbox.

The Serial Interface Server is connected to the controlling PCs via Ethernet Network.
It includes:

- 8 serial lines according to RS-422 and IEC 61162-1/2
- 8 serial lines according to RS-232

A.1.7 Laboratory Network

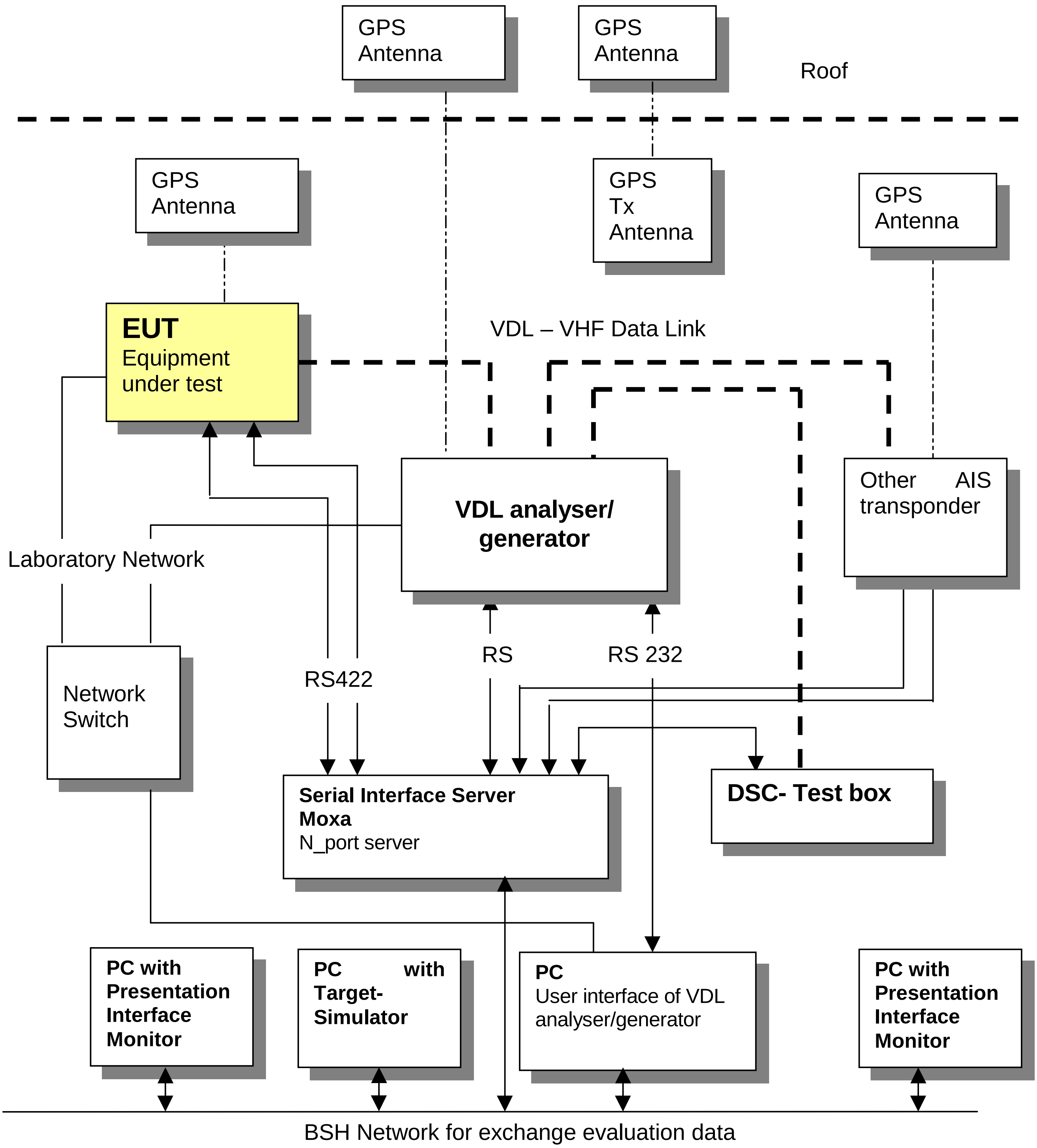
A special laboratory network connect controlling PCs with equipment of the test environment (VDL Generator/ analyser) and with EUT if equipped with an ethernet interface.

A.1.8 GPS Retransmitter

All AIS equipment includes a GPS receiver for the exact timing and for getting position and speed information.

To avoid the need to connect all AIS equipment to GPS antennas outside the laboratory a re-transmitting GPS antenna is installed in the lab. It amplifies and radiates a GPS signal in the laboratory which is received by active GPS antenna on the roof.

A.2 Test environment overview



Annex B Test sentences

B.1 IEC 61162 Test Sentences

Many of the test sentences are modified manually during the test according to the requirements of the actual test items.
Mainly the MMSI in all addressed sentences are adapted to the actual MMSI of the EUT or of the unit the EUT communicates with.
In addition the files containing these sentences contain also some control information used by the monitor program like:

<UTC>	is replaced by the actual UTC time at time of output
<WAIT EVENT>	waiting for user action before next output
<WAIT xxxx>	waiting xxx ms before next output

This control information is not shown in the following sentence examples because it is not sent to the EUT.

B.1.1 Sensor input

Sensor input sentences	
File name	Description
Sentences	
AIS01_gll_vtg_hdt_rot.sst	Standard sensor input sentences
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS01d_dtm_gll_vtg_hdt_rot.sst	Standard sensor input with DTM
Similar files with an additional DTM sentence are also available for the other position sentence sets and not listed explicitely	
$GPDTM,w84,,,,,,,P90 *$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A* *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS01g_gll_vtg_gbs_hdt_rot.sst	Standard sensor input with GBS sentence
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$GPGBS,141800.00,2.6,2.8,4.2,,,,* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS01x_gll_vtg_hdt_rot_180.sst	Standard sensor input at Longitude of 180°
$GPGLL,0001.00,N,17959.00,W,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS02_gga_vtg_hdt_rot.sst	Sensor Input set with GGA position

$GPGGA,092854,5330.1234,N,01001.2345,E,1,3,1.2,65.2,M,45.1,M,,* *$GPVTG,350.0,T,,M,10.0,N,,K,A *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS02d_dtm_gga_vtg_hdt_rot.sst	Sensor Input set with GGA position and DTM
$GPDTM,999,,,,,,,P90 *$GPGGA,092854,5330.1234,N,01001.2345,E,1,3,1.2,65.2,M,45.1,M,,* *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS03_gns_vtg_hdt_rot.sst	Sensor input set with GNS position
$GNGNS,122500.00,5330.1234,N,01001.2345,E,AA,5,1.2,35.5,41.1,,* *$GNVTG,350.0,T,,M,10.0,N,,K,A *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS04_rmc_hdt_rot.sst	Sensor input set with RMC position and speed
$GPRMC,122500.00,A,5330.1234,N,01001.2345,E,11.2,352.2,120202,2.0,E,A *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS06_gll_vtg_vbw_hdt_rot.sst	Sensor input set with speed by VBW and VTG
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS07_osd.sst	Single OSD sentence
$INOSD,359.9,A,5.2,B,12.6,B,150.0,1.2,N	
AIS08_gll_vbw_hdt_rot.sst	Standard sensor input with VBW instead of VTG
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS09_gll_osd.sst	Sensor input set with GLL and OSD
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$INOSD,359.9,A,5.2,B,12.6,B,150.0,1.2,N*	
AIS10_gll_vtg.sst	GPS receiver sentences (GLL and VTG)
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A*	
AIS11_vbw.sst	Log sentence VBW
$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V	
AIS12_hdt_rot.sst	Gyro sentences (HDT and ROT)
$TIHDT,359.9,T *$TIROT,0.0,A*	

B.1.2 Settings (VSD, SSD)

Settings (VSD, SSD)	
File name	Description
Sentences	
AISSD_transpondertype.sst	Settings of static data, specific set for each transponder type
$AISSD,callsign,name,100,20,15,10,1,GP	
AIVSD_Hamburg.sst	Settings of voyage related data
$AIVSD,51,11.5,26,HAMBURG,131020,20,05,0,0	

B.1.3 Messages (ABM, BBM)

The addressed messages include a MMSI number which is changed according to the actual MMSI number of the EUT

Messages (ABM, BBM)	
File name	Description
Sentences	
AIABM_bin.sst	Standard addressed binary message
!AIABM,1,1,2,000001005,1,6,06P0test,0	
AIABM_safety.sst	Standard addressed safety related message
!AIABM,1,1,2,000001005,1,12,D5CD,0	
AIABM_4_bin.sst	Set of 4 addressed binary messages
!AIABM,1,1,3,000008001,1,6,06P0test,0 *!AIABM,1,1,0,000008001,2,6,06P0test,0* *!AIABM,1,1,1,000008001,1,6,06P0test,0* *!AIABM,1,1,2,000008001,2,6,06P0test,0*	
AIABM_4_safety.sst	Set of 4 addressed safety related messages
!AIABM,1,1,0,000001005,1,12,D5CD,0 *!AIABM,1,1,1,000001005,1,12,D5CD,0* *!AIABM,1,1,2,000001005,1,12,D5CD,0* *!AIABM,1,1,3,000001005,1,12,D5CD,0*	
AIBBM_bin.sst	Standard binary broadcast message
!AIBBM,1,1,6,1,8,06P0test,0	
AIBBM_safety.sst	Standard safety related broadcast message
!AIBBM,1,1,6,1,14,D5CD,0	

AIBBM_5_bin.sst	Set of 5 binary broadcast messages
!AIBBM,1,1,7,0,8,06P0test1,0 *!AIBBM,1,1,8,0,8,06P0test2,0* *!AIBBM,1,1,9,0,8,06P0test3,0* *!AIBBM,1,1,0,0,8,06P0test4,0* *!AIBBM,1,1,1,0,8,06P0test5,0*	
AIBBM_5_safety.sst	Set of 5 safety related broadcast messages
!AIBBM,1,1,6,0,14,D5CDi,0 *!AIBBM,1,1,7,0,14,D5CDj,0* *!AIBBM,1,1,8,0,14,D5CDk,0* *!AIBBM,1,1,9,0,14,D5CDl,0* *!AIBBM,1,1,0,0,14,D5CDm,0*	
AIBBM_bin_stuffing.sst	Special message for bit stuffing test
!AIBBM,1,1,6,1,8,06Qv>khvOP,4	
AIBBM_multi_bin.sst	Long 5 slot binary broadcast message
!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 *!AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,4,6,2,8,012345678901234567890123456789012345678901,4*	
AIBBM_multi_safety.sst	Long 5 slot safety related broadcast message
!AIBBM,4,1,6,2,14,0123456789012345678901234567890123456789,0 *!AIBBM,4,2,6,2,14,0123456789012345678901234567890123456789,0* *!AIBBM,4,3,6,2,14,0123456789012345678901234567890123456789,0* *!AIBBM,4,4,6,2,14,0123456789012345678901234567890123456789,0*	
AIBBM_multi_bin_1.sst	Longer than 5 slots binary broadcast message, all bits 1
!AIBBM,4,1,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 *!AIBBM,4,2,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0* *!AIBBM,4,3,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0* *!AIBBM,4,4,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*	
AIBBM_ABM_17_5.sst	Set of 2 long messages 8 and 12 for message priority test
!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 *!AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,4,6,2,8,0123456789012345678901234567890123456789,0* *!AIABM,4,1,2,000001005,1,12,0123456789012345678901234567890123456789,0* *!AIABM,4,2,2,000001005,1,12,0123456789012345678901234567890123456789,0* *!AIABM,4,3,2,000001005,1,12,0123456789012345678901234567890123456789,0* *!AIABM,4,4,2,000001005,1,12,0123456789012345678901234567890123456789,0*	

AIBBM_25.sst	25 broadcast message to check 20 slots per frame rule
!AIBBM,1,1,6,1,8,06P0test1,0 *!AIBBM,1,1,6,1,14,D5CD1,0* *!AIBBM,1,1,7,1,8,06P0test2,0* *!AIBBM,1,1,7,1,14,D5CD2,0* *!AIBBM,1,1,8,1,8,06P0test3,0* *!AIBBM,1,1,8,1,14,D5CD3,0* *!AIBBM,1,1,9,1,8,06P0test4,0* *!AIBBM,1,1,9,1,14,D5CD4,0* *!AIBBM,1,1,0,1,8,06P0test5,0* *!AIBBM,1,1,0,1,14,D5CD5,0* *!AIBBM,1,1,1,1,8,06P0test6,0* *!AIBBM,1,1,1,1,14,D5CD6,0* *!AIBBM,1,1,2,1,8,06P0test7,0* *!AIBBM,1,1,2,1,14,D5CD7,0* *!AIBBM,1,1,3,1,8,06P0test8,0* *!AIBBM,1,1,3,1,14,D5CD8,0* *!AIBBM,1,1,4,1,8,06P0test9,0* *!AIBBM,1,1,4,1,14,D5CD9,0* *!AIBBM,1,1,5,1,8,06P0test10,0* *!AIBBM,1,1,5,1,14,D5CD10,0* *!AIBBM,1,1,6,1,8,06P0test11,0* *!AIBBM,1,1,6,1,14,D5CD11,0* *!AIBBM,1,1,7,1,8,06P0test12,0* *!AIBBM,1,1,7,1,14,D5CD12,0* *!AIBBM,1,1,7,1,8,06P0test13,0*	
AIAIR_5.sst	Simple interrogation for Message 5
$AIAIR,000001005,5,,,,,,	
AIAIR_35_5.sst	Interrogation of Message 3 and 5 from ID1 and Message 5 from ID2
$AIAIR,000005002,3,,5,,000007001,5,,	
AIS_DSI.sst	Test that EUT ignores command to send a DSC message
$AIDSI,1,1,2210393930,,,,03,,11,,	

B.1.4 Regional operational settings (ACA)

