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: **Saab**

Type: **R5 solid**

Applying test standards: IEC 61993-2 [Sections 14, 16-21]: 2001

Test Report No.: BSH/4612/4321964/12-1

Applicant:

Saab TransponderTech AB
Låsblecksgatan 3
58941 Linköping
Sweden

Hamburg, 08 March 2012
Federal Maritime and
Hydrographic Agency

by order

Heinrich Bartels
Test engineer

by order

Hans-Karl von Arnim
Head of section

nach EN ISO/IEC 17025:2005
akkreditiertes Prüflaboratorium

Deutscher Akkreditierungs Rat
DAR
DAT-P-086/98

Federal Maritime and Hydrographic Agency
Bernhard-Nocht-Str. 78
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The **TGA GmbH,** represented by the **DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH**, confirms that the Testing Laboratory

Federal Maritime and Hydrographic Agency
Department Shipping
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Bernhard-Nocht-Straße 78

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is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out testing in the fields of

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DAR-Registration No.: **DAT-PL-086/98-02**

Frankfurt/Main, 2008-12-23

Correctness of the english translation confirmed: Frankfurt/Main, 2008-12-23

i.V. Dipl.-Ing.(FH) R. Egner
Head of the Accreditation Body

Member in EA, ILAC, IAF

Translation for information purposes only. The German Accreditation Certificate is authoritative

See notes overleaf

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1 General

Applicant:	Saab TransponderTech AB Låsblecksgatan 3, 58941 Linköping, Sweden
Equipment under test:	
Type:	R5 solid
Manufacturer:	Saab TransponderTech AB
	Låsblecksgatan 3, 58941 Linköping, Sweden
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	23 May 2011
End of test:	08 March 2012

Test standards[1]:

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

IEC 61993-2 (2001)
Maritime navigation and radiocommunication equipment and systems-
Automatic Identification Systems
Part 2: Class A shipborne equipment of the Universal Automatic Identification System (AIS) – Operational and performance requirements, Methods of testing and required test results
IEC 61162-1/ -2
Maritime navigation and radiocommunication equipment and systems Digital Interfaces
Part 1: single talker and multiple listeners (2011)
Part 2: single talker and multiple listeners, high speed transmission (1998)

[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.

Summary

Test No.	Reference	Section	Result (passed/ not passed / not applicable / not tested)
2	IEC 61993-2	14 Operational tests	Passed
3	IEC 61993-2	15 Physical tests	Not included
4	IEC 61993-2	16 Specific tests of link layer	Passed
5	IEC 61993-2	17 Specific tests of network layer	Passed
6	IEC 61993-2	18 Specific tests of transport layer	Passed
7	IEC 61993-2	19 Specific presentation interface tests	Passed
8	IEC 61993-2	20 DSC functionality tests	Passed
9	IEC 61993-2	21 Long range functionality tests	Passed

2 General

2.1 Equipment history

For each Transponder unit under test an numbered entry is provided here. For the two test environment it is recorded which EUT system is under test in that environment

2.1.1 EUT system no 1

Transponder				
Type	R5 solid		Part No.:	---
Delivery date	2011-05-19		Serial number	No label, “BSH 1”
HW Version:	Delivery date	2011-05-19	Version no	R5 Solid 0
	Installation date	2011-05-19		
SW Version:	Delivery date	2011-05-19	Version no	R5 0.2 BSH
	Installation date	2011-05-19		
SW Version:	Delivery date	2011-05-24	Version no	R5 0.3 BSH
	Installation date	2011-05-24		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Internal	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	MA-700		Part No.:	---
Delivery date	2011-05-19		Serial number	0025343
HW Version:	Delivery date	2011-05-19	Version no	---
	Installation date	2011-05-19		

2.1.2 EUT system no 2

Transponder				
Type	R5 solid	Part No.:	---	
Delivery date	2011-05-24	Serial number	No label, “BSH 2”	
HW Version:	Delivery date	2011-05-24	Version no	R5 Solid 0
	Installation date	2011-05-24		
SW Version:	Delivery date	2011-05-24	Version no	R5 0.2 BSH
	Installation date	2011-05-24		
SW Version:	Delivery date	2011-05-24	Version no	R5 0.3 BSH
	Installation date	2011-05-24		
SW Version:	Delivery date	2011-06-21	Version no	R5 0.6 BSH
	Installation date	2011-06-21		
SW Version:	Delivery date	2011-07-12	Version no	R5 0.7 BSH
	Installation date	2011-07-19		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Internal	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	MA-700	Part No.:	---	
Delivery date	2011-05-19	Serial number	0025343	
HW Version:	Delivery date	2011-05-19	Version no	---
	Installation date	2011-05-19		

2.1.3 EUT system no 3

Transponder				
Type	R5 solid		Part No.:	2000 118-130
Delivery date	2011-11-17		Serial number	00001
HW Version:	Delivery date	2011-11-17	Version no	R5 Solid 0
	Installation date	2011-11-17		
SW Version:	Delivery date	2011-11-17	Version no	R5 0.10
	Installation date	2011-11-17		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Internal	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	MA-700		Part No.:	---
Delivery date	2011-05-19		Serial number	0025343
HW Version:	Delivery date	2011-05-19	Version no	---
	Installation date	2011-05-19		

2.1.4 EUT system no 4

Transponder				
Type	R5 solid	Part No.:	2000 118-130	
Delivery date	2012-01-23	Serial number	00010	
HW Version:	Delivery date	2012-01-23	Version no	R5 Solid 0
	Installation date	2012-01-23		
SW Version:	Delivery date	2012-01-23	Version no	R5 0.13
	Installation date	2012-01-23		
SW Version:	Delivery date	2012-01-26	Version no	R5 0.15
	Installation date	2012-01-26		
SW Version:	Delivery date	2012-02-20	Version no	R5 0.18
	Installation date	2012-02-20		
SW Version:	Delivery date	2012-02-21	Version no	R5 0.19
	Installation date	2012-02-21		
SW Version:	Delivery date	2012-02-27	Version no	R5 0.20
	Installation date	2012-02-27		
SW Version:	Delivery date	2012-03-06	Version no	R5 0.21
	Installation date	2012-03-06		
SW Version:	Delivery date	2012-03-07	Version no	R5 0.22
	Installation date	2012-03-07		
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Internal	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	MA-700	Part No.:	---	
Delivery date	2011-05-19	Serial number	0025343	
HW Version:	Delivery date	2011-05-19	Version no	---
	Installation date	2011-05-19		

2.1.5 EUT system no 5

Transponder				
Type	R5 solid		Part No.:	2000 118-130
Delivery date	2012-01-26		Serial number	00009
HW Version:	Delivery date	2012-01-26	Version no	R5 Solid 0
	Installation date	2012-01-26		
SW Version:	Delivery date	2012-01-26	Version no	R5 0.14
	Installation date	2012-01-26		
SW Version:	Delivery date	2012-01-31	Version no	R5 0.17
	Installation date	2012-02-01		
SW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date		Version no	
	Installation date			
SW Version:	Delivery date		Version no	
	Installation date			

MKD			
Type	Internal	Part No.:	
Delivery date		Serial number	

GPS antenna				
Type	MA-700		Part No.:	---
Delivery date	2011-05-19		Serial number	0025343
HW Version:	Delivery date	2011-05-19	Version no	---
	Installation date	2011-05-19		

2.2 Test environment

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

2.2.1 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	2011-05-23	2011-05-24	Bartels
2	2011-05-24	2011-05-27	Bartels
2	2011-06-24	2011-07-01	Bartels
2	2011-07-20	2011-07-27	Bartels
2	2011-08-10	2011-08-11	Skrabs
3	2011-11-24	2011-12-15	Bartels
4	2012-01-24	2012-02-02	Bartels
4	2012-02-20	2012-03-08	Bartels

2.3 Composition

Minimum Keyboard and display (MKD)

☒ Internal ☐ Remote ☐ external

internal GNSS

☐ sync only ☒ backup pos. sensor

2.4 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	Result	Status

Issue of this template 2009-08-28

[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

2.5 General observations

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

	General problems		
Date	Item	Remark	Result
2012-01-31 Ba	Alarm management	There is a problem with the alarm handling. It seems that disabled alarms activate the relay and the blinking Status LED but cannot be acknowledged because there is no popup for acknowledgement. Actually I had rather often an VSWR alarm (002) but could not really inactivate it. It did not generate an popup alarm window but switched the relay on and activated the blinking Status LED which I could not acknowledge. If an alarm is disabled it should not activate the relay and should not activated the blinking Status LED. Retest 2012-02-22 Ba If an alarm is disabled, there is still an ALR output but the relay is not activated.	Passed

2.6 4.3 Manuals

2.6.1 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 of external connector required for connection of the external display as referred to in 7.6.3.2*
- *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.

2012-02-22 Ba	Test details – General documentation		
Test item	Check	Remark	Result
Composition of customer documentation	Check the composition of customer documentation.	The documentation consists of: • Combined Installation and operation manual	
Description of AIS	Check that an general function description of AIS as a new system is included. This is not required but recommended in the introduction phase of a new system.	Section 1 of the manual	Passed
Operating information	Check that an operating manual is included	Manual section 4	Passed
Technical information	Check that an technical manual is included	Manual section 6	Passed
Installation information	Check that an installation manual is included	Manual section 3	Passed
Language	Check that the documentation is written in English		Passed

Some details of installation information			
System overview	Check that an AIS system overview diagram is available	Section 2.1 figure 1	Passed
Mechanical dimensions	Check that mechanical dimension drawings of transponder are available	Section 3.4.2	Passed
	Check that mechanical dimension drawings of MKD are available	Internal	N/A
	Check that mechanical dimension drawings of a Connection box available	No connection box available	N/A
	Check that mechanical dimension drawings of GPS antenna are available	Section 3.4.2 For MA-700, AT575-68 and AC Marine VHF/GPS	Passed
	Check that mechanical dimension drawings of VHF antenna are available	For AC Marine VHF/GPS	Passed

2012-02-22 Ba	Test details – Requirements of IEC 61993-2		
Test item	Check	Remark	Result
Connector of external display	Check that type of connector of external Display is included	Not applicable because open lead are used for the connection of the display	N/A
Siting of antennas	Check that information about siting the GPS antenna is included	Section 3.6.1	Passed
	Check that information about siting the VHF antenna is included	Section 3.5.1	Passed
RF cable requirements	Check that information about cable requirements for GPS antenna is included	Section 3.6.2	Passed
	Check that information about cable requirements for the VHF antenna is included	Section 3.5.2	Passed
Illumination	Check that information about external illumination is included if required	No illumination required	N/A

2.6.2 Interface documentation

(61993-2) The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular (see 8.219.2 Check of the 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.

2012-02-22 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	Section 3.7.4	Passed
b) Output driver	Check that the output drive capability is included	Section 3.7.1 25 x 2 mA	Passed
c) Talker sentences of PI ports	Check that list of sentences is included	The PI output sentence (like VDM, VDO) are missing Retest 2012-02-24 Ba: PI output sentences are included	Passed
	Check that unused fields are noted		Passed
c) Talker sentences of long range port	Check that list of sentences is included	Section 9.2	Passed
	Check that unused fields are noted		Passed
d) Input load	Check that the input load is included	Section 3.7.2 6.4 kOhm	Passed
e) Input sentences of PI ports	Check that list of sentences is included	Section 8.2	Passed
	Check that required and unused fields are noted		Passed
e) Input sentences of long range port	Check that list of sentences is included	Section 8.3	Passed
	Check that required and unused fields are noted		Passed
e) Input sentences of sensor inputs	Check that list of sentences is included	Section 8.1	Passed
	Check that a list is included for each sensor input if different for the ports		Passed
	Check that required and unused fields are noted		Passed
Proprietary sentences	Check that proprietary sentences are listed and described	Section 8.4, 9.1	Passed
f) Software version	Check that the relevant software version is included	Section iv	Passed
f) Hardware version	Check that the relevant hardware version is included	Section v	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	Section 3.7 and 8	Passed

3 14 Operational tests

3.1 14.1 Operating modes / Capability

(4.2)

3.1.1 14.1.1 Autonomous mode

(4.2.1, M.1371 A2/3.3.5)

3.1.1.1 14.1.1.1 Transmit Position reports

Method of measurement

Set up a test environment of at least 5 test targets. Record the VDL communication and check for messages of the EUT.

Required results

Confirm that the EUT transmits continuously and that the transmitted data complies with sensor inputs.

This is a first more general check that the EUT is continuously transmitting a position report. Special tests regarding

- Reporting rate
- Message contents
- Slot use

are done in special test items.

2011-05-26 Ba	Test details – Transmission of Position reports		
Test item	Check	Remark	Result
Navigation status is set to 0 (travelling using engine) Internal GNSS is in use			
MMSI	Check MMSI		Passed
Transmission rate	Check that the message 1 is transmitted continuously		Passed
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

3.1.1.2 14.1.1.2 Receive Position reports

Method of measurement

Set up a test environment of at least 5 test targets.

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.

2011-05-26 Ba	Test details a)– Receive Position reports, Target first started		
Test item	Check	Remark	Result
Switch on Test targets, then start operation of the EUT Check the following items on VDM output at PI compared with the transmitted values			
MMSI	Check MMSI		Passed
Transmission rate	Check that the message 1 is received continuously		Passed
Position	Check the values of lat and lon		Passed
Speed	Check the values of SOG and COG		Passed
Heading/ROT	Check the values of heading and ROT		Passed

2011-05-26 Ba	Test details b)– Receive Position reports, EUT first started		
Test item	Check	Remark	Result
Start operation of the EUT, then switch on Test targets Check the following items on VDM output at PI compared with the transmitted values			
MMSI	Check MMSI		Passed
Transmission rate	Check that the message 1 is received continuously		Passed
Position	Check the values of lat and lon		Passed
Speed	Check the values of SOG and COG		Passed
Heading/ROT	Check the values of heading and ROT		Passed

3.1.2 14.1.2 Assigned mode

(4.2.1 M.1371A2/3.3.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command msg 16 to the EUT with:

a) Slot offset and increment

b) Designated reporting rate.

Record transmitted messages..

Required results

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

This is a test on operational basis. The details of slot allocation are checked in a special test on link layer (see 5.6.5 16.6.4 Assigned operation). A record of this test can be used for evaluation of this slot allocation test point.

A test if the assigned reporting rate depends on course, speed and navigation status is done in 3.4.3 14.4.3 Assigned reporting rates.

This test is completely covered by test 5.6.5 16.6.4 Assigned operation.

3.1.3 14.1.3 Polled mode

(4.2.1 M.1371A2/3.3.2)

3.1.3.1 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 (msg 15) by the EUT addressing 1 or 2 destinations according to message table (M.1371 table 13) requesting the following responses:

- *msg 3, msg 5 from mobile stations*
- *msg 4, msg 20, msg 22. from base stations*

Record transmitted messages.

Required results

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

2011-06-24 Ba	Test details - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,xxxxxxxxxx,3,,,,,, Change type from 5 to 3 A response is automatically transmitted by the addressed transponder			
VDO output of EUT	Check the VDO output on PI		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgement	$AIABK,000001028,B,15,,3	Passed
Tx channel	Check that the interrogation is transmitted on the channel given in the AIR sentence	The interrogation is always transmitted on both channels Retest 2011-07-27 Ba No change, the interrogation is always transmitted on both channels. Retest 2012-02-21 Ba: If a channel is included the interrogation is transmitted on the selected channel. If the channel field is empty the interrogation is transmitted on both channels.	Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check request on VDL analyser		Passed
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Passed
RX of response (VDM)	Check that the response message 3 is received by EUT (VDM)		Passed

2011-06-24 Ba	Test details - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00000xxxx,5,,,,,, A response is automatically transmitted by the addressed transponder			
VDO output of EUT	Check the VDO output on PI		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Tx channel	Check that the interrogation is transmitted on the channel given in the AIR sentence	The interrogation is always transmitted on both channels Retest 2011-07-27 Ba No change, the interrogation is always transmitted on both channels. Retest 2012-02-21 Ba: If a channel is included the interrogation is transmitted on the selected channel. If the channel field is empty the interrogation is transmitted on both channels	Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check request on VDL analyser		Passed
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Passed
RX of response (VDM)	Check that the response message 5 is received by EUT (VDM)		Passed

2011-06-24 Ba	Test details - Interrogation of msg from base stations		
Test item	Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00000xxxx,4/20/22,,,,,, Change type to 4, 20, 22 The response from the base station is not checked			
Request msg 4	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 9	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 18	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 19	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 24	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 20	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed
Request msg 22	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,000001028,A,15,,3	Passed

2011-06-24 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,00000xxxx,3,,5,,000007001,5,, A response is automatically transmitted by one of the addressed transponder			
VDO output of EUT	Check the VDO output on PI		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgement		Passed
RX of request	Check that message is received by one of the addressed transponders (VDM)		Passed
Received by VDL Analyser	Check request on VDL analyser		Passed
TX of response (VDO)	Check that response is transmitted by addressed transponder (VDO)		Passed
RX of response (VDM)	Check that the response message 5 is received by EUT (VDM)		Passed

3.1.3.2 14.1.3.2 Interrogation response

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (msg 15; EUT as destination) to the VDL according to message table (M.1371 table13) for responses with msg 3, msg 5 and slot offset set to defined value.

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.

2011-06-24 Ba	Test details - Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5, slot offset = 0 (auto select) A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX 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	Slot offset 47, 49	Passed
Response channel	Check that the response is transmitted on the request channel		Passed

2011-06-24 Ba	Test details - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 with given slot offset = 10 A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX of response (VDO)	Check that response is transmitted by EUT (VDO)		Passed
Response on VDL	Check the response on VDL with the VDL analyser		Passed
Slot selection	Check that the slot offset defined in the request is used		Passed

More detailed interrogation tests are made in 7.3 “18.2 (M.1371 A1/5.3) Interrogation responses”

3.1.4 14.1.4 Addressed operation

(6.1 M1371 A2/3.3.8)

3.1.4.1 14.1.4.1 Transmit an addressed message

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of an addressed binary message (msg 6; EUT as source) according to message table (M.1371 table 13) by the EUT.

Record the transmitted messages.

Required results

Check that the EUT transmits the msg 6 as appropriate. Repeat test with the addressed safety related message (msg 12).

More detailed tests of addressed message including channel use and transmission retry are made in 7.1“”.

2011-06-24 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 or alternatively using the MKD PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,00000xxxx,1,6,06P0test,0 A response is automatically transmitted by the addressed transponder .			
VDO output of EUT	Check the VDO output on PI	UTC 08:51	Passed
Channel	Check Tx channel		Passed
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check msg on VDL analyser		Passed
TX of ackn. msg 7 (VDO)	Check that ackn msg 7 is transmitted by addressed transponder (VDO)		Passed
Use of Appl. ID	Check for proper use of DAC and FI for text messages when using MKD		Passed
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)		Passed
AIABK acknowledgement		$AIABK,000001028,A,62,0	Passed
Add invalid character to encapsulated data, e.g. x,y,z			
Transmission	Check that message is not transmitted		Passed
ABK sentence	Check that ABK message with ackn. type 2 (could not be broadcast) is output on PI		Passed

2011-06-24 Ba	Test details - 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 or alternatively using the MKD . PI sentence: File AIABM_safety.sst: !AIABM,1,1,2,00000xxxx,1,12,D5CD,0 (D5CD = „TEST“). A response is automatically transmitted by the addressed transponder .			
VDO output of EUT	Check the VDO output on PI	UTC 08:55	Passed
Channel	Check Tx on channel A		Passed
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentence		Passed
Received by VDL Analyser	Check msg on VDL analyser		Passed
RX of msg 13 (VDM)	Check that the ackn. msg 13 is received by EUT (VDM)		Passed
acknowledgement	Check AIABK or MKD for corresponding pos. and neg. ackn.		Passed

3.1.4.2 14.1.4.2 Receive addressed message

(4.2)

Method of measurement

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

a) Apply an addressed binary message (msg 6; EUT as destination) to the VDL.

b) Apply an addressed binary message (msg 6; 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.

Further tests of received addressed messages including acknowledgement see 7.1.2 .

2011-06-24 Ba	Test details - Addressed binary message 6		
Test item	Check	Remark	Result
Transmit an addressed binary message by VDL generator or other Transponder verified by VDL analyser			
Addressed to EUT	Check that VDM output on PI of EUT	UTC 08:56	Passed
	Check DAC		Passed
	Check FI		Passed
	Check binary data		Passed
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Passed

2011-06-24 Ba	Test details - Addressed safety related message 12		
Test item	Check	Remark	Result
transmit an addressed safety related message by VDL generator or other Transponder verified by VDL analyser			
Addressed to EUT	Check that VDM output on PI of EUT		Passed
	Check message text		Passed
Addressed to other AIS transponder	Check that no VDM output on PI or on display of EUT		Passed

3.2 14.2 Multiple slot messages

(4.2 M.1371 A2/5.2.1)

3.2.1 14.2.1 5 slot messages

(M.1371 A2 / 5.2.1)

Method of measurement

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

Required results

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

Single slot binary and safety related messages broadcast messages are tested in 7.4 18.3 Broadcast messages

2011-06-24 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: AIS channel for broadcast is 1: (ch A) 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 09:02	Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,B,8,6,3	Passed
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence	= 6	Passed
Message on VDL	Check the broadcast message on VDL analyser		Passed
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Passed

2011-06-24 Ba	Test details - Safety related broadcast message 14		
Test item	Check	Remark	Result
Transmit a safety related broadcast messages 14 with 120 data bytes of binary data by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_safety.sst: AIS channel for broadcast is 2: (ch B) The file contains 4 BBM sentences with in total 120 data bytes or 160 characters			
VDO output of EUT	Check the VDO output on PI	UTC 09:04	Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,B,14,6,3	Passed
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message on VDL	Check the broadcast message on VDL analyser		Passed
Rx on other transponder (VDM)	Check the VDM output of an other transponder		Passed

3.2.2 14.2.2 Longer messages

(M.1371 A2 / 5.2.1)

Method of measurement

Apply a BBM sentence to the PI of the EUT Presentation Interface with an information content not fitting in 5 slots (i.e. more than 121 data bytes of binary data containing only binary 1's).

Required results

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

2011-06-24 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: AIS channel for broadcast is 1: (ch A) 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		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

This test evaluates if the transponder takes into account the actually required amount of bit stuffing and can so transmit longer messages in 5 slots. This is not required.

2011-06-24 Ba	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit a binary broadcast messages 8 with 123 data bytes of binary data, not all "1", by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin_long.sst: AIS channel for broadcast is 1: (ch A) The file contains 4 BBM sentences with in total 123 data bytes or 164 characters			
VDO output of EUT	Check the VDO output on PI	No VDO output	Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements, type should be 3	= 2	Passed
Sequential message identifier in VDO	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message on VDL	Check the broadcast message on VDL analyser	No Tx	Passed
Rx on other transponder (VDM)	Check the VDM output of an other transponder		N/A

3.3 14.3 Information content

(6.5.1 M.1371 A2/3.3.8)

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 contents of position report msg 1 and static data report msg 5.

Required results

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

3.3.1 Information content of msg 1

The dynamic information content of msg 1,2,3 provided by external sensors is checked in detail in 8.5 "19.5 Test of sensor input" depending on the content and status of the different sensor input sentences. 3.1.1.1
Information content provided by internal GNSS receiver – if used as backup position source – and manual MKD inputs are tested here.

2011-05-27 Ba	Test details – content of msg 1		
Test item	Check	Remark	Result
Internal GNSS is in use, no external sensor inputs			
MMSI	Check MMSI and compare with MKD display		Passed
Navigational status	See below		Passed
Position	Check the values of lat and lon and compare with MKD display		Passed
Speed	Check the values of SOG and COG and compare with MKD display	SOG = 0.0 COG = 360 = default COG cannot be calculated at SOG = 0	Passed
Heading/ROT	Check that the values of heading and ROT are default		Passed
Position accuracy flag	Check flag with and without differential corrections by msg 17	PA flag = 1 Because of RAIM result	Passed
Time stamp	Check time stamp		Passed
Comm state	Check for availability, detailed test in 6		Passed
Default values	Check that default values for LAT, LON, SOG, COG are transmitted if internal GNSS is unavailable		Passed

2011-05-27 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 = 5 (moored)	Check Status in VDL message 1		Passed
Status = 6 (aground)	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

3.3.2 Information content of msg 5

2011-05-27 Ba	Test details – Content of msg 5		
Test item	Check	Remark	Result
Check of the contents of msg 5 (static and voyage related data) Data can be changed using MKD or VSD/SSD input at PI			
MMSI	Check value in msg 5		Passed
AIS version indicator	Check that version is 1		Passed
IMO number	Check value in msg 5		Passed
Call sign	Check value in msg 5		Passed
Name of ship	Check value in msg 5		Passed
Type of ship and cargo type	Check value in msg 5		Passed
Reference point for internal GPS			
Reference point A	Check value in msg 5	With “Ship size mode” set to “Standard”	Passed
Reference point B	Check value in msg 5		Passed
Reference point C	Check value in msg 5		Passed
Reference point D	Check value in msg 5		Passed
Reference point for EPFS			
Reference point A	Check value in msg 5	With “Ship size mode” set to “Standard”	Passed
Reference point B	Check value in msg 5		Passed
Reference point C	Check value in msg 5		Passed
Reference point D	Check value in msg 5		Passed
Tx of msg 5	Check if msg 5 is transmitted at change of position source		Passed

Voyage related data			
ETA	Check value in msg 5		Passed
Maximum present static draught	Check value in msg 5		Passed
Destination	Check value in msg 5		Passed
DTE flag can be checked in connection with 3.9.2.5 "14.9.2.5 Remote MKD disconnection, when so configured". Check the flag during that test and enter result her			
DTE on	Check that DTE flag = 0		Passed
DTE off	Check that DTE flag = 1	Not applicable because of internal MKD	N/A
Type of EPFS			
Apply simulated GLL,VTG, GDT and ROT sentence to the sensor input File name is 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	Device = 1 Retest 2011-06-24 Ba: Device = 15	Passed

3.4 14.4 Reporting rates

(6.5.2)

3.4.1 14.4.1 Speed and course change

(6.5.2)

Method of measurement

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

a) start with own speed of 10kn; record all messages on VDL for 10min and evaluate reporting rate 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) in accordance with 6.5.2 Table 1 and ITU-R M.1371 A2/4.3.

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

d) Make speed and/or heading sensor unavailable.

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

Required results

a) Reporting rate shall comply to Table 1 (10sec ±10%).

b) Confirm that the new reporting rate has been established (after 2 transmissions ±20%.)

c) Confirm that the reporting rate is reduced after 4min (speed reduction) or 20sec (ROT reduction).

d) Check that with unavailable sensors the reporting rate reverts to default values (10sec if no sensor connected).

2011-05-26 Ba	Test details – Change of reporting rate by speed		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data. Change speed according to the test items and record VDL data. After each change wait until new reporting rate is clearly established. Lines are related to Excel table reprate_speed.xls			
Speed = 10 kn	Check that reporting rate is 10 s		Passed
Speed = 15 kn	Check slot allocation using msg 3 for new reporting rate		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 new reporting rate is 6 s		Passed
Speed = 25 kn	Check slot allocation using msg 3 for new reporting rate		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 new reporting rate is 2 s		Passed
Reduction of speed to Speed = 15 kn	Check slot allocation by deallocation of slots, Msg 3 not required for new reporting rate		Passed
	Check that new rate starts after 3 min and is established within 4 minutes		Passed
	Check that new reporting rate is 6 s		Passed
Reduction of speed to Speed = 10 kn	Check slot allocation using msg 3 for new reporting rate		Passed
	Check that new rate starts after 3 min and is established within 4 minutes		Passed
	Check that new reporting rate is 10 s		Passed

2011-05-26 Ba	Test details – Change of reporting rate by heading		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Record the VDL data of the procedure according to the following test items, generate a table and diagram from that data and check the items using the recorded data. Change speed according to the test items and record VDL data. After each change wait until new reporting rate is clearly established. Lines are related to Excel table reprate_speed.xls			
Change of heading from 359°to 0°	Check that the reporting rate is not increased		Passed
Change of heading from 0°to 359°	Check that the reporting rate is not increased		Passed
Speed = 10 kn Heading = 0	Check that reporting rate is 10 s		Passed
Speed = 10 kn Increase heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate		Passed
	Check that new rate is established immediately (within 150 slots)		Passed
	Check that new reporting rate is 3 1/3 s		Passed
Speed = 10 kn Stop Increasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Passed
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Passed
	Check that new reporting rate is 10 s again		Passed
Speed = 15 kn Decrease heading by 10 degr. steps sometimes	Check slot allocation by inserting ITDMA slots (msg 3) for new reporting rate		Passed
	Check that new rate is established immediately (within 150 slots)		Passed
	Check that new reporting rate is 2 s		Passed

Speed = 15 kn Stop decreasing heading	Check slot allocation by stopping insertion of ITDMA slots (msg 3)		Passed
	Check that new rate is established within (30 s averaging+20 s delay =) 50 s after stop of heading change		Passed
	Check that new reporting rate is 6 s again		Passed
Speed = 25 kn	Wait until speed is 2 s with msg type 1		
Speed = 25 kn Increase heading with 50°/min	Check that no change		Passed
Speed = 25 kn Stop Increasing heading	Check that no change		Passed

2011-05-26 Ba	Test details – Reporting rate - Sensor unavailable		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input. Set Navigation status to 0 (under way) File name is ais01_gll_vtg_hdt_rot.sst Change speed according to the test items and record VDL data.			
Speed = 10 kn	Check that reporting rate is 10 s		Passed
Speed = 25 kn	Check that reporting rate is 2 s		Passed
Speed sensor unavailable (internal source made unavailable)	Record time from stopping speed input to reverting report rate	UTC 14:35 The EUT starts immediately reverting the reporting interval to 10 s. I recommend to do it after 3 min as in all other cases of reduction of the autonomous reporting interval Retest 2011-06-24 Ba: UTC 09:32 Not changed Retest 2012-02-02 Ba: Not changed	Passed
	Check that new reporting rate is 10 s		Passed

3.4.2 14.4.2 Change of navigational status

(6.5.2)

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.

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 rate of position report of EUT.

Required results

a) Reporting rate shall be 3 min.

b) Reporting rate shall be 10 s.

c) Reporting rate shall be adjusted according to speed and course (see 14.4.1)

2011-05-26 Ba	Test details – Reporting rate		
Test item	Check	Remark	Result
Apply simulated sensor data to the sensor input. File name is ais01_gll_vtg_hdt_rot.sst Change Navigation status and speed according to test items			
Navigation status = 0 (under way using engine Speed = 2 kn	Check that reporting rate is 10 s		Passed
Nav. status = 1 (at anchor) Speed = 2 kn	Check that reporting rate is 3 min		Passed
	Check that the position report is interleaved three (3) min after Message 5 (ITU 1371 4.3.1.3)	Message 3 is interleaved about 2 minutes after message 3. This may depend on the time when the Nav status is changed or the speed is decreased. Retest 2011-06-24 Ba: Message 3 is interleaved with message 5	Passed
Nav. status = 1 Speed = 4 kn	Check that reporting rate is 10 s		Passed
Nav. status = 5 (moored) Speed = 2 kn	Check that reporting rate is 3 min		Passed
Nav. status = 2 (not under command) Speed = 2 kn	Check that reporting rate is 10 s min		Passed
Nav. status = 6 (Aground) Speed = 2 kn	Check that reporting rate is 10 s min		Passed
Nav. status = 3 or other Speed = 2 kn	Check that reporting rate is 10 s		Passed

Note) According to ITU-R M1371 §4.3.1.3 “When the vessel is at anchor, moored, not under command or aground, which is indicated by the navigational status, ...Message 3 should be used with a reporting rate of 3 minutes.”
On the other hand in table 1 of ITU-R M1371 and IEC 61933-2 only “at anchor” and “Moored” is mentioned for a reporting rate of 3 min.
This has to be clarified but we recommend to use 3 min reporting interval only for “at anchor” and “Moored”.

2011-05-24 Ba	Test details – Check of slot handling		
Test item	Check	Remark	Result
Apply simulated sensor data to the sensor input. File name is ais01_gll_vtg_hdt_rot.sst Change Navigation status according to test items			
Navigation status = 0 (under way using engine Speed = 2 kn	Check that reporting rate is 10 s		Passed
Change Nav status to “at anchor”	Check that the used slots are release by time-out 0 and slot offset = 0k		Passed
	Check that the position reports are transmitted in ITDMA mode using msg 3		Passed
Change Nav status back to 0	Check that a procedure like network entry is performed		Passed

3.4.3 14.4.3 Assigned reporting rates

(6.5.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command msg 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 msg 2 according to the parameters defined by msg 16; the reporting rate shall not be affected by course, speed or NavStatus. The EUT shall revert to msg 1 or 3 in autonomous mode with standard reporting rate after 4 to 8 min.