Regional operational settings (ACA)	
File name	Description
Sentences	
AIACA_Region_in_ch86.SST	Region around standard position with test channels
$ECACA,2,5400.0,N,01030.0,E,5300.0,N,00930.0,E,4,2086,0,1086,0,0,1,,,	
AIACA_Region_out_ch74_76.SST	Region not including standard position with channels 74 and 76
$ECACA,2,5500.0,N,00900.0,E,5400.0,N,00800.0,E,4,0074,0,0076,0,0,1,,,	
AIACA_Region_17_3_SW.SST	2 adjacent regions in SW quadrant, for test 17.3
$ECACA,2,3000.00,S,01200.00,W,3100.00,S,01300.00,E,1,2081,0,1081,0,0,1,,,* *$ECACA,2,3000.00,S,01100.00,W,3100.00,S,01200.00,E,1,2082,0,1082,0,0,1,,,	
AIACA_8_Regions_17_7_1.SST	8 different regions to fill quickly the complete list, for test 17.7.1
$ECACA,,5400.00,N,01030.00,E,5300.00,N,00930.00,E,2,72,0,74,0,0,1,,,* *$ECACA,,5200.00,N,00700.00,E,5100.00,N,00600.00,E,2,2060,0,1060,0,0,1,,, *$ECACA,,5200.00,N,00900.00,E,5100.00,N,00800.00,E,2,2061,0,1061,0,0,1,,,* *$ECACA,,5200.00,N,01100.00,E,5100.00,N,01000.00,E,2,2062,0,1062,0,0,1,,,* *$ECACA,,5200.00,N,01300.00,E,5100.00,N,01200.00,E,2,2063,0,1063,0,0,1,,,* *$ECACA,,5200.00,N,01500.00,E,5100.00,N,01400.00,E,2,2064,0,1064,0,0,1,,,* *$ECACA,,5100.00,N,00800.00,E,5000.00,N,00700.00,E,2,2065,0,1065,0,0,1,,,* *$ECACA,,5100.00,N,01000.00,E,5000.00,N,00900.00,E,2,2066,0,1066,0,0,1,,,*	
AIACA_Region_17_7_2_c.SST	Region for test 17.7.2 c)
$ECACA,2,5430.00,N,01200.00,E,5300.00,N,01100.00,E,4,2083,0,1083,0,0,1,,,	
AIACA_Region_17_7_2_f.SST	Region for test 17.7.2 f)
$ECACA,2,5300.00,N,01320.00,E,5200.00,N,01200.00,E,4,2081,0,1081,0,0,1,,,	
AIACA_Region_17_7_4.SST	4 adjacent regions for test 17.7.2 f)
$ECACA,2,5800.00,N,00800.00,E,5700.00,N,00700.00,E,4,2081,0,1081,0,0,1,,,* *$ECACA,2,5800.00,N,00900.00,E,5700.00,N,00800.00,E,4,2082,0,1082,0,0,1,,, *$ECACA,2,5700.00,N,00800.00,E,5600.00,N,00700.00,E,4,2083,0,1083,0,0,1,,,* *$ECACA,2,5700.00,N,00900.00,E,5600.00,N,00800.00,E,4,2084,0,1084,0,0,1,,,*	
AIACA_Region_lon180.SST	Special region at longitude = 180°
$ECACA,2,0100.00,N,17900.00,W,0100.00,S,17900.00,E,2,0074,0,0076,0,0,1,,,	
AIACA_Set_channel.SST	Set channel command, without area coordinates
$ECACA,,N,,W,,N,,W,2,2074,0,2076,0,0,1,,,,	
Request_ACA.SST	Request of ACA sentences from EUT
$ECAIQ,ACA	

B.1.5 Long range requests

The of long range requests include a MMSI number which is changed according to the actual MMSI number the EUT

Long Range (LRI, LRF)	
File name	Description
Sentences	
LRI_LRF_MMSI_all.sst	Request of all data addressed by MMSI
$LRLRI,5,0,211003000,000002002,,,,,,,,* *$LRLRF,5,211003000,VTS,ABCEFIOPUW,	
LRI_LRF_area_CEF.sst	Request of some data addressed by area
$LRLRI,6,1,211003000,,6000.0,N,2000.0,E,4000.0,N,0500.0,E *$LRLRF,6,211003000,VTS,CEF,*	
LRI_LRF_out_area_CEF.sst	Request of some data addressed by area, standard position not in area
$LRLRI,6,1,211003000,,6000.0,N,1500.0,E,5500.0,N,0800.0,E *$LRLRF,6,211003000,VTS,CEF,*	
LRI_LRF_area_at_180_CEF.sst	Request of some data addressed by area, area around longitude of 180°and latitude of 0°
$LRLRI,6,1,211003000,,0500.0,N,17500.0,W,0500.0,S,17500.0,E *$LRLRF,6,211003000,VTS,CEF,*	
LRF_ack_all.sst	For external confirmation of request
$LRLRF,5,211003000,VTS,ABCEFIOPUW,	

B.2 DSC sentences

The sentences are listed as they are applied to the DSC Testbox for transmission of DSC test calls. There is a special format used based on an earlier definition of NMEA private sentences.

The frame for transmitting a DSC call is:
$PDEBT,CCDSC,T,00014600<call content>FF

The <call content> has to be entered in Hex code, 2 hex numbers for each 7 bit DSC symbol, without spaces, beginning with the format specifier which included only ones.
The DSC coding and addition of redundancy (3 bit symbol redundancy and symbol repetition) are done by the test box. The content description of the calls is available on request.

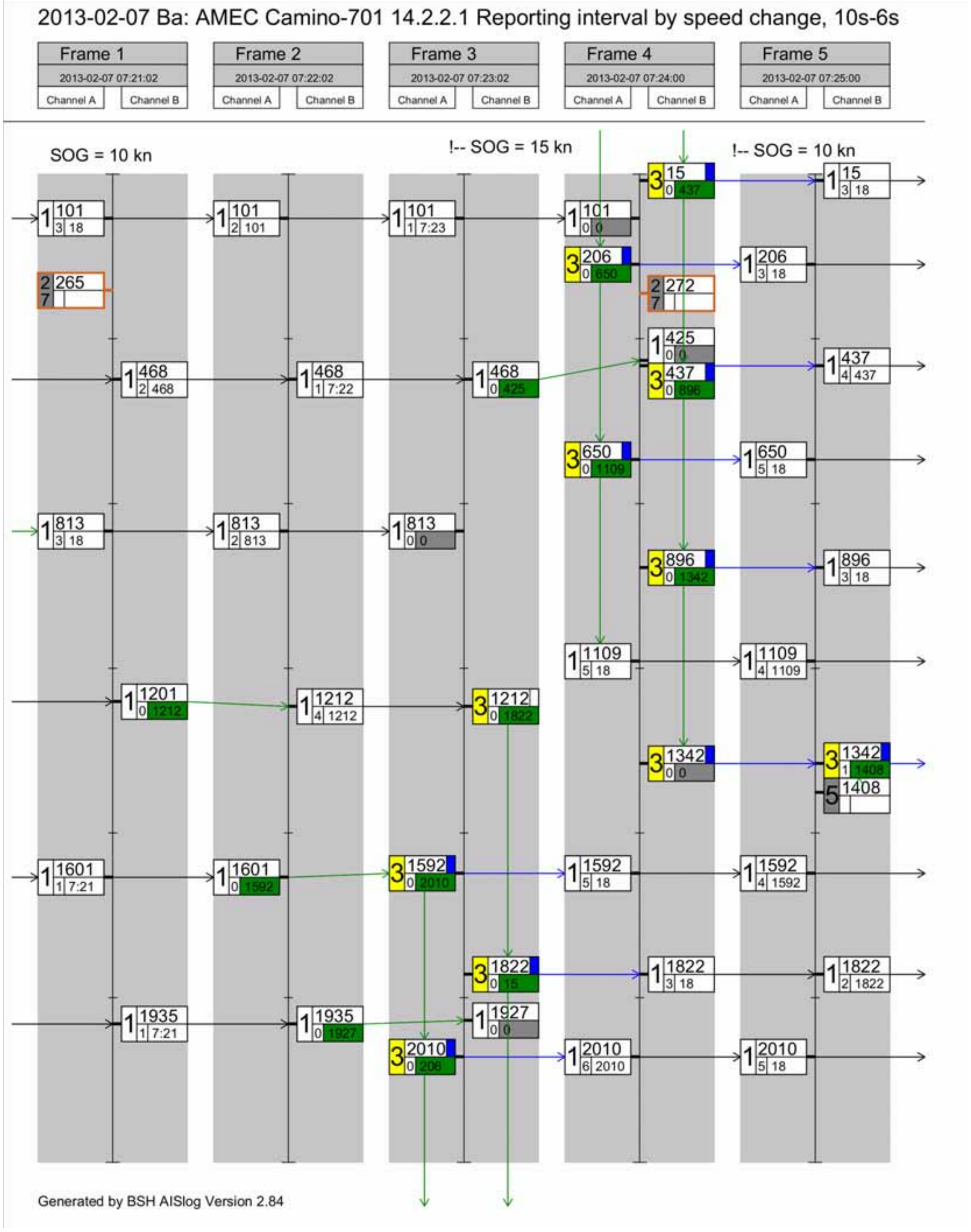
The DSC sentences include MMSI number which is changed according to the actual MMSI number the EUT.

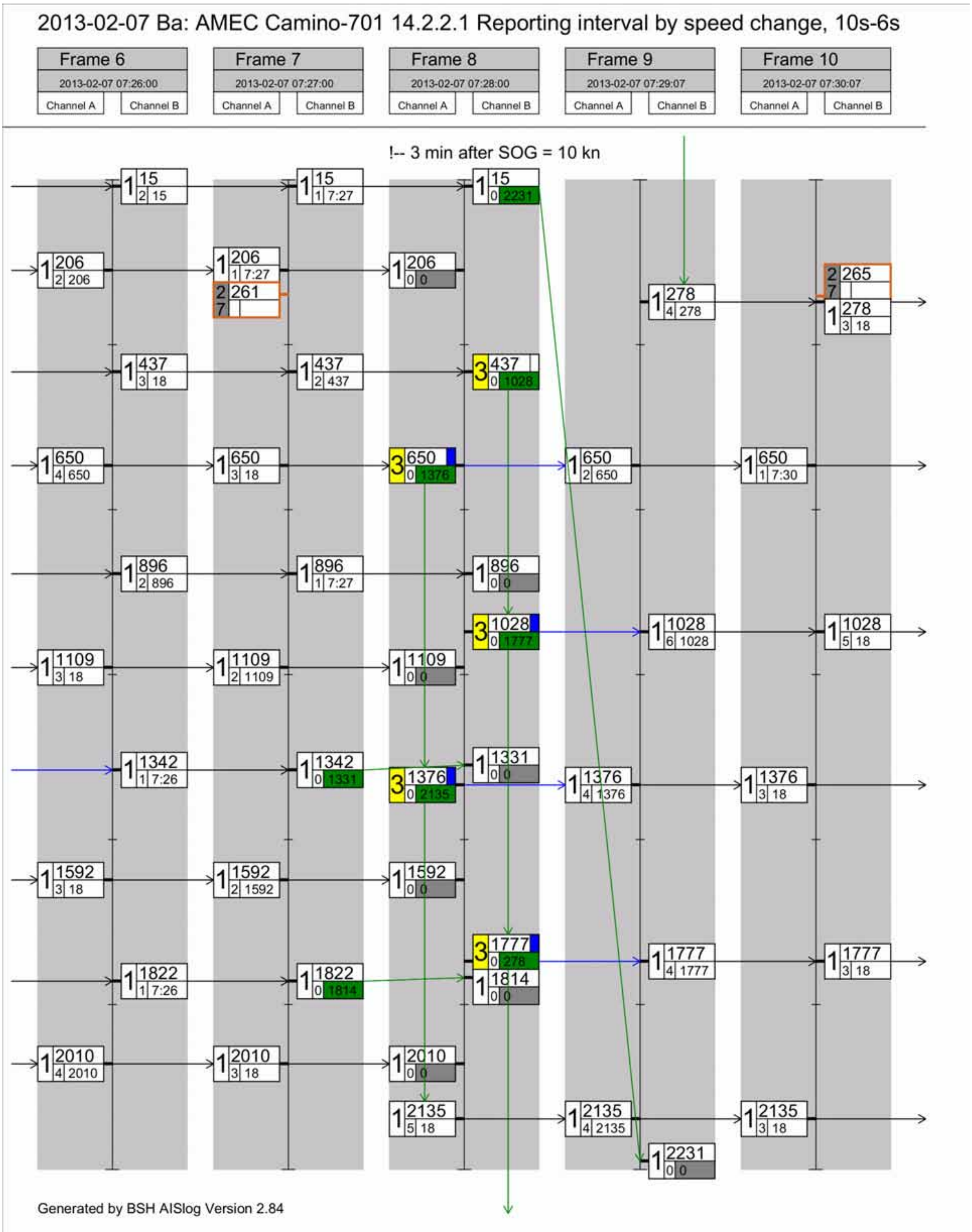
DSC Sentences	
File name	Description
Sentences	
Test_Signal_1.sst	Standard test signal no 1, selective position and name request.
$PDEBT,CCDSC,T,0001460078000001005067150A27271E676F75FF	
area_pos_name_rq.sst	Position and name request addressed to an area, standard position inside
$PDEBT,CCDSC,T,000146006705280000091E003C003C0067150A27271E676F75FF	
area_pos_name_rq_180.sst	Position and name request addressed to an area around a longitude of 180° and latitude of 0°.
$PDEBT,CCDSC,T,000146006700030001 4F1E003C003C0067150A27271E676F75FF	
sel_set_region.sst	Selective regional setting by DSC, standard pos. outside, channel 61
$PDEBT,CCDSC,T,0001460078000001005067150A27271E68090A3D00680A143D00680C053C00011400680D053200010A0075FF	
sel_set_region_in.sst	Selective regional setting, standard position inside, channel 72, 73, 12.5 kHz
$PDEBT,CCDSC,T,0001460078000001005067150A27271E680900480A680A00490A680C052800010300680D051E00005D0075FF	
sel_set_ais_channel_ch65.sst	Setting AIS channel to 65
$PDEBT,CCDSC,T,0001460078000001005067150A27271E68090A4100680A14410075FF	
sel_check_channel.sst	Test of channel use in 20.4
$PDEBT,CCDSC,T,0001460078000001010067150A27271E654875FF *$PDEBT,CCDSC,T,000146006705280000091E003C003C0067150A27271E676F75FF*	
area_set_region.sst	Area addressed regional setting, standard position inside address, but not inside area, channel 60
$PDEBT,CCDSC,T,000146006705280000091E003C003C0067150A27271E68090A3C00680A143C00680C051400005A00680D050A0000500075FF	
area_set_region_20_2.sst	Area addressed regional setting for test 20.2
$PDEBT,CCDSC,T,00014600670F3200000E00005A005A0067150A27271E6809145200680A0A5200680C0F1E00011E00680D0F140001280075FF *$PDEBT,CCDSC,T,00014600670F3200000E00005A005A0067150A27271E6809145100680A0A5100680C0F1400011E00680D0F0A0001280075FF*	
Sequence_20_1sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF *$PDEBT,CCDSC,T,00014600660600050A0A64150A27271E646E5A00487E7E7E7FFF* *$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF* *$PDEBT,CCDSC,T,0001460078000001010067150A27271E646E5A00487E7E7E75FF* *$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF*	
Test_sequence_20_3.sst	Sequence of an area addressed call and continues transmission of other call for test of free channel check
$PDEBT,CCDSC,T,000146006705320000091E003C003C0067150A27271E676F75FF *$PDEBT,CCDSC,T,0008460078000000010167150A27271E676F75FF*	
Sel_act_alt_system.sst	Activate an alternative system
$PDEBT,CCDSC,T,00014600780000000A0567150A27271E6803017875FF	

Annex C Test Diagrams

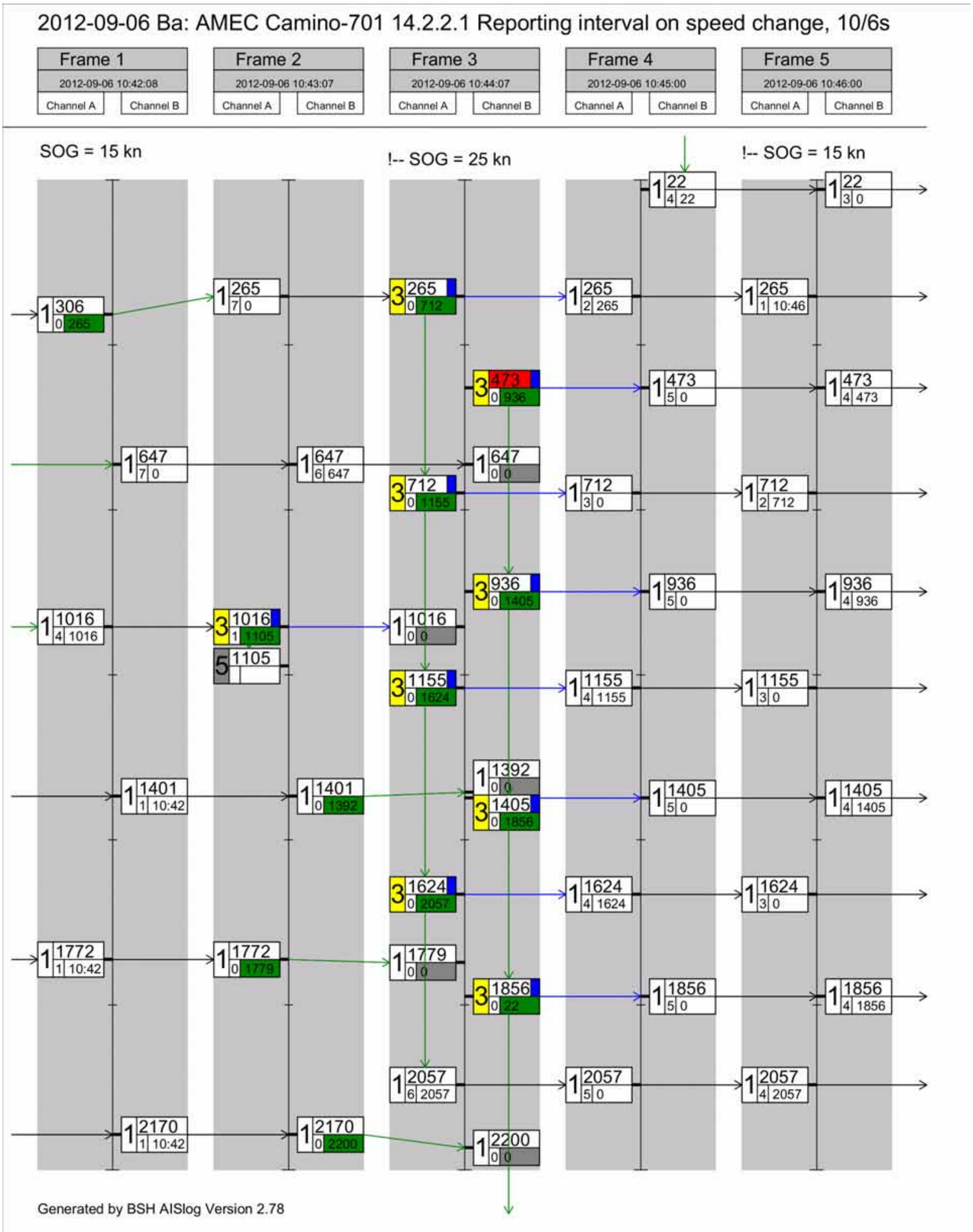
C.1 14.2.2.1 Speed and course change

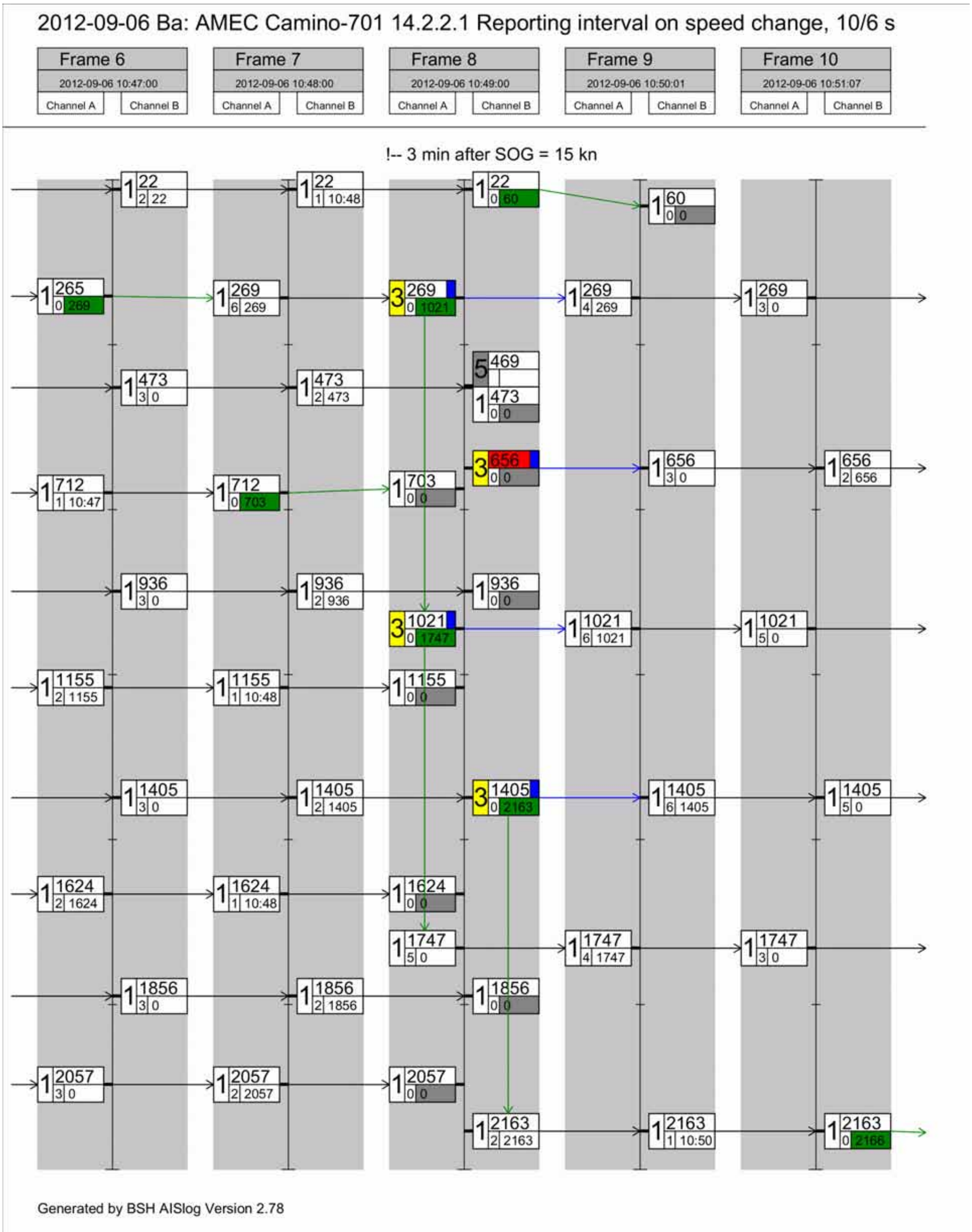
C.1.1 Speed change, Interval 10s – 6s



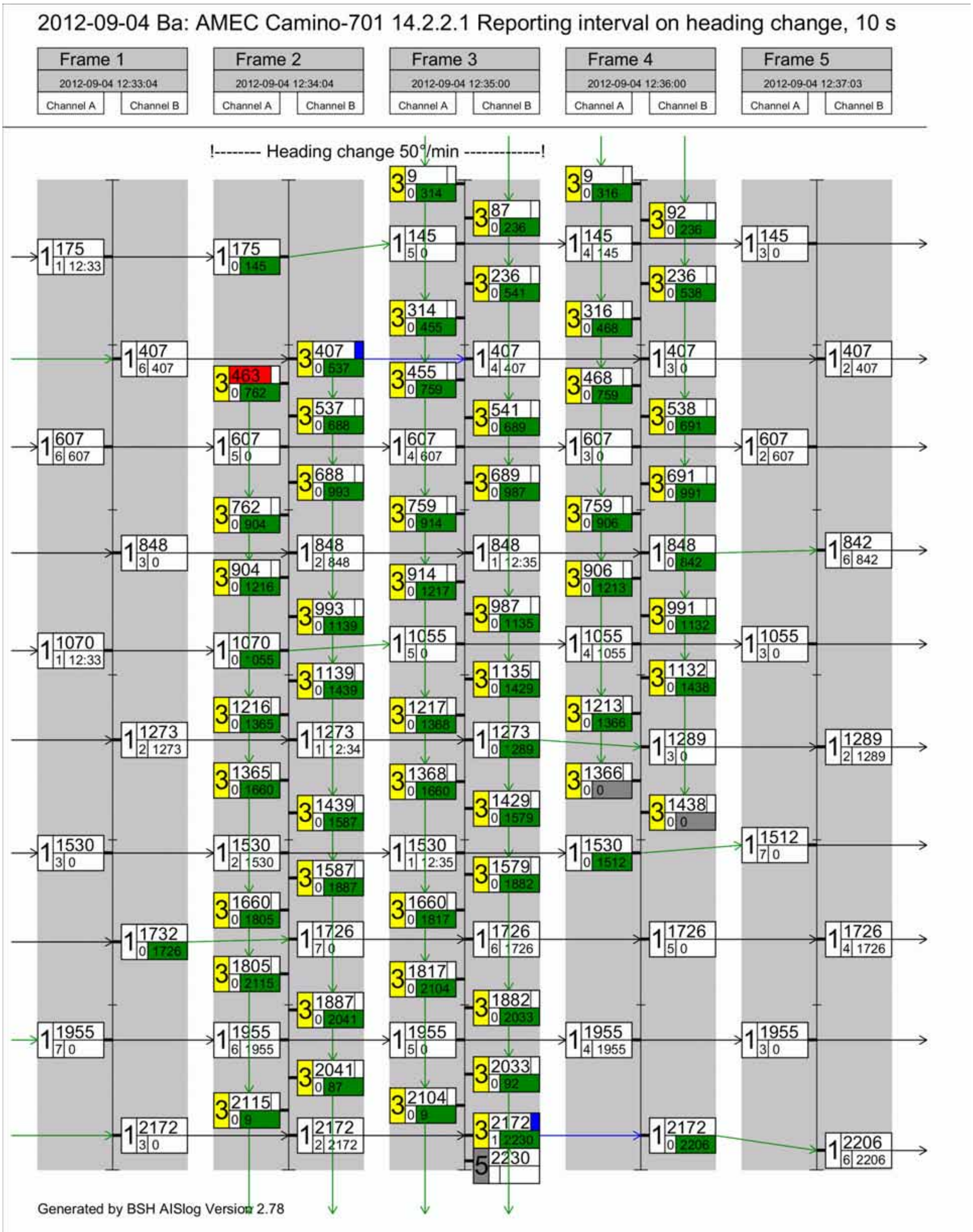

2013-02-07 Ba: AMEC Camino-701 14.2.2.1 Reporting interval by speed change, 10s-6s
Frame 6
2013-02-07 07:26:00
Frame 7
2013-02-07 07:27:00
Frame 8
2013-02-07 07:28:00
Frame 9
2013-02-07 07:29:07
Frame 10
2013-02-07 07:30:07
Channel A
Channel B
!-- 3 min after SOG = 10 kn
Generated by BSH AISlog Version 2.84