If the autonomous mode requires a higher reporting rate than that directed by Message 16, the Class A shipborne mobile AIS station should use the autonomous mode.

More detailed tests are made in 5.6.5 16.6.4 Assigned operation

In this test it is only checked if the assigned reporting rate depends on 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.

2011-05-27 Ba	Test details a) – Slot offset and increment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset A = 40 (offset to first assigned slot = 40) and slot increment parameter = 3 (increment = 225 = 6 s)			
NavStatus = 0 (under way using engine), Speed = 10 kn • Send assignment cmd	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2	2011-06-28 Ba UTC 13:35	Passed
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode	2011-06-28 Ba UTC 13:36	Passed
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	2011-06-28 Ba UTC 13:44	Passed
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed	2011-06-28 Ba UTC 13:52	Passed
• Increase speed to 15 kn	Check that EUT maintains assignment mode	2011-06-28 Ba UTC 13:54	Passed
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and	2011-06-28 Ba UTC 13:58 • The EUT starts increasing the speed with a delay of 1 minute. • The increased reporting interval is correct (2s) Retest 2011-07-20 Ba: The EUT still start increasing speed after more than 1 minute. Immediately after increasing speed the message type of the VDOs without channel (not transmitted) changes from 2 to 1. So it seems the condition for increasing the speed is recognised at the correct time. Retest 2011-12-14 Ba: The EUT reverts to autonomous mode with 2 s reporting interval immediately after changing SOG to 25 kn	Passed Passed
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Type = 1	Passed

NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode		Passed
In assigned mode: • Change heading	Check that reporting rate is increased to 2 s	The reporting rate is not increased Retest 2011-06-28 Ba: • In the first test increasing the reporting rate starts about 90 s after beginning of heading change. • Two repetitions of the test were ok, the increased reporting rate starts about 7 s after start of heading change. Retest 2011-07-20 Ba: In 4 tests the increasing of the reporting rate starts immediately	Passed
	Check the method of increasing the reporting rate (msg 3 inserted between msg 1 or 2)	Test 2011-06-28 Ba:	Passed
Allocation of message	In slot assigned mode the keep flag of a message 3 (changed from message 2) is not set when allocating the slots for message 5. (See diagram, UTC 12:00 and 12:12) In rate assigned mode and in autonomous mode the keep flag is set correctly. Retest 2011-07-20 Ba: Message 5 is either not allocated, or if allocated the keep flag of message 3 is not set. Retest 2012-01-25 Ba: Message 5 is allocated by message 3, and the keep flag is set		Passed

2011-05-25 Ba	Test details b) – Rate assignment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset = 100 (reporting rate = 100 msg/10 min), increment=0			
NavStatus = 0 (under way using engine), Speed = 10 kn • Send assignment cmd	Check that slot offset = 225 and reporting rate is 6 s And msg type = 2	2011-06-28 Ba UTC 12:00	Passed
In assigned mode • change NavStatus to 1 (at anchor)	Check that Navstatus has no effect: EUT maintains assigned mode	2011-06-28 Ba UTC 12:02	Passed
In autonomous mode: NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd	Check that the assignment command is accepted	2011-06-28 Ba UTC 12:16	Passed
Nav Status = 0, speed = 10 kn • Send assignment	Check that assignment command is executed		Passed
• Increase speed to 15 kn	Check that EUT maintains assignment mode	2011-06-28 Ba UTC 12:30 EUT did not revert to autonomous mode (see diagram) Retest 2011-07-20 Ba: In all tests the EUT reverts to autonomous mode after time-out	Passed
• Increase speed to 25 kn	Check that EUT increases reporting rate to 2 s and	2011-05-25 Ba	Passed
	Check if msg type = 1 or msg type 2 is used (rescheduling with msg 3)	Message type = 1	Passed
NavStatus = 0, Speed = 15 kn: • Send assignment cmd	Check that EUT changes to assigned mode		Passed

In assigned mode: • Change heading	Check that reporting rate is increased to 2 s	The reporting rate is increased after about 20s. At the end of the frame the addition of message 3 stops even if the heading is still changing Retest 2011-06-28 Ba The reporting interval is 2 s EUT did not revert to autonomous mode (see diagram) Retest 2011-07-20 Ba: In all tests the EUT reverts to autonomous mode after time-out	Passed
	Check the method of increasing the reporting rate (msg 3 inserted between msg 1 or 2)	The additional messages are not correctly allocated. After each message 1 one unalloced message 3 is added which allocates one further message 3. Then the allocation chain stops. Retest 2011-06-28 Ba: • The method of increasing the reporting interval works basically correct. • In the first of two tests the additional messages 3 start with incorrect timing. Additionally on channel A the chain stops after 2 message and starts again about 15 s later. • A repetition of the test was ok. Retest 2011-07-20 Ba: In 4 tests the increasing of the reporting rate starts immediately with the correct timing	Passed

3.4.4 14.4.4 Static data reporting rates

(6.5.2)

Method of measurement

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

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

b) Change static and/or voyage related station data. Record the transmitted messages and check for static and voyage related data (msg 5).

Required results

a) Confirm that the EUT transmits msg 5 with a reporting rate of 6 min.

b) Confirm that the EUT transmits msg 5 within 1 min reverting to a reporting rate of 6 min.

2011-06-24 Ba	Test details - Static data reporting rates		
Test item	Check	Remark	Result
Record msg 5 and check repetition rate			
a) Default update rate	Check that update rate is 6 min		Passed
b) Change static data using SSD sentence short time after regular msg 5	Check that msg 5 is transmitted within 1 min		Passed
	Check that msg 5 is transmitted only if an item has been changed		Passed
Wait for next msg 5	Record if the next msg 5 is transmitted: • 6 min after regular msg 5 or • 6 min after additional msg 5		
Change voyage related data using VSD sentence	Check that msg 5 is transmitted within 1 min		Passed
	Check that msg 5 is transmitted only if an item has been changed		Passed
Change static data using MKD	Check that msg 5 is transmitted within 1 min		Passed
Change position source with different ref. point data (see 61993 6.10.3.4)	Check that msg 5 with ref point of new source is transmitted before next transmission of pos. report	If this is not done before next transmission of position report there will be a position jump on the display system of near targets.	Passed

3.5 14.5 Security

(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.

Required results

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

2011-07-27 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-functional times (Tx off times) are displayed on the MKD	Passed
Read out recorded data	Check that all switch off times > 15min are correctly recorded	- There have been more then 10 power off phases in total and 6 since the last software update but only 2 power off times are recorded. - The record ends with power off time but the unit is on. So the last On date/time is not displayed. - I could not find any relation between the displayed date/times and the real switching times (e.g. on/off times on Sunday 24 July and last date 25 Jan 2024) Retest 2012-01-30 Ba: The on and off times are correctly logged.	Passed
If the EUT supplies a "silent mode" (no transmission)	Check that all silent mode times > 15min are correctly recorded	Could not be recognized because the recorded times are generall incorrect. It may be that the silent time was recorded because there was an off time with the right duration but with incorrect date and time and the reason: power off. Test 2012-01-27 Ba: Silent mode (ACA input) is recorded correctly	Passed

3.6 14.6 Initialisation period

(6.7 M.1371 A2/3.3.3)

Method of measurement

Set up standard test environment with all sensors available.

a) Switch on EUT with EUT operating in autonomous mode.

b) Switch off EUT for approx. 0.5 s. Record transmitted messages.

Required results

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

2012-01-27 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 15:42 The first transmission starts after 1 min 54 s	Passed
Set the EUT to the default MMSI (normally 000000000)			
Switch on EUT	Check that EUT does not start transmission	There is no transmission, and there is a Tx malfunction alarm	Passed

3.7 14.7 Channel selection

(6.9)

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.1084-4, Annex 4 using both 25kHz and 12.5kHz channel spacing (incl. 12.5kHz emission on a 25kHz channel):

a) manually,

b) by transmission of channel management message (msg 22) broadcast and addressed to EUT,

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

d) By transmission of DSC telecommand to EUT

Record the VDL messages.

Required results

Confirm that the EUT switches to Channel / bandwidth and duplex / simplex channels accordingly.

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

2012-01-30 Ba	Test details - Channel selection		
Test item	Check	Remark	Result
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			
a) Enter <u>manually</u>: 2 simplex channels 25 kHz spacing 25 kHz bandwidth	Check that channels are used	I did not find a simplex channel which was accepted – I have tried several but not all simplex channels. Please provide a list which channels are accepted and which not. Lower band channels of duplex channels which I tried were accepted (e.g. 1082) <u>Retest 2012-02-21 Ba:</u> Reason was that simplex channels were accepted only as 2 digit value (e.g. 72), not as 4 digit value (e.g. 1072). Now 2 and 4 digits are accepted.	Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
b) Enter by using <u>msg 22</u>: 1 duplex channel, upper and lower band channel 25 kHz spacing 25 kHz bandwidth	Check that channels are used	Remark: Message 22 is accepted only in connection with a message 4 from the same base station	Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
c) Enter by <u>ACA sentence</u>: 2 channel, upper band channels of duplex 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 <u>DSC</u> 2 simplex channels	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI	The ACA is output only if the current channel usage is affected, that means if the position is inside the modified area.	Passed

3.8 14.8 Transceiver protection

(6.9 ; M.1371 A2/2.14, 2.15)

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.

This test should be done as the last test to be able to do all other tests in case of transmitter damage.

2012-01-30 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 11:41 The EUT start transmission after refitting the antenna with the next scheduled message	Passed
Short circuit of VHF antenna terminal	Check that EUT starts transmission within 2 min after refitting the antenna	UTC 11:45	Passed
		After this test the Tx malfunction alarm is active nearly all the time. The transmissions are received by other transponders but it seems that the output power is lower than before. I have not measured it exactly. Retest 2012-03-08 Ba: There is no Tx malfunction alarm after this test, and the output power is the same as before the test.	Passed

3.9 14.9 Alarms and indicators, fall-back arrangements

(6.10)

2012-01-30 Ba	Test details - General alarm tests		
Test item	Check	Remark	Result
No alarm pending			
Alarm output repetition	Check that ALR sentences are not output with a repetition rate < 1 min	UTC 11:37 There is an ALR,,,V,V every minute	Passed

3.9.1 14.9.1 Loss of power supply

(6.10.1.2)

Method of measurement

Disconnect power supplies of the EUT.

Required result

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

2012-01-27 Ba	Test details - Loss of power supply		
Test item	Check	Remark	Result
Switch off power supply	Check that alarm relay output is active.	The relay output is not active 2012-02-21 Ba: The relay function has been inverted. The output to the relay is now off if the power is off or there is an active alarm condition	Passed

3.9.2 14.9.2 Monitoring of functions and integrity

(6.10.2)

3.9.2.1 14.9.2.1 Tx malfunction

Method of measurement

Disable the transmitter by disconnecting the antenna.

Required result

Verify that an alarm sentence ALR with alarm ID 001 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.

Alternatively an ALR 001 when TX active between TX-slots is accepted; disconnecting antenna is also alarmed by ALR 002.

2012-01-27 Ba	Test details - Tx malfunction		
Test item	Check	Remark	Result
Disconnect VHF antenna or: make TX active between scheduled slots (e.g. CW carrier)			
Stop of transmission	Check if transmission is stopped	UTC 14:06 The transmission contionues	Passed
ALR output	Check that ALR sentence ID 001 is output at PI	With status A,V	Passed
ALR output repetition	Check that the ALR sentence is repeated with a rate of 30 s		Passed
Alarm relay	Check that alarm relay is activated		Passed
MKD display	Check that the alarm is displayed on the MKD	And the Status LED is blinking red	Passed
Send an ACK sentence	Check that alarm relay deactivated		Passed
	Check that ALR sentence is updated	To A,A	Passed
	Check that alarm display on the MKD is updated	The popup window disappears and the Status LED stops blinking but remains red Tx malfunction alarm is still in the alarm list	Passed
Reconnect VHF antenna	Check that ALR sentence is updated	To V,V	Passed
	Check that alarm display on the MKD is updated	The Status LED becomes green and the Tx malfunction alarm is removed from the alarm list	Passed

3.9.2.2 14.9.2.2 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 transmitting. 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.

2012-01-27 Ba	Test details - Antenna VSWR		
Test item	Check	Remark	Result
Connect a mismatched dummy load with a VSWR of 3:1 to the VHF antenna terminal			
Continuation of Tx	Check that transmission continues	15:20 16 Ohm connected 15:26 150 Ohm connectd	Passed
ALR output	Check that ALR sentence ID 002 is output at PI		Passed
MKD display	Check that the alarm is displayed on the MKD		Passed
Alarm relay	Check that alarm relay is activated		Passed
Send an ACK sentence	Check that alarm relay deactivated		Passed
	Check that ALR sentence is updated		Passed
	Check that alarm display on the MKD is updated		Passed
Generate a new alarm by connection the VHF antenna and again connect the mismatched dummy load			
Acknowledge the alarm on MKD (applies to all alarms) note: NEW	Check that alarm relay deactivated		Passed
	Check that ALR sentence is updated		Passed
	Check that alarm display on the MKD is updated (the alarm indication is cleared)		Passed
Connect VHF antenna	Check that ALR sentence is updated		Passed

3.9.2.3 14.9.2.3 Rx malfunction

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

2012-02-22 Ba	Test details - Rx malfunction		
Test item	Check	Remark	Result
Check the documentation			
Detection of RX malfunction	Check that documentation describes how the AIS detects Rx malfunction	E-Mail from Johan Lindborg, dated 20.02.2012	Passed
ALR output	Check that documentation describes that an ALR sentence with ID 003 (RX1), ID 004 (RX2) and ID 005 (DSC) is sent.	The ALR sentences are mentioned by name	Passed

3.9.2.4 14.9.2.4 Loss of UTC

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Disconnect the GNSS antenna (UTC clock lost).

Required result

Verify that the system continues to operate but changes to indirect synchronisation and that an TXT-sentence with ID 007 is sent and the relay output is not activated.

2012-01-27 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
TXT output	Check that a TXT sentence with ID 007 is output at PI	There is an ALR output with ID 007. This is correct according to Ed. 2	Passed
Alarm relay	Check that the alarm relay output is not activated	The alarm relay output is activated. This is correct according to Ed. 2	Passed
MKD display	Check that the status display of the MKD is updated	The alarm list is updated (according to Ed. 2)	Passed

3.9.2.5 14.9.2.5 Remote MKD disconnection, when so configured

Method of measurement

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

a) Disconnect the connection to the remote MKD.

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

Required result

a) Verify 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 msg 5.

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

2011-07-25	Test details - Remote MKD disconnection		
Test item	Check	Remark	Result
Disconnect the connection to the remote MKD.			
Continuation of Tx	Check that transmission continues	Not applicable because internal MKD	N/A
DTE flag	Check that the DTE flag in msg 5 is set to 1		N/A
ALR output	Check that ALR sentence ID 008 is output at PI		N/A
Alarm relay	Check that alarm relay is activated		N/A
MKD display	Check that loss of connection to the transponder is displayed on the MKD		N/A
Send an ACK sentence	Check that alarm relay deactivated		N/A
	Check that ALR sentence is updated		N/A
Reconnect MKD	Check that ALR sentence is updated		N/A
MKD display	Check that the MKD display is updated		N/A

3.9.3 14.9.3 Monitoring of sensor data

(6.10.3)

3.9.3.1 14.9.3.1 Priority of position sensors

(6.1.1.3, 6.10.3)

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 6.2).

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; msg 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 to Table 4.

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.

2012-01-31 Ba	Test details - Position priority – Basic test without internal DGNSS		
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 sensor data: Changing upwards			
f) Start with: • No external GNSS input • No 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 every 30 s		Passed
e) Change from f: • No external GNSS input • Activate internal GNSS	Check that internal position is used		Passed
	Check that position accuracy flag = 0	PA flag = 1	Passed
	Check that RAIM flag is according to internal sensor (= 1)		Passed
	Check that msg 5 is output with new (internal) ref. point	No message 5, was internal before	Passed
	Check that ALR message with ID 026 is updated		Passed
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that the alarm on MKD according to ALR ID 026 is updated		Passed
	Check that status display of MKD is updated according to TXT ID 025 and ID 028		Passed
	Check that status has been changed after 30 s	Status is changed after 11 s Coming from no position this seems to be acceptable	Passed

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 msg 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 the alarm on MKD according to ALR ID 025 is updated		Passed
	Check that status display of MKD is updated according to TXT ID 022 and ID 027		Passed
	Check that status has been changed after 30 s	The status is changed after 7 s Retest 2012-02-21 Ba: The status is 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	After 30 s	Passed
	Check that status display of MKD is updated according to TXT ID 021		Passed
	Check that status has been changed after 30 s	The PA flag is changed immediately Retest 2012-02-21 Ba: The status and the PA flag is 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 display of MKD is updated according to TXT sentence		Passed
	Check that status has been changed after 5 s	After 1 s Retest 2012-02-21 Ba: The status is 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	= 1	Passed
	Check that RAIM flag is set according to documentation of internal GPS (=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 display of MKD is updated according to TXT sentence		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		Passed
	Check that an alarm according to ALR message is displayed on MKD		Passed
	Check that status has been changed after 5 s	After 17 s Accepted because it takes some time to really disconnect the antenna	Passed

2012-02-01 Ba	Test details - Position priority –DGNSS test Msg 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 msg 17	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that RAIM flag is set according to internal GNSS (=1)		Passed
	Check that msg 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		Passed

	Check that status display of MKD is updated according to TXT ID 024 and 028		Passed
	Check that status is changed after 30 s		Passed
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg 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 msg 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		Passed
	Check that status display of MKD is updated according to TXT sentences		Passed
	Check that status is changed after 5 s	Status is changed immediately, should be after 5 s Retest 2012-02-21 Ba: The status is changed after 5 s	Passed
d) Change from c: • External GNSS input • Remove msg 17 (correction data for Internal GNSS)	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that flag is set according to external sensor input data (=0)		Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status is changed after 5 s + max age of correction data		Passed

2012-02-01 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		Passed
	Check that position accuracy flag = 1		Passed
	Check that msg 5 is output with new (internal) ref. point		Passed
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 023 and 028		Passed
a) Change from C: • Change external mode to DGNSS • Internal DGNSS (beacon)	Check that external position is used		Passed
	Check that position accuracy flag = 1		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		Passed
Status change time	Check that status is changed after 30 s		Passed

Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by beacon • 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 023 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status is changed after 5 s	After 3 s Should be 5 s Retest 2012-02-21 Ba: The status is changed after 5 s	Passed
d) Change from c: • External GNSS input • Remove beacon correction data for Internal GNSS	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to sensor input data		Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
	Check that status is changed after 5 s	After one minute because of the max. age of correction data.	Passed

2012-02-01 Ba	Test details - Position priority –DGNSS test beacon + Msg 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
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that msg 5 is output with new (internal) ref. point		Passed
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 023		Passed
b) Change from c: • External mode is GNSS • Correction data for DGNSS by beacon • Apply msg 17 with correction data	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 024 is output on PI		Passed
	Check that status display of MKD is updated according to TXT ID 024		Passed
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (msg17)	Check that external position is used		Passed
	Check that position accuracy flag = 1		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		Passed
Status change time	Check that status is changed after 30 s	• The change from “Internal DGNSS in use (beacon)” to “... (message 17) is done immediately. • The other status changes are done in 30 s <u>Retest 2012-02-21 Ba:</u> • The status from “Internal DGNSS in use (beacon)” to “... (message 17) is changed in 30 s	Passed

Highest Level: Changing downwards			
b) Change from a: • Msg 17 for internal DGNSS • Internal DGNSS by beacon • 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		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
c) Change from b: • External sensor mode is GNSS • Internal DGNSS by beacon • Stop msg 17	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 023 is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
d) Change from c: • External GNSS input • Remove beacon correction data for internal GNSS	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to sensor input data (=0)		Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI		Passed
	Check that status display of MKD is updated according to TXT sentence		Passed
Status change time	Check that status is changed after 5 s	• The status change from b) to c) is done immediately, should be 5 s. • The other status changes ore done within 30 s. This is ok because of the validity of correction data for some time <u>Retest 2012-02-21 Ba:</u> The status from b) to c) is changed in 5 s	Passed

3.9.3.2 14.9.4 Heading sensor

(6.10.3.1)

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 (e.g. 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 (e.g. by wrong checksum, "valid/invalid" flag). Establish a rate of heading change that is greater than 5 degrees in 30 seconds

d) Reconnect the ROT input

Required Result

a) Check that 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 msg 1,2 or 3.

b) Check that an alarm sentence ALR with alarm ID 031 for valid HDG and ID 033 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. Check that TXT-sentences with ID 031 for valid HDG and ID 033 for ROT indicator in use are sent to the PI

c) Check that 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 5 "ROT sensor fallback conditions," Priority 2).

d) Check that a TXT-sentence with ID 033 for ROT indicator in use is sent to the PI.

2012-01-31 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		Passed
	Check that alarm relay is inactive		Passed
	Check that no ALR output is active	The heading alarm is inactive	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
	Check that an alarm according to ID 032 is displayed on MKD		Passed
	Check that an alarm according to ID 035 is displayed on MKD		Passed

b) Reconnect heading and ROT • Valid heading • Valid ROT	Check that heading in VDL ok		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	The relay is active	Passed
	Check that the alarm display on MKD is updated		Passed
	Check that the status display on MKD is updated (heading and ROT valid)		Passed
c) Change ROT source • Valid heading • Other ROT source (talker not TI or configuration setting)	Check that ROT in VDL is + 127 for ROT > 10 °/min, turning right	ROT from other source is not used	N/A
	Check that ROT in VDL is - 127 for ROT < -10 °/min, turning left		N/A
	Check that TXT message with ID 034 (other ROT in use) is output on PI		N/A
	Check that the status display on MKD is updated (other ROT)		N/A
d) Change ROT source back to TI • Valid heading • ROT from TI	Check that ROT in VDL ok		N/A
	Check that TXT message with ID 033 (ROT in use) is output on PI		N/A
	Check that the status display on MKD is updated (ROT in use)		N/A
a) Disconnect ROT • Valid heading • No ROT Change heading > 5 °/30s	Check that ROT in VDL is + 127 for increasing heading	See test 19.5 ROT	Passed
	Check that ROT in VDL is - 127 for decreasing heading		Passed
	Check that TXT message with ID 034 (other ROT in use) is output on PI		Passed
b) Reconnect ROT • Valid heading • Valid ROT from TI	Check that ROT in VDL ok		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI		Passed

3.9.3.3 14.9.5 Speed sensors

(6.10.3.3)

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).

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

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

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

2012-01-31 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		Passed
	Check that COG = default		Passed
	Check that alarm relay is active		Passed
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		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
	Check that the status according to TXT 28 is updated on MKD (internal SOG/COG in use		Passed
	Check that the alarm ID 29/30 is deleted from MKD		Passed

c) Connect external speed • No external Position • External speed	Check that SOG from internal Sensor is used in VDL message 1,2,3		Passed
	Check that COG from internal Sensor is used in VDL message 1,2,3	= default because speed is 0	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		Passed
	Check that the status according to TXT msg ID 027 is displayed on MKD (external COG/SOG in use)		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		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 the status according to TXT msg ID 028 is displayed on MKD (internal COG/SOG in use)		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		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
	Check that the status according to ALR msg ID 029/30 is displayed on MKD		Passed

3.10 14.10 Display and control

(6.11)

3.10.1 14.10.1 Data input/output facilities

Method of measurement

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

a) Check size of minimum display

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

c) Input static and voyage related data via the minimum display

Required results

a) The minimum display shall contain at least three lines of data, with no horizontal scrolling of the range and bearing data display..

b) Confirm that all messages including binary and safety related and Long Range messages received can be displayed and that means to select messages and data fields to be displayed are available.

c) Confirm that all necessary data can be input.

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

2011-08-10 Skr	Test details a) - MKD size of display		
Test item	Check	Remark	Result
a) Size of display	Check that at minimum 3 lines of data are available	There are 7 lines available.	Passed
	Check that range and bearing of AIS targets can be displayed without horizontal scrolling	Age = time since last receiving is displayed.	Passed

2011-08-10 Skr	Test details – Display of own ship position		
Test item	Check	Remark	Result
Internal Position	Check that the own ship position is displayed continuously		Passed
	Describe how it is displayed (in which menu/screen) and how this screen is activated	It is displayed continiously in all screens at the upper left side.	Passed
	Check that the actual source is indicated (external/internal)	In “Status List”	Passed
External Position	Check that the own ship position is displayed continuously		Passed
	Check that the actual source is indicated (external/internal)	In “Status List”	Passed

3.10.1.1 Display of received messages

2011-08-10 Skr	Test details b) - MKD display of received messages		
Test item	Check	Remark	Result
Receive messages and check display of data			
MSG 1,2,3 Display of dynamic ship data - required -	Check that received target is displayed		Passed
	MMSI	Recommended	Passed
	MMSI of SART: Check that a message 1 with an MMSI 970xxyyyy and navigational status 14 is displayed as an AIS SART, not as a normal target. The Symbol for a graphical display is defined in the display standard IEC 62288	First a normal target symbol is displayed, the SART symbol appears later and looks very small. Changing from "Plot" to "Target List" the MKD hung up.	Passed
	Position (RNG, BRG); Detailed check of values in next table		Passed
	Position (Lat,Lon)	Recommended	Passed
	Time	Not required	Passed
	PA (Position accuracy) flag	Not required	Passed
	SOG and COG	Recommended	Passed
	True heading	Recommended	Passed
	Navigational status	Recommended	Passed
	RAIM flag		Passed
	Special manoeuvre indicator	= Regional App. Flag	Passed
MSG 5 Display of static and voyage related ship data - required -	MMSI	Recommended	Passed
	IMO number	Not required	Passed
	Call sign	Recommended	Passed
	Name of ship	Required	Passed
	Type of ship and cargo Check that the new categories according to Clar. 2.2 (X, Y, Z, OS) are displayed	Recommended	Passed
	Dimension/Reference for position	Length recommended	Passed
	Type of EPFD, external position		Passed
	Type of EPFD, internal position Check that the value 15 is correctly displayed	An empty field is displayed. According to ITU-R M.1371-3 this is ok but we recomment to display "Internal GNSS" according to to ITU-R M.1371-4 Retest 2011-12-14 Ba: 15 is displayed as "Internal GNSS"	Passed
	Estimated time of arrival	Not required	Passed
	Maximum present static draught	Not required	Passed
	Destination	Not required	Passed
	DTE flag	Not required	Passed

MSG 4 Base station report - Recommended -	MMSI	Recommended	Passed
	Position (Lat,Lon)	Recommended	Passed
	Position (RNG, BRG); Check values	Recommended	Passed
	Time	Not required	Passed
	PA flag	Not required	Passed
	RAIM flag	Not required	Passed
MSG 9 SAR aircraft position report - optional -	MMSI	Recommended	Passed
	Position (RNG, BRG); Check values	Recommended	Passed
	Position (Lat,Lon)	Recommended	Passed
	Time	Not required	Passed
	PA flag	Not required	Passed
	SOG and COG	COG ok, but SOG is displayed in 1/10 kn, it has to be displayed in knots (1000 kn), different to all other messages <u>Retest 2011-12-14 Ba:</u> SOG is displayed in kn	Passed
	RAIM flag	Not required	Passed
	DTE flag	Not required	Passed
	Regional App. Flags	Not required	Passed
	Altitude	Not required	Passed
MSG 12/14 Safety related text message - Required -	MMSI	Required	Passed
	Text content	Required	Passed
	Broadcast or selective	Recommended	Passed
MSG 18,19 Class B position report - required -	MMSI	Required	Passed
	Position (RNG, BRG)	Required	Passed
	Position (Lat,Lon)	Recommended	Passed
	Time	Not required	Passed
	PA flag	Not required	Passed
	SOG and COG	Recommended	Passed
	True heading	Recommended	Passed
	RAIM flag	Not required	Passed
	Name	Recommended,	Passed
	Type of ship and cargo	Recommended	Passed
	Dimension/Reference for position	Length and beam recommended	Passed
	Type of EPFD	Position sensor Not required	Passed
	DTE flag	Not required	Passed

MSG 24 Class B position report - required -	MMSI	Required	Passed
	Name	Recommended	Passed
	Type of ship and cargo	Not indicated > perhaps Msg 24B is not evaluated? There was VDM output of Msg 24B Retest 2011-12-14 Ba: The type of ship is displayed	Passed
	Call sign	Not indicated > see above Retest 2011-12-14 Ba: The call sign is displayed	Passed
	Dimension/Reference for position	Not indicated > see above The Dimension/ Reference is displayed	Passed
MSG 21 Aids to navigation report - recommended -	MMSI	Recommended	Passed
	Type of Aids to navigation	Recommended	Passed
	Name of Aids to navigation	Recommended	Passed
	Position (RNG, BRG); Check values	Recommended	Passed
	Position (Lat,Lon)	Recommended	Passed
	PA flag	Position quality Not required	Passed
	RAIM flag	Position quality Not required	Passed
	Virtual/Pseudo AtoN flag	Recommended	Passed
	Dimension/Reference for position	Length and beam recommended	Passed
	Type of EPFD	Position sensor Not required	Passed
	Off position indicator	Recommended	Passed
	SOG, COG are not displayed or show default values		Passed
Means to select messages	Check that means to select received messages are available		Passed
Means to select data fields	Check that means to select data fields are available		Passed

3.10.1.2 Range and Bearing calculation

2011-08-11 Skr	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	Check range = 34.9 nm		Passed
54°00 N 010°30 E	Check bearing = 30.6 °	30°	Passed
Target in N direction	Check range = 30 nm		Passed
54°00 N 010°00 E	Check bearing = 0°		Passed
Target in NW direction	Check range = 34.9 nm		Passed
54°00 N 009°30 E	Check bearing = 329.4°		Passed
Target in W direction	Check range = 17.8 nm		Passed
53°30 N 009°30 E	Check bearing = 270°		Passed
Target in SW direction	Check range = 35 nm		Passed
53°00 N 009°30 E	Check bearing = 210.9°		Passed
Target in S direction	Check range = 30 nm		Passed
53°00 N 010°00 E	Check bearing = 180°		Passed
Target in SE direction	Check range = 35 nm		Passed
53°00 N 010°30 E	Check bearing = 149,1°	148°	Passed
Target in E direction	Check range = 17.8 nm		Passed
53°30 N 010°30 E	Check bearing = 90°	89°	Passed

2011-08-11 Skr	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/W)			
Target in NE direction	Check range = 42,4 nm		Passed
00°30 N 179°30 W	Check bearing = 45 °	44°	Passed
Target in N direction	Check range = 30 nm		Passed
00°30 N 179°59.9999 W	Check bearing = 0°		Passed
Target in NW direction	Check range = 42.4 nm		Passed
00°30 N 179°30 E	Check bearing = 315°		Passed
Target in W direction	Check range = 30 nm		Passed
00°00 N 179°30 E	Check bearing = 270°	269°	Passed
Target in SW direction	Check range = 42.4 nm		Passed
00°30 S 179°30 E	Check bearing = 225°	224°	Passed
Target in S direction	Check range = 30 nm		Passed
00°30 S 179°59.9999 E	Check bearing = 180°		Passed
Target in SE direction	Check range = 42.4 nm		Passed
00°30 S 179°30 W	Check bearing = 135°		Passed
Target in E direction	Check range = 30 nm		Passed
00°00 S 179°30 W	Check bearing 90°		Passed

2011-08-11 Skr	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		Passed
30°00 S 11°30 W	Check bearing = 40.8°	40°	Passed
Target in N direction	Check range = 30 nm		Passed
30°00 S 12°00 W	Check bearing = 0°		Passed
Target in NW direction	Check range = 39.6 nm		Passed
30°00 S 12°30 W	Check bearing = 319.2°		Passed
Target in W direction	Check range = 25.8 nm		Passed
30°30 S 12°30 W	Check bearing = 270°	269°	Passed
Target in SW direction	Check range = 39.6 nm		Passed
31°00 S 12°30 W	Check bearing = 220.7°	220°	Passed
Target in S direction	Check range = 30 nm		Passed
31°00 S 12°00 W	Check bearing = 180°		Passed
Target in SE direction	Check range = 39.6 nm		Passed
31°00 S 11°30 W	Check bearing = 139.3°		Passed
Target in E direction	Check range = 25.8 nm		Passed
30°30 S 11°30 W	Check bearing 90°		Passed

3.10.1.3 Input of data

2011-08-11 Skr	Test details c) – Input of data		
Test item	Check	Remark	Result
MMSI number	Check that number can be input		Passed
	Check that input is protected		Passed
IMO number	Check that number can be input		Passed
	Check that input is protected		Passed
Call sign	Check that Call sign can be input		Passed
	Check that input is protected		Passed
Name of ship	Check that name can be input		Passed
	Check that input is protected		Passed
Navigational status	Check that data can be input		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 cannot be selected		Passed
Type of ship and cargo	Check that data can be input	There is only Inland AIS data available. In Class A mode it should be able to input the type of ship and cargo values according to ITU-R M.1371-4 A8 3.3 Retest 2011-12-14 Ba: Type of ship and cargo can be selected	Passed
	Check if input by number or by selection of items	By selection of items	Passed
	If input by selection of items: Check that the new values of Clarifications 2.2 (X, Y, Z, OS) can be input	There is only Inland AIS data available. Retest 2011-12-14 Ba: X, Y, Z and OS can be selected	Passed
Dimension/Reference for position	Check that data for internal GPS antenna position can be input		Passed
	Check that data for external EPFSD position can be input		Passed

Maximum static draught	Check that data can be input	The draught input is listed only under “Inland”. This is confusing because it is also a Class A value. Additionally it is not correctly rounded up to 1/10m <u>Retest 2011-12-14 Ba:</u> In Class A mode the draught can be input in 1/10 m only, without rounding. Remark: in Inland AIS mode the draught has to be input in cm and rounded up to 1/10 for message 5	Passed
Destination	Check that name of destination can be input		Passed
	Check that estimated time of arrival can be input		Passed

3.10.2 14.10.2 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 (msg 12 and msg 14) can be initiated by means of the minimum display. Confirm that transmission of messages 4, 16, 17, 18, 19, 20, 21, 22 is not possible.