C.1.2 Speed change, Interval 6s – 2s

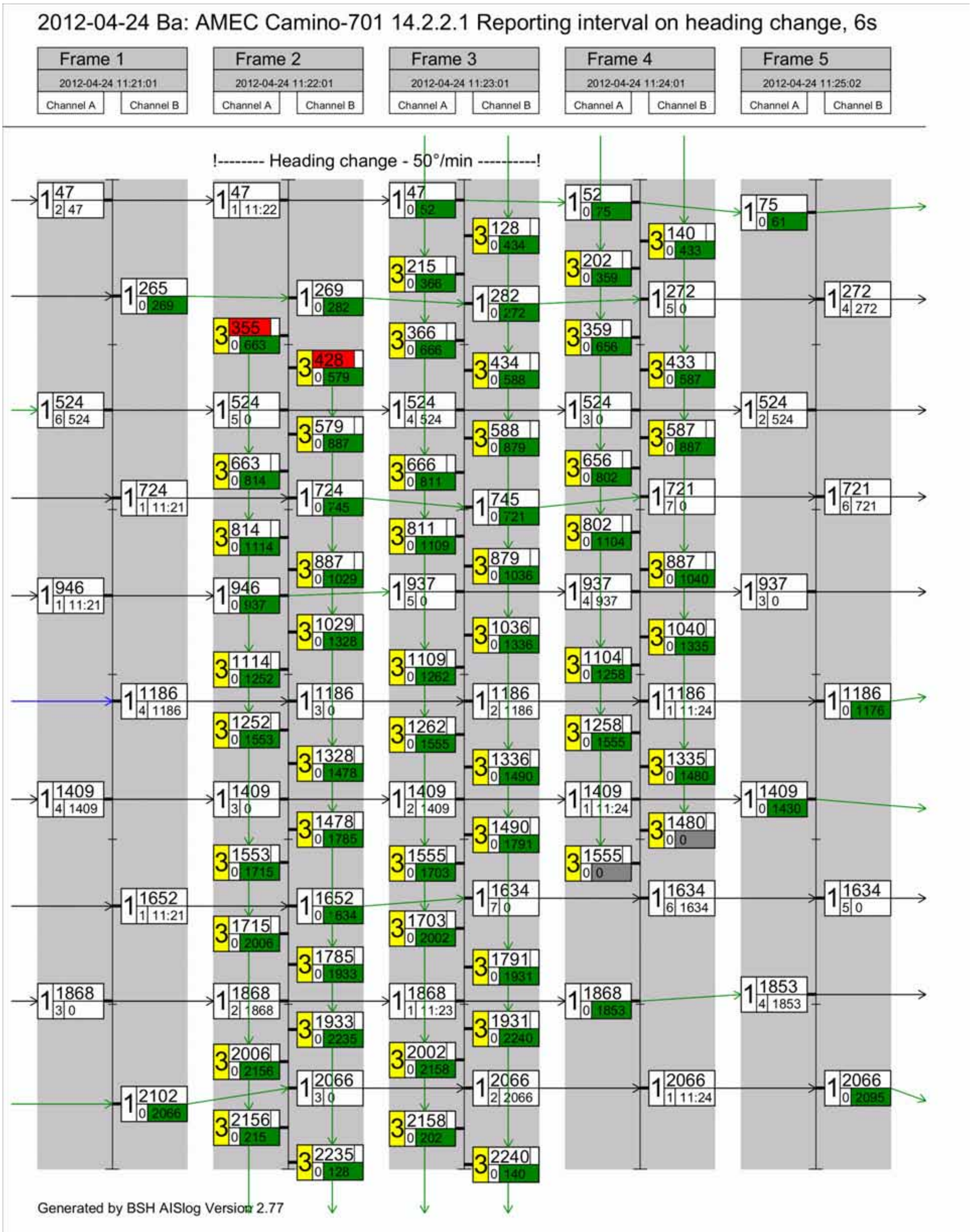



2012-09-06 Ba: AMEC Camino-701 14.2.2.1 Reporting interval on speed change, 10/6 s
Frame 6
2012-09-06 10:47:00
Channel A
Channel B
Frame 7
2012-09-06 10:48:00
Channel A
Channel B
Frame 8
2012-09-06 10:49:00
Channel A
Channel B
Frame 9
2012-09-06 10:50:01
Channel A
Channel B
Frame 10
2012-09-06 10:51:07
Channel A
Channel B
!-- 3 min after SOG = 15 kn
Generated by BSH AISlog Version 2.78

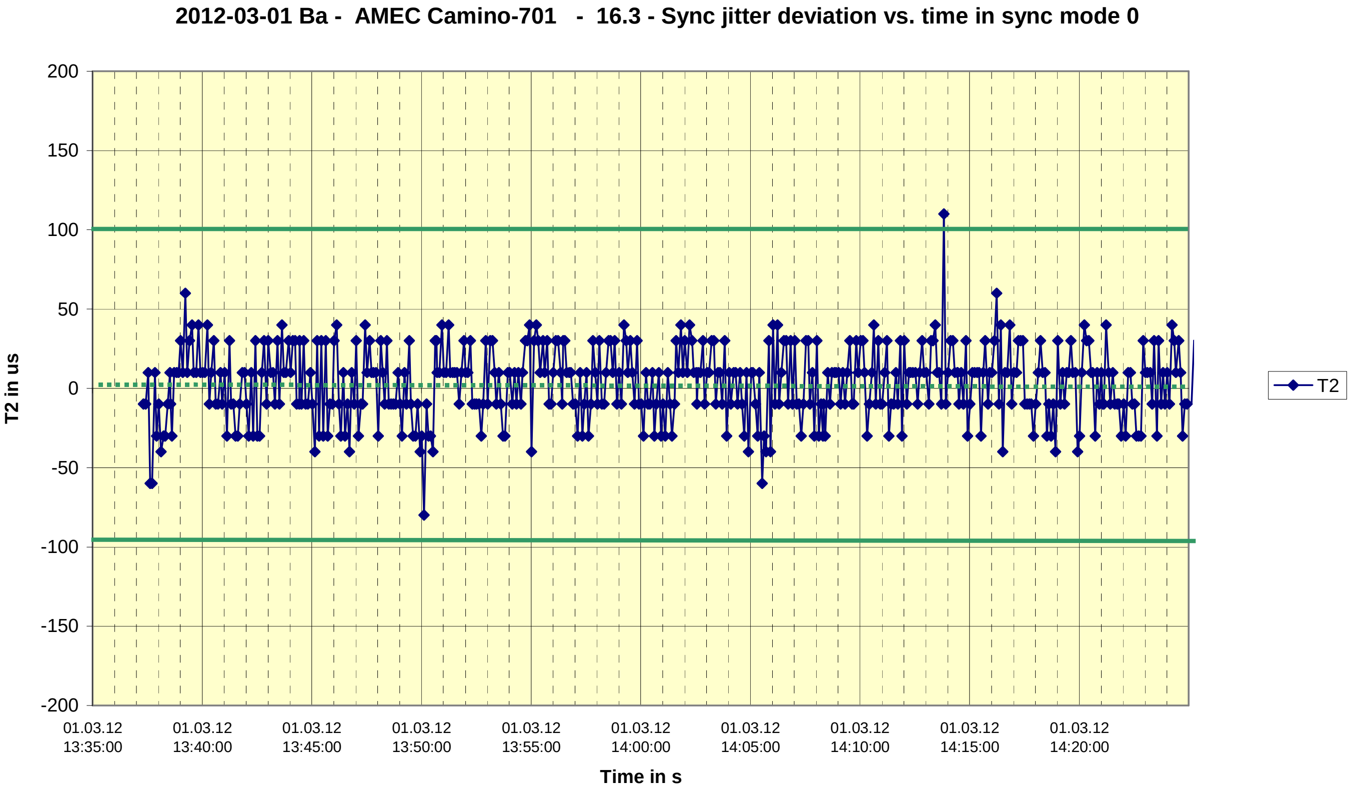
C.1.3 Heading change, Interval 10s – 3 1/3s

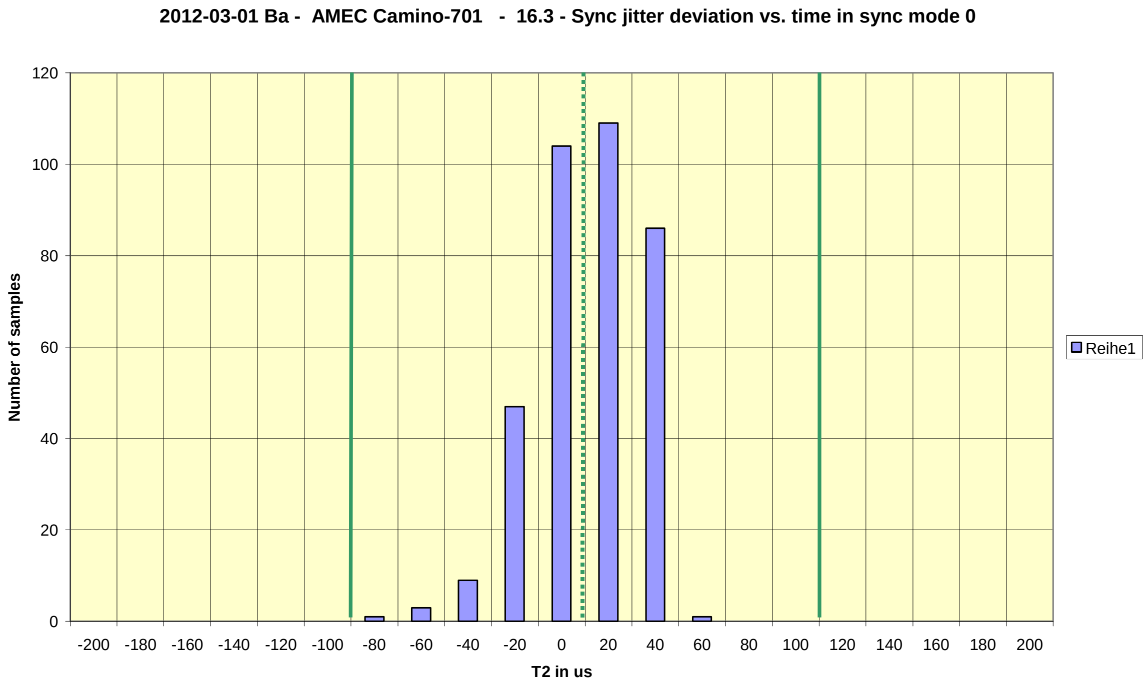


C.1.4 Heading change, Interval 6s – 2s

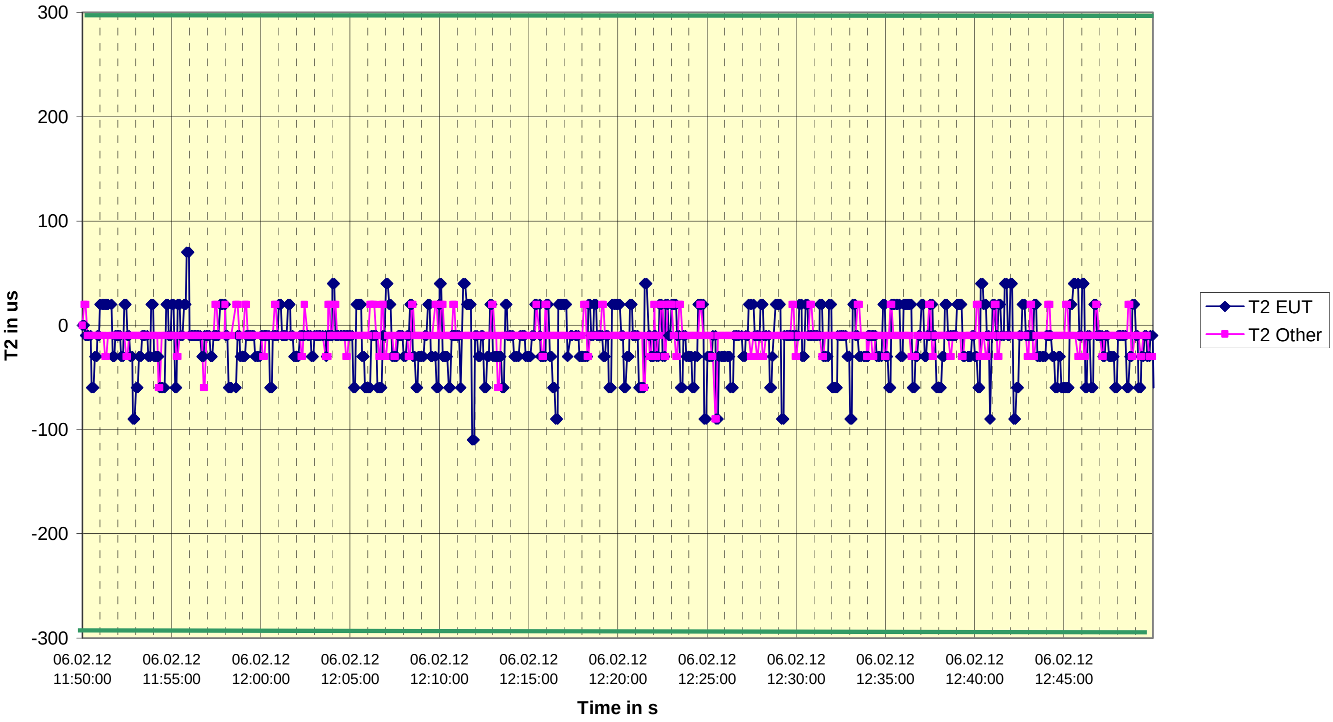


C.2 16.3 Synchronisation and jitter accuracy



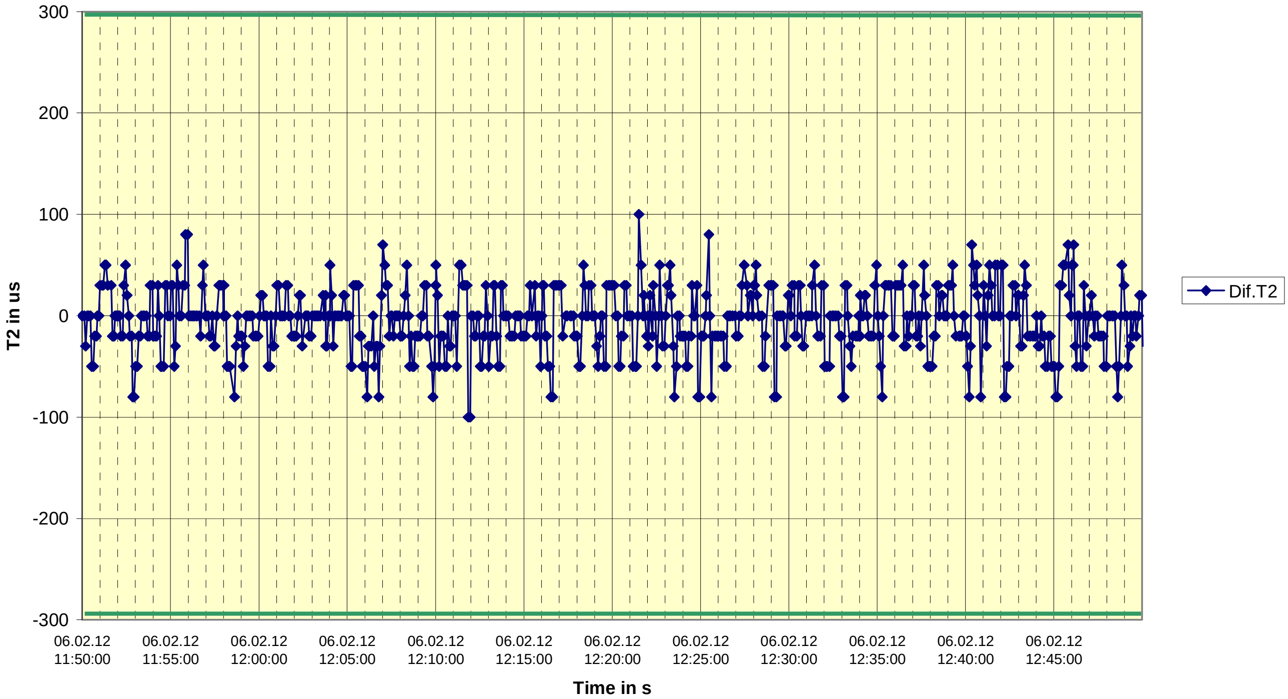


2012-02-06 Ba - AMEC Camino-701 - 16.3 - Sync jitter deviation vs. time in sync mode 1



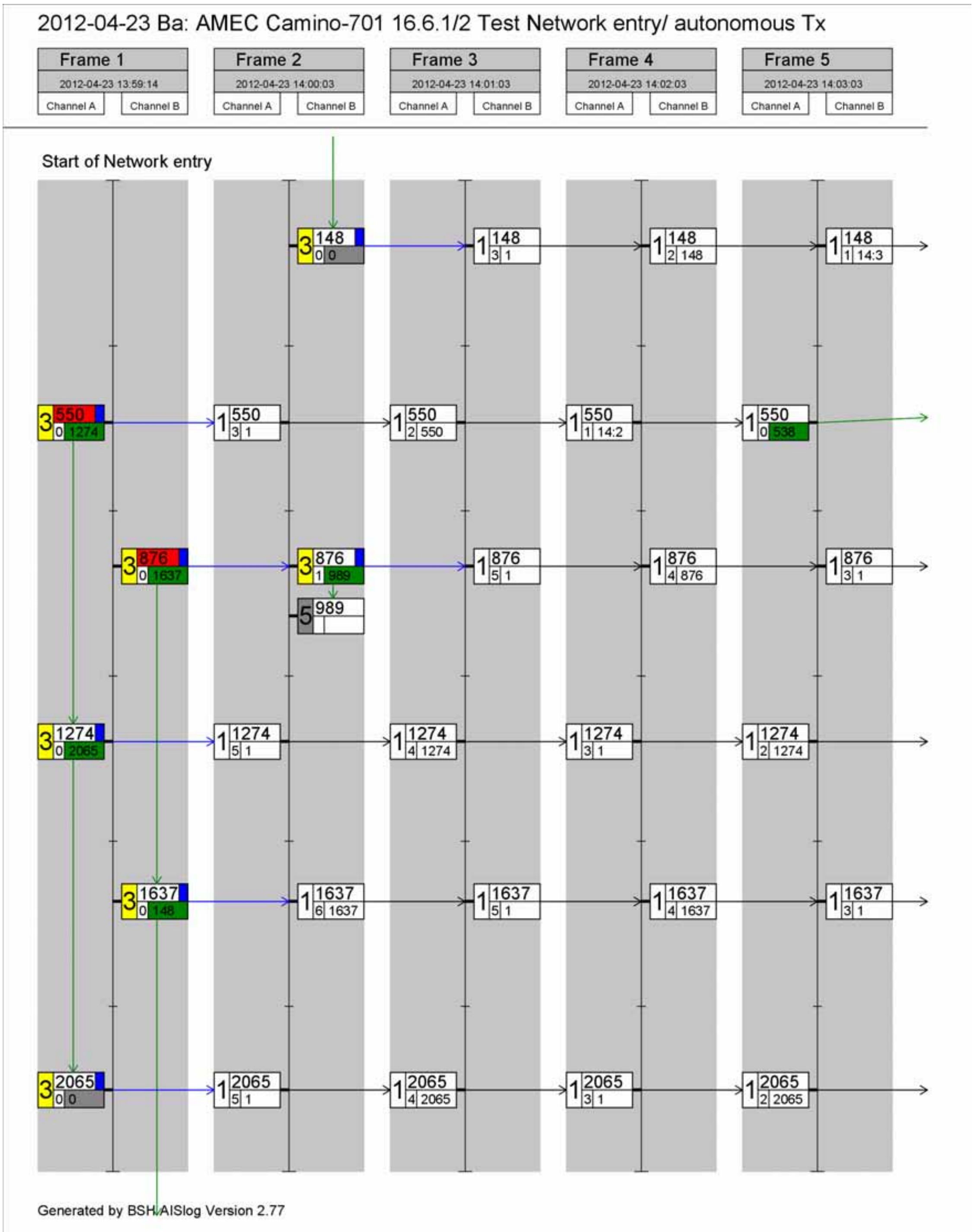
2012-02-06 Ba - AMEC Camino-701 - 16.3 - Sync jitter deviation vs. time in sync mode 1