NOTE: Use of messages 4, 16, 17, 18,19, 20, 21, 22 is restricted to base stations or class B AIS.

2011-08-11 Skr	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 TX channel		Passed
	Check data input		Passed
	Check that no prepared text blocks are available	There are no prepared text blocks available	Passed
	Check if input of invalid characters (e.g. lower case letters) are inhibited		Passed
	Check display of transmission status (indication that message is transmitted)		Passed
Transmission of addressed safety related message	Check selection of TX channel		Passed
	Check data input		Passed
	Check input of MMSI		Passed
	Check if selection of MMSI from received message (e.g. position report) is possible		Passed
	Check display of transmission status (indication that message is transmitted and acknowledged)		Passed
Repetition	Check if repetition of transmission is possible without entering the data again.	Repetition of transmission is not possible. We recommend to provide a repetition without entering the data again.	Rec
Transmission of other messages	Check for a sample of msg 4, 16, 17, 18, 19, 20, 21, 22 that a transmission is not possible.		Passed

3.10.3 14.10.3 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

At least initiation of channel switching shall be possible with the minimum display. Output power may not be switched manually. Confirm that the configuration level and other functions, not intended for use by the operator, are protected by password or adequate means.

3.10.3.1 Regional area setting

2011-08-11 Skr	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	For channel B always the value of Channel A. is displayed Retest 2011-12-14 Ba: Channel B is displayed correctly	Passed
	Check display of RX/TX mode		Passed
	Check display transmission power		Passed
	Check display of NE point of area		Passed
	Check display of SW point of area		Passed
	Check display of transitional zone	Zone size	Passed

Entry of a new area	Check selection between changing an existing area and creating a new regional area entry	Only the changing of an existing area is possible. 2011-12-14 Ba: If the changed area is not overlapping the existing one a new area setting is created	Passed
	Check input of Channel A and B	"	Passed
	Check input of RX/TX 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	"	Passed
	Check that new area is correctly stored if confirmed	"	Passed
	Check that the user can alternatively return to the editing without loosing the entered data	"	Passed
	Check that the user can alternatively leave the editing without storing the area	"	Passed
Enter invalid channel	Check that entry is refused		Passed
Enter too small area (<20 NM)	Check that entry is refused	2011-12-14 Ba: Remark: The area change is not accepted but there is no indication why the change is not accepted.	Passed
Enter too large area (> 200 NM)	Check that entry is refused	2011-12-14 Ba:	Passed
Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused	2011-12-14 Ba:	Passed

Changing an existing area	Check that existing area for changes can be selected		Passed
	Check change of Channel A and B	Channel B can be changed (checked by ACA output) but for channel B always the value of Channel A. is displayed Retest 2011-12-14 Ba: Channel B is displayed correctly	Passed
	Check change of RX/TX mode		Passed
	Check change transmission power	Not possible The reason may be that the current hardware does not support high power Retest 2011-12-14 Ba: The power can be changed to high power	Passed
	Check change of NE point of area	Not possible Retest 2011-12-14 Ba: The NE point can be changed	Passed
	Check change of SW point of area	Not possible Retest 2011-12-14 Ba: The SW point can be changed	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	Can be changed See Note) Retest 2011-12-14 Ba: The default channels cannot be changed	Passed
	Check that the TX /Rx mode cannot be changed without entering a complete area	Can be changed Retest 2011-12-14 Ba: The default channels cannot be changed	Passed
	Check that the transmission power cannot be changed without entering a complete area	Can be changed Retest 2011-12-14 Ba: The default Tx power cannot be changed	Passed
Entering of default values	Check that the default channels can be used for an area		Passed
	Check that the complete default values (channels, TX/RX mode, power level, bandwidth, TZ size) can be used for an area setting	It is not possible to change the power level. Retest 2011-12-14 Ba: The default settings can be set	Passed

Erase of area settings	Check that areas cannot be deleted manually except when replaced by another overlapping area setting.	Areas cannot be deleted manually	Passed

Note)
We did not find in IEC 61993-2 that this is not allowed but the draft edition 2 says in 14.7.4.2 “Verify that regional channel management settings can be input via the MKD and that there is no other means of changing the radio parameters”

Therefore we think this function to change the default parameters should be removed from the MKD.

3.10.3.2 Password protection

Remark to password protection:
If only 1 password is used, no data which may be change 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 level 1 password.

2011-08-11 Skr	Test details - Password protection			
Input item	Level one requirement	Level 2 Recommendation	Implemented type of protection	Result
Static data				
MMSI	Required	---	Password	Passed
IMO-Number	Required	---	Password	Passed
Call sign	Recommended	Recommended if not level 1	Password	Passed
Name	Recommended	Recommended if not level 1	Password	Passed
Dimension/Reference for position	Required	---	Password	Passed
Type of ship	Recommended		Password Only Inland AIS data available	Passed
Tx off switching	Required, if function available	---	Password	Passed

Voyage data				
Navigational status	Not allowed	Not recommended	No Password	Passed
Type of cargo	Not allowed	Not recommended	No Password Only Inland AIS data available	Passed
Destination	Not allowed	Not recommended	No Password	Passed
ETA	Not allowed	Not recommended	No Password	Passed
Maximum static draught	Not allowed	Not recommended	No Password Only Inland AIS data available	Passed
Persons on board	Not allowed	Not recommended	No Password Only Inland AIS data available	Passed
Other operational data				
Area settings	Not allowed	Recommended	No Password	Passed
Message transmission	Not allowed	Recommended	No Password	Passed
Long range confirmation	Not allowed	Not recommended	No Password	Passed
Configuration data				
Serial port settings (Baudrate, ...)	Required	---	Password	Passed
Long range autoackn.	Not required	Recommended	Password	Passed

4 15 Physical tests

Physical test are not part of this test document.

Physical tests are done in a separate test.

5 16 Specific tests of Link Layer

(7.3)

5.1 16.1 TDMA Synchronisation

(M.1371 A1/3.1.1)

5.1.1 16.1.1 Synchronisation test using UTC

(M.1371 A1/3.1.3.4.1)

Method of measurement

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

- *UTC direct*
- *UTC indirect (internal GNSS receiver disabled; at least one other station UTC direct synchronised)*
- *BASE direct (internal GNSS disabled; base station with UTC direct synchronisation within range)*

Check CommState Parameter SyncState in position Report and reporting rate

Required result

Transmitted Communication state shall fit the Synchronisation mode

2011-07-21 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			
• Operate with GPS	Check that sync state is 0 (UTD direct)		Passed
	Check that report rate is 10 s		Passed
• Disable GPS by disconnection of GPS antenna, • at least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect		Passed
	Check that report rate is 10 s		Passed
• GPS disabled • Remove other AIS	Check that sync state is 3 (no UTC source)		Passed
• 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
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)		Passed

5.1.2 16.1.2 Synchronisation test without UTC, semaphore

(M.1371 A1/3.1.1.4)

Method of measurement

Set up standard test environment without UTC available. Let EUT operate as a sync source (semaphore) for other stations. Check CommState Parameter SyncState in position Report and reporting rate.

Required results

Transmitted CommState shall fit the Synchronisation mode.

The EUT shall increase reporting rate to 2 s when acting as a semaphore.

2011-07-21 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			
• Operate without GPS	Check that sync state is 3		Passed
• Other Transponders all without GPS, • Semaphore 1)	Check that report rate is 2 s	UTC 11:04 –11:11 Higher number of received stations, semaphore mode UTC 11:16 semaphore mode finished UTC 11:18 lower MMSI: semaphore mode UTC 11:26 equal number of received stations, semaphore mode continues UTC 11:35 end of test, still semaphore mode	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.

5.1.3 16.1.3 Synchronisation test without UTC

(M.1371 A1/3.1.1)

Method of measurement

Set up standard test environment; chose 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) Enable internal GNSS in synchronisation modes other than UTC direct

Check CommState Parameter SyncState in position Report and reporting rate.

Required results

a) Transmitted Communication state shall fit the Synchronisation mod

b) Transmitted Communication state shall fit the Synchronisation mod

d) Synchronisation mode shall revert to UTC direct

2011-07-21 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			
• Disable GPS, • One base station without GPS within range	Check that sync state is 2 (Base station indirect)	UTC 11:35	Passed
	Check that report rate is 10 s	UTC 11:40	Passed
• GPS disabled • Remove Base station	Check that sync state is 3 (no UTC source)	UTC 11:41	Passed
• Operate without GPS • Other Transponders all without GPS, • Not semaphore 1)	Check that sync state is 3	UTC 11:00	Passed
	Check that report rate is 10 s		Passed
• Enable GPS • Other Transponders all without GPS,	Check that sync state is 0	UTC 11:45	Passed
	Check that report rate is 10 s		Passed

5.2 16.2 Time division (Frame format)

(M.1371 A1/3.1.2)

Method of measurement

Set the EUT to max reporting rate of 2 sec by applying a speed of >23kn and a ROT of >20°/sec. 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 26,67msec.

2011-05-26 Ba	Test details - TDMA Synchronisation		
Test item	Check	Remark	Result
Check the data recorded in 3.4.1 “14.4.1 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

5.3 16.3 Synchronisation jitter

(M.1371 A1/3.2.2.8.4)

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 3.2.2.10 in Rec. ITU-R M.1371-1).

Method of measurement

Set-up standard test environment. Set the EUT to 25 kHz bandwidth, max reporting rate of 2 sec 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, e.g. by evaluating the start flag and calculating back to T_o are allowed.

Repeat the test for 12.5 kHz bandwidth.

Required results

The synchronisation jitter shall not exceed

a) ±104 μs using UTC direct synchronisation

b) ±312 μs using UTC indirect synchronisation .

2011-05-25 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). C heck 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 The measured value of the VDL analyser (in units of 10 µs) should be in the range of 330 ... 360 (RMS, inc. Tolerance of VDL analyser)	Generally the timing is correct Retest 2011-07-20-25 Ba Sometimes the EUT works with a timing offset of 1 s = 37.5 slots • 2011-07-20 Ba: The EUT started with 1 slot offset and changed at UTC 10:01 to 1 s offset • 2011-07-22 Ba: Start with 1 s offset. After restart at 09:15 ok, at UTC 12:56:25 changed to 1 s offset • 2011-07-25 Ba: Start with 1 s offset Retest 2012-02-01 Ba: A timing offset has not been observed during this test phase with EUT 4.	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 measured value of the VDL analyser (in units of 10 µs) should be in the range of +/- 31 of the measured values of the sync source	Test 2011-06-24	Passed

5.4 16.4 Data encoding (bit stuffing)

Method of measurement

Setup standard test environment.

- *apply a binary broadcast message (msg 8) to the VDL containing the HEX-values "7E 3B 3C 3E 7E" in the data portion and check Presentation Interface output of EUT*
- *apply a BBM message to the EUT initiating the transmission of msg 8 containing the HEX-values as above in the data portion and check the VDL*

Required results

Confirm that

- *Data output on the presentation interface conforms to transmitted data*
- *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

2011-07-01 Ba	Test details - Data encoding (bit stuffing)		
Test item	Check	Remark	Result
File name for BBM sentence is AIBBM_bin_stuffing.sst			
RX of BBM message Transmit msg 8 from VDL generator	Check that VDM is according transmitted data	UTC 09:23	Passed
TX of BBM message Apply BBM sentence to the PI	Check that VDO output of PI is according to BBM sentence	UTC 09:25	Passed
	Check with VDL analyser that VDL message is according to BBM		Passed
	Check that VDM sentence of RX is according to VDO of TX		Passed

5.5 16.5 Frame check sequence

(M.1371 A1/3.2.3)

Method of measurement

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

Required results

Confirm that this message is not forwarded to the PI by the EUT.

2011-07-01 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 position report is received from EUT (VDO output)		Passed
Set CRC bit sequence to false	Check that position report is not received from EUT (VDO output)		Passed

5.6 16.6 Slot allocation (Channel access protocols)

(M.1371 A1/3.3.1)

5.6.1 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 frames after initialisation period. Check CommState for channel access mode

Required results

EUT shall start autonomous transmissions of msg 3 (position report) with ITDMA CommState with KeepFlag set true for first frame and msg 1 with SOTDMA CommState for consecutive frames.

Record the VDL data of the first 12 frames after switching on the EUT, 3 frames for this test and 8 frames for test 5.6.2. Generate a table and diagram from that data and check the following test items using the recorded data.

2011-05-24 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 msg 3		Passed
Keep flag	Check that the keep flag is set in msg 3		Passed
Slot offsets	Check that the slot offsets of msg 3 are in the range 750 +/- 75= 675 ... 825	Remark: It is a little bit strange that on channel A the third message is not allocated and transmitted in the first frame but in the second frame.	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 time-out in the 2nd frame is between 2 and 6 (decremented from initial 3..7)		Passed

2011-05-27 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 msg 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 msg 3 are in the range 150 +/- 15 = 135...165		Passed

5.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)

(M.1371 A1/3.3.2)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Record transmitted scheduled position reports msg 1 and check frame structure. Check CommState of transmitted messages for channel access mode and parameters slot timeout, slot number and slot offset

Required results

Check that nominal reporting rate is achieved ±20% (allocating slots in selection interval SI). Confirm that the EUT allocates new slots NTS within SI after 3 to 8min. Check that slot offset indicated in CommState matches slots used for transmission.

2011-05-24 Ba	Test details – 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 msg 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 time-out is counting from 3...7 to 0		Passed

Slots used	Check that the slots indicated in CommState match the slots used		Passed
Slots allocated at time-out 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 time-out 3,5,7 the number of received stations is indicated		Passed
	Check that for time-out 2,4,6 the slot number is indicated		Passed
	Check that for time-out 1 the correct value of UTC is indicated		Passed
	Check that for time-out 0 the slot increment is indicated		Passed
Alternating channels	Check that the position reports are transmitted on alternating channels		Passed
Msg 5	Check that the channel alternating of position report is not impaired by msg 5		Passed
Others	Check the recorded data for other possibly incorrect items		Passed

5.6.3 16.6.2 add Autonomous scheduled transmissions (ITDMA)

(M.1371 A1/3.3.2)

(from Inland AIS)

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 %.

2011-05-24 Ba	Test details – Autonomous scheduled transmissions (ITDMA)		
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 3 min			
Reporting rate	Check that the reporting rate is 3 min		Passed
Message type	Check that msg 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

5.6.4 16.6.3 Single message transmission (RATDMA)

(M.1371 A1/3.3.2)

Method of measurement

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

a) Apply a 1 slot Binary Broadcast message (msg 8) to the PI of the EUT. Record transmitted messages.

b) Apply combinations of Binary Broadcast message (msg 8), Addressed Binary message(msg 14), Broadcast Safety Related message (msg 6) and Addressed Safety Related message(msg12) to the PI of the EUT. Record transmitted messages and output of the PI of the EUT.

Required results

a) Confirm that EUT transmits this msg 8 within max. 4sec. Retry with 90% channel load.

b) Confirm that maximum 20 slots can be used per frame for unannounced messages using RATDMA access scheme and that messages using the twenty first slot and above are rejected. Confirm that message ABK is sent with acknowledge type 2 (Message could not be broadcast) when the message is rejected.

2011-06-29 Ba	Test details – a) 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 is: AIBBM_bin.sst			
Standard test environment	Check that msg 8 is transmitted within 4 s		Passed
	Check that RATDMA is used if there is no position report within 4 s		Passed
	Check that ITDMA is use, if there is a position report in the next 4 s. The position report is changed from msg 1 to 3 to announce the msg 8 slot		Passed
90 % channel load Generate channel load as described below 1).	Check that msg 8 is transmitted within 4 s	Test 2011-07-25 Ba	Passed
	Check that RATDMA is used if there is no position report within 4 s		Passed
	Check that ITDMA is use, if there is a position report in the next 4 s. The position report is changed from msg 1 to 3 to announce the msg 8 slot		Passed

2011-07-25 Ba	Test details – Multi RATDMA transmissions		
Test item	Check	Remark	Result
Apply more than 20 msg 6,8,12,14 to the PI port of the EUT within one frame. File name is: AIBBM_25.sst. Delay = 2 s			
Maximum transmissions per frame	Check that only 20 msg are transmitted in one frame. Msg 21 ... have to be rejected		Passed
ABK output	Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		Passed

5.6.4.1 16.6.3 add 1 Transmission of message 5 (ITDMA)

(M.1371/A2-3.3.2, 3.3.4.2.1, 3.3.4.1)

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.

2011-05-24	Test details – ITDMA transmission of msg 5		
Test item	Check	Remark	Result
Record the VDL data of 15 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		Passed
Message type for allocation	Check that a message 1 before msg 5 on the same channel is changed to msg 3 to allocate the slots for message 5		Passed
Number of slots	Check that the number of slots = 2		Passed
Keep flag	Check that the keep flag = 1		Passed
Slot allocation	Check that the slot allocated by msg 3 is used for Tx of msg 5		Passed
Alternating channels	Check that the msg 5 are transmitted on alternating channels		Passed

5.6.5 16.6.4 Assigned operation

(M.1371 A2/3.3.6)

A fast and simple test of assigned operation has been made in paragraph 3.1.2 14.1.2 Assigned mode).

A record of the complete operation from assignment message until end of switch back to SOTDMA should be made and evaluated.

5.6.5.1 16.6.4.1 Assigned mode using reporting rates

Method of measurement

Operate standard test environment and EUT in autonomous mode. Transmit an Assigned mode command msg 16 to the EUT with:

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

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

Required results

a) Confirm that EUT transmits position reports message msg 2 at a report rate that corresponds to the next highest multiple of 20

b) Confirm that EUT transmits position reports message msg 2 at a report rate of one report per second.

2011-05-27 Ba	Test details – Assigned Mode		
Test item	Check	Remark	Result
Send a msg 16 rate assignment with invalid offset values			
Offset value = 110 (not a multiple of 20)	Check that the reporting rate is 120/10min = 12/min = 5s	UTC 07:17	Passed
Offset value = 1000 (> 600 msg/10 min	Check that the reporting rate is 600/10min = 60/min = 1s	UTC 07:23	Passed
Send a msg 16 rate assignment with EUT as second transponder in the message			
Dest. A: rate = 600 msg/10min Dest. B: rate = 120 msg/10min	Check that the EUT does reschedule to the assigned reporting rate of 120 msg/10 min = 12 msg/min = 5s		Passed

5.6.5.2 16.6.4.2 Receiving test

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command (msg 16) to the EUT with:

- *slot offset and increment*
- *designated reporting rate.*

Record transmitted messages.

Required results

Confirm that EUT transmits position report msg 2 according to defined parameters and reverts to SOTDMA msg 1 with standard reporting rate after 4 to 8 min (ITU-R M.1371 A2/3.3.8.2.12).

2011-05-25 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 time-out time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Passed
First message	Check that first message is sent after 40 slots		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 msg2 frame have the same timeout		Passed
	Check that the timeout is between 3 and 7	= 4	Passed
	Check that the timeout is decremented after 1 min	Remark: When a new message 16 is received the time-out is re-set to the same value 4	Passed
Comstate	Check that the ComState is like the ComState of msg 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 msg 3 to start autonomous mode		Passed
	Check that EUT initialises autonomous mode like network entry		Passed

2011-12-15 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 = 3 (increment = 225) Within the time-out time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Passed
First message	Check that first message is sent after 40 slots	The first message is sent after 524 slots. This value is different from test to test. When Message 16 with the same settings is repeated every minute in the same slot the used slots of message 2 are different from frame to frame. Retest 2012-01-25 Ba: The first message is sent 40 slots after message 16	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 225 slots		Passed
Timeout	Check that all slots of the first msg2 frame have the same timeout		Passed
	Check that the timeout is between 3 and 7	= 4	Passed
	Check that the timeout is decremented after 1 min		Passed
Comstate	Check that the ComState is like the ComState of msg 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 msg 3 to start autonomous mode		Passed
	Check that EUT initialises autonomous mode like network entry	The switching back to the autonomous interval is incorrect. The transmissions on both channels are nearly at the same time. There should be a distance of 6 s from the transmission on one channel to the transmission on the other channel. Retest 2012-01-25 Ba: The switching back to the autonomous interval is now correct	Passed

2011-05-24 Ba	Test details b)– Rate assignment		
Test item	Check	Remark	Result
Send an assignment message 16 with offset=reporting rate of 300msg/10 min, increment=0 Within the timeout time repeat the message 16 Record VDL messages and evaluate record			
VDM output	Check VDM output of msg 16		Passed
Initialisation phase	Check that EUT starts immediately with rescheduling to the new reporting rate	With the next message 1 on each channel	Passed
Message type	Check that message type of position report is 2 instead of msg 1		Passed
Reporting rate	Check that the reporting is 300 msg/10 min = 30msg/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 msg 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 msg 16: Switch back is between 3 and 7 minutes after last repetition	6 min after last message 16	Passed
Switch back to autonomous mode	Check that the EUT reverts to normal reporting rate between 4 and 8 minutes after last msg 16		Passed

5.6.5.3 16.6.4.3 Assignment selectivity

(M.1371 A1/3.3.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Check frame structure. Transmit an Assigned mode command (msg 16) to another AIS with a slot offset and increment pointing to a slot used by the EUT. Record transmitted messages.

Required results

Confirm that EUT does not allocate slots on a msg16 addressed to other stations.

2011-05-27 Ba	Test details)– assignment selectivity		
Test item	Check	Remark	Result
Send a message to another MMSI			
Wrong MMSI	Check that the EUT does not change the reporting rate		Passed

5.6.5.4 16.6.4.4 Slot assignment to FATDMA reserved slots

(M.1371 A1/3.3.6)

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

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Transmit an Assigned Mode Command (msg 16) to the EUT and command it to use one or more of those FATDMA allocated slots. Record transmitted messages.

Required results

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

2011-07-21 Ba	Test details – Slot assignment to FATDMA reserved slots		
Test item	Check	Remark	Result
Send message 4 with distance < 120 NM Send a message 20 on channel A 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)			
Rx of msg 20	Check that msg 20 has been received by EUT (VDM output)	UTC 11:52	Passed
Slot use	Check that slots assigned by the msg 16 are used by the EUT	• The EUT does not transmit on channel A (with reservation by message 20) • The EUT does transmit on channel B (without reservation by message 20) Retest 2012-01-25 Ba: The EUT transmits on both channels using the assigned slots	Passed

5.6.6 16.6.5 Fixed allocated transmissions (FATDMA)

(M.1371 A1/3.3.6)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment. Record transmitted messages.

Required results

Confirm that EUT does not use slots allocated by msg 20 for own transmissions until timeout of 4 to 8 min.

2011-07-21 Ba	Test details – FATDMA reserved slots		
Test item	Check	Remark	Result
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 time-out 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 time-out of 4-8 minutes after message 20		Passed
Start of reservation	Check that the reserved slots are not used 1 min after reception of message 20	The reserved slots are not used in the frame immediately following the first message 20 See Note 1) Retest 2012-01-26 Ba: The EUT continues one frame using the reserved slots. The time-out of messages using reserved slots is forced to 0 and the (not reserved) slot for the next frame is allocated.	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)	After regular time-out the slots reserved on the other channel are not used	Passed
Repeat test without message 4	Check that all slots are used	All slots are used	Passed
Repeat test with base station, distance > 120 NM	Check that all slots are used	The reserved slots are not used Remark: The MKD has displayed a distance of 124 NM Retest 2012-01-26 Ba: All slots are used	Passed

Note 1)
Generally there are 3 different ways to handle the start of reservation:

1) the reserved slots are not used in the frame immediately following the first received message 20. The disadvantage of this solution is that it is not possible to allocate the slots for the messages which have to change the transmission slot because of the reservation.

2) The EUT continues one frame using the reserved slots. The time-out of messages using reserved slots is forced to 0 and the (not reserved) slot for the next frame is allocated. In the next frame no reserved slots are used. So 1 minute after message 20 no reserved slots are used.
3) The EUT continues normal operation. If the time-out of a message is counted down to 0 the reservation is considered when selecting the new slot. So after maximum 8 frames no reserved slots are used.

The standard do not define which methode should be used.

- For the channel with the slot reservation the commonly used methode is 2). We also prefer this solution. There is no problem with unallocated slots, and within one frame the reserved slots are left. This delay of 1 frame for the reservation is no problem. The base stations have to consider it when setting up a new reservation. For ships approaching a base station area it does not matter if the receive or consider a message 20 one frame earlier or later.

- For the other channel methode 3) is the best way. There is no need to force the time-out to 0 or even not to use the slots immediately. The slots are not reserved and can thererfore be used. They only have a lower priority. That means that at regular time-out 0 slots with higher priority (e.g. free slots) should be preferred.

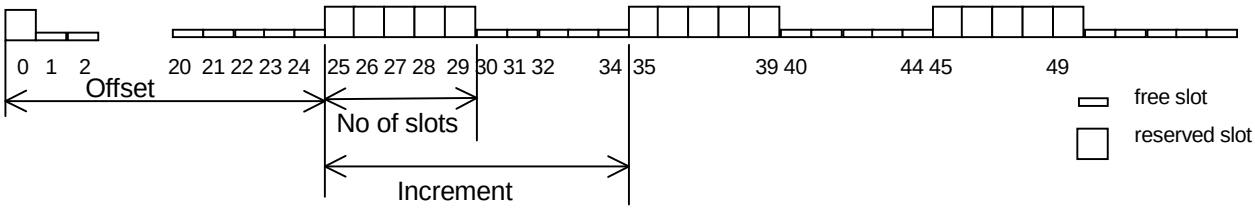
Note) According to ITU-R M1371, §4.4.1 and clarification 2.56 a slot reserved by a base station on the other channel has got the lowest possible priority, that means it can be used for candidate slots, but only if no other slot with higher priority is available.

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: Msg 20 transmission by test system.
Msg 20 reserves slots which should not be used by mobile stations.
Msg 20 parameters:

- Msg 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



5.6.7 16.6.6 Group assignment

(6.1.3, 7.3.3.1, M.1371/A8-3.12, A8-3.19, A2-3.3.6)

This test item is taken from the Inland AIS standard and modified for class A

5.6.7.1 16.6.6.1 Assignment priority

5.6.7.1.1 16.6.6.1.1 Assignment by message 22

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit an Assigned mode command (message 23) to the EUT with TX/RX mode 1.

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 TX/RX mode 2

b) Transmit a message 23 to the EUT with TX/RX mode 1 within 10 minutes after test a)

c) Repeat transmission of message 23) to the EUT with TX/RX mode 1 after 15 minutes.

d) Repeat the test, clear the region defined by message 22 under a)[3]. Transmit message 22 to the EUT with regional settings specifying TX/RX mode 2

Record transmitted messages.

Required results

a) The Tx/Rx mode field setting of message 22 shall take precedence over the Tx/Rx mode field setting of message 23.

b) Verify that the EUT ignores the assignment by message 23 and the setting of message 22 takes precedence for 10 minutes.

c) Verify that the EUT applies the Tx/Rx mode field setting of message 23

d) The Tx/Rx mode field setting of message 23 shall take precedence over the Tx/Rx mode field setting of message 22. The receiving station shall revert to its previous Tx/Rx mode after a timeout value randomly chosen between 240 sec and 480 sec.

[3] This can be carried out by assigning a new simulated position to the EUT.

2011-05-25 Ba	Test details - Assignment by msg 22		
Test item	Check	Remark	Result
The test sequence is modified to improve testability (Test d before a..c) Setup EUT in autonomous mode Prepare message 23 such that the EUT is addressed by group assignment command. Set Tx/Rx mode to 1. Prepare message 22, EUT inside area, Tx/Rx mode = 0			
Transmit message 23	Verify that message 23 is received and content is correct.	UTC 13:24	Passed
Reporting rate	Check that reporting rate is as expected by message 23.	Autonomous rate	Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel A).	Channel A	Passed
d) Msg 22 to an area			
Transmit message 22 (Tx/Rx mode = 0)	Verify that message 22 is received (ACA output)	UTC 13:26	Passed
Tx/Rx mode	Check Tx/Rx mode = 1 (Tx on channel A) according to msg 23		Passed
Wait for time-out of msg23			
Reporting rate	Check that reporting rate = autonomous reporting rate		Passed
Tx/Rx mode	Check Tx/Rx mode = mode of msg 22 = 0 (Tx on channel A and B)		Passed
Msg 22 individually addressed			
Transmit message 23 (Tx/Rx mode = 1)	Verify that message 23 is received and content is correct.	2011-05-26 UTC 11:54	Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel A).		Passed
a) Transmit message 22 individually addressed (MMSI) (Tx/Rx mode = 2)	Verify that message 22 is received and content is correct.	UTC 11:56	Passed
Tx/Rx mode	Check Tx/Rx mode = mode of msg 22 = 2 (Tx on channel B)		Passed
b) Transmit message 23 with Tx/Rx mode 1 within 10 min after msg 22	Verify that message 23 is received and content is correct.	UTC 11:59	Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 22 (Tx on channel B).		Passed
c) Transmit message 23 with Tx/Rx mode 1 more than 10 min after msg 22	Verify that message 23 is received and content is correct.		Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel A).		Passed

5.6.7.1.2 16.6.6.1.3 Assignment by message 16

Messages which are addressed directly to an AIS Transponder have precedence of group assignment commands and manual assignments. Following test should verify the assignment priority of these messages.

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode. Input sensor data to achieve a reporting interval of 10 sec.

a) Address the EUT with an AIS message 16 to bring the EUT in assigned mode with a reporting interval of 5 seconds. Record VDL and verify the reaction of the EUT.

b) Apply a message 23 with a reporting interval of 2 seconds. Construct message 23 in that way that the EUT will be addressed by the message.

Required results

a) Verify that the reporting interval is 5 s.

b) Verify that the EUT ignores the command given by message 23.

2011-05-27 Ba	Test details - a, b		
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Input sensor data to achieve a reporting interval of 10 sec.			
Apply sensor data	Check that EUT operates in autonomous mode and transmits position reports with autonomous reporting rate.		Passed
Transmit message 16 (reporting rate 5 seconds, Offset = 120)	Monitor VDL and presentation interface and verify that message 16 is received and content is correct.	UTC 11:25	Passed
Assigned mode	Check that msg type of position reports = 2		Passed
Reporting rate	Check that reporting rate is 5 seconds.		Passed
Transmit message 23 with reporting interval = 2 s	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	UTC 11:27	Passed
Assigned mode	Verify that the EUT ignores the command given by message 23 (reporting interval = 5s)		Passed

5.6.7.2 16.6.6.2 Increased reporting interval assignment

5.6.7.2.1 16.6.6.2.1 Increased reporting interval assignment by message 23

(7.3.3.1, M.1371/A2-3.3.6)

Method of measurement

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

a) Transmit a Group Assignment message (message 23) to the EUT with a reporting interval greater than the autonomous reporting interval.

b) Transmit a Group Assignment message (message 23) to the EUT with a quiet time command.

Record transmitted messages.

Required results

Confirm that the EUT transmits position reports with the autonomous reporting interval in both a) and b).

2011-05-27 Ba	Test details - Increased reporting interval		
Test item	Check	Remark	Result
Reporting rate	Check VDO output and verify that RR is as given by autonomous mode (10 sec)		Passed
Transmit msg23 (reporting interval > 10 s)	Verify that EUT receives the msg	UTC 11:11 value 5 UTC 11:32 value 10 UTC 11:32 value 6	Passed
Report rate	Check that transponder declines msg 23 command		Passed
Transmit msg23 with quite time	Verify that EUT receives the msg	UTC 11:33	Passed
Report rate	Check that transponder declines msg 23 command		Passed

5.6.7.3 16.6.6.3 Entering interval assignment

5.6.7.3.1 16.6.6.3.1 Entering interval assignment

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 seconds..