Difference: T2 EUT - T2 Other

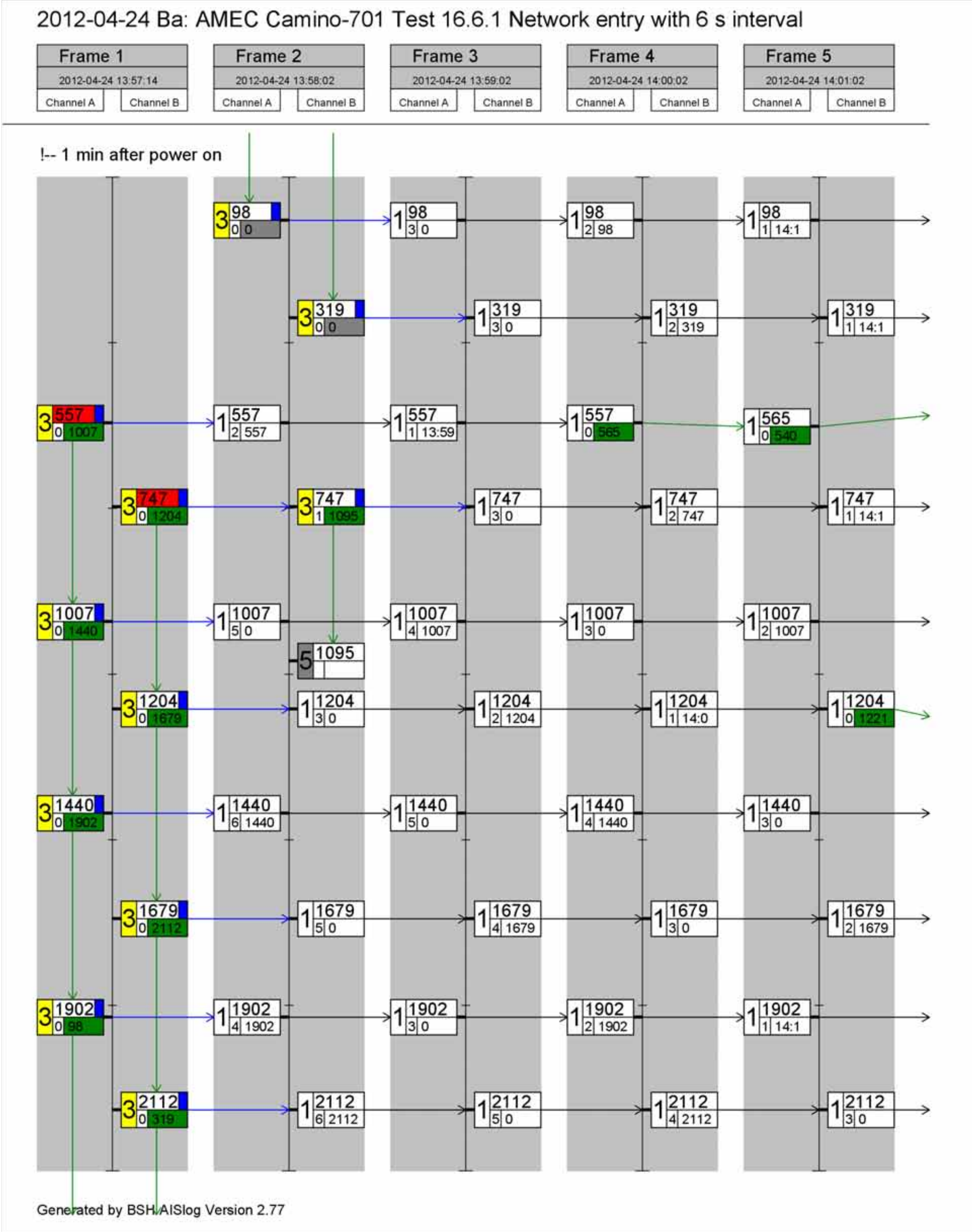


C.3 16.6.1 Network entry

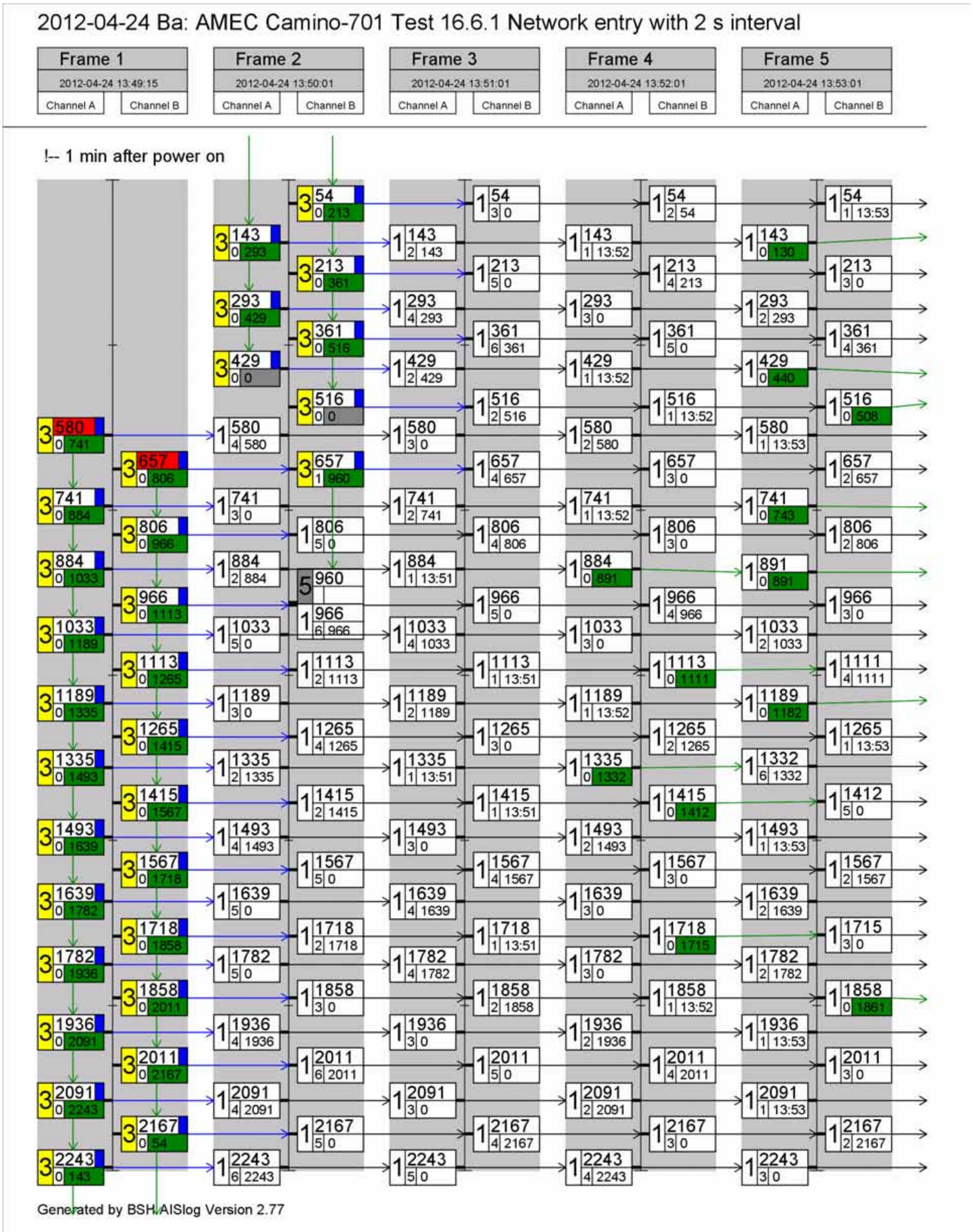
C.3.1 10 s reporting interval



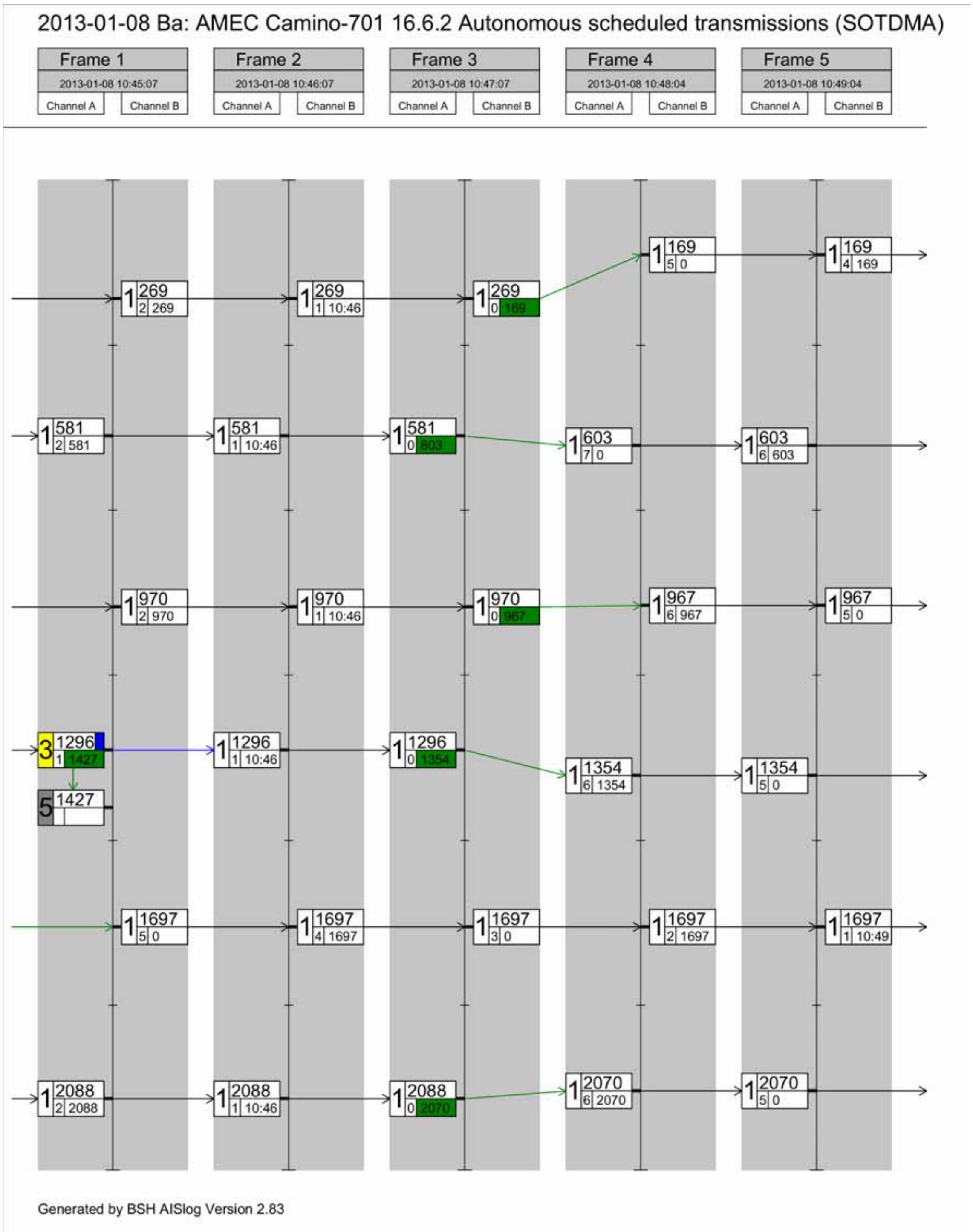
C.3.2 6 s reporting interval



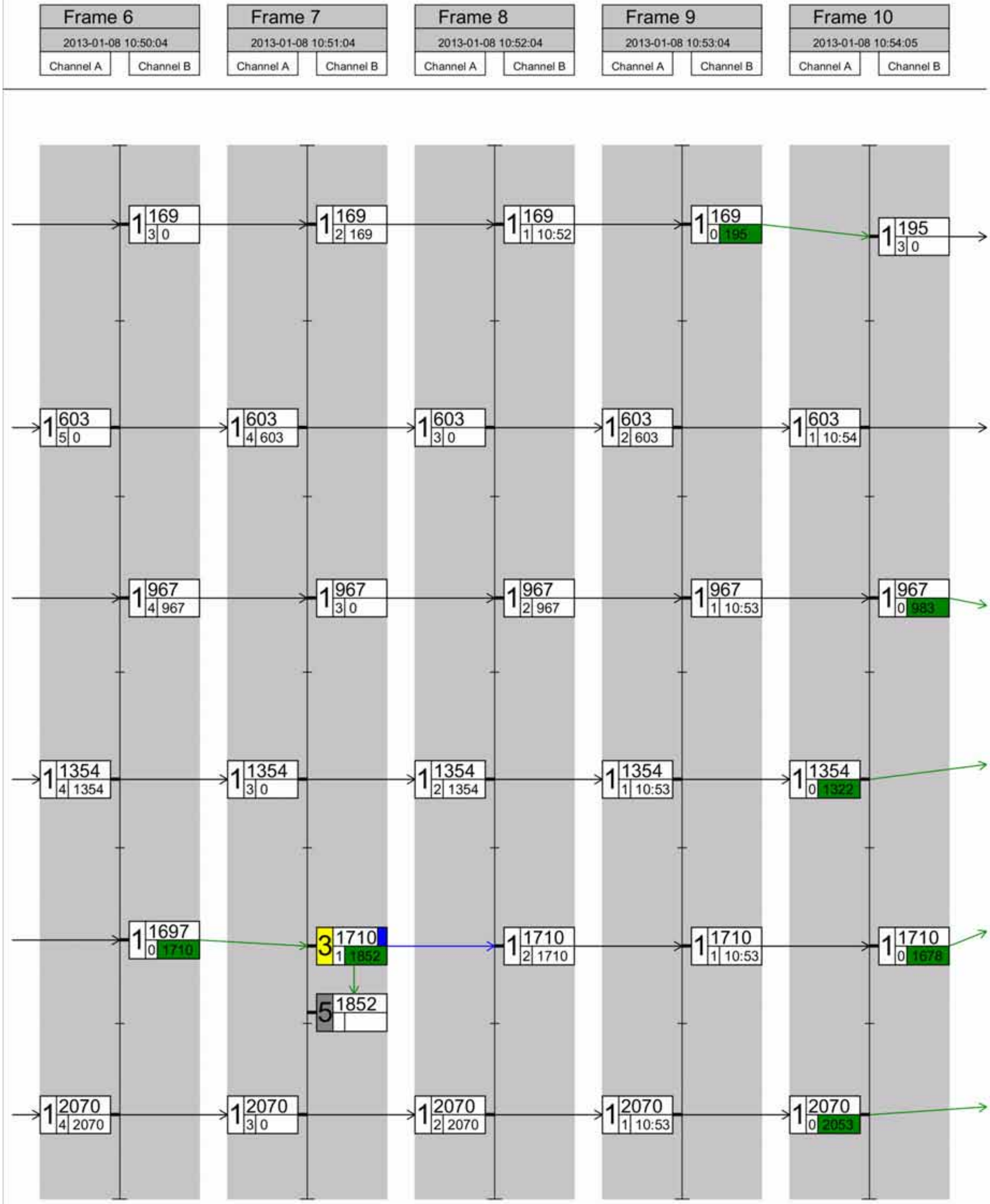
C.3.3 2 s reporting interval



C.4 16.6.2 Autonomous scheduled Tx (SOTDMA)



2013-01-08 Ba: AMEC Camino-701 16.6.2 Autonomous scheduled transmissions (SOTDMA)



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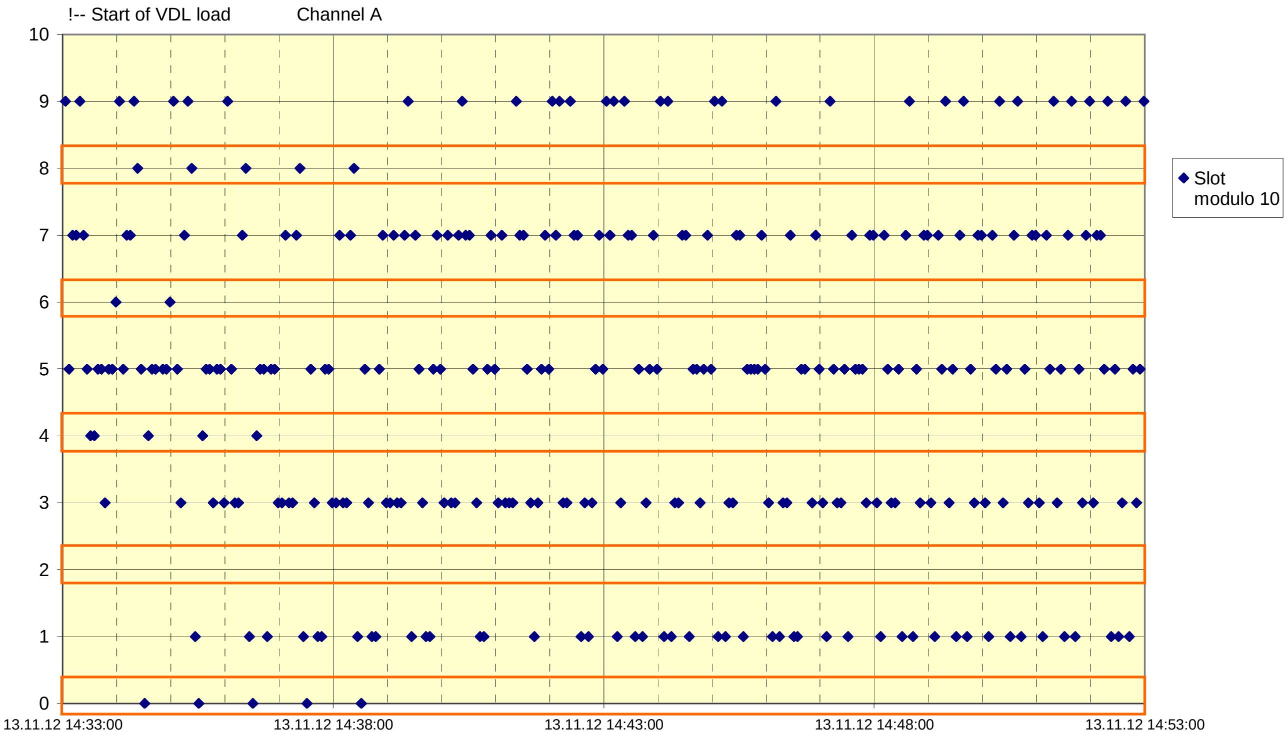
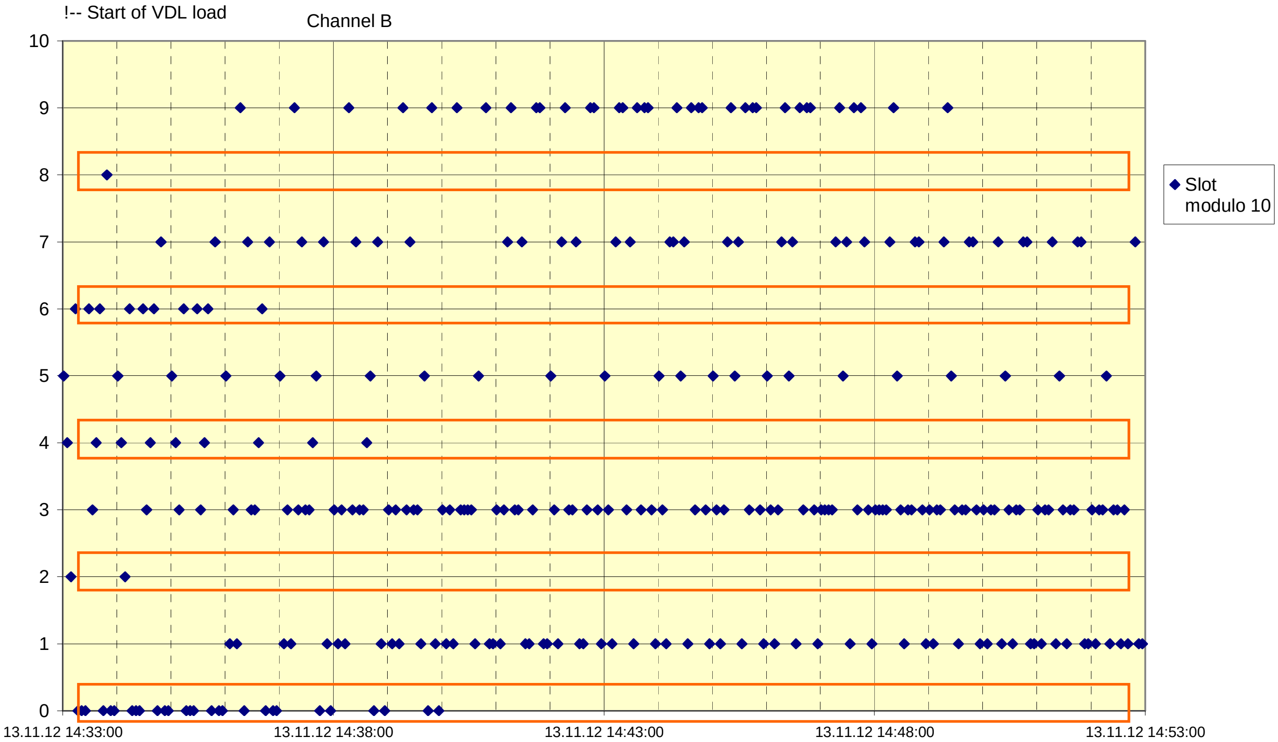
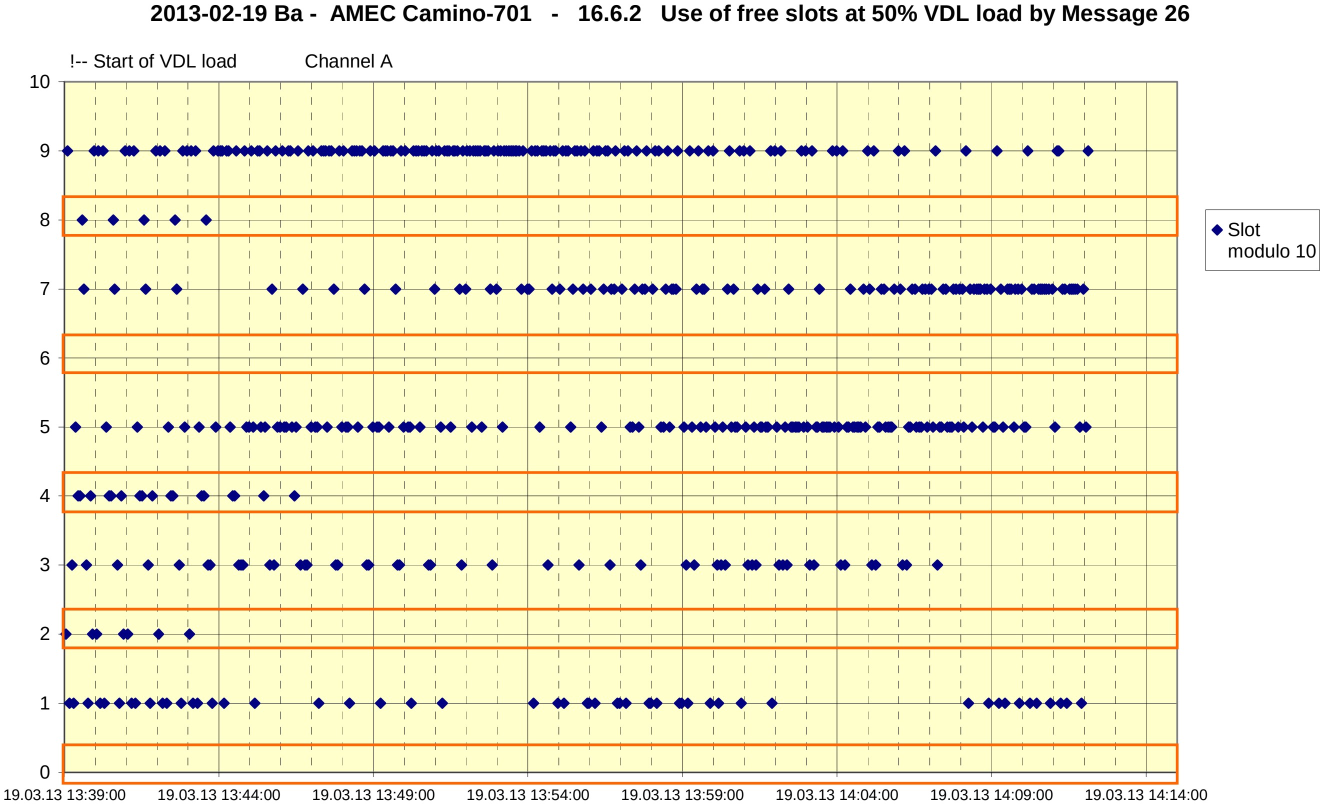
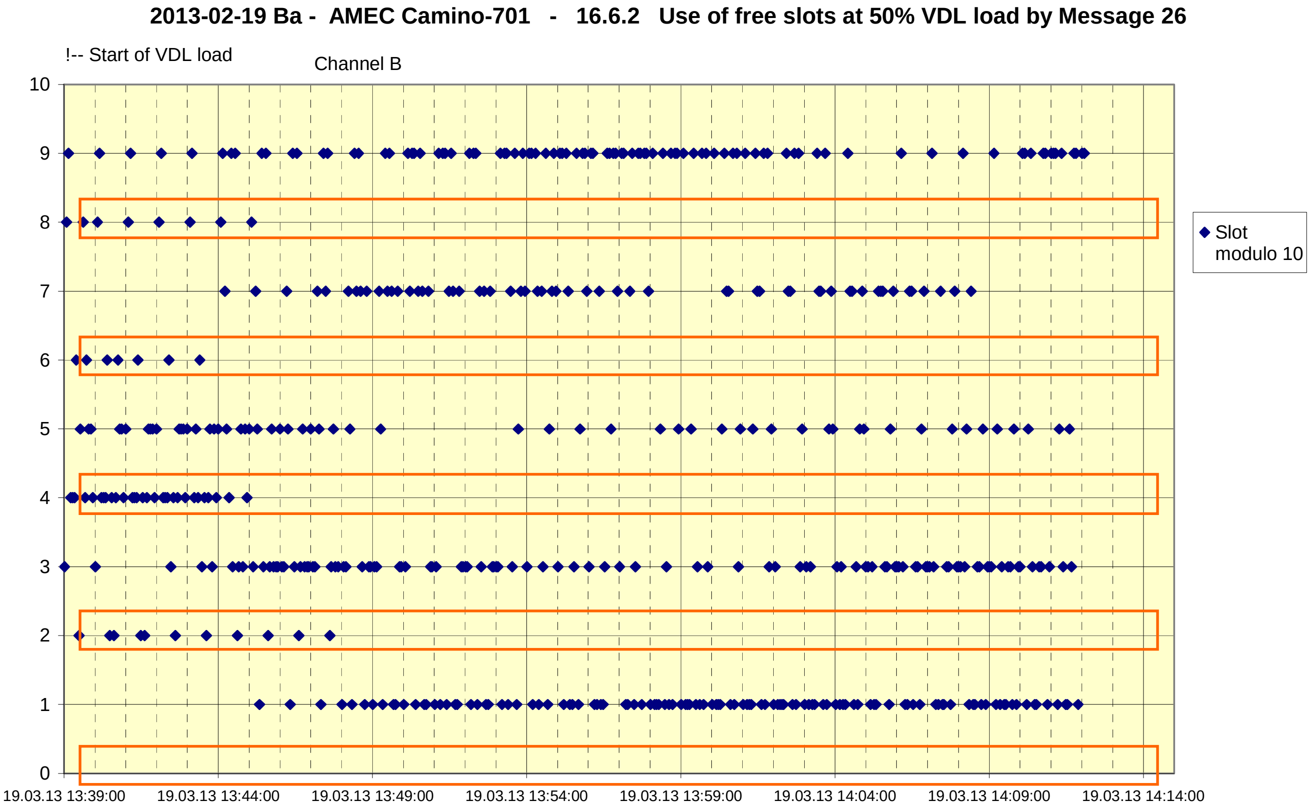
2012-11-13 Ba - AMEC Camino-701 - 16.6.2 Use of free slots at 50% VDL load by message 1/3.



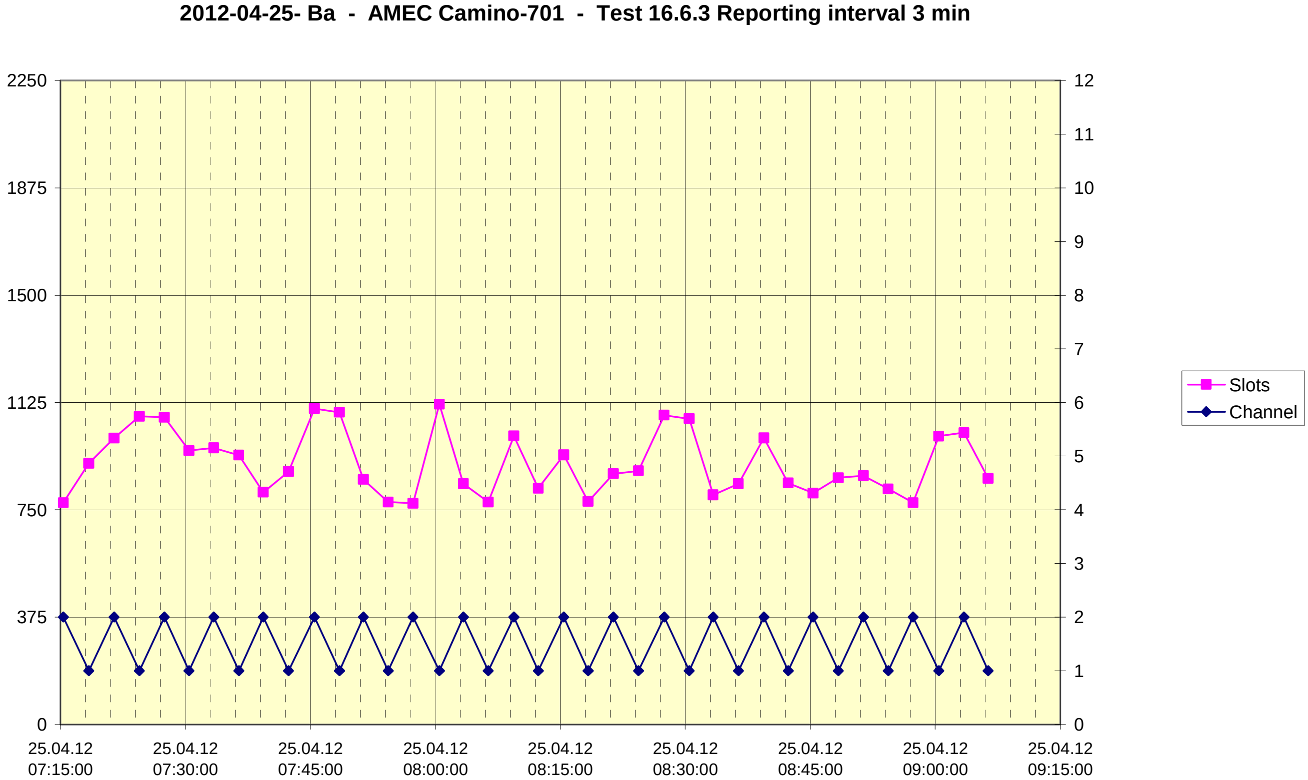
2012-11-13 Ba - AMEC Camino-701 - 16.6.2 Use of free slots at 50% VDL load by message 1/3.

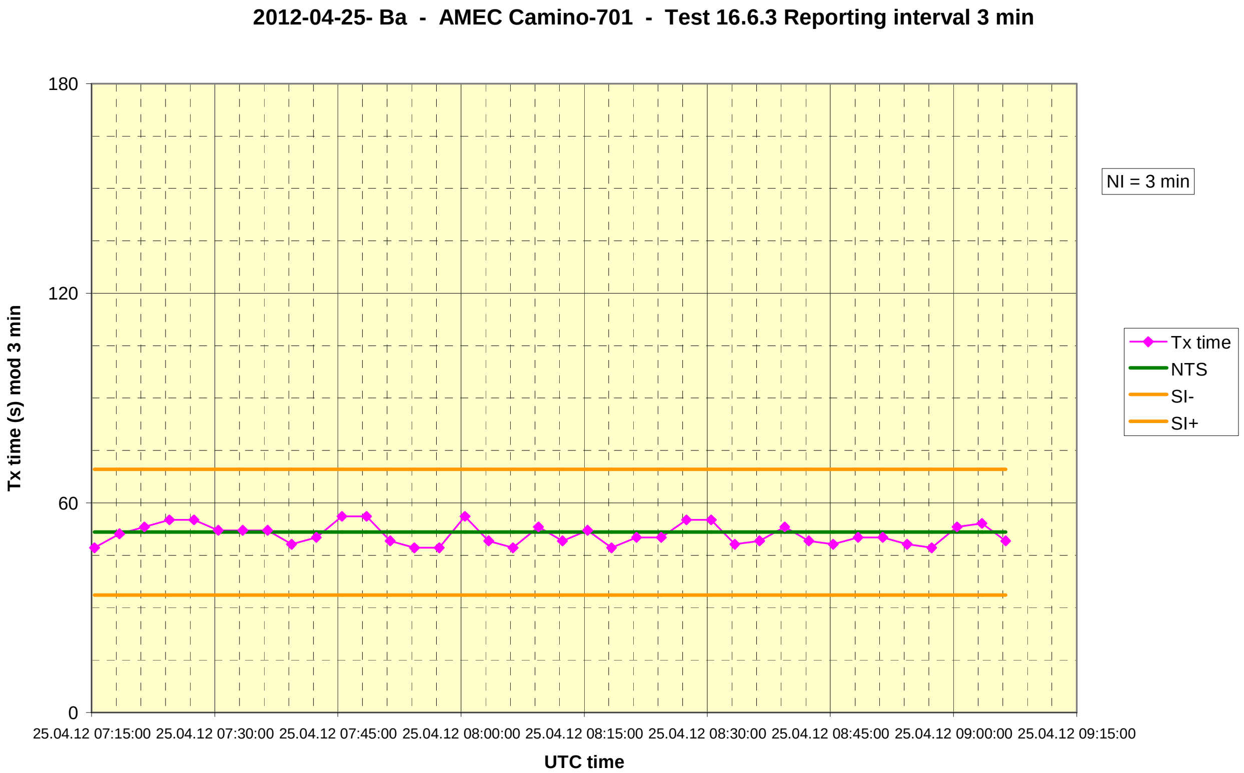


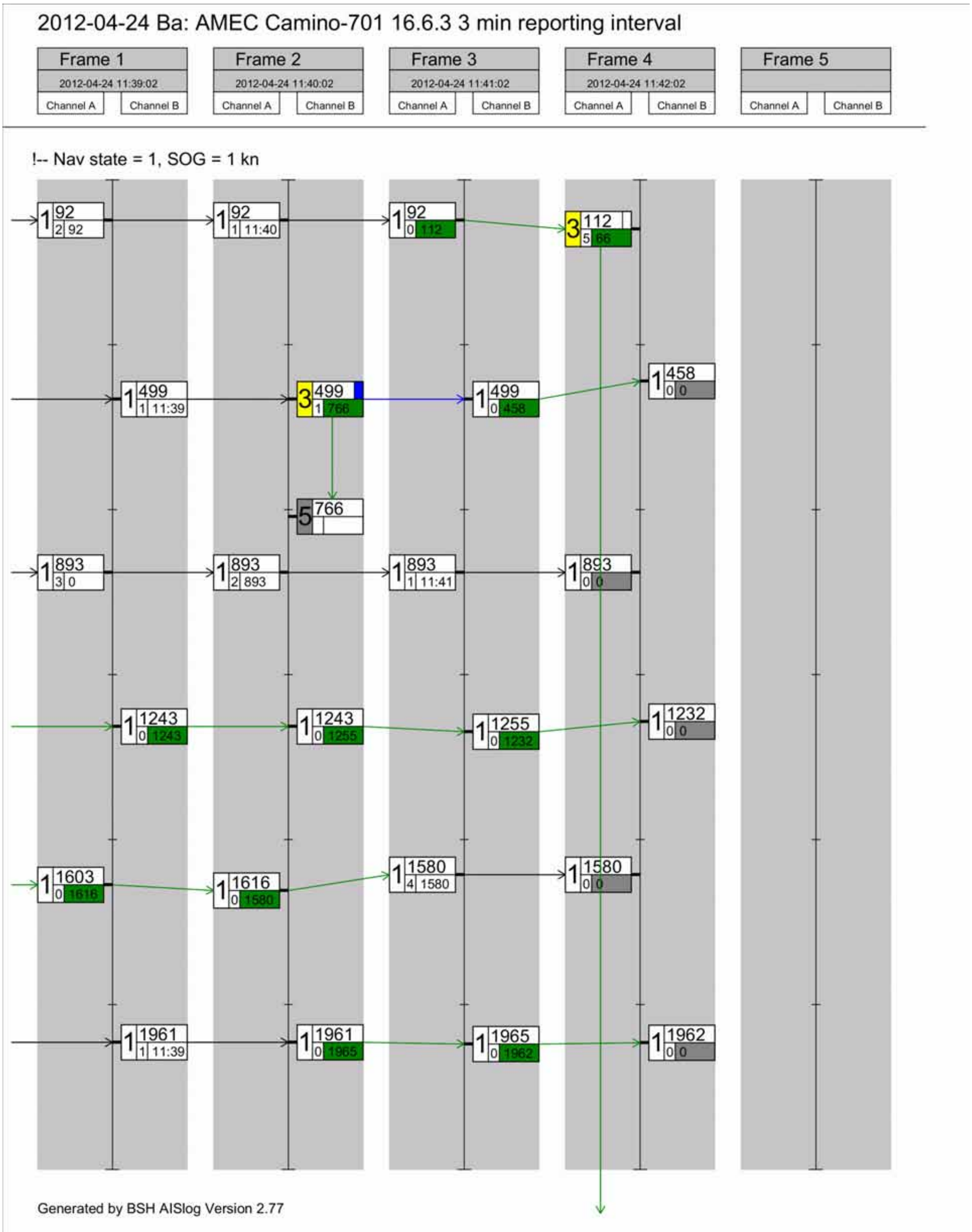

2013-02-19 Ba - AMEC Camino-701 - 16.6.2 Use of free slots at 50% VDL load by Message 26
!-- Start of VDL load
Channel A
10
9
8
7
6
5
4
3
2
1
0
19.03.13 13:39:00
19.03.13 13:44:00
19.03.13 13:49:00
19.03.13 13:54:00
19.03.13 13:59:00
19.03.13 14:04:00
19.03.13 14:09:00
19.03.13 14:14:00
Slot modulo 10