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 next shorter.

d) Operate EUT in autonomous mode with a reporting interval of 6 seconds. Transmit a Group Assignment command (message 23) to the EUT with a reporting interval next shorter.

Monitor the VDL.

Required results

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

b) Verify that EUT enters assigned operation mode and transmits position report message 2 with 2 seconds reporting interval.

c) Verify that EUT enters assigned operation mode and transmits position report message 2 with 5 seconds reporting interval.

d) Verify that EUT enters assigned operation mode and transmits position report message 2 with 2 seconds reporting interval.

2011-05-25 Ba	Test details Entering interval assignment		
Test item	Check	Remark	Result
a) 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 msg 23		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 msg 1		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		Passed
Initialisation / Slot allocation	Check that the slot of the autonomous reporting interval (10s) are allocated according to the network entry procedure		Passed
Timeout	Check that the assigned timeout is between 2 and 6	5	Passed
b) Send a group assignment message 23 with a reporting interval of 2 s (value 11)			
VDM output	Check VDM output of msg 23	2011-05-27 UTC 08:18	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 2 s		Passed
c) Send a group assignment message 23 with reporting interval = next shorter interval (value 9)			
VDM output	Check VDM output of msg 23	2011-05-27 UTC 08:29	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 5 s		Passed
d) 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 msg 23	2011-05-27 UTC 10:33	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 2 s		Passed

5.6.7.3.2 16.6.6.3.2 Addressing by geographic region

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 seconds.

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 seconds 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 seconds and apply message to VDL.

Required result

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

b) Verify that EUT declines message 23.

2011-05-27 Ba	Test details - a) inside the addressing area		
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 seconds (SOG).			
Transmit message 23, EUT inside region (Reporting interval value = 11)	Check that msg 23 is received (VDM output)	UTC 11:35	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

2011-05-27 Ba	Test details - b) outside the addressing area		
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 seconds (SOG).			
Transmit message 23, EUT outside region (Reporting interval = 2 s)	Verify that EUT declines message 23	UTC 11:46	Passed

5.6.7.3.3 16.6.6.3.3 Addressing by station type

Method of measurement

Set up standard test environment and operate EUT in autonomous mode with a reporting interval of 10 seconds.

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 seconds and the station type to 0 (all stations).

b) Transmit a Group Assignment command (message23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 seconds and the station type to 4 (A to N).

c) Transmit a Group Assignment command (message23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 5 seconds and the station type to 1 (Class A only). Apply this message to the VDL again within 4 minutes. Record VDL and check reaction of the EUT.

Required result

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

b) Verify that EUT declines message 23.

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

2011-05-27 Ba	Test details - a) station type 0		
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 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 0, Reporting interval = 2 s	Check that msg 23 is received (VDM output)	UTC 11:35	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

2011-05-27 Ba	Test details - b) Other station types		
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 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 4 (AtoN), Reporting interval = 2 s	Check that msg 23 has been received (VDM output)	UTC 11:49 Tested with station types 2 (Class B), 3 (airborne), 4 (Class B SO), 5 (Class B CS), 6 (Inland AIS)	Passed
Reporting rate	Check that EUT transmit position reports with autonomous reporting interval..		Passed

2011-05-27 Ba	Test details - c) Station type 1 = Class A		
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 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 1 (Class A station only), Reporting interval = 5 s (8)	Check that msg 23 has been received (VDM output	UTC 11:55	Passed
Reporting rate	Check that the reporting interval is changed to 5 s		Passed
Repeat message 23 within 4 minutes	Check that reporting interval of 5 s is maintained		Passed
Stop repetition of msg 23	Verify that EUT reverts to normal operation mode at 4... 8 min after the last msg 23		Passed

5.6.7.3.4 16.6.6.3.4 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 seconds.

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 seconds 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 seconds and the ship and cargo value to a desired value. Make sure that a different value is configured in the EUT.

Required result

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

b) Verify that EUT declines message 23.

2011-05-27 Ba	Test details - a) Matching type		
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 seconds (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 msg 23 is received (VDM output)	UTC 13:10	Passed
Reporting rate	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 msg 23 is received (VDM output)	UTC 13:17	Passed
Reporting rate	Check that the reporting interval is changed to 2 s		Passed

2011-05-27 Ba	Test details - b) Not matching type		
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 seconds (SOG). Set EUT to ship and cargo type = 82			
Transmit message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 72	Check that msg 23 has been received (VDM output)		Passed
Reporting rate	Check that EUT transmit position reports with autonomous reporting interval..		Passed

5.6.7.3.5 16.6.6.3.5 Ships not under way (NavStat 1 or 5)

Method of measurement

Set up standard test environment and operate EUT with navigational status not under way (NavStat 1 or 5) and not moving (autonomous mode with a reporting interval of 3 minutes.)

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 seconds 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 inside this region). Set the TX/RX mode to mode 2 and apply message to VDL.

Set up standard test environment and operate EUT with navigational status not under way (NavStat 1 or 5) and moving faster than 3 knots (autonomous mode with a reporting interval of 10 seconds.)

c) 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 seconds and apply message to VDL.

Required result

a) Confirm that the EUT transmits position reports with the autonomous reporting interval.

b) Confirm that the EUT switches to TX/RX mode 2 and reverts to normal operation mode after timeout period.

c) Confirm that the EUT transmits position reports with the assigned reporting interval (2 seconds).

2012-02-24 Ba	Test details - a, b, c)		
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode with a reporting rate of 3 min (Nav status 1 or 5 and SOG < 3 kn.			
a) Transmit message 23 with reporting interval = 2 s	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	UTC 08:09	Passed
Assigned mode	Check that msg type remains 3 and is not changed to 2		Passed
Reporting rate	Check that reporting rate remains at 3 min		Passed
b) Transmit message 23 with Tx/Rx mode = 2	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	UTC 08:39	Passed
Tx/Rx mode	Confirm that EUT transmit position reports on the channel specified in message 23 (Tx on channel B).		Passed
Time-out	Verify that the EUT reverts to normal operation mode after timeout period.		Passed
Set SOG to a value > 3 kn			
c) Transmit message 23 with reporting interval = 2 s	Monitor VDL and presentation interface and verify that message 23 is received and content is correct.	08:30	Passed
Assigned mode	Check that msg type is changed to 2		Passed
Reporting rate	Check that reporting interval is set to 2 s according to the interval of message 23		Passed

5.6.7.4 16.6.6.4 Reverting from interval assignment

Method of measurement

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

Verify that EUT enters autonomous operation mode after a time-out of 4 to 8 minutes and transmits position report message 1 with autonomous derived reporting interval.

Verify that EUT build up the assigned transmission scheduled according to network entry procedure. Verify that unused slots of the previous reporting schedule are released.

2011-05-25 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 RR is 10 seconds (SOG).			
Transmit message 23 EUT inside area, station type = 0 Reporting interval = 5 s	Check that msg 23 has been received. Record Rx time		Passed
Reporting rate	Check that EUT transmit position reports with reporting interval of 5 seconds.		Passed
Time-out	Check that the EUT reverts to 10 s reporting rate after 4.. 8 min	5 min	Passed
Slot deallocation	Check that the slot of the assigned reporting interval are released using time-out = 0 and slot offset = 0		Passed
Slot allocation	Check that the slot of the autonomous reporting interval (10s) are allocated according to the network entry procedure		Passed
2011-05-27 Ba	In an other test with message 23, reporting interval = 2 s, the transmission schedule after leaving the assigned mode was incorrect. Instead of the intervals 10s, 10s, 10s, 10s, ...the intervals were 2s, 18s, 2s, 18s, ... It was a rather special case, message 23 was applied short time after the end of a previous assignment. Retest 2011-07-27 Ba: This problem could not reproduced during this test phase. It has to be observed in the next test phase. Retests 2012-01-27 Ba: The problem was not observee		Passed

5.7 16.7 Message Formats

(M.1371 A1/3.3.7)

5.7.1 16.7.1 Received messages

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 7 to the VDL. 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.

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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 7.3 18.2 (M.1371 A1/5.3) 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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

2011-07-21 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.		Passed

2011-07-21 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

5.7.2 16.7.2 Transmitted messages

(M.1371 A1/3.3.7)

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 7 by the EUT.

Record transmitted messages.

Required results

Confirm that 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 are NOT being transmitted by the EUT.

The message contents of most transmitted messages are checked in special tests

2011-07-22 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 3.3.1 Information content of msg 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 TX		Passed
Fill bits	Check that value = 0		Passed
Message content	The message content is tested in 14.3		Passed

2011-07-22 Ba	Test details – Message 5 Static data		
Test item	Check	Remark	Result
The message content of message 5 is checked in 3.3.2 Information content of msg 5.			
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	The message content is tested in 14.3		Passed

2011-07-22 Ba	Test details – Content of msg 6 Addressed binary message		
Test item	Check	Remark	Result
This test can be done in combination with test 3.1.4.1 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	UTC 06:50	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 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

2011-07-22 Ba	Test details – Content of msg 7 Binary acknowledge		
Test item	Check	Remark	Result
This test can be done in combination with test 7.1.2 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	UTC 06:51	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

2011-07-22 Ba	Test details – Content of msg 8 Binary broadcast message		
Test item	Check	Remark	Result
This test can be done in combination with 7.4 18.3 Broadcast messages 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	UTC 06:53	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 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

2011-07-22 Ba	Test details – Content of msg 10 UTC and date inquiry		
Test item	Check	Remark	Result
Activate transmission of msg 10 if implemented (not required)			
Number of sentences	Check that value = 1	UTC 06:56 Tx of message 10 is implemented for the Ed. 2 communication test	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 = 72 bit)		Passed
Message ID	Check the field content		Passed
Source ID	Check the field content		Passed
Destination ID	Check the field content		Passed

2011-07-22 Ba	Test details – Content of msg 11 UTC date response		
Test item	Check	Remark	Result
Transmit a msg 10 from VDL generator to request transmission of msg 11 by EUT Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1	UTC 06:58	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

2011-07-22 Ba	Test details – Content of msg 12 Addressed safety related message		
Test item	Check	Remark	Result
This test can be done in combination with test 3.1.4.1 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	UTC 07:03	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 = 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	0 for first Tx, 1 for retransmission	Passed
Safety related text	Check the field content		Passed

2011-07-22 Ba	Test details – Content of msg 13 Safety related acknowledge		
Test item	Check	Remark	Result
This test can be done in combination with test 7.1.2 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	UTC 07:05	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

2011-07-22 Ba	Test details – Content of msg 14 Safety related broadcast message		
Test item	Check	Remark	Result
This test can be done in combination with 7.4 18.3 Broadcast messages 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	UTC 07:06	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 (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

2011-07-22 Ba	Test details – Content of msg 15 Interrogation		
Test item	Check	Remark	Result
This test can be done in combination with 7.3 18.2 (M.1371 A1/5.3) 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	UTC 11:09	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 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

Remark:
The transmission of message 25 and 26 have not been tested because the methode of initiation is not yet defined.

Message 25 and 26 have to be tested when the methode of initiating transmission has been clarified in IEC 61993-2 Ed.2

6 17 Specific tests of Network Layer

(7.4)

6.1 17.1 Dual channel operation

(M.1371 A1/4.1)

6.1.1 17.1.1 Alternate transmissions

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode on default channels AIS1, AIS2. Record transmitted scheduled position reports on both channels. Check CommState for slot allocation.

Required results

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

2011-05-24 Ba	Test details – Alternate transmissions		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode, set report rate to 10sec with external sensor input. Record transmitted scheduled position reports on both channels. Check Comm State for slot allocation.			
Alternate transmissions	Check that the EUT transmission is alternating		Passed
Comm state	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
Comm state	Check that the slots of each channel are allocated on the same channel		Passed

6.2 17.2 Regional area designation by VDL message

(M.1371 A1/4.1))

Method of measurement

Set-u p standard test environment and operate EUT in autonomous mode. Apply Channel management messages (msg 22) to the VDL defining two adjacent regional areas 1 and 2 with different channel assignments for both regions and a transitional zone extending 4nm either side of the regional boundary. At least one channel shall be 12.5kHz channel. 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.

Region	***Primary channel***	***Secondary channel***
Region 1	*CH A1*	*CH B1*
Region 2	*CH A2*	*CH B2*
Default region	*AIS 1*	*AIS 2*

Required results

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones. EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

Item	***Area***	***Channels in use***
1	*default region*	*AIS1, AIS2*
2	*first transitional zone*	*AIS1, 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*

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

2011-07-22 Ba	Test details part 1 – Channel management by VDL msg 22		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS1/AIS2, send 2 Msg 22 by VDL generator, defining 2 adjacent areas with channels A1, B1 and A2, B2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 4nm. 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 msg 22 are output on PI	UTC 07:12	Passed
Display of defined area	Check that the defined area is correctly stored (displayed on MKD)	• The areas are stored. • The display of channel B is incorrect. The channel number of channel A is displayed • The power level is always displayed as "low", also if the stored level is high <u>Retest 2012-01-26 Ba:</u> The power level and the channels are correctly displayed Remark: Message 22 is only accepted if a message 4 has been received from the same base station.	Passed
	Check ACA and TXT output on PI (not required but recommended.	There is an TXT output but no ACA output	Passed
	ACA: check in use flag and time of in use flag		Passed
<u>Item 1</u>: In high sea area	Check that channels AIS1 and AIS2 are in use		Passed
<u>Item 2:</u> Move position into outer TZ of region 2	Check ACA and TXT output (No required)	TXT and ACA output <u>Retest 2012-01-27 Ba:</u> There is no TXT/ACA output	Passed
	If ACA output: check in use flags and time of in use flag	In use flag of area 2 = 1	Passed
	Check the limit of the TZ (5 nm = 8.8 minutes)	The TZ border is at 9.0 minutes See Note to 17.3) Retest 2012-01-26 Ba: At 9.0 minutes the EUT is outside the TZ	Passed
	Check that channel AIS 1 and A2 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)	TXT and ACA output Retest 2012-01-27 Ba: There is a TXT/ACA 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)	UTC 08:44 Not ACA/TXT output	Passed
	Check the limit of the TZ (4 nm = 7 minutes)	The TZ border is at 7 minutes	Passed
	Check that channel A2 and B2 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 A2 and A1 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 08:51	Passed
	Check the border of area		Passed
Item 7: Move position into region 1 (out of TZ)	Check that channels A1 and B1 are used		Passed
	Check the limit of the TZ (4 nm = 7 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 A1 and AIS1 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 AIS1 and AIS2 are used		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

Main scope of this table is the correct slot allocation and use on the different channels.

2011-07-22 Ba	Test details part 2 – Channel management by VDL msg 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 AIS1 and AIS2 are in use		Passed
Item 2: Move position into transitional area of region 2, first frame after transition	Check that EUT continues TX on AIS1 and AIS2 for 1 frame		Passed
	Check that EUT releases the slots on AIS2 by msg 1 with time-out 0 and no slot offset		Passed
	Check that channel AIS 1 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 (AIS1) using msg 3	There is a complete re-allocation on channel A.	Passed
	Check complete slot allocation on channel B (A2) using msg 3		Passed
	Check that channel AIS 1 and A2 are used for Tx		Passed
	Check that channel AIS 1 and A2 are used for Rx		Passed
	Check that reporting rate is doubled		Passed
	Check that msg on AIS1 are output on PI (VDM/VDO) as channel A and A2 as channel B		Passed

Item 4: Move into inner transitional area of region 2, crossing the area border,	Check that msg on AIS1 are output on PI (VDM/VDO) as channel B and A2 as channel A (channels reverted)	The VDM and VDO output after crossing the border is correct. There is a complete rescheduling with a gap of 15 s. This rescheduling is not necessary. The transmission can continue exactly as it is. Only the transmitter and receiver have to be exchanged internally. Because the rescheduling has some disadvantages, including two transmissions on unallocated slots, I classify it as "Nok" even if the standard does not exactly say how to handle this Retest 2012-01-27 Ba: There is no rescheduling when crossing the border	Passed
Item 5: Move position into the area of region 2 (out of TZ), first frame after transition	Check that EUT continues TX on AIS1 and A2 for 1 frame		Passed
	Check that EUT releases all slots on AIS1 by msg 1 with time-out 0 and no slot offset		Passed
	Check that EUT releases every second slot on channel A2 by msg 1 (for reversion to normal reporting rate		Passed
	Check that channel A2 and **B2** are used for **Rx**		Passed

Item 6: Inside area of region 2, next frames after transition	Check allocation of Slots on channel B (B2) using msg 3	Remark: • The transmission on channel A is not continued (as in the previous frame) but unnecessarily rescheduled. • The allocation on channel B starts rather late, in slot 1431, So there is a gap without transmission of about 20 s.	Passed
	Check that channels A2 and B2 are used for Tx		Passed
	Check that channel A2 and B2 are used for Rx		Passed
	Check that reporting rate is back to normal reporting rate		Passed
	Check that msg on A2 are output on PI (VDM/VDO) as channel A and B2 as channel B		Passed

Note)
The TXT and ACA output is rather inconsistent and also different from test to test. It is really difficult to understand when there is an TXT 036 and an ACA.

Edition 1 of IEC 61993-2 does not say much about the ACA output, so I have not marked it as an error.

Edition 2 gives a little bit more information at the following places:

6.10.3.3 Channel management parameters changed

The TXT-sentence, Text Identifier 036, shall be followed by the appropriate ACA sentence(s) to report the affected AIS conditions.

The TXT and ACA sentence pair shall be transmitted only once when crossing the boundary of the region, when the parameters in use are changed by a new command or on request ($xxAIQ,ACA).

17.2 Regional area designation by VDL message

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);

I understand from this definitions:
- the in-use flag is set to 1 when the position is inside the area, not if it is in the TZ but outside the area.
- Consequently there is an TXT/ACA output when crossing the area border, not when crossing the TZ borders
- TXT 036 + ACA are a pair, the TXT 036 is always followed by an ACA sentence

I recommend to implement the TXT 036/ACA output according to edition 2.

I recomment to send me an proposal for the implementation (e.g. including a map of test 17.2/3 with marking the points when an TXT/ACA will be output) before you implement it. Then we can agree on it before you start work.

Retest 2012-01-27 Ba:
There is a TXT/ACA output when crossing the borders of the areas, with a correct setting of the in-use flag.

2011-07-22 Ba	Test details – Check of Tx/Rx mode		
Test item	Check	Remark	Result
Set Tx/Rx-Mode in msg 22 to 0	Check that mode is correctly stored		Passed
	Check that channel A and B are used for Tx		Passed
	Check that channel A and B are used for Rx		Passed
Set Tx/Rx- Mode in msg 22 to 1	Check that mode is correctly stored	UTC 09:38	Passed
	Check that channel A only is used for Tx		Passed
	Check that channel A and B are used for Rx		Passed
	Check that the reporting rate is correct		Passed
Set Tx/Rx-Mode in msg 22 to 2	Check that mode is correctly stored		Passed
	Check that channel B only is used for Tx		Passed
	Check that channel A and B are used for Rx		Passed

6.3 17.3 Regional area designation by serial message

(M.1371 A1/4.1.3)

Repeat test 17.2 using ACA serial message for channel assignment.

2011-07-22 Ba	Test details – Channel management by ACA sentence on PI		
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS1/AIS2, send 2 ACA sentences to the PI , defining 2 adjacent areas with channels A1, B1 and A2, B2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 1nm. Set the position outside the areas. Areas are in SW quadrant. File name is 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.	TXT output ACA output only on request	Passed
Item 1: In high sea area	Check that channels AIS1 and AIS2 are in use		Passed
Item 2: Move position into outer TZ of region 2	Check ACA and TXT output (No required)	UTC 11:29 TXT output only Test 2: TXT and ACA output	Passed
	Check the limit of the TZ (5 nm = 5.8 minutes)	The TZ border is at 6.0 minutes See Note) Retest 2012-01-27 Ba: The TZ border is at 5.8 minutes	Passed
	Check that channel AIS 1 and A2 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 11:33 There is only aTXT output Test 2: TXT and ACA output	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 11:35 No ACA and TXT output	Passed
	Check the limit of the TZ (2 nm = 2.3 minutes)	The TZ size is between 1.9 and 2.0 minutes (not NM). Retest 2012-01-27 Ba: The TZ border is at 2.3 minutes = 2 NM	Passed
	Check that channel A2 and B2 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 A2 and A1 are used	UTC 13:06	Passed
	Check the limit of the TZ (2 nm = 2.3 minutes)	At 11'58.0 (2.0 min from border) the EUT is not yet in the TZ At 11'58.1 (1.9 min from border) the EUT is in the TZ So the TZ size is between 1.9 and 2.0 minutes (not NM). Retest 2012-01-27 Ba: The TZ border is at 2.3 minutes = 2 NM (11'57.7)	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 13:08 There is only a TXT output Test 2: TXT and ACA output	Passed
	Check the border of area		Passed
Item 7: Move position into region 1 (out of TZ)	Check that channels A1 and B1 are used		Passed
	Check the limit of the TZ 1 nm = 1.15 minutes)	At 12'01.00 the EUT is already outside the TZ So the TZ size is between 0.9 and 1.0 minutes (not NM). Retest 2012-01-27 Ba: The TZ border is at 1,15 minutes = 1 NM	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 A1 and AIS1 are used		Passed
	Check the limit of the TZ 1 nm = 1.15 minutes)	At 12'59.00 the EUT is still outside the TZ At 12'59.10 the EUT is inside the TZ. So the TZ size is between 0.9 and 1.0 minutes (not NM). It seems that the TZ is calculated in minutes, not in NM. Retest 2012-01-27 Ba: The TZ border is at 1.15 minutes = 1 NM	Passed
	Check that reporting rate is doubled		Passed

Move position out of the TZ of region 1, into high sea	Check that channels AIS1 and AIS2 are used	UTC 13:42	Passed
	Check the limit of the TZ 5 nm = 5.8 minutes)	The TZ border is at 6.0 minutes <u>Retest 2012-01-27 Ba:</u> The TZ border is at 5.8 minutes = 5 NM	Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

2011-05-25 Ba	Test details – Check of Tx/Rx mode		
Test item	Check	Remark	Result
Set Tx/Rx-Mode to 0	Check that mode is correctly stored		Passed
	Check that channel A and B are used for Tx		Passed
	Check that channel A and B are used for Rx		Passed
Set Tx/Rx-Mode to 1	Check that mode is correctly stored		Passed
	Check that channel A only is used for Tx		Passed
	Check that channel A and B are used for Rx		Passed
	Check that the reporting rate is correct		Passed
Set Tx/Rx-Mode to 2	Check that mode is correctly stored		Passed
	Check that channel B only is used for Tx		Passed
	Check that channel A and B are used for Rx		Passed
Set Tx/Rx-Mode to 3	Check that mode is correctly stored		Passed
	Check that EUT is not transmitting		Passed
	Check that channel A and B are used for Rx		Passed

6.4 17.4 Power setting

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit channel management message (msg 22) defining output power high/low.

Repeat test using ACA and manual input.

Required result

Check that EUT sets output power as defined.

2012-01-30 Ba	Test details – Power setting by msg 22		
Test item	Check	Remark	Result
The EUT has to be in an area with regional operating settings and the channels as used in the following msg 22. Transmit a msg 22 from VDL generator like the following: 22,0,2345,0,2086,1086,0,**1**,[MMSI(MSB)],[MMSI(LSB)],1,0,0,,0			
Channel switch	Check that the EUT doesn't switch channels	UTC 12:10	Passed
Power low	Check that the transmitting power is changed from high to low		Passed
MKD	Check the low power settings are displayed on MKD		Passed
Transmit the same message 22, but power setting to 0 = high power			
Power high	Check that EUT reverts to high power		Passed

2012-01-30 Ba	Test details – Power setting by ACA		
Test item	Check	Remark	Result
Apply the following message at PI: File name = AIACA_region_in_ch86.sst. Set power flag to 1 = low power and channels to actually used channels			
Power low	Check that the transmitting power is changed from high to low		Passed
MKD	Check the low power settings are displayed on MKD		Passed
Transmit the same ACA sentence, but power setting to 0 = high power			
Power high	Check that EUT reverts to high power		Passed

2012-01-30 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, Don't change the channels			
Power low	Check that the transmitting power is changed from high to low		Passed
Set power level back to high power.			
Power high	Check that EUT reverts to high power		Passed

6.5 17.5 Message priority handling

(M.1371 A1/4.1.8)

Method of measurement

Set-up standard test environment and operate test equipment with 90% channel load. Set the EUT to max reporting rate of 2 sec by applying a speed of >23kn and a ROT of >20°/sec. Record VDL messages and check for used slots. Initiate the transmission of two 5 slot messages (msg 12 and msg 8) by the EUT. Record transmitted messages on both channels.

Required results

Check that EUT transmits the messages in correct order according to their priority (ITU-R M.1371 A/3.3.8.1 table 13).

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 msg 8 and msg 12 are applied.

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

2011-07-25 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 msg 8 and immediately following an ABM sentences with msg 12 to the PI port. File name is AIBBM_ABM_17_5.sst Check transmissions by VDL analyser.			
Transmission order	Check that msg 12 is transmitted first because of higher priority	UTC 11:27 In two tests message 12 has been transmitted after two message 8, in a 3rd test message 12 has not been transmitted Retest 2012-01-30 Ba: In 3 tests the transmission order was 8, 8, 12 Retest 2012-01-30 Ba: In 3 tests the transmission order was 8, 12, 8	Passed

6.6 17.6 Slot reuse (link congestion)

(M.1371 A1/4.4)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Transmit a Data Link Management message (msg 20) to the EUT with slot offset and increment to allocate slots for a base station. Assure that at test receiver location the signal level received from EUT exceeds the signal level received from test transmitter. Record transmitted messages and check frame structure. Set up additional test targets to simulate a VDL load of >90% until slot reuse by EUT is observed.

Required results

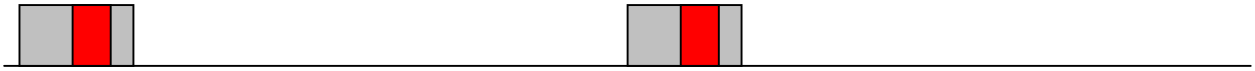
Check that the nominal reporting rate for Position Report msg 1 is achieved ±10% (allocating slots in selection interval SI) under link congestion conditions. Confirm that the slot occupied by the most distant station (within selection interval) is used by the slot reuse algorithm.

Check that a station is not subject to slot reuse more than once a frame. Check that slots allocated by a local base station are not subject to slot reuse.

Used test procedure:

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 minutes 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.

2011-07-25 Ba	Test details – Slot reuse		
Test item	Check	Remark	Result
This test can be done as described before.			
Reporting rate, use of selection interval	Check that the slots are selected within the SI		Passed
Slot reuse	Check that only the slots of odd numbered targets are used		Passed
	Check that a the slot of a target is not used twice in a frame		Passed
Reserved Slot	Check that slots reserved by msg 20 are not used	The test of use of reserved slots is done in 16.6.5 Fixed allocated transmissions (FATDMA)	Passed

6.7 17.7 Management of received regional operating settings

(7.4.1)

6.7.1 17.7.1 Test for replacement or erasure of dated or remote regional operating settings

(7.4.1)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Send a valid regional operating setting to the EUT by msg 22 with the regional operating area including the own position of the EUT. Consecutively send a total of seven (7) valid regional operation settings to EUT, using both msgs 22 and DSC telecommands, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown:

a) Send a ninth msg 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas.

b) Step 1: Set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously.

Step 2: Send a tenth telecommand to the EUT, with a regional operating area which partly overlaps the regional operating area to which the EUT was set by Step 1 but which does not include the own position of the EUT.

c) Step 1: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands.

Step 2: Consecutively set own position of EUT to within all regions defined by the previous telecommands.

Required results

After the initialisation, the EUT should operate according to the regional operating settings defined by the first msg 22 sent.

a) The EUT shall return to the default operating settings.

b) Step 1: Check that the EUT changes its operating settings to those of that region which includes own position of the EUT.

Step 2: Check that the EUT reverts to the default operating settings.

Note: Since the regional operating settings to which the EUT was set in Step 1 shall be erased due to Step 2, and since there is no other regional operating setting due to their non- overlapping definition, the EUT shall return to default.

c) Step 1: Check that the EUT operates with the default settings.

Step 2: Check that the EUT operates with the default settings.

2011-07-25 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 ACA • 1 area including own position • 7 areas not overlapping, not including own position File name: AIACA_8_regions_17_7_1.sst	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 9. msg 22 to the EUT	Check that the first area is deleted		Passed
	Check that the EUT returns to the default operating settings		Passed
b) step 1: Set own position to any of the 7 areas	Check that the EUT changes its operating settings according to that region	Checked area two, all other by ACA output	Passed
b) step 2: 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 08:30 Remark: There is no ACA output even if the operating parameters have been changed.	Passed
	Check that the EUT reverts to the default operating settings		Passed
d) <u>Erasure by distance</u>: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands	Check that all areas are deleted	Checked by ACA output,	Passed
<u>Check of erasure</u>: Set own position of EUT to within all regions defined by the previous telecommands.	Check that the EUT operates with the default settings because the areas are deleted		Passed

6.7.2 17.7.2 Test of correct input via Presentation Interface or MKD

(7.4.1)

Method of measurement

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

following tests in the following order:

a) Send msg 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 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 msg 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 Presentation Interface with a valid regional operating area overlapping the regional operating area sent to the EUT by msg 22 or a DSC telecommand.

Required results

a) Confirm that the EUT uses the regional operating settings commanded by msg 22 or DSC telecommand.

b) Step 1: Confirm that the regional operating settings of the previous msg 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 prompt 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 msg 22 or DSC telecommand.

f) Check, that the EUT does not use the regional operating setting commanded to it via the Presentation Interface.

2011-07-25 Ba	Test details – Correct input via Presentation Interface or MKD		
Test item	Check	Remark	Result
Send msg 22 with same settings as in 17.2 Channel management, set position of own ship into this area			
a) Use of settings	Confirm that the EUT uses the regional operating settings commanded by msg 22		Passed
b) MKD input Entering new area by MKD	Step 1: Confirm that the regional operating settings of the previous msg 22 is displayed to the user on the MKD for editing.	• The area is displayed • The display of channel B is incorrect. The channel number of channel A is displayed • The power level is always displayed as "low", also if the stored level is high Retest 2012-01-30 Ba: Channel B and power level are displayed correctly	Passed Passed
	Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings.	• When editing a field the input field was overlaying one other fields 2 lines below. So the input data cannot were not readable In a repetition of this test the problem was not observed. The input field was in the correct line. Remark: Only the settings itself can be changed, not the corner points Retest 2012-01-30 Ba: The incorrect editing field was not observed. The corner points can also be modified	Passed
	Check, that the EUT does not accept incomplete or invalid regional operating settings.	Retest 2012-01-30 Ba: Only complete areas are accepted	Passed
	Check, that the EUT accepts a complete and valid new regional operating setting.	No way found to add a new area. There is no menu item for a new area, and it is not possible by changing the corner points of an existing area Retest 2012-01-30 Ba: A new area can be generated by modifiction of the corner points of an existing area.	Passed

	Step 3: Check, that the EUT prompt the user to confirm the intended change of regional operating settings		Passed
	Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.		Passed
Move position inside the new area	Step 4: Check, that the EUT uses the regional operating settings input via the MKD.		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		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	Remark: The area has been deleted after setting the parameters to the default parameters	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 msg Rejection of a shipborne (ACA) regional operating setting when overlapping a setting from base station not older than 2 hours (Clarifications to 1371, 2.54 paragraph 4	Check, that the EUT does not accept the regional operating setting commanded to it via the Presentation Interface.	• If the the ACA area is overlapping but different corner points the ACA is refused • If the corner points are identical (completely overlapping) the new setting by ACA are accepted. See Note) Retest 2012-01-30 Ba: The ACA with identical corner points is not accepted	Passed Passed

Note)
The intention of this requirement is to avoid that the operators can change the area settings commanded continously by a base station. Therefore it doesn't matter if the area applied by ACA is partly or completely overlapping the area commanded by the base station.

6.7.3 17.7.3 Test of addressed telecommand

(7.4.1)

Method of measurement

Set-up a standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order:

a) Send msg 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 msg 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

a) Check, that the EUT uses the regional operating settings commanded to it in a).

b) Check, that the EUT uses the regional operating settings commanded to it in b).

c) Check, that the EUT reverts to default.

2011-07-25 Ba	Test details – Test of addressed telecommand		
Test item	Check	Remark	Result
a) Send msg 22 with valid regional operating settings, with a regional operating area, which contains the current position of own station.	Check, that the EUT uses the regional operating settings commanded to it		Passed
b) Send an addressed msg 22 to the EUT with different regional operating settings	Check, that the EUT uses the regional operating settings commanded to it		Passed
b) Send an addressed msg 22, addressed **as ID 2**, to the EUT with different regional operating settings	Check, that the EUT uses the regional operating settings commanded to it		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

6.7.4 17.7.4 Test for invalid regional operating areas (3 areas with same corner)

(7.4.1)

Method of measurement

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

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

a) Check, that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting.

b) Check, that the EUT consecutively uses the regional operating settings of the first two received regional operating areas.