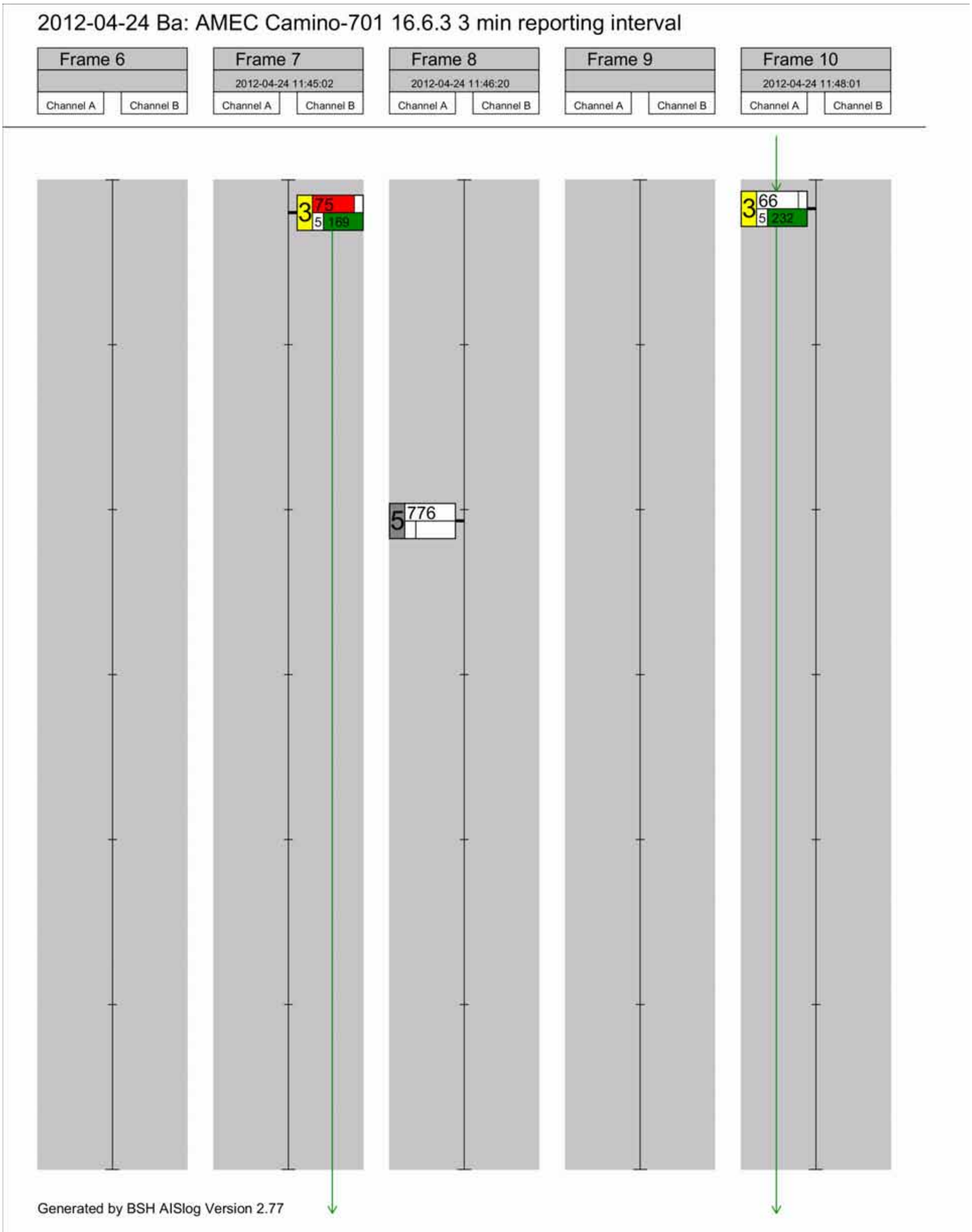

2013-02-19 Ba - AMEC Camino-701 - 16.6.2 Use of free slots at 50% VDL load by Message 26
!-- Start of VDL load
Channel B
10
9
8
7
6
5
4
3
2
1
0
19.03.13 13:39:00
19.03.13 13:44:00
19.03.13 13:49:00
19.03.13 13:54:00
19.03.13 13:59:00
19.03.13 14:04:00
19.03.13 14:09:00
19.03.13 14:14:00
Slot modulo 10

C.5 16.6.3 Autonomous scheduled Tx (ITDMA)

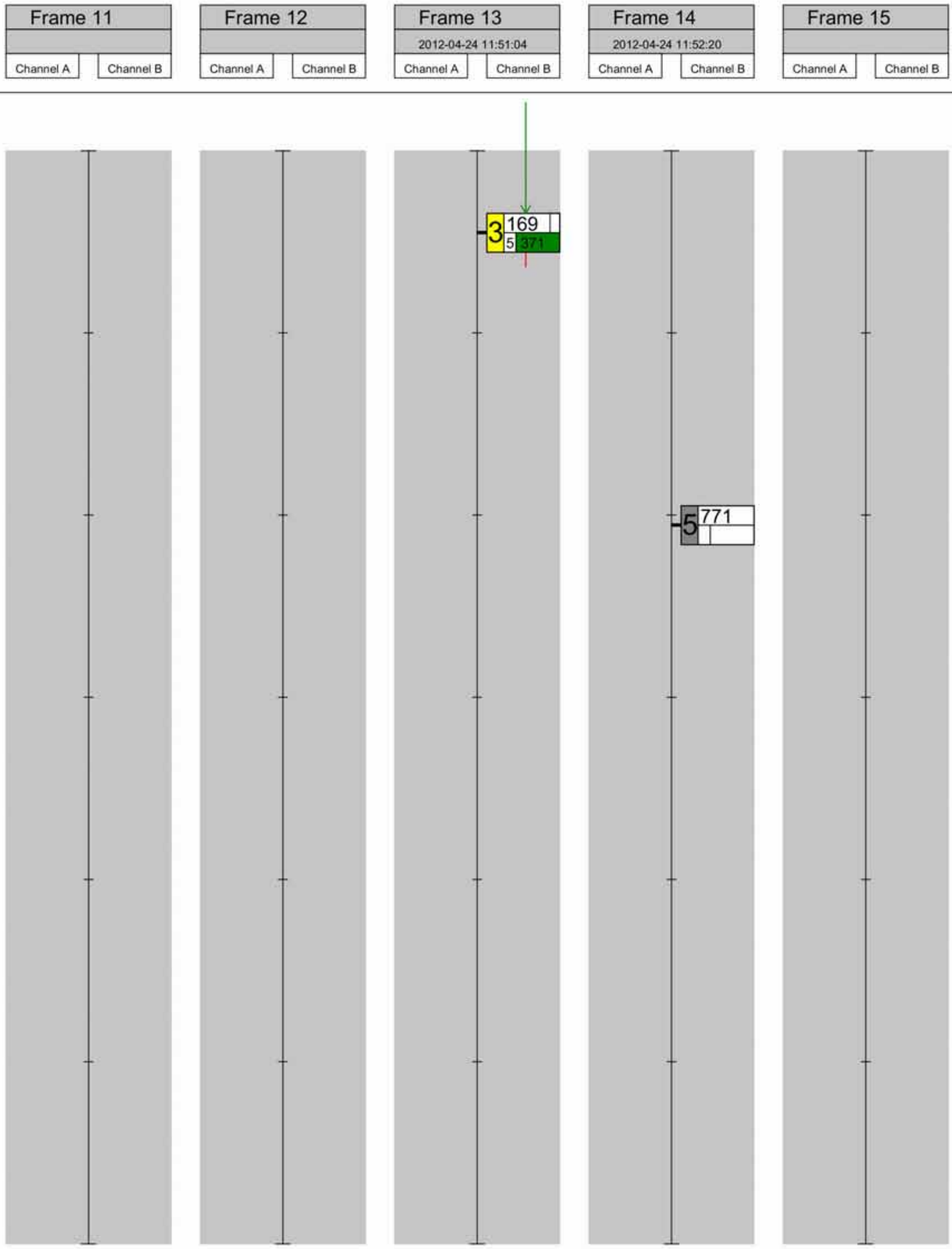




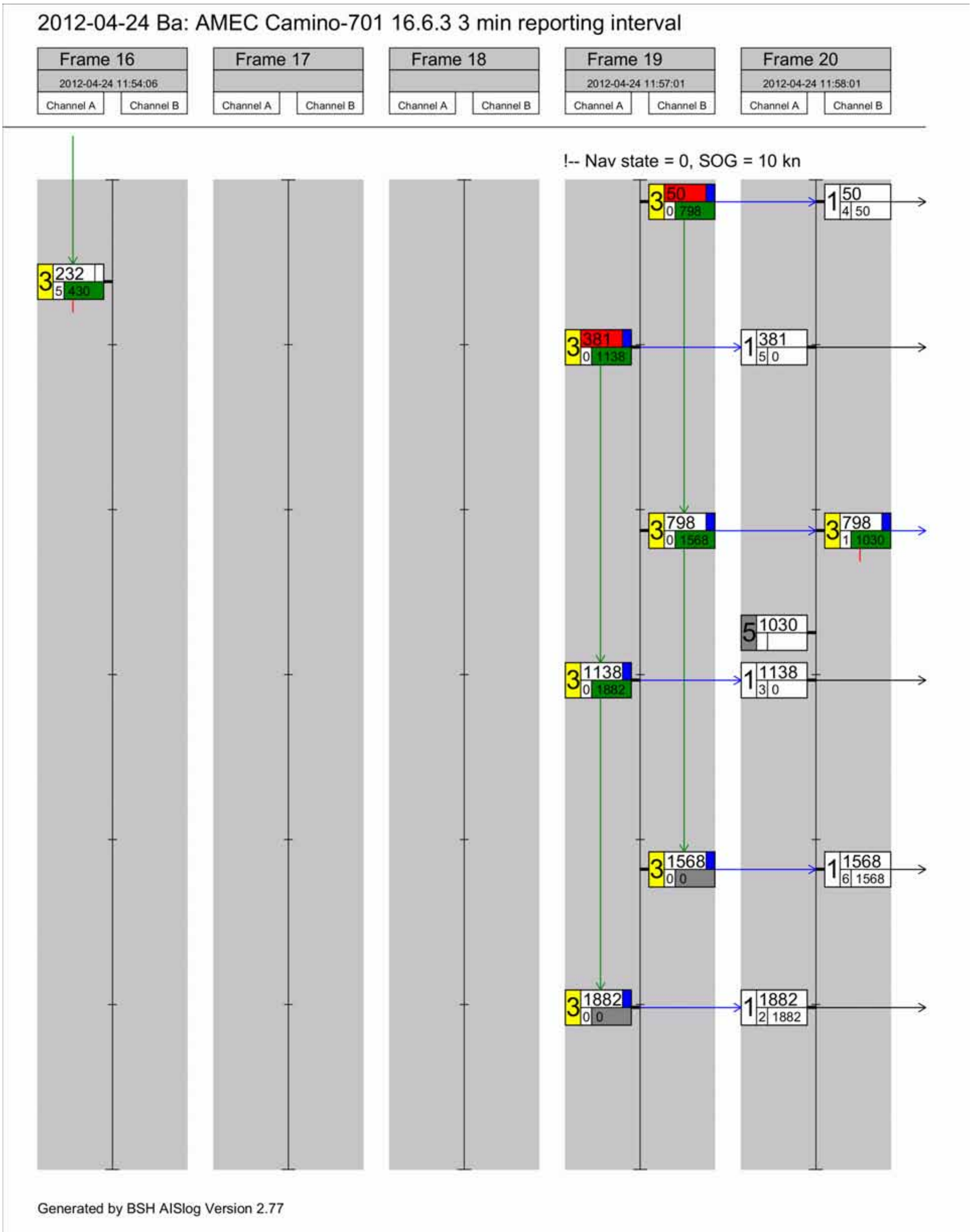

2012-04-24 Ba: AMEC Camino-701 16.6.3 3 min reporting interval
Frame 1
2012-04-24 11:39:02
Frame 2
2012-04-24 11:40:02
Frame 3
2012-04-24 11:41:02
Frame 4
2012-04-24 11:42:02
Frame 5
Channel A
Channel B
!-- Nav state = 1, SOG = 1 kn
Generated by BSH AISlog Version 2.77


2012-04-24 Ba: AMEC Camino-701 16.6.3 3 min reporting interval
Frame 6
Frame 7
2012-04-24 11:45:02
Frame 8
2012-04-24 11:46:20
Frame 9
Frame 10
2012-04-24 11:48:01
Channel A
Channel B
3
75
5
169
5
776
3
66
5
232
Generated by BSH AISlog Version 2.77

2012-04-24 Ba: AMEC Camino-701 16.6.3 3 min reporting interval



Generated by BSH AISlog Version 2.77


2012-04-24 Ba: AMEC Camino-701 16.6.3 3 min reporting interval
Frame 16
2012-04-24 11:54:06
Frame 17
Frame 18
Frame 19
2012-04-24 11:57:01
Frame 20
2012-04-24 11:58:01
Channel A
Channel B
!-- Nav state = 0, SOG = 10 kn
Generated by BSH AISlog Version 2.77

C.6 16.6.4 Safety related/ binary message transmission