2011-07-25 Ba	Test details – Test for invalid regional operating areas (three regional operating areas with same corner		
Test item	Check	Remark	Result
a) Send three different valid regional with adjacent corners by ACA, File name: AIACA_region_17_7_4.sst Position inside 3rd area.	Check, that the 3rd area is refused and settings are not used	UTC 09:19	Passed
b) Move own position to the first 2 areas	Check, that the EUT uses the operational settings of these areas		Passed

6.7.5 17.7.5 Self-Certification of other conditions

(7.4.1)

The fulfilment of all other conditions of 7.4.1 shall be self-certified by the manufacturer.

Date	**Result**	**Status**
2011-07-25 Ba	No Self-Certification frequired.	Passed

6.8 17.8 Continuation of autonomous mode reporting rate

(M.1371- 1 A2/3.3.6, IALA Technical clarifications to recommendation ITU- R M.1371- 1)

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 rate.

Required result

Ensure that the autonomous reporting rate is maintained.

2011-07-25 Ba	Test details – Continuation of autonomous mode reporting rate		
Test item	Check	Remark	Result
Set the EUT into a transitional zone Send assignment commands msg 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	Message 16 is received (VDM) but the command is ignored	Passed
Slot assignment command in a transitional zone	Check that an slot assignment command is ignored in a transitional zone		Passed

7 18 Specific tests of Transport Layer

(7.5)

7.1 18.1 Addressed messages

(M.1371 A1/5.3.1)

7.1.1 18.1.1 Transmission

(M.1371 A1/5.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Set up a test target for scheduled transmissions on channel AIS1 only. Initiate the transmission of an addressed binary message (msg 6) by the EUT (test target as destination). Record transmitted messages on both channels.

Required results

Check that the EUT transmits msg 6 on channel AIS1. Repeat test for AIS2.

Basic test of addressed message is made in **3.1.4.1 "**14.1.4.1 Transmit an addressed message**"**

The test procedure is modified in that way that the test target is transmitting on both channels, and in case of channel = 0 it is checked that the transmission is always on that channel on that the target transponder was last received.

2011-06-24 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,1,1,2,000005002,x,6,06P0test,0 Change transmission channel x according to test item Transmit some messages for each test item and check the used channel.			
Channel = 0 (autoselect)	Check tx on last received channel	UTC 09:36	Passed
Channel = 1 (A)	Check Tx on channel A		Passed
Channel = 2 (ch. B)	Check Tx on channel B		Passed
Channel = 3 (ch. A+B)	Check Tx on channel A+B		Passed

2011-06-24 Ba	Test details - Addressed safety related message 12		
Test item	Check	Remark	Result
Transmit an addressed safety related message 12 by sending an ACA sentence to the PI. PI sentence: File AIABM_safety.sst: !AIABM,1,1,2,000005002,x,12,D5CD,0 (D5CD = „TEST“. Change transmission channel x according to test item Transmit some messages for each test item and check the used channel.			
Channel = 0 (autoselect)	Check tx on last received channel	UTC 09:39	Passed
Channel = 1 (ch. A)	Check Tx on channel A		Passed
Channel = 2 (ch. B)	Check Tx on channel B		Passed
Channel = 3 (ch. A+B)	Check Tx on channel A+B		Passed

2011-06-24 Ba	Test details - 4 addressed binary messages 6		
Test item	Check	Remark	Result
Transmit an set of 4 addressed binary messages 6 by sending 4 ABM sentences to the PI. Transmission channel is alternating on channel A and B as indicated in the ABM sentences. PI sentence: File AIABM_4_bin.sst: A response is automatically transmitted by the addressed transponder ID 1028			
VDO output of EUT	Check that the 4 messages are transmitted directly without waiting for ackn.	UTC 10:39	Passed
Channel	Check Tx on channel A and B as indicated in the ABM sentence		Passed
Message sequence number	Check that sequence number in VDL msg = Sequential message identifier of ABM sentences		Passed
RX of request	Check that message is received by addressed transponder (VDM)		Passed
Received by VDL Analyser	Check msg on VDL analyser		Passed
TX of ackn. msg 7 (VDO)	Check that ackn msg 7 is transmitted by addressed transponder (VDO)		Passed
RX of msg 7 (VDM)	Check that the ackn. msg 7 is received by EUT (VDM)		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements		Passed
Other items	Sometimes only 3 of the 4 messages are transmitted Retest 2011-07-25 Ba: In 5 tests all message 6 have been transmitted		Passed

7.1.2 18.1.2 Acknowledgement

Method of measurement

Operate standard test environment and EUT in autonomous mode. Apply up to 4 addressed binary messages (msg 6; EUT as destination) to the VDL on Channel AIS 1. Record transmitted messages on both channels. Repeat with AIS2.

Required results

Confirm that EUT transmits a binary acknowledge message (msg 7) with the appropriate sequence numbers within 4 sec on the channel where the msg 6 was received. Confirm that EUT transmit the result with an appropriate message to PI.

A basic receive test is made in 3.1.4.2 14.1.4.2 Receive addressed message.

The content fields of the transmitted acknowledgement should be checked in 5.7.2 16.7.2 Transmitted messages.

2011-06-24 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 10:42	Passed
Transmission of acknowledgement msg 7	Check transmission of ackn. by VDO output of EUT	Messge 7 is too long by 96 bit (3 IDs) or by 32 bit (one ID). Message 7 is not finished after the first entry (ID1) which is only used. Retest 2011-07-25 Ba: Message 7 is alway 72 long	Passed
Sequence numbers	Check that sequence number in ackn = sequence number of Rx message		Passed
Ackn. channel	Check that ackn Tx channel = Rx channel		Passed
RX of ackn. msg 7	Check that the ackn. msg are received by Transmitter (VDM/ABK)		Passed

7.1.3 18.1.3 Transmission Retry

(M.1371 A1/5.3.1)

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 to 8 sec. Confirm that EUT transmit the overall result with an appropriate message to PI.

Basic test of addressed message is made in **3.1.4.1** **"**14.1.4.1 Transmit an addressed message**"**

2011-06-24 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 10:52:08	Passed
Number of repetitions	Note and check the number or repetitions	3 repetitions, 4 transmissions	Passed
Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	:10, :16, :23, :30 time: 6,7,7	Passed
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)	:35 $AIABK,000001020,A,6,2,1 type = 1	Passed
Message sequence numbers	Check message sequence numbers of transmissions and ABK	= 2	Passed

2011-06-24 Ba	Test details - 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: 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 10:58:30	Passed
Number of repetitions	Note the number or repetitions	3 repetitions, 4 transmissions	Passed
Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	:32, :39, :45, :52 time: 6,6,7	Passed
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)	:57 $AIABK,000001005,A,12,2,1 type = 1	Passed
Message sequence numbers	Check message sequence numbers of transmissions and ABK	= 2	Passed

7.2 18.1.4 Acknowledgement of Addressed safety related messages

Repeat test under 18.1.2 with addressed safety related message.

The contents of the acknowledgement should be entered in test 5.7.2 16.7.2 Transmitted messages

2011-06-24 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			
Rx of messages (VDM)	Check that the messages are received by VDM output on PI of EUT	UTC 10:46	Passed
Transmission of acknowledgement msg 13	Check transmission of ackn. by VDO output of EUT	Messge 13 is too long by 96 bit or by 32 bit Retest 2011-07-25 Ba: Message 7 is alway 72 long	Passed
Sequence numbers	Check that sequence number in ackn = sequence number of Rx message		Passed
Ackn. channel	Check that ackn Tx channel = Rx channel		Passed
RX of ackn. msg 13	Check that the ackn. msg are received by Transmitter (VDM/ABK)		Passed

7.3 18.2 (M.1371 A1/5.3) Interrogation responses

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (msg 15; EUT as destination) to the VDL according to message table 7 for responses with msg 5 and slot offset set to defined value 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 AIS1. Repeat test for AIS2.

A simple operational test is made in 3.1.3.2 14.1.3.2 Interrogation response

The check of the contents of the transmitted message should be entered in 5.7.2 16.7.2 Transmitted messages

The test cases “case 1” to “case 4” are the four cases as defined in ITU-R M1371, “3.3.8.2.11 Message 15 Interrogation”

The requests have to be made by the VDL generator, because a mobile transponder cannot generate requests with slot offset.

2011-06-24 Ba	Test details - case 1- Interrogation of msg 5, Ch 1		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5 with given slot offset, 10 slots A response shall automatically be transmitted by the EUT Request is transmitted on channel 1			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX 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	= 10	Passed
Response channel	Check that the response is transmitted on the request channel		Passed

2011-06-24 Ba	Test details - case 1 - Interrogation of msg 5, Ch 2		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 5 with given slot offset A response shall automatically be transmitted by the EUT Request is transmitted on channel 2			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX 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	= 10	Passed
Response channel	Check that the response is transmitted on the request channel		Passed

2011-06-24 Ba	Test details - case 2 - Interrogation of msg 3 and 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 and 5 from EUT with given slot offsets A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX of response 1 (VDO)	Check that response is transmitted by EUT (VDO)		Passed
Response 1 on VDL	Check the response on VDL with the VDL analyser		Passed
Slot selection	Check that the slot offset 1 defined in the request is used		Passed
TX of response 2 (VDO)	Check that response is transmitted by EUT (VDO)		Passed
Response 2 on VDL	Check the response on VDL with the VDL analyser		Passed
Slot selection	Check that the slot offset 2 defined in the request is used		Passed

2011-06-24 Ba	Test details - case 3 Interrogation of msg 5		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3 from other AIS and msg 5 from EUT with given slot offsets A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX of response (VDO)	Check that response msg 5 is transmitted by EUT (VDO)		Passed
Response on VDL	Check the response on VDL with the VDL analyser		Passed
Slot selection	Check that the slot offset defined in the request 2.1 is used		Passed

2011-06-24 Ba	Test details - case 4 - Interrogation of msg 3		
Test item	Check	Remark	Result
Transmit an interrogation message 15 requesting msg 3,5 from other AIS and msg 5 from EUT with given slot offsets A response shall automatically be transmitted by the EUT			
RX of request by EUT	Check that the request message is received by the EUT (VDM)		Passed
TX of response (VDO)	Check that response msg 5 is transmitted by EUT (VDO)		Passed
Response on VDL	Check the response on VDL with the VDL analyser		Passed
Slot selection	Check that the slot offset defined in the request 2.1 is used		Passed

7.4 18.3 Broadcast messages

(M.1371 A1/5.3)

Method of measurement

Set-up standard test environment and operate EUT in autonomous mode. Initiate the transmission of 5 binary broadcast messages (msg 8) by the EUT. Record transmitted messages on both channels.

Required results

Check that EUT transmits the msg 8 messages on channels A and B alternating.

Test of multislot broadcast messages is done in 3.2 14.2 Multiple slot messages

The check of message contents should be entered in 5.7.2 16.7.2 Transmitted messages

2011-06-24 Ba	Test details - Binary broadcast message 8		
Test item	Check	Remark	Result
Transmit 5 binary broadcast messages 8 by sending 5 BBM sentences to the PI. PI sentence: File AIBBM_5_bin.sst: !AIBBM,1,1,[7;8;9;0;1],0,8,06P0test1,0 AIS channel for broadcast is 0: autoselect The file contains 5 BBM sentences with consecutive sequential message identifiers.			
VDO output of EUT	Check the VDO output on PI		Passed
Channel	Check Tx alternating channels A and B		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,A,8,7,3	Passed
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
MMSI	Check Transmitter MMSI		Passed

2011-06-24 Ba	Test details - Safety related broadcast message 14		
Test item	Check	Remark	Result
Transmit 5 safety related broadcast messages 14 by sending 5 BBM sentences to the PI. PI sentence: File AIBBM_5_safety.sst: !AIBBM,1,1,[6;7;8;9;0],0,8,D5CDi,0 AIS channel for broadcast is 0: autoselect The file contains 5 BBM sentences with consecutive sequential message identifiers.			
VDO output of EUT	Check the VDO output on PI		Passed
Channel	Check Tx alternating channels A and B		Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements	$AIABK,,A,14,6,3	Passed
Message sequence number	Check that message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
MMSI	Check Transmitter MMSI		Passed

8 19 Specific Presentation Interface Tests

(7.6)

8.1 19.1 General

The EUT (Equipment Under Test) 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.

The following tests shall be carried out under "Normal" environmental conditions as defined in IEC 60945.

Where appropriate, tests against different clauses of this and other chapters may be carried out simultaneously.

2012-02-22 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

8.2 19.2 Check of the manufacturer's documentation

(7.6.1)

The following checks for formal consistency and compliance shall be made for all ports

- *approved sentences against IEC 61162*
- *proprietary sentences against IEC 61162*
- *usage of fields as required for different functions including provided default values or settings*
- *transmission intervals against IEC 61162*
- *configuration of hardware and software if this is relevant to the interface performance and port selection*

The following checks for compliance with IEC 61162

- *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 2.6 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.

2012-02-22 Ba	Test details - Check of manufacturers documentation		
Test item	Check	Remark	Result
Approved sentences	Check approved sentences against IEC 61162		Passed
Proprietary sentences	Check proprietary sentences against IEC 61162		Passed
Usage of Fields	Check usage of fields	• GBS is incorrect: Expected errors are used for PA flag • GLL: status is not ignored • ROT: comment are missing for fields 2 and 3 • SSD: Source identifier is used This was a result of a short check. Please check all sentences carefully. Retest 2012-02-24 Ba GBS, GLL and ROT are corrected. SSD: Source identifer is still described as “ignored” but it is used to identify the set of dimension/reference (AI = internal, other = external) Retest 2012-03-08 Ba: The Source identifer is marked as used	Passed
Transmission intervals	Check transmission intervals		Passed
Hardware configuration	Check hardware configuration		Passed
Output drive capability	Check output drive capability	50 mA Required: 2 V at 100 Ohm = 20 mA	Passed
Input load	Check input load	6,4 kOhm Required: > 3 kOhm	Passed
Electrical Isolation	Check electrical isolation	Section 3.7.3	Passed

8.3 19.3 Electrical test

(7.6.1)

Method of test

Input / Output Ports configured as 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.

2012-01-31 Ba	Test details - Electrical test of inputs		
Test item	Check	Remark	Result
Minimum voltage	Check that input works with minimum input voltage	Tested with all IEC 61162 ports	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: 0.2 / -0.76 mA 10 V: 0.67 / - 1.24 mA 15 V: 1.15 / -1.71 mA	Passed
Electrical Isolation	Check that sensor inputs are electrically isolated		Passed
	Check that high speed inputs are electrically isolated		Passed

8.4 19.4 Test of input sensor interface performance

(7.6.2)

Method of measurement

Connect all inputs and outputs of the EUT as specified by the manufacturer and simulate VDL-messages using 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 percent 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 simulated input and all output data is transmitted without loss or additional delay

2012-01-31 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

8.5 19.5 Test of sensor input

(7.6.2)

Method of measurement

Set-up standard test environment and operate inputs with simulated sensor data. Record VDL output.

a) simulate sensor information for position, speed, heading, ROT

b) simulate invalid and unavailable data

Required results

a) Verify that the recorded VDL message contents agree with the simulated sensor information.

b) Verify that affected data is set to default values.

Switch off internal GPS to get default values in case of invalid sensor data. The intention of this test is to check the conversion of sensor input data to the VDL messages, VDO output and MKD display including the test, if invalid and unavailable data are recognised.

Fall back behaviour at sensor fail is checked in another test (see 3.9.3 - 14.9.3 Monitoring of sensor data).

For message content of VDL messages 1, 2, 3 (position reports) no special test is required. Please enter the results of this test in that test table (go to 3.3.1 “Information content of msg 1” at the end of this test.

8.5.1 GLL sentence

2011-07-25 Ba	Test details – GLL position input		
Test item	Check	Remark	Result
Apply simulated GLL sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Set status/mode to **A,A** Check on VDL	Check latitude		Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
Check VDO output on PI	Check latitude		Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
Check Display on MKD	Check latitude		Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
Set status/mode to **A,D** (differential mode)	Check PA-Flag = 1 on VDL		Passed
	Check PA-Flag = 1 in VDO		Passed
	Check display of differential mode on MKD		Passed
Set status/mode to **V,N** (invalid data) Check on VDL	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
Check on VDO output of PI	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
Check display on MKD	Check latitude = "-----"		Passed
	Check longitude = "-----"		Passed
	Check PA-Flag = 0		Passed
Set status/mode to **A,E** (Estimated position) Check on VDL or PI output	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
Set status/mode to **A,M** (manual position) Check on VDL or PI output	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
No GBS sentence applied	Check that RAIM-Flag = 0		Passed

8.5.2 GGA sentence

2011-07-25 Ba	Test details - GGA GPS position input		
Test item	Check	Remark	Result
Apply simulated GGA sentence to the sensor input File name is ais02_gga_vtg_hdt_rot.sst			
Set Mode = 1 (**autonomous**) Check on VDL	Check latitude		Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
Set mode = 2 (**differential**) Check on VDL	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set mode = 3 (GPS-PPS) Check on VDL	Short check data ok		Passed
	Check PA-Flag = 0 on VDL		Passed
Set mode =4 (RTK fixed) Check on VDL	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set mode =5 (RTK float Check on VDL	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set mode = 6 (dead reck.) Check on VDL	Check that timestamp = 62 Note if data = default	Timestamp = 63 This is ok because no position is provided	Passed
Set mode = 7 (manual) Check on VDL	Check that timestamp = 61 Note if data = default	Timestamp = 63 This is ok because no position is provided	Passed
Set mode = 8 (simulated) Check on VDL	Check that timestamp = 63 Short check default data		Passed
Set mode = 0 (**no fix**) Check on VDL	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check that timestamp = 63		Passed
	Check PA-Flag = 0		Passed

8.5.3 GNS sentence

2011-07-25 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 is ais03_gns_vtg_hdt_rot.sst			
Set Mode = **AA** (autonomous GPS/GLONASS) Check on VDL	Check latitude		Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
	Check RAIM-Flag = 0		Passed
Set Mode = AN (autonomous GPS/no GLONASS)	Short check data ok		Passed
	Check PA-Flag = 0 on VDL		Passed
Set Mode = A (autonomous GPS/no GLONASS)	Short check data ok		Passed
	Check PA-Flag = 0 on VDL		Passed
Set Mode = NA (no GPS/ autonomous GLONASS)	Short check data ok		Passed
	Check PA-Flag = 0 on VDL		Passed
Set Mode = **DA** (differential GPS/ autonomous GLONASS)	Short check data ok		Passed
	Check **PA-Flag = 1** on VDL		Passed
Set Mode = DD (differential GPS/ differential GLONASS)	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set Mode = DN (differential GPS/ no GLONASS)	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set Mode = D (differential GPS/ no GLONASS)	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set Mode = AD (autonomous GPS/ differential GLONASS)	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set Mode = ND (no GPS/ differential GLONASS)	Short check data ok		Passed
	Check PA-Flag = 1 on VDL		Passed
Set mode = E (estimated position.)	Check that timestamp = 62 Note if data = default	Timestamp = 63 This is ok because no position is provided	Passed
Set mode = M (manual position)	Check that timestamp = 61 Note if data = default	Timestamp = 63 This is ok because no position is provided	Passed
Set mode = S (simulated position)	Check that timestamp = 63 Short check default data		Passed
Set Mode = **NN** (no GPS/ no GLONASS)	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed

Set Mode = **AA** Add an Navigational status field at the end			
Enter Navigational status field value “S” (safe)	Check latitude		Passed
	Check longitude		Passed
Enter Navigational status field value “C” (caution)	Check latitude		Passed
	Check longitude		Passed
Enter Navigational status field value “U” (unsafe)	Check latitude = default	Position from GNS	Passed
	Check longitude = default	Position from GNS	Passed
Enter Navigational status field value “V” (not available)	Check position = default	Position from GNS Accepted because this should normally be combined with NN in the mode field.	Passed

8.5.4 RMC sentence

2011-07-25 Ba	Test details – RMC position input		
Test item	Check	Remark	Result
Apply simulated RMC sentence to the sensor input File name is ais04_rmc_hdt_rot.sst			
Set status/mode to **A,A** Check on VDL	Check latitude		Passed
	Check longitude		Passed
	Check SOG		Passed
	Check COG		Passed
	Check PA-Flag = 0		Passed
Set status/mode to **A,D** (differential mode)	Short check of valid data		Passed
	Check PA-Flag = 1 in VDO		Passed
Set status/mode to **A,P** (Precise)	Check latitude	= default This is a valid value of IEC 61162-1 edition 4 Retest 2012-01-27 Ba: Position is used	Passed
	Check longitude	= default 2012-01-27 Ba: Position is used	Passed
	Check SOG		Passed
	Check COG		Passed
Set status/mode to **A,R** (Real time kinematic)	Check latitude	= default This is a valid value of IEC 61162-1 edition 4 Retest 2012-01-27 Ba: Position is used	Passed
	Check longitude	= default Retest 2012-01-27 Ba: Position is used	Passed
	Check SOG		Passed
	Check COG		Passed
Set status/mode to **V,N** (invalid data) Check on VDL	Check latitude = 91°		Passed
	Check longitude = 181°		Passed
	Check SOG = 102.3	SOG from RMC Retest 2012-01-27 Ba: SOG = default	Passed
	Check COG = 360°	COG from RMC Retest 2012-01-27 Ba: COG = default	Passed
	Check PA-Flag = 0		Passed

Set status/mode to **V,E** (estimated position) (Test if also status is evaluated)	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
	Check SOG = 102.3	SOG from RMC Retest 2012-01-27 Ba: SOG = default	Passed
	Check COG = 360°	COG from RMC Retest 2012-01-27 Ba: COG = default	Passed
Set status/mode to **V,M** (manual position) (Test if also status is evaluated)	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
	Check SOG = 102.3	SOG from RMC Retest 2012-01-27 Ba: SOG = default	Passed
	Check COG = 360°	COG from RMC Retest 2012-01-27 Ba: COG = default	Passed
Set status/mode to **V,S** (Simulator mode)	Check latitude = 91°		Passed
	Check longitude = 181°		Passed
	Check SOG = 102,3 kn	SOG from RMC Retest 2012-01-27 Ba: SOG = default	Passed
	Check COG = 360°	COG from RMC Retest 2012-01-27 Ba: COG = default	Passed
Set status/mode to **A,A** Modify the new Navigational status field			
Enter Navigational status field value “S” (safe)	Check latitude		Passed
	Check longitude		Passed
	Check SOG		Passed
	Check COG		Passed
Enter Navigational status field value “C” (caution)	Check latitude		Passed
	Check longitude		Passed
	Check SOG		Passed
	Check COG		Passed
Enter Navigational status field value “U” (unsafe)	Check latitude = default	Latitude from RMC	Passed
	Check longitude = default	Longitude from RMC	Passed
	Check SOG = default	SOG from RMC	Passed
	Check COG = default	COG from RMC	Passed
Enter Navigational status field value “V” (not available)	Check latitude = default	Latitude from RMC	Passed
	Check longitude = default	Longitude from RMC	Passed
	Check SOG = default	SOG from RMC	Passed
	Check COG = default	COG from RMC	Passed

8.5.5 DTM sentence

2011-07-25 Ba	Test details – DTM reference datum		
Test item	Check	Remark	Result
Apply simulated position sentences with DTM. Start with datum not WGS 84, change to WGS 84 and back to not WGS 84			
Apply **GLL** sentence with DTM File name: ais1d_gll_dtm_vtg_hdt_rot.sst Datum = not WGS 84	Check on VDL that data are default data		Passed
Set Datum = WGS 84	Check that data are valid		Passed
Set Datum = not WGS 84	Check that data are changed to default		Passed
Apply **GGA** sentence with DTM File name: ais2d_gga_dtm_vtg_hdt_rot.sst Datum = not WGS 84	Check on VDL that data are default data		Passed
Set Datum = WGS 84	Check that data are valid		Passed
Set Datum = not WGS 84	Check that data are changed to default		Passed
Set Datum = WGS 84	To get valid data for further tests		Passed

8.5.6 GBS sentence

2011-07-25 Ba	Test details – GBS input		
Test item	Check	Remark	Result
Apply simulated GLL sentence with GBS sentence to the sensor input File name is ais01g_gll_vtg_gbs_hdt_rot.sst			
Fields with expected error of Lat and Lon contain values	Check that RAIM-Flag = 1		Passed
Fields with expected error of Lat and Lon are empty (NULL fields)	Check that RAIM-Flag = 0		Passed
Apply GLL sentence in normal mode (mode flag = A)			
Set expected error in GPS sentence to < 10 m	Check that PA flag = 1		Passed
Set expected error in GPS sentence to > 10 m	Check that PA flag = 0		Passed
Apply GLL sentence in differential mode (mode flag = D)			
Set expected error in GPS sentence to < 10 m	Check that PA flag = 1		Passed
Set expected error in GPS sentence to > 10 m	Check that PA flag = 0		Passed

8.5.7 VTG sentence

2011-07-25 Ba	Test details – VTG speed input		
Test item	Check	Remark	Result
Apply simulated VTG sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Set mode to **A** (autonomous)	Check SOG		Passed
Check on VDL	Check COG		Passed
Check VDO output on PI	Check SOG		Passed
	Check COG		Passed
Check Display on MKD	Check SOG		Passed
	Check COG		Passed
Set mode to **D** (differential)	Short check SOG/COG ok		Passed
Set mode to **P** (differential)	Short check SOG/COG ok		Passed
Set mode to **N (**invalid)	Check SOG = 102.3 (default)		Passed
Check on VDL	Check COG = 360 (default)		Passed
Check VDO output on PI	Check SOG = 102.3 (default)		Passed
	Check COG = 360 (default)		Passed
Check Display on MKD	Check SOG = "-----"	"NA"	Passed
	Check COG = "-----"	"NA"	Passed
Set mode to E (estimated)	Short check SOG/COG default		Passed
Set mode to M (manual)	Short check SOG/COG default		Passed
Set mode to S (simulated)	Short check SOG/COG default		Passed
Delete SOG-N field and add SOG K-Field (speed in km/h)	Check SOG value in VDL It has to be converted into knots or set to default	= default	Passed

8.5.8 VBW sentence

2011-07-25 Ba	Test details – VBW log input with VTG sentence valid		
Test item	Check	Remark	Result
Apply simulated VBW sentence to the sensor input File name is ais06_gll_vtg_vbw_hdt_rot.sst			
Status of bottom track: **A** (valid) Ahead and across speed available. Check on VDL	Check that SOG = resultant of ahead and across speed		Passed
	COG = calculated from SOG vector and heading		Passed
Check on VDO output of PI	Check SOG = VDL SOG value		Passed
	Check COG = VDL COG value		Passed
Check on MKD	Check SOG = VDL SOG value		Passed
	Check COG = VDL COG value		Passed
Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid ! Check on VDL	SOG from VTG		Passed
	COG from VTG		Passed
Check on VDO output of PI	SOG from VTG		Passed
	COG from VTG		Passed
Check on MKD	SOG from VTG		Passed
	COG from VTG		Passed
Status of bottom track: A (valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG from VTG		Passed
	COG from VTG		Passed
Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**	SOG from VTG	SOG from VBW Remark: This may be critical because SOG and COG are not from the same source.	Passed
	COG from VTG	COG from VTG	Passed

2011-07-25 Ba	Test details – VBW log input, no VTG		
Test item	Check	Remark	Result
Apply simulated VBW sentence to the sensor input, GPS disconnected, No VTG speed available File name is ais08_gll_vbw_hdt_rot.sst			
Status of bottom track: **A** (valid) Ahead and across speed available. Check on VDL	Check that SOG = resultant of ahead and across speed		Passed
	COG = calculated from SOG vector and heading		Passed
Check on VDO output of PI	Check SOG = VDL SOG value		Passed
	Check COG = calculated from SOG vector and heading		Passed
Check on MKD	Check SOG = VDL SOG value		Passed
	Check COG = calculated from SOG vector and heading		Passed
Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid ! Check on VDL	SOG = default		Passed
	COG = default		Passed
Check on VDO output of PI	SOG = default		Passed
	COG = default		Passed
Check on MKD	SOG = default		Passed
	COG = default		Passed
Status of bottom track: A (valid) Ahead available, **across speed empty (**e.g. single axis log)	SOG = default		Passed
	COG = default		Passed
Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**	SOG from VBW or default	SOG vrom VBW	Passed
	COG = default		Passed

8.5.9 OSD sentence

2011-07-25 Ba	Test details – OSD own ship data input		
Test item	Check	Remark	Result
Apply simulated GLL and OSD sentence to the sensor input. External GLL is required for the test because with internal position the speed is taken from the internal source too. File name is ais09_gll_osd.sst			
Heading status = A (valid) Speed reference = B (bottom) Check on VDL	Check SOG from OSD		Passed
	Check COG from OSD		Passed
	Check heading from OSD		Passed
Check VDO output on PI	Check SOG from OSD		Passed
	Check COG from OSD		Passed
	Check heading from OSD		Passed
Check Display on MKD	Check SOG from OSD		Passed
	Check COG from OSD		Passed
	Check heading from OSD		Passed
Set speed reference to P (Positioning system)	Check SOG and COG from OSD		Passed
Set speed reference to R Radar tracking	Check SOG and COG from OSD		Passed
Set speed reference to W (Water speed)	Check SOG = default		Passed
	Check COG = default		Passed
	Check heading from OSD		Passed
Set speed reference to M (Manual)	Check SOG = default		Passed
	Check COG = default		Passed
	Check heading from OSD		Passed
Set speed reference to P (Positioning system) Set **heading status = V** (invalid)	Check SOG from OSD		Passed
	Check COG from OSD		Passed
	Check heading = default		Passed
Change speed reference from N (kn) to K (km/h)	Check SOG value in VDL It has to be converted into knots		Passed

8.5.10 HDT sentence

2011-07-25 Ba	Test details – HDT heading input		
Test item	Check	Remark	Result
Apply simulated HDT sentence to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Heading value = 359.0	Check heading on VDL		Passed
	Check heading on VDO		Passed
	Check heading in MKD		Passed
Change value to 359.9	Check that heading on VDL = 359 or 0, **not 360**	= 0	Passed
Delete heading value (empty field)	Check that heading = default on VDL		Passed
	Check that heading = default on VDO		Passed
	Check that heading = default on MKD		Passed
Change talker to "HC" (Magnetic compass)	Check that heading is not used	The Heading value is used	Passed
If HC talker data are used: Apply • A HE talker with valid data • A HC talker with valid data	Check that only HE data are used and not changed sometime to HC data	The value from HC is used (It is the later sentence). If both sentences are provided always the data from the gyro compass (HE) should be used. Retest 2012-01-27 Ba: The HE data are use only.	Passed
Apply • A HE talker with valid data • A HC talker without data	Check that only HE data are used and not changed sometime to invalid		Passed

8.5.11 ROT sentence

2011-07-25 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 is ais01_gll_vtg_hdt_rot.sst			
ROT status = **A** (valid) ROT value = 0.0 degr./min	Check ROT on VDL		Passed
	Check ROT on VDO		Passed
	Check ROT on MKD		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)	177.2	Passed
	360 converted to 361.6 (90)		Passed
	720 converted to 708.7 (126)		Passed
	-20 converted to 19.7 (-21)		Passed
	-720 converted to –708.7 (-126)		Passed
Set ROT status = **V** (invalid)	Check that ROT = default on VDL (default = -731.4 = -128)		Passed
	Check that ROT = default on VDO		Passed
	Check that ROT = default on MKD		Passed
ROT status = A (valid) ROT value = 0.0 degr./min Select other source of ROT (Talker not TI or configuration setting)	Check ROT = 0.0 on VDL	In this case the ROT value is not taken form the TI sentence but calculated from the HDT data.	Passed
	Check ROT = 0.0 on VDO		N/A
	Check ROT = 0.0 on MKD		N/A
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	9 converted to 0	= 0	N/A
	11 converted to 720	= 0	N/A
	- 9 converted to 0	= 0	N/A

	-11 converted to -720	= 0	N/A
ROT status = V (invalid) Change heading with different rates	Check ROT = 0.0	UTC 15:05	Passed
	9°/min converted to 0	= 0	Passed
	12°/min converted to 720	= 0 Retest 2012-01-27 Ba: = 720	Passed
	15°/min converted to 720	= 0 Retest 2012-01-27 Ba: = 720	Passed
	20°/min converted to 720	= 720	Passed
	30°/min converted to 720	= 720	Passed
	-9°/min converted to 0		Passed
	-12°/min converted to 720	= 0 Retest 2012-01-27 Ba: = 720	Passed
	-15°/min converted to 720	= 0 Retest 2012-01-27 Ba: = 720	Passed
	-20°/min converted to 720	= 720	Passed
	-30°/min converted to 720	= 720	Passed

8.5.12 Additional Tests

2012-01-31 Ba	Test details – Additional Tests		
Test item	Check	Remark	Result
Apply simulated sensor sentences to the sensor input File name is ais01_gll_vtg_hdt_rot.sst			
Send sentences without checksum, check on VDL	Check position = default		Passed
	Check SOG/COG = default		Passed
	Check heading = default		Passed
	Check ROT = default		Passed
Send sentences with false checksum, check on VDL	Check position = default		Passed
	Check SOG/COG = default		Passed
	Check heading = default		Passed
	Check ROT = default		Passed
Back to valid checksum Set baud rate of simulator to 38400 Bd, The purpose is to check if input survives wrong baudrate.	Check position = default		Passed
	Check SOG/COG = default		Passed
	Check heading = default		Passed
	Check ROT = default		Passed
Set baud rate of simulator and sensor input also to 38 400, check on VDL	Check position		Passed
	Check SOG/COG		Passed
	Check heading		Passed
	Check ROT		Passed

8.5.13 Check of different inputs

2012-01-31 Ba	Test details – Different inputs		
Test item	Check	Remark	Result
Apply simulated sensor sentences to the sensor inputs File name of 1st part is ais01_gll_vtg_hdt_rot.sst			
Connect simulator to sensor input 2. Change configuration according to the used input	Check position		Passed
	Check SOG/COG		Passed
	Check heading		Passed
	Check ROT		Passed
Connect simulator to sensor input 3. Change configuration according to the used input	Check position		Passed
	Check SOG/COG		Passed
	Check heading		Passed
	Check ROT		Passed
• Connect simulator output 1 to sensor input 1 and apply GLL and VTG. File name is ais10_gll_vtg.sst	Check position		Passed
	Check SOG and COG		Passed
• Connect simulator output 2 to sensor input 2 and apply VBW . , File name is ais11_vbw.sst	Check heading		Passed
• Connect simulator output 3 to sensor input 3 and apply HDT and ROT. File name is ais12_hdt_rot.sst	Check ROT		Passed

8.6 19.6 Test of high speed output

(7.6.3)

Method of measurement

Set-up standard test environment and simulate VDL-position reports using test system. Record output from the EUT high speed port (see table 11).

Required results

Verify that the recorded message contents agree with the simulated VDL contents (VDM) and own transmitted data (VDO) and in accordance with the sentence specifications of IEC 61162-1.

This contents of VDM and VDO are checked in

- 5.7.1 16.7.1 Received messages and
- 5.7.2 16.7.2 Transmitted Messages

8.6.1 VDM – Received message

2012-01-31 Ba	Test details – Content of received 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		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 (msg 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 (msg 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

8.6.2 VDO Transmitted messages

2012-01-31 Ba	Test details – Content of transmitted 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 (msg 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 (msg 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

8.7 19.7 High speed output Interface performance

(7.6.3)

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 port for "external Display" and "auxiliary Display".

Required results

Confirm that EUT outputs all received messages to the PI. Repeat test for port "auxiliary display".

Date	Result	Status
2011-07-25 Ba	99.9 % on channel A, 99.7 % on channel B	Passed

8.8 19.8 Test of high speed input

(7.6.3)

Method of measurement

Set-up standard test environment. Apply simulated input data, in accordance with the sentence specifications of IEC 61162-1 and 7.6.3.3 table 10, to the EUT and record VDL output.

Required results

Verify that the VDL message contents agree with simulated input data.

Date	Format	Result	Status
	VSD	See test details below	
	SSD	See test details below	

All other sentences are tested in special test items

2011-05-27 Ba	Test details – Evaluation of SSD sentence		
Test item	Check	Remark	Result
Apply an SSD sentence to an high speed input (PI)			
VDL transmission	Check that msg 5 is transmitted after change of data by SSD sentence	UTC 12:53	Passed
	Check that msg 5 is transmitted only if a field has been changed		Passed
Call sign	Check that the new call sign is transmitted in msg 5		Passed
	Check that the new call sign is displayed on MKD		Passed
Ship's name	Check that the new ship's name is transmitted in msg 5		Passed
	Check that the new ship's name is displayed on MKD		Passed
Internal GPS A – Distance from bow B – Distance from stern C – Distance from port D – Distance from starboard	Check that the new dimensions are transmitted in msg 5	Not used, All values 0 Retest 2011-06-24 Ba: UTC 09:16 With "Ship size mode" set to "Standard"	Passed
	Check that the new dimensions are displayed on MKD	Not used, All values 0 Retest 2011-06-24 Ba: With "Ship size mode" set to "Standard"	Passed
External 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 msg 5	Not used, All values 0 Retest 2011-06-24 Ba: UTC 09:10 "Ship size mode" has to be set to "Standard"	Passed
	Check that the new dimensions are displayed on MKD	Not used, All values 0 Retest 2011-06-24 Ba: With "Ship size mode" set to "Standard"	Passed
DTE indicator flag	Check if the DTE flag is entered in VDL message 5 Not required	Not applicable because of the internal MKD	N/A

2011-05-27 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 msg 5 is transmitted after change of data by VSD sentence	UTC 12:41	Passed
	Check that msg 5 is transmitted only if a field has been changed		Passed
Navigational status	Check that the new Navigational status is transmitted in msg 1		Passed
	Check that the Navigational status is displayed on MKD		Passed
Type of ship and cargo	Check that the new type is transmitted in msg 5		Passed
	Check that the new type of ship is displayed on MKD		Passed
Maximum actual static draught	Check that the new draught is transmitted in msg 5		Passed
	Check that the new draught is displayed on MKD		Passed
Destination	Check that the new destination is transmitted in msg 5	The Destination applied by SSD is transmitted, but the rest of the 20 characters is not filled up with "@@@@..." but with various characters, different from transmission to transmission of message 5. Retest 2011-06-24 Ba: The name is filled up with "@@@@..."	Passed
	Check that the new destination is displayed on MKD	• Voyage data input: correct • Own ship data: Same as message 5 content Retest 2011-06-24 Ba: The name is displayed correctly	Passed
Estimated Time of Arrival (ETA)	Check that the new ETA is transmitted in msg 5		Passed
	Check that the new ETA is displayed on MKD		Passed
Regional application flag	Check if the regional application flag is entered in VDL message 1	= 0	Passed
Persons on board	Check if the persons on board are displayed on MKD Not required	Not displayed	N/A

8.9 Test of IEC 61162-1 Ed. 4 compatibility

This tests check if the EUT is compatible to the new Edition 4 of IEC 61162-1 which is published in November 2010.

8.9.1 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 "\".

2012-01-31 Ba	Test details - Positon 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		Passed
	Confirm that no malfunction is observed		Passed

8.9.2 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

2012-01-31 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 and trailed by a number of valid or invalid characters			
Sensor data	Verify that the sensor data are correctly used		Passed
	Confirm that no malfunction is observed		Passed

8.9.3 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.

2012-01-31 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 know sensor input sentences with additional fields			
GLL input	Verify that the GLL input data are correctly used		Passed
GGA input	Verify that the GGA 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

9 20 DSC functionality tests

(M.1371 A3)

Remark: Because of the changes in ITU-R M.1371-4 this section is completely taken from the Ed. 2 CDV.

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.

Remark:

In a pre-test nearly no DSC call was received by the EUT. I tried it with two different DSC transmitters, with one transmitter only one of many DSC calls was received, with the other transmitter about 1 of 10 transmissions was received.

This is not an reliable basis to perform the DSC test.

If a DSC call has been received the command has been performed and the settings are stored

2011-MM-DD	**Tester:**	**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 a TXT output ID 036 immediately after receiving the DSC call and an ACA output when changing the channels	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 15:12	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
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	UTC 15:14	Passed
Send a area addressed region setting call, EUT outside the addressing area		Check that the new area is ignored and not stored		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 15:21 Area setting is not accepted Retest 2012-02-21 Ba: UTC 13:06	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	Retest 2012-02-21 Ba: UTC 13:06	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	AIS setting: 72 Tested with 70 and 72	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	UTC 15:24 EUT continues normal operation	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 15:32 The DSC call from a mobile station MMSI has been accepted Retest 2012-02-21 Ba: UTC 13:09	Passed

10 21 Long Range functionality tests

(9)

10.1 21.1 LR interrogation

(9.2)

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

- *Automatic response*
- *Manual response via MKD*
- *Manual response via PI*

Required results

Check that EUT displays LR interrogation messages and sends to PI.

Check that EUT outputs a LR position report message

- *Automatically (and indicates action on display)*
- *After manual confirmation via MKD*
- *After manual confirmation via PI*

2012-01-31 Ba	Test details – 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	There is a symbol in the top status line, and the details of the request are shown in the Long Range menue	Passed
	Check that replay status is displayed on MKD		Passed
PI output	Check that LR interrogation and response is output on PI	The LRI and the LRF (input and output) are output on the PI port	Passed

Contents of LRF response	Check output of LRF sentence		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 av.)		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		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		Passed
	Check Lat, Lon		Passed
	Check COG		Passed
	Check SOG		Passed
Contents of LR3 response	Check output of LR3 sentence		Passed
	Check that sequence number = request = LRF		Passed
	Check MMSI of responder = own MMSI		Passed
	Check destination		Passed
	Check ETA	The date is ok The UTC time is 000000 Retest 2012-02-21 Ba: The ETA is output correctly	Passed
	Check draught		Passed
	Check ship/cargo		Passed
	Check length of ship		Passed
	Check breadth of ship		Passed
	Check ship type		Passed
	Check persons	Instead of the number of persons the draught in dm is output Retest 2012-02-21 Ba: The number of persons is output correctly	Passed

2012-01-31 Ba	Test details – 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	LR2 and LR3 are also output, but with null fields	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	LR3 is also output, with null fields	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

2012-01-31 Ba	Test details – 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	There is a symbol in the top status line, and the details of the request are shown in the Long Range menue	Passed
	Check that response is transmitted after manual confirmation on MKD	Key: “OPT”	Passed

2012-01-31 Ba	Test details – 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		Passed

10.2 21.2 LR “all ships” interrogations

(9.2)

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

- *Automatic response*
- *Manual response.*

Repeat check with own ship outside specified area.

Required results

Check that EUT outputs a LR position report message

- *Automatically (and indicates action on display)*
- *After manual confirmation.*

No response shall be output on the repeat check.

2012-01-31 Ba	Test details – 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		Passed
	Check that the request is not displayed on MKD		Passed
	Check that the request is not output on PI		Passed

	Test details – 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		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		Passed
	Check that the request is not output on PI		Passed

10.3 21.3 Consecutive LR "all ships" interrogations

(9.2)

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 ships position;

Record LR output port. Set the control flag in the LRI message to

- *0 (reply on first interrogation only)*
- *1 (reply on all applicable interrogations)*

Required results

Check that EUT outputs a LR position report message

- *On the first interrogation only*
- *On all interrogations.*

2012-01-31 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			
Control flag = 1 (reply on all requests)	Check that the 1. request is automatically responded		Passed
	Check that the following interrogations are responded		Passed
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		Passed
	Check that the following interrogations are not output on PI		Passed

10.4 21.2 Long-range application by broadcast

(See 8.3)

10.4.1 21.2.1 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.

Do not apply Message 4 and Message 23.

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.

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.

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. Message 23 fields after station type shall not match current settings of EUT.

Repeat the test d) using different MMSIs for Message 4 and Message 23.

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.

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 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:

EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.

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.

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.

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.

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.

EUT begins transmission of Message 27 no sooner than 4 minutes and no later than 8 minutes after Message 23 was removed.

EUT begins transmission of Message 27 beyond 3 minutes after Message 4 was removed.

2012-03-07	**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	Message 27 is transmitted	Passed
		Check Tx channels C and D	Set to 1075 and 1076	Passed
		Check that the transmission is alternating between C and D	Remark: For the channels in the VDO the values “3” and “4” are used. It seems to be more consistant to the channels “A” and “B” used for the normal transmissions to use “C” and “D” for the long range transmissions (Msg 27). Therefore I recommend to change the VDO to use “C” and “D” for the two long range broadcast channels.	Passed
		Check reporting interval = 3 min		Passed
		Check message 27 content		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 14:12	Passed
Apply message 4 with long range control bit set to 1		Check that message 27 is transmitted with 3 min interval		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 14:51	Passed
Apply message 4 with long range control bit set to 1		Check that message 27 is transmitted with 3 min interval	UTC 14:57	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 14:14, UTC 14:30	Passed
		Verify that the information of message 23 after station type is ignored	Reporting interval = 11 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 14:23	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	UTC 15:19	Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 15:25	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 15:06/15:09	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)	After 5 min	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 14:30	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 14:36 Start Tx msg 27 at 14:48	Passed

10.4.2 21.2.2 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.

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).

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.

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.

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:

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

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.

EUT transmits Message

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.

2012-03-07	**Tester: Ba**	**Test details:** Multiple assignment operation		
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)	UTC 16:08	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	UTC 15:53	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 15:40	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	UTC 16:03	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	UTC 16:05	Passed

Annex A Test equipment

A.1 Test equipment summary

#	description	type	identification
1	VDL analyser / Generator	Attingimus UAIS Test unit	S/N 001 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
	Auxiliaries:		
5	True RMS Multimeter DMM 916	Tektronix	S/N 138531
6	2-Kanal-Digital-Oszilloskop Wavesurfer 422	Le Croy	LCRY 0301 J 15673
7	8 Converters RS 422 to RS 232		
8	2 fixed voltage power supply (24 V/10A)		
9	2 adjustable power supplies (30 V/5 A)		
10	Active retransmitting GPS antenna		

for a description of pos. 1-4 see below

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.

A.1.2 Target simulator

The target simulator consists of a standard PC with

- special Radar and Target Simulator software
- extension boards for generation of Radar signals and RS422 serial output signals

Connection of AIS Test system
For tests of AIS transponders the data of 60 moving targets defined in the Radar Simulator are transferred to the VDL Generator and transmitted on VHF. Thus the AIS VHF data link is loaded with simulated AIS targets.
Connection of display systems
Radar systems as well as ECDIS systems will have the ability to receive, process and display AIS information in the near future. In order to test this feature the data of moving targets defined in the Radar Simulator are transferred to the RADAR (together with video, sensor data etc as known).
Connection of AIS under Test
The AIS under test can be connected to the own ship sensor outputs in order to provide full control over own ships dynamic data (for tests of reporting rates, channel management...).

A.1.3 Presentation Interface Monitor

The Presentation Interface Monitor is a PC software running on two standard PCs.
It is used to

- simulate Sensor inputs
- 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 DSC Testbox

The DSC test box includes:

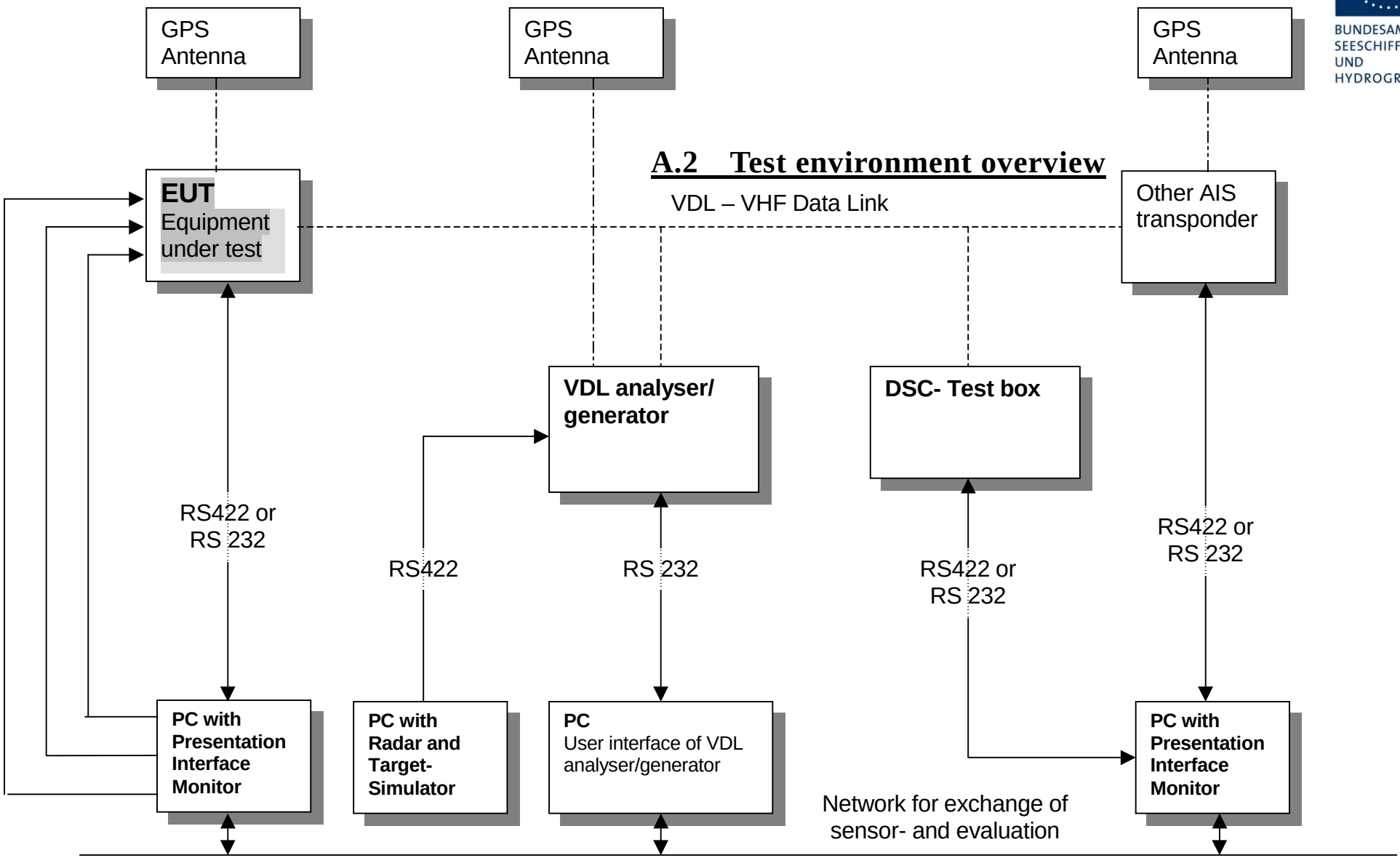
- A standard VHF DSC controller DEBEG 3817 with open interface
- A standard VHF radiotelephone DEBEG 6348

The software modification of the DSC controller comprises a remote control input/output facility

- to transmit DSC calls according to ITU 825-3 generated in an external device on DSC channel 70 and
- to output received DSC calls from the EUT to the external device.

The Presentation Interface Monitor is used to generate the DSC calls and to display, log and evaluate the received DSC calls.

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,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 !AIBBM,4,2,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 !AIBBM,4,3,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 !AIBBM,4,4,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,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 msg 5
$AIAIR,000001005,5,,,,,	
AIAIR_35_5.sst	Interrogation of msg 3 and 5 from ID1 and msg 5 from ID2
$AIAIR,000005002,3,,5,,000007001,5,,	
AIS_DSI.sst	Test that EUT ignores command to send a DSC msg
$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°
`$ECACA,2,0100.00,N,17900.00,W,0100.00,S,17900.00,E,2,0074,0,0076,0,0,1,,,`	
AIACA_Set_channel.SST	Set channel command, without area co-ordinates
`$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

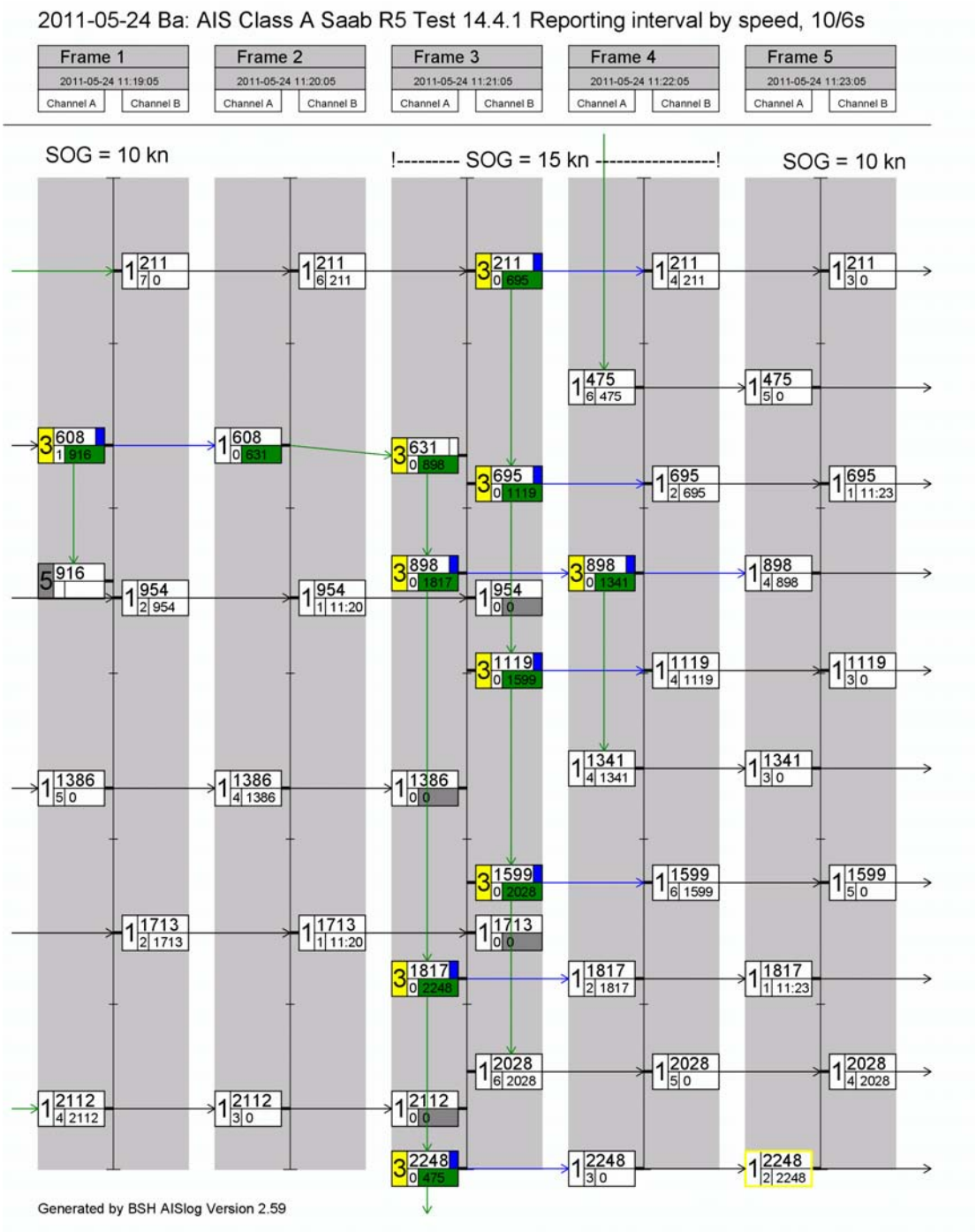
The of long range requests include a MMSI number which is changed according to the actual MMSI number the EUT

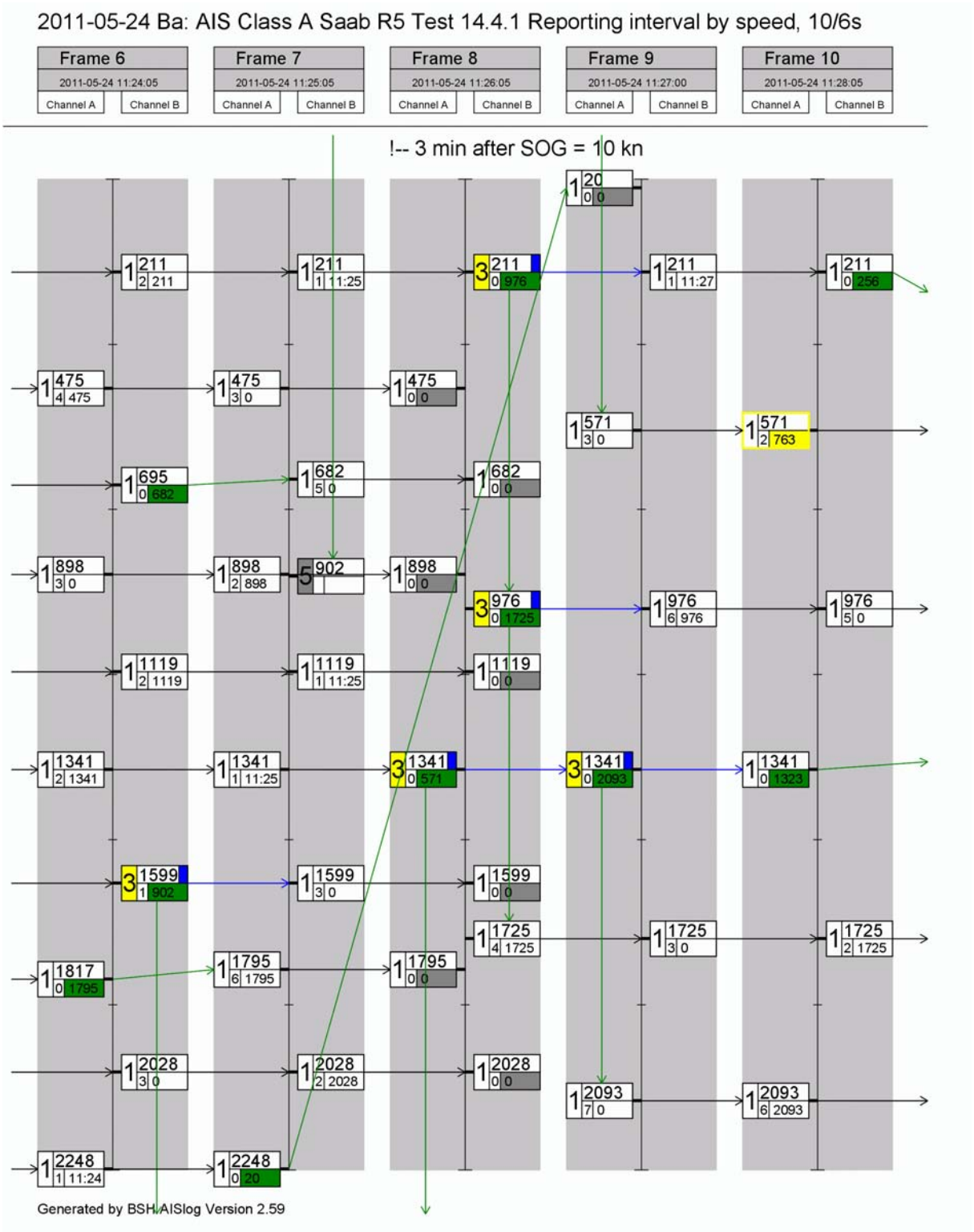
Long Range (LRI, LRF)	
File name	Description
Sentences	
LRI_LRF_MMSI_all.sst	Request of all data addressed by MMSI
`$LRLRI,5,0,211003000,000002002,,,,,,,` `$LRLRF,5,211003000,VTS,ABCEFIOPUW,`	
LRI_LRF_area_CEF.sst	Request of some data addressed by area
`$LRLRI,6,1,211003000,,6000.0,N,2000.0,E,4000.0,N,0500.0,E` `$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,`	

Annex C test diagrams

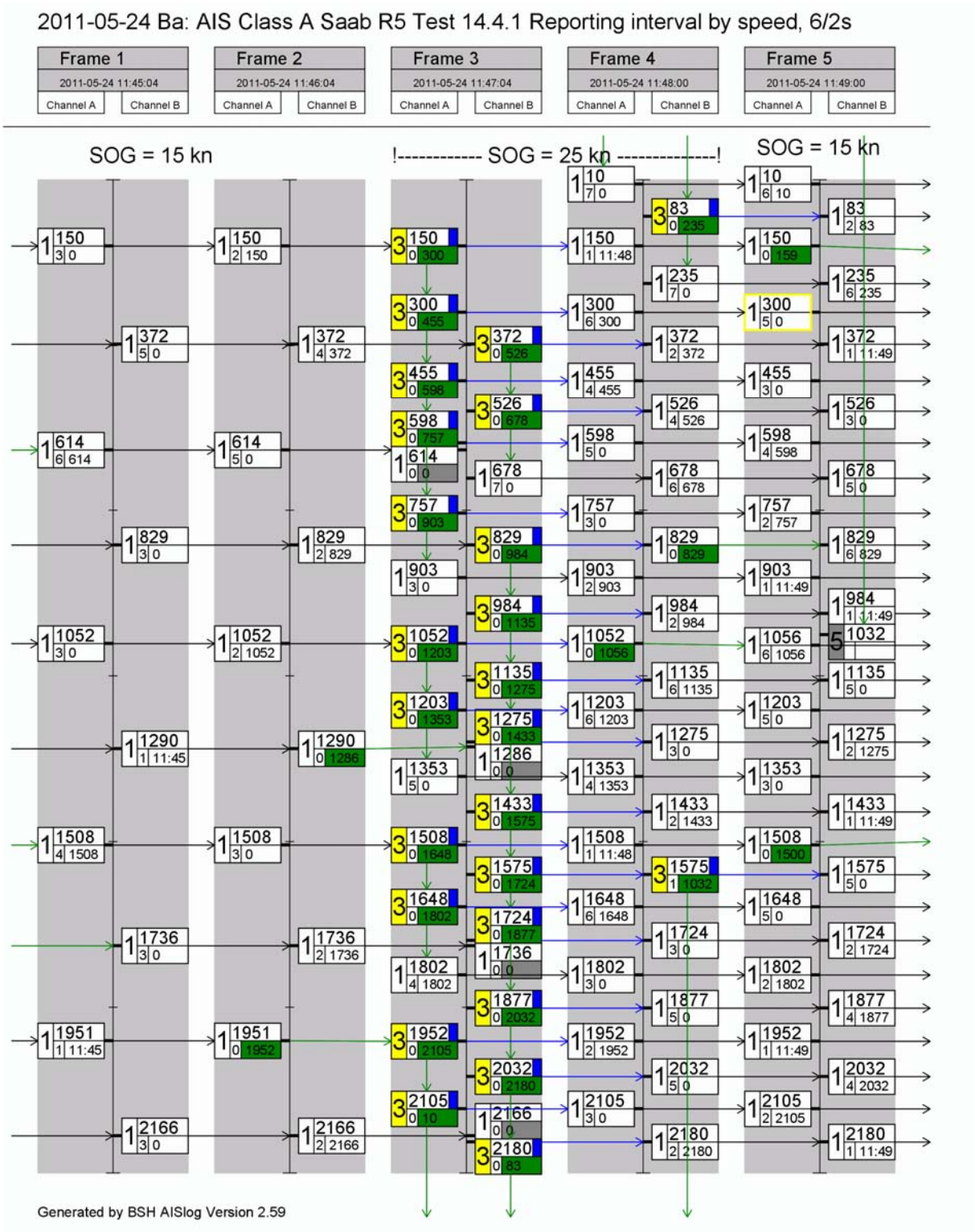
C.1 14.4.1 Reporting rates

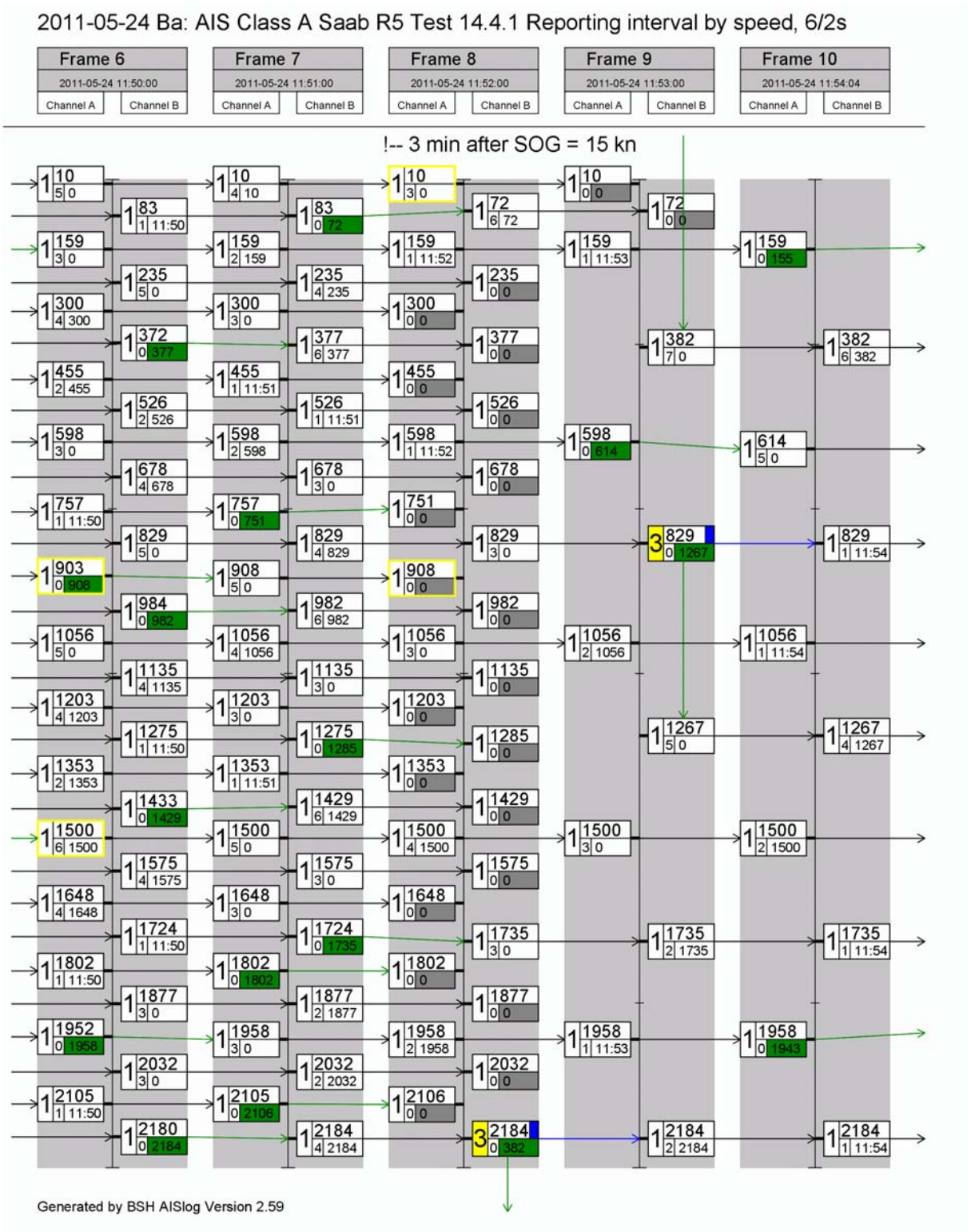
C.1.1 Reporting rate by speed change, 10 kn



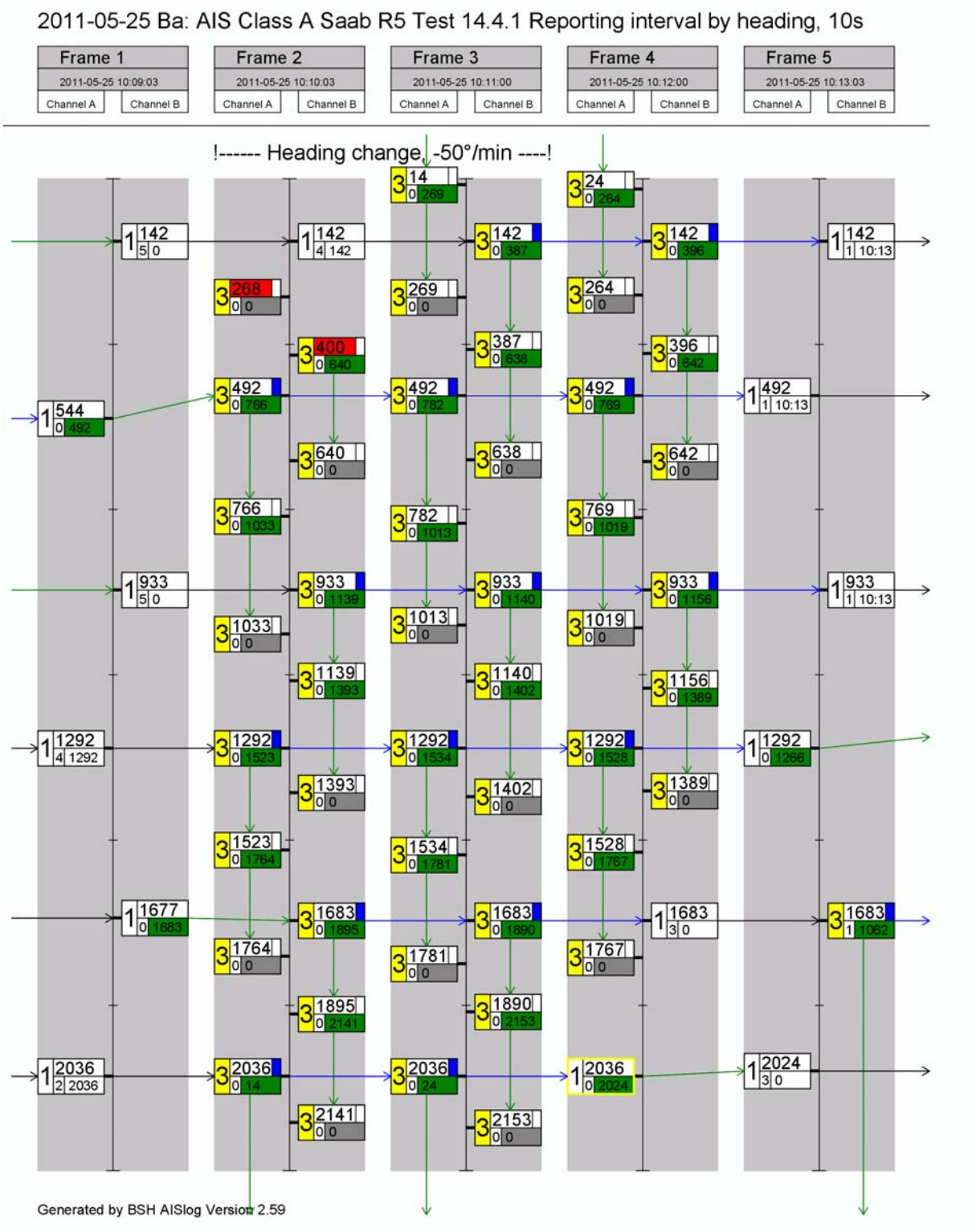

2011-05-24 Ba: AIS Class A Saab R5 Test 14.4.1 Reporting interval by speed, 10/6s
Frame 6
2011-05-24 11:24:05
Frame 7
2011-05-24 11:25:05
Frame 8
2011-05-24 11:26:05
Frame 9
2011-05-24 11:27:00
Frame 10
2011-05-24 11:28:05
Channel A
Channel B
!-- 3 min after SOG = 10 kn
Generated by BSH/AISlog Version 2.59

C.1.2 Reporting rate by speed change, 15 kn

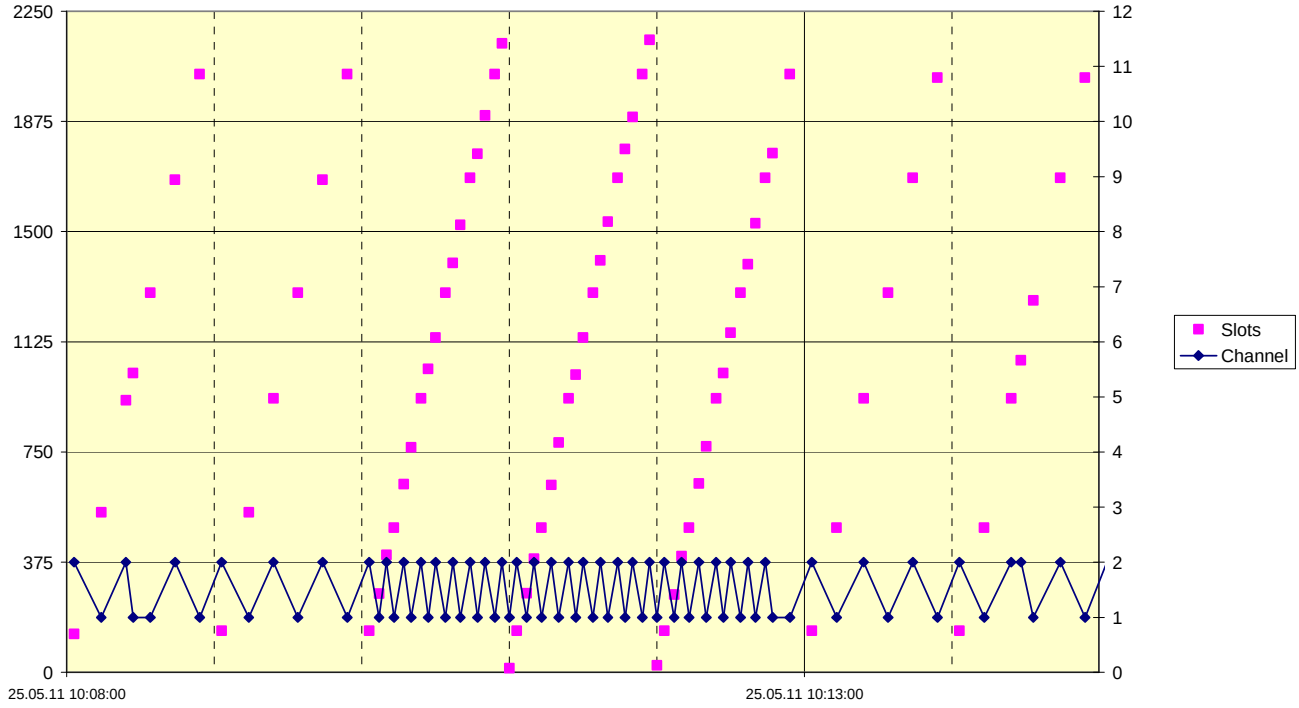



2011-05-24 Ba: AIS Class A Saab R5 Test 14.4.1 Reporting interval by speed, 6/2s
Frame 6
2011-05-24 11:50:00
Frame 7
2011-05-24 11:51:00
Frame 8
2011-05-24 11:52:00
Frame 9
2011-05-24 11:53:00
Frame 10
2011-05-24 11:54:04
Channel A
Channel B
!-- 3 min after SOG = 15 kn
Generated by BSH AISlog Version 2.59

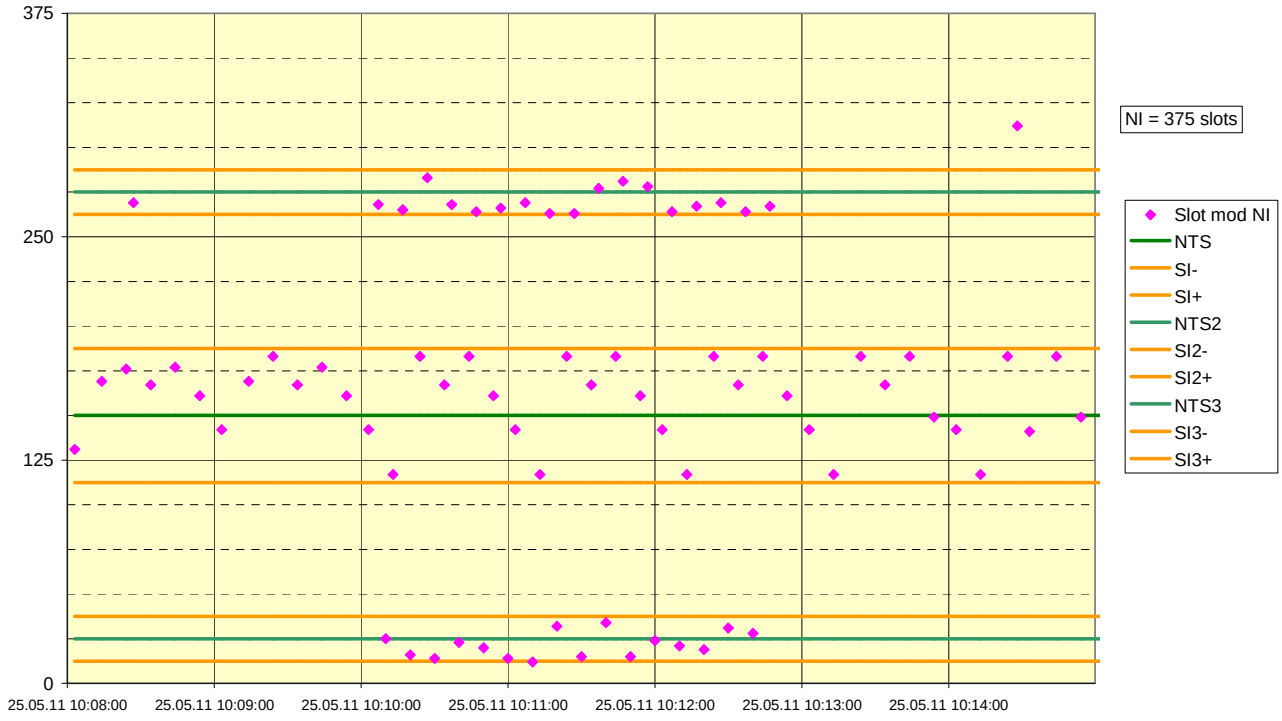
C.1.3 Reporting rate by heading change, 10 kn



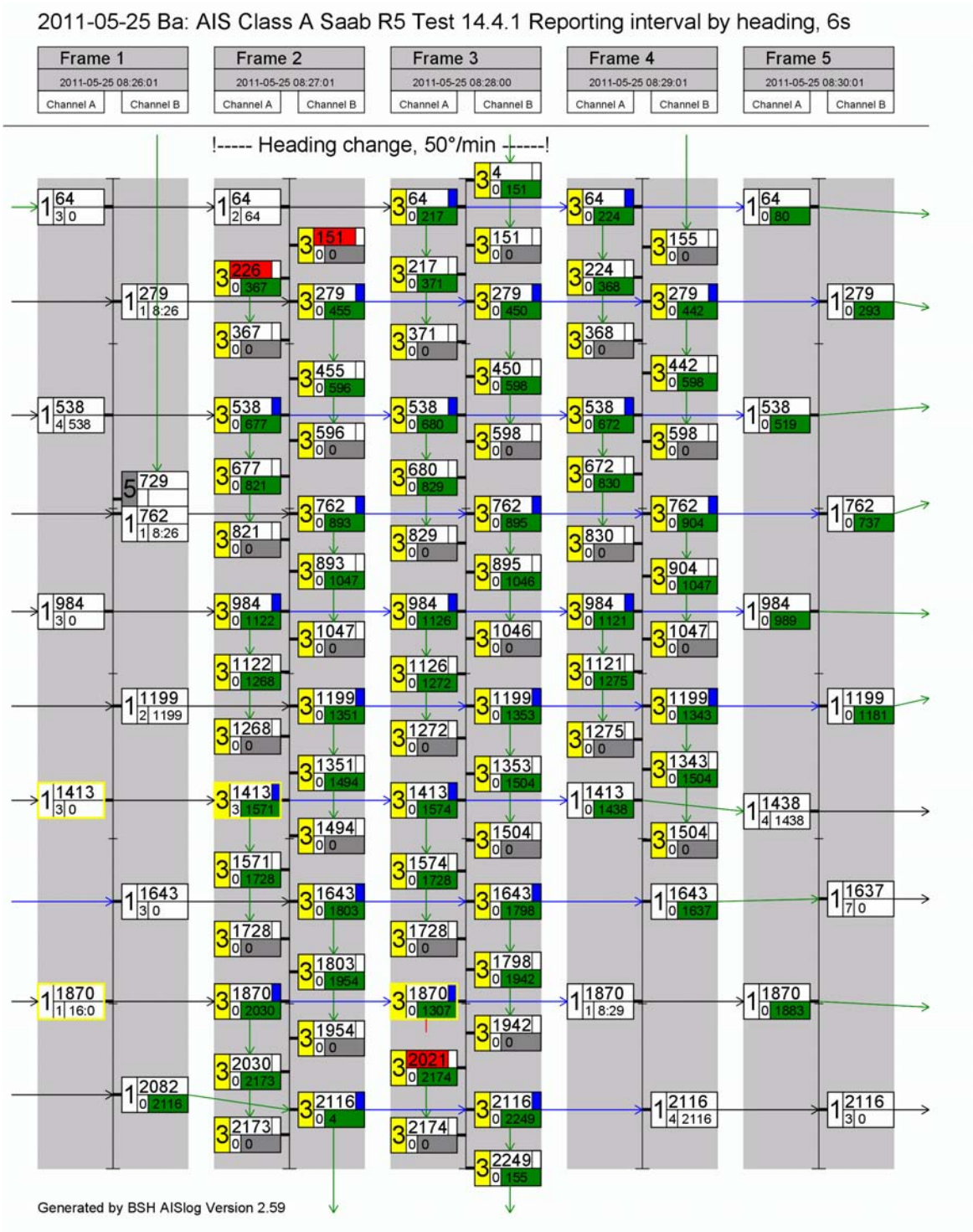
2011-06-29 Ba - Saab R5 - Test 14.4.1 Reporting interval by heading change, basic interval = 10s



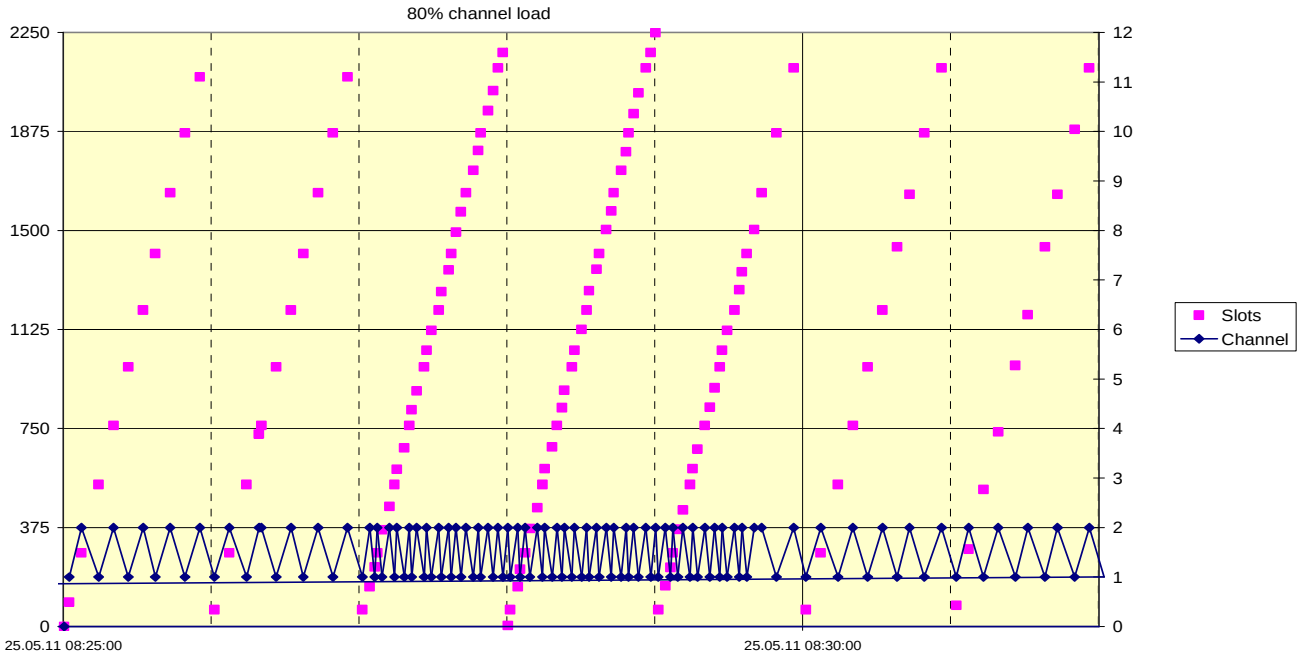
2011-06-29 Ba - Saab R5 - Test 14.4.1 Reporting interval by heading change, basic interval = 10s



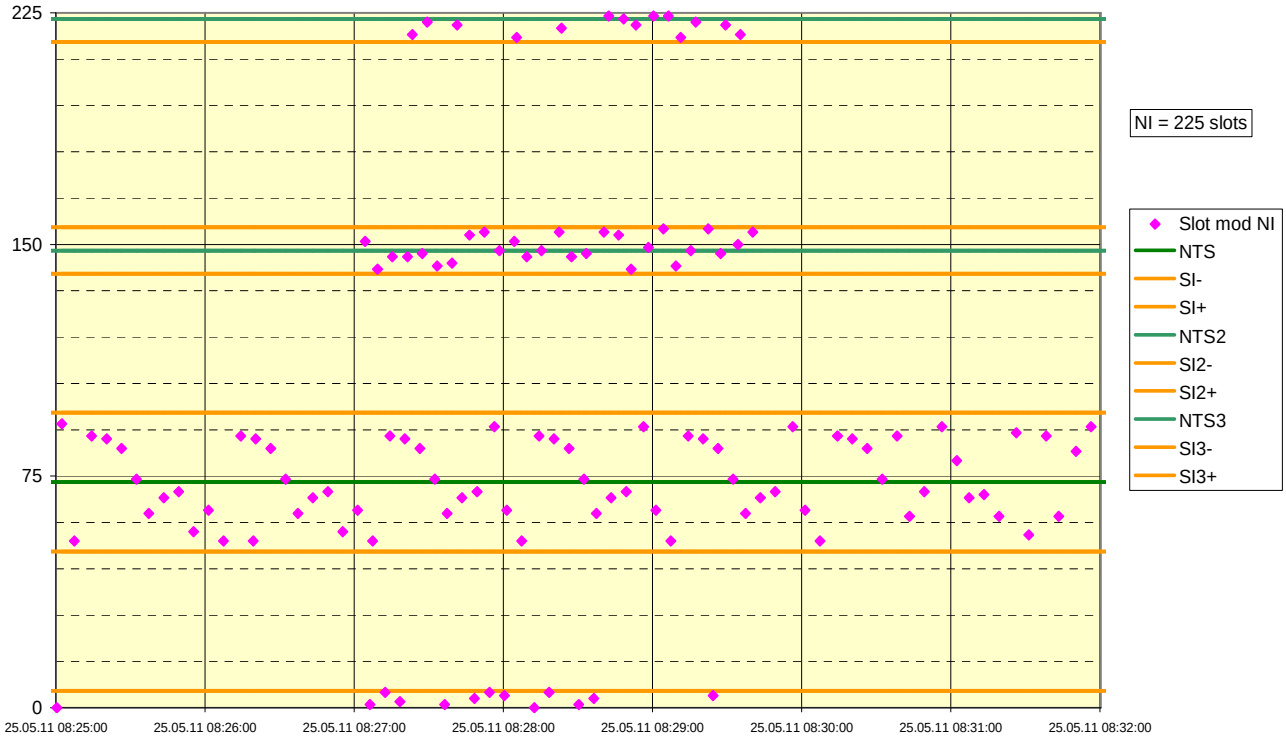
C.1.4 Reporting rate by heading change, 15 kn



2011-06-29 Ba - Saab R5 - Test 14.4.1 Reporting interval by heading change, basic interval = 6s

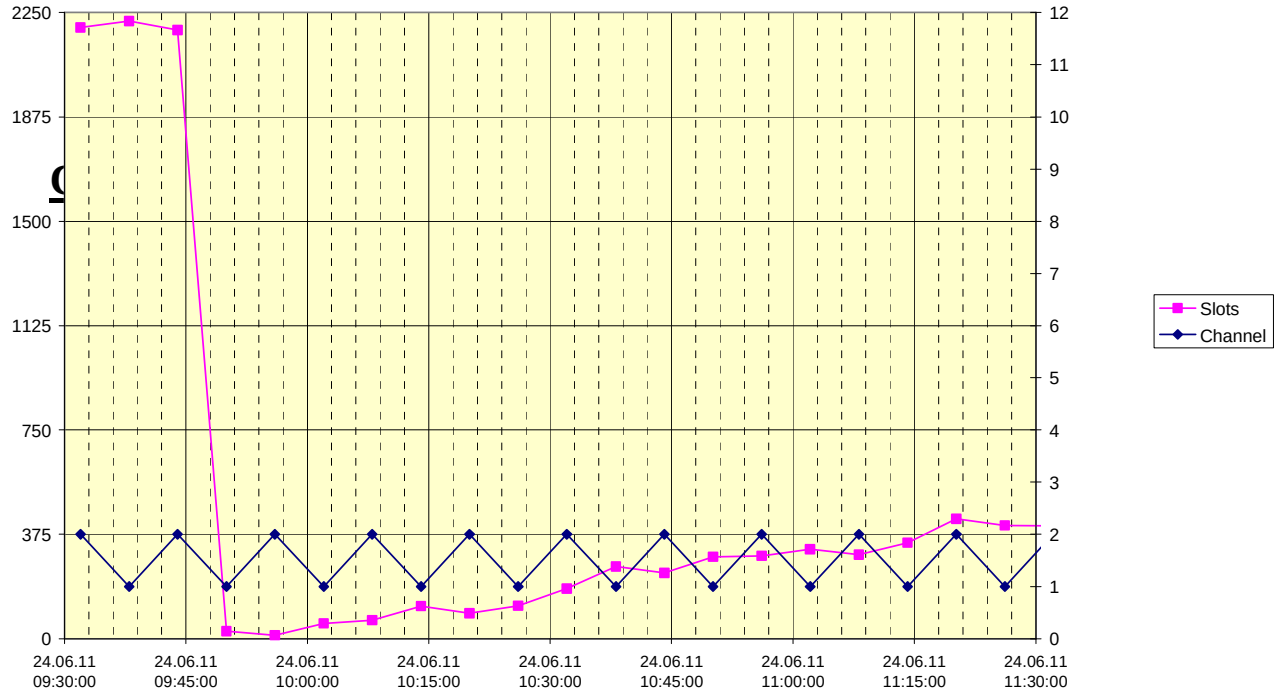


2011-06-29 Ba - Saab R5 - Test 14.4.1 Reporting interval by heading change, basic interval = 6s

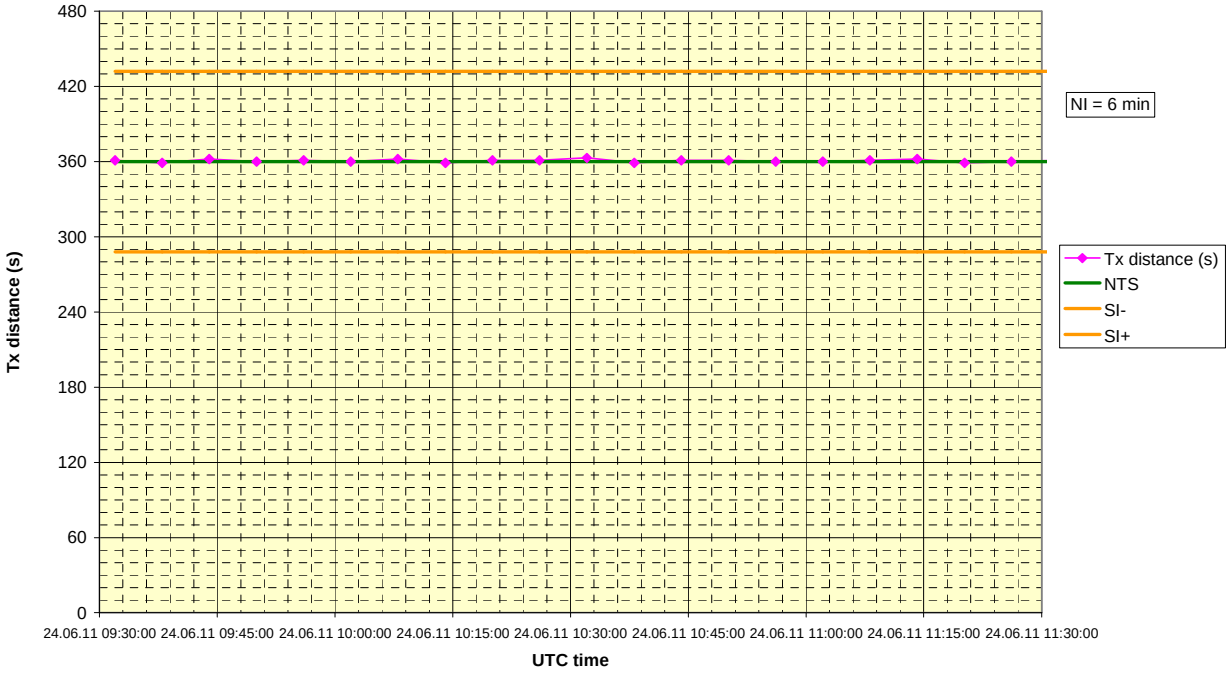


C.2 14.4.4 Static data reporting interval

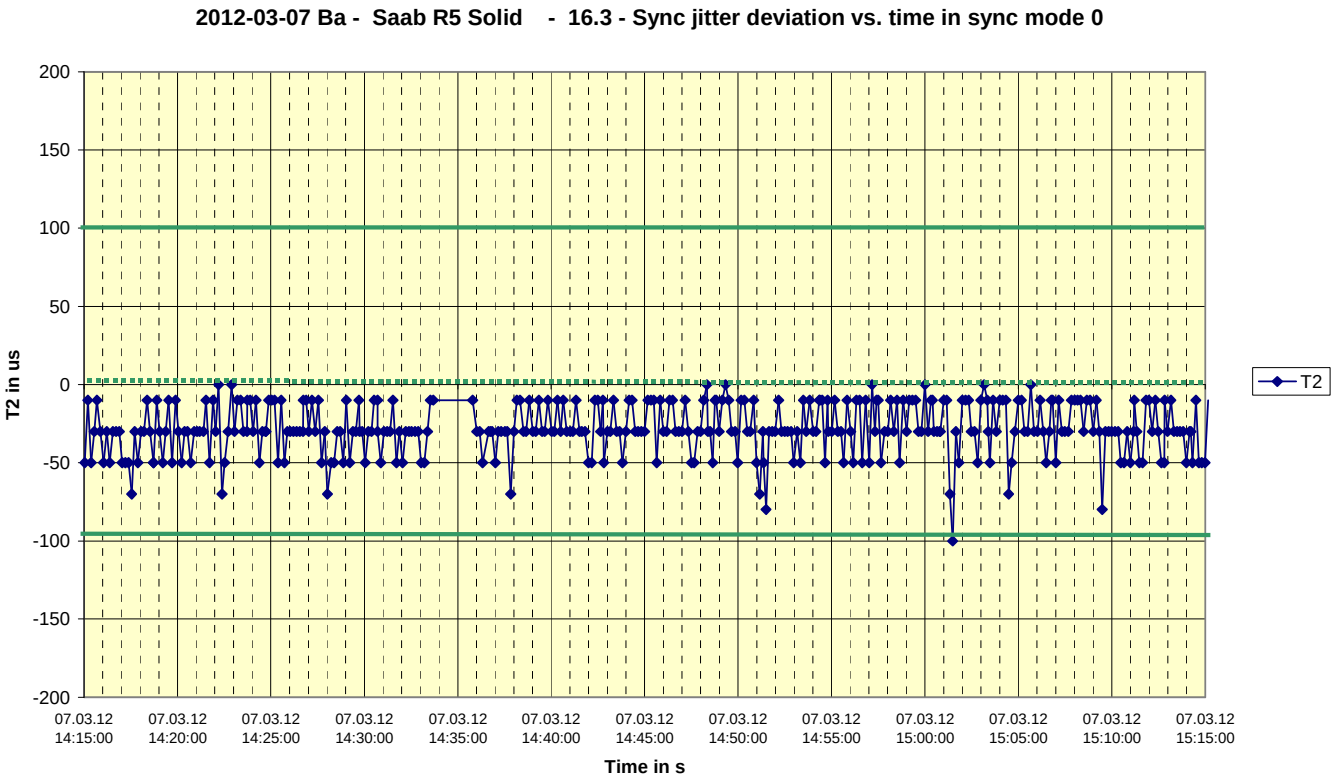
2011-06-24 Ba - Saab R5 - Test 14.4.4 Static data reporting interval

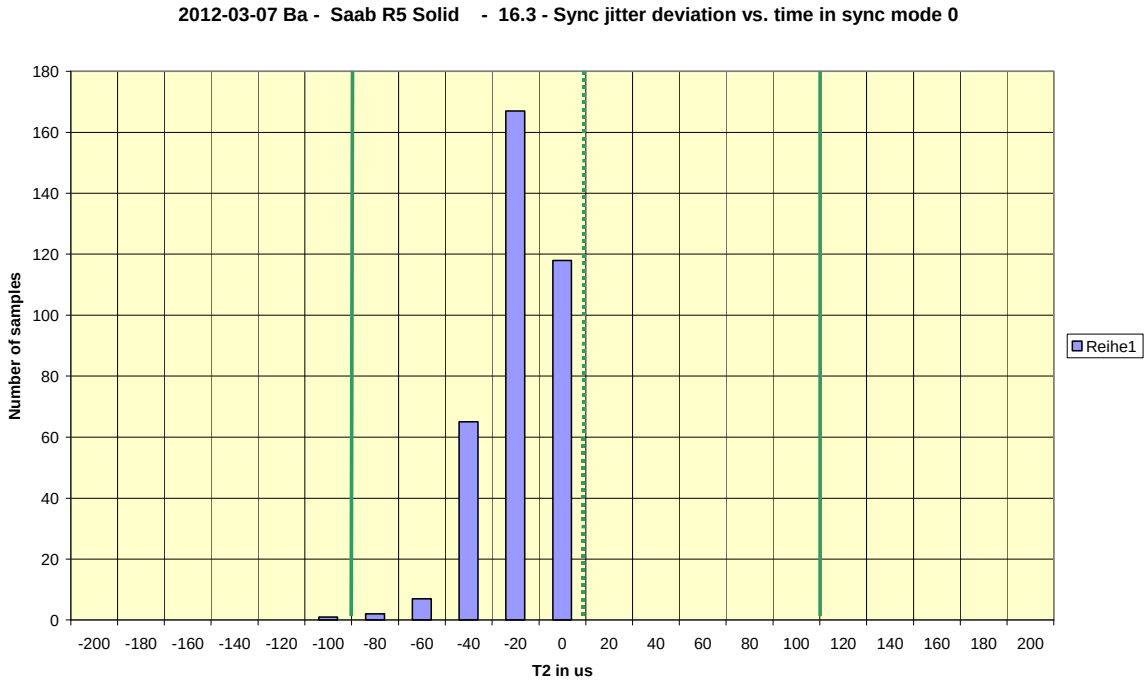


2011-06-24 Ba - Saab R5 - Test 14.4.4 Static data reporting interval

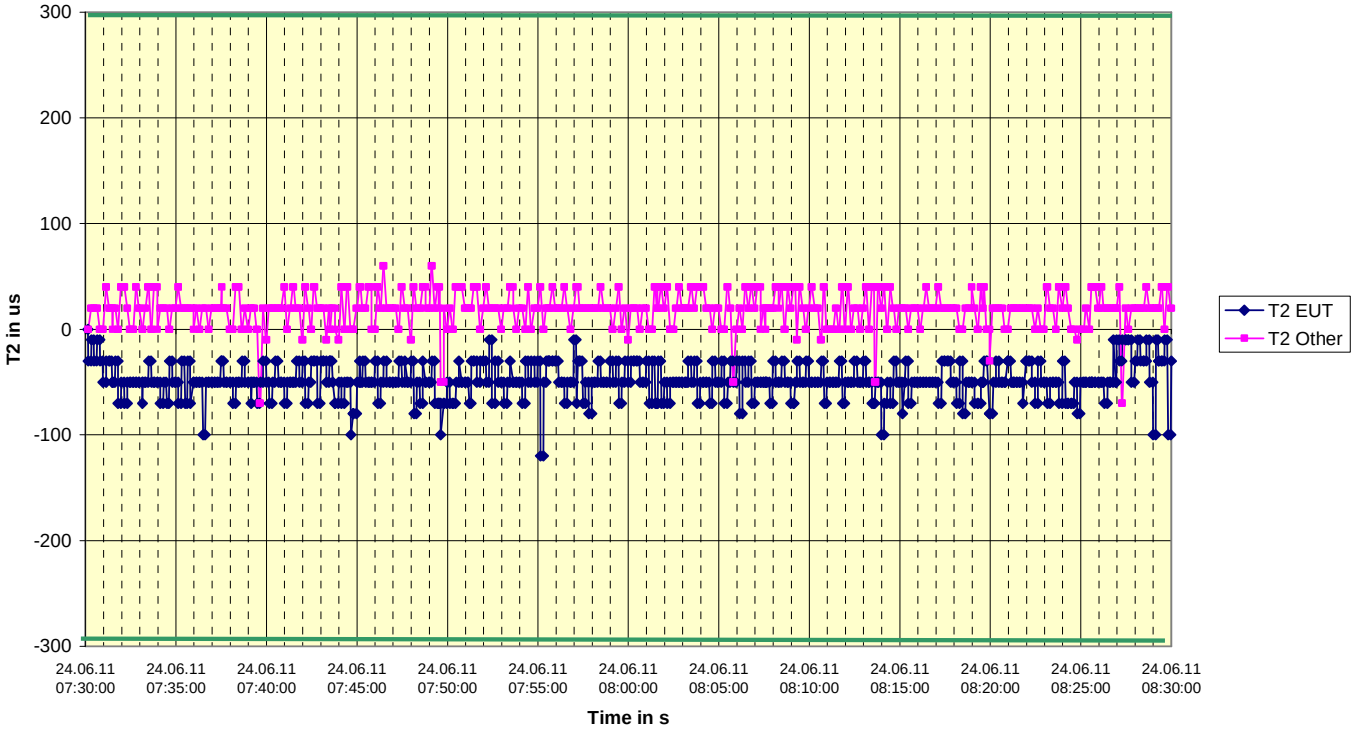


16.3 Synchronisation jitter

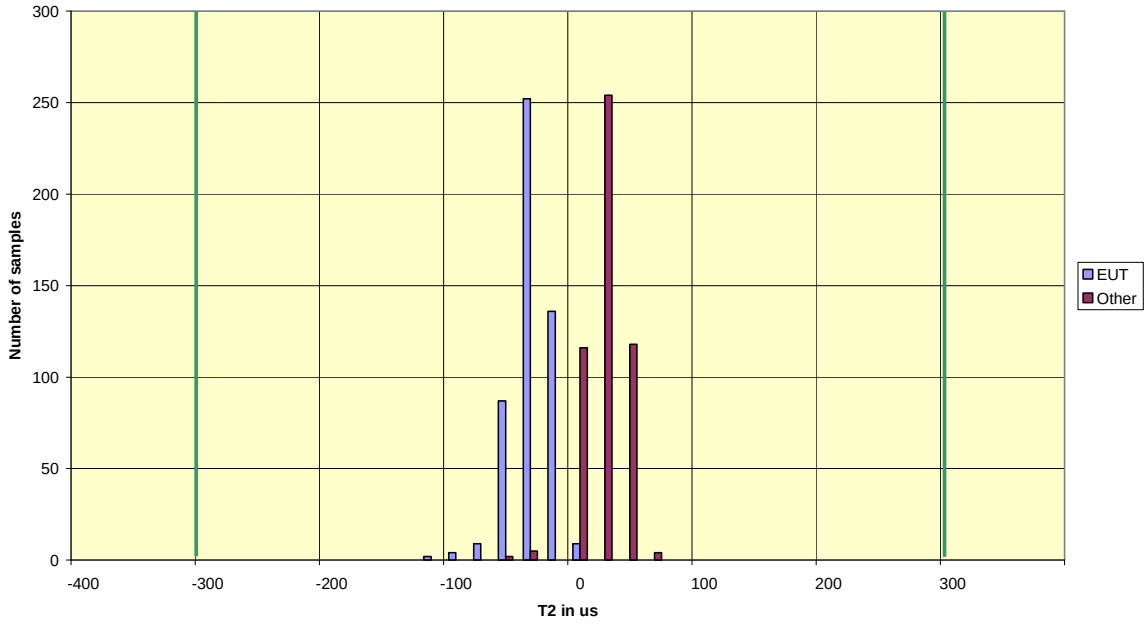




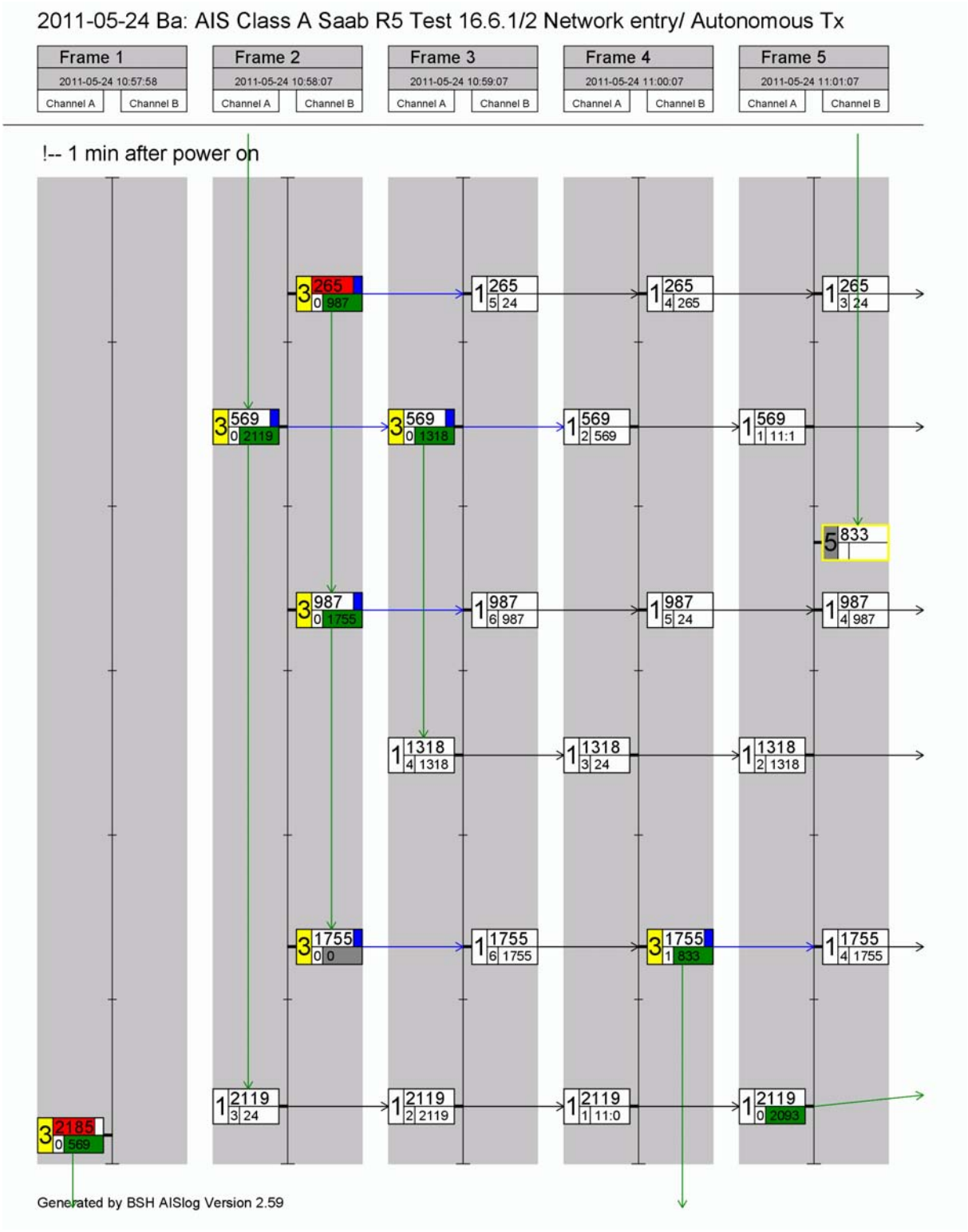
2011-06-24 Ba - Saab R5 - 16.3 - Sync jitter deviation vs. time in sync mode 1

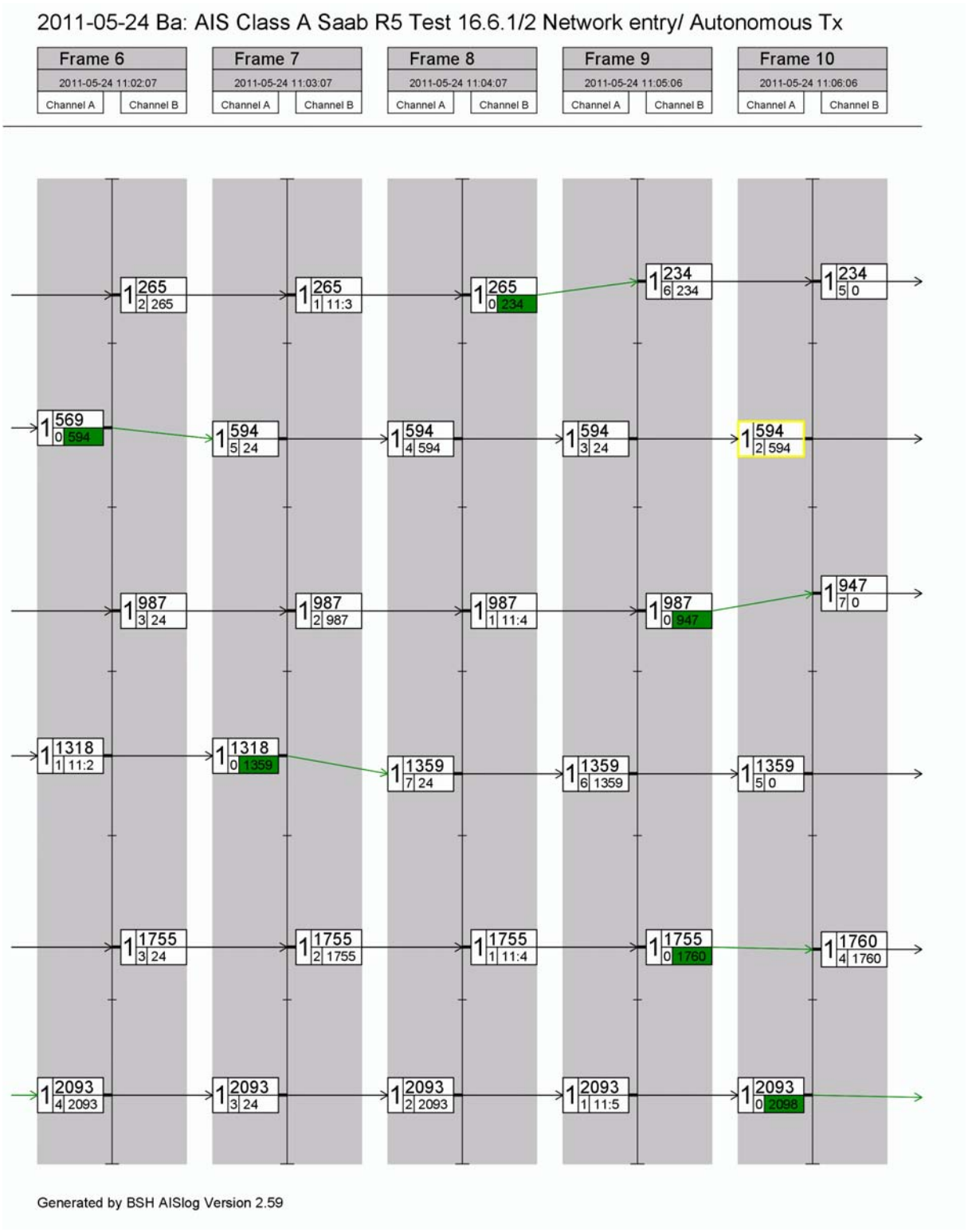


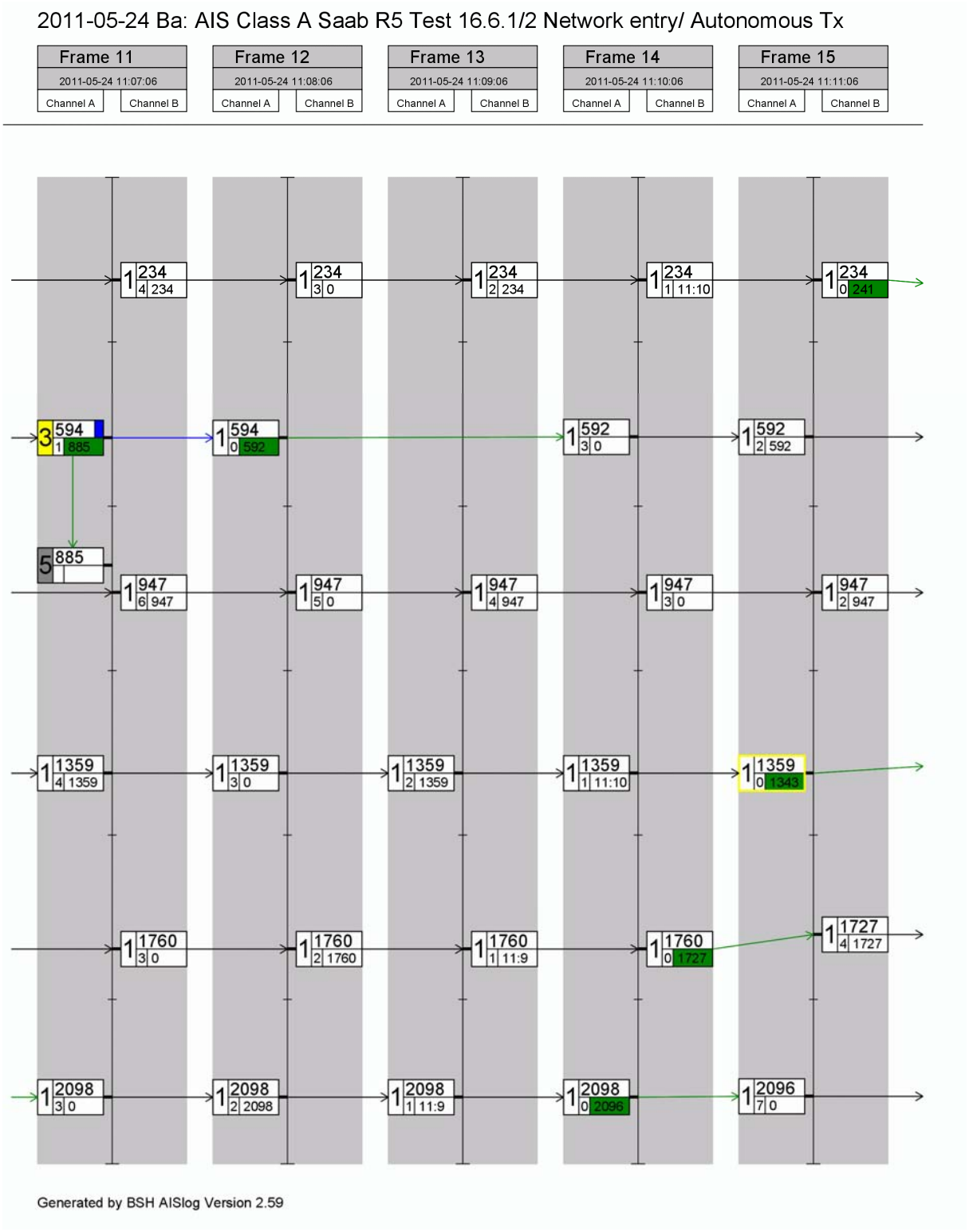
2011-06-24 Ba - Saab R5 - 16.3 - Sync jitter deviation vs. time in sync mode 1



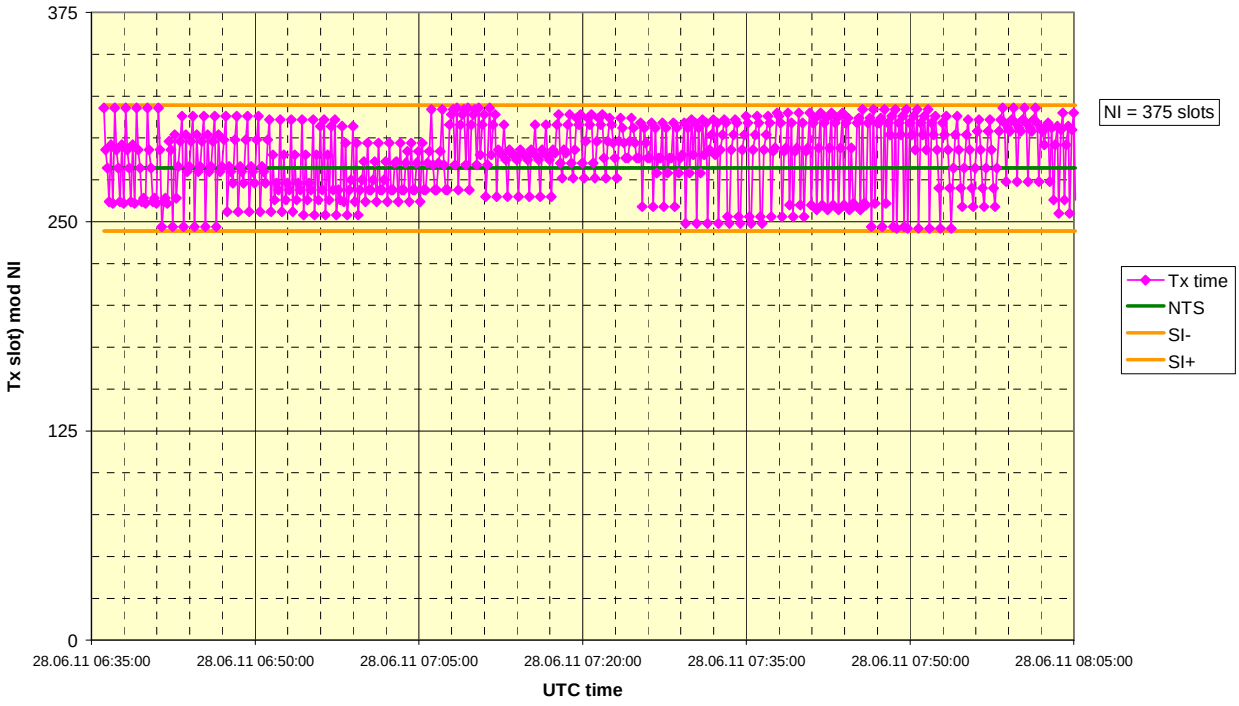
C.4 16.6.1 Network entry phase



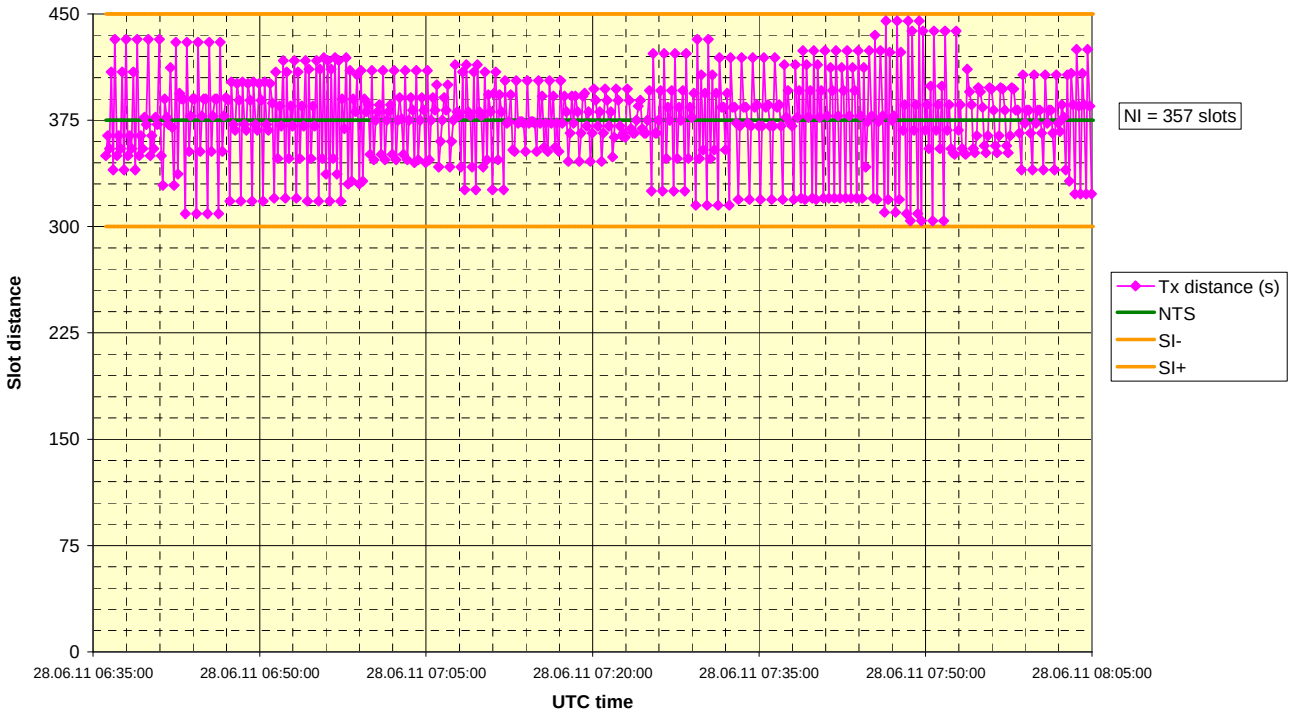

2011-05-24 Ba: AIS Class A Saab R5 Test 16.6.1/2 Network entry/ Autonomous Tx
Frame 6
2011-05-24 11:02:07
Channel A
Channel B
Frame 7
2011-05-24 11:03:07
Channel A
Channel B
Frame 8
2011-05-24 11:04:07
Channel A
Channel B
Frame 9
2011-05-24 11:05:06
Channel A
Channel B
Frame 10
2011-05-24 11:06:06
Channel A
Channel B
1 265 2 265
1 265 1 11:3
1 265 0 234
1 234 6 234
1 234 5 0
1 569 0 594
1 594 5 24
1 594 4 594
1 594 3 24
1 594 2 594
1 987 3 24
1 987 2 987
1 987 1 11:4
1 987 0 947
1 947 7 0
1 1318 1 11:2
1 1318 0 1359
1 1359 7 24
1 1359 6 1359
1 1359 5 0
1 1755 3 24
1 1755 2 1755
1 1755 1 11:4
1 1755 0 1760
1 1760 4 1760
1 2093 4 2093
1 2093 3 24
1 2093 2 2093
1 2093 1 11:5
1 2093 0 2098
Generated by BSH AISlog Version 2.59

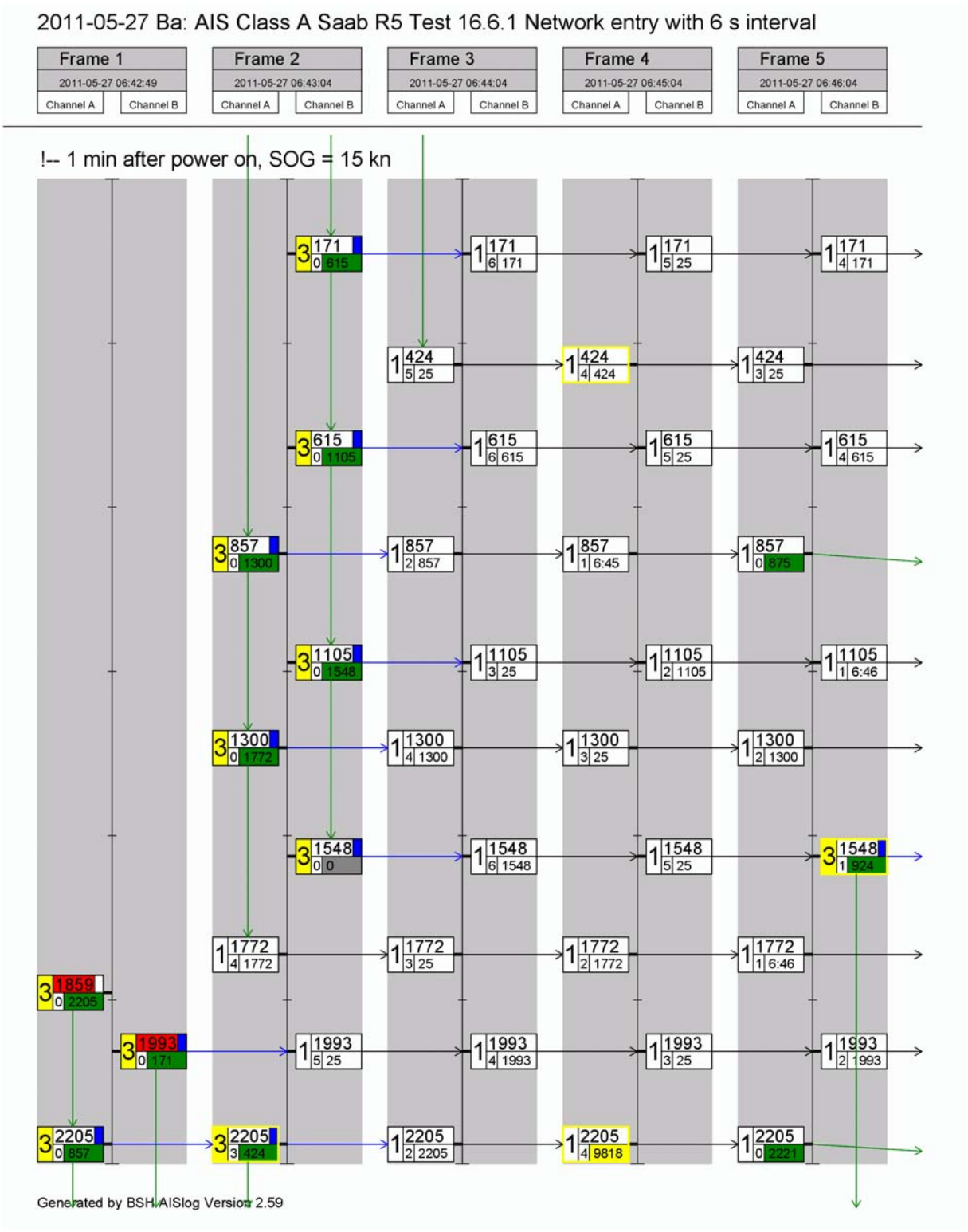

2011-05-24 Ba: AIS Class A Saab R5 Test 16.6.1/2 Network entry/ Autonomous Tx
Frame 11
2011-05-24 11:07:06
Channel A
Channel B
Frame 12
2011-05-24 11:08:06
Channel A
Channel B
Frame 13
2011-05-24 11:09:06
Channel A
Channel B
Frame 14
2011-05-24 11:10:06
Channel A
Channel B
Frame 15
2011-05-24 11:11:06
Channel A
Channel B
Generated by BSH AISlog Version 2.59

2011-06-29 Ba - Saab R5 - Test 16.6.2 Selection interval at 10 s reporting interval

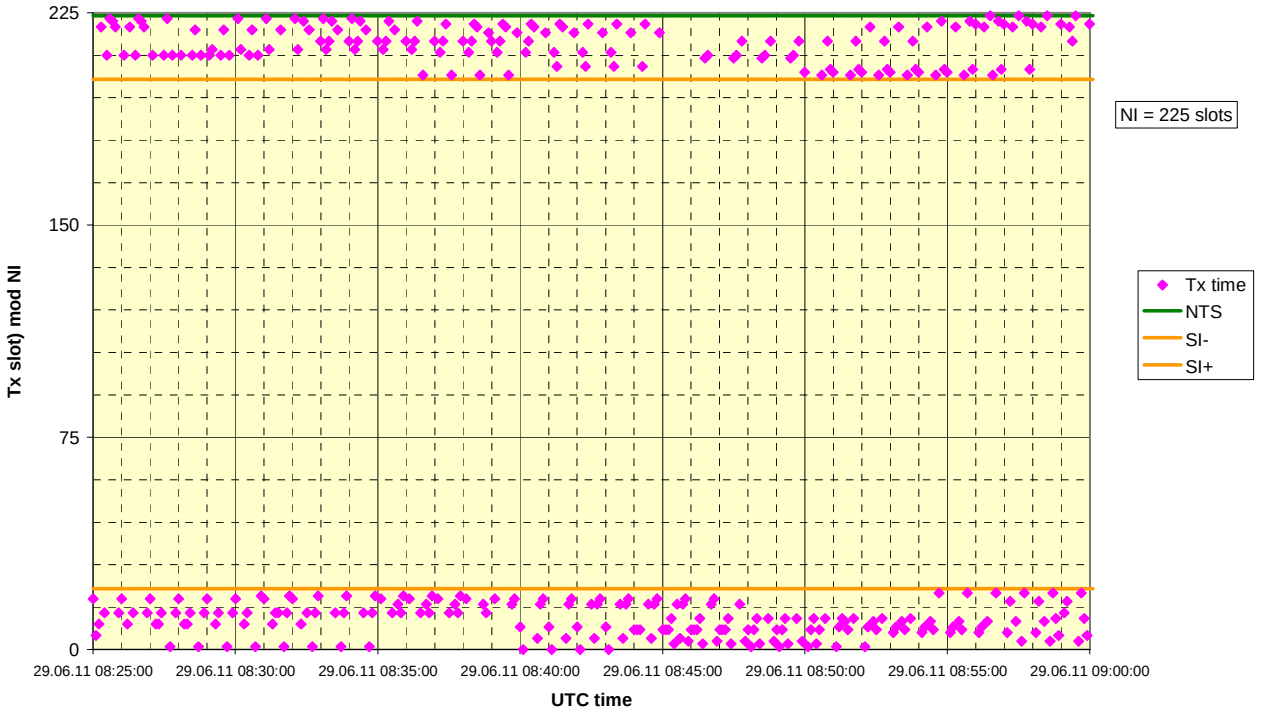


2011-06-29 Ba - Saab R5 - Test 16.6.2 Selection interval at 10 s reporting interval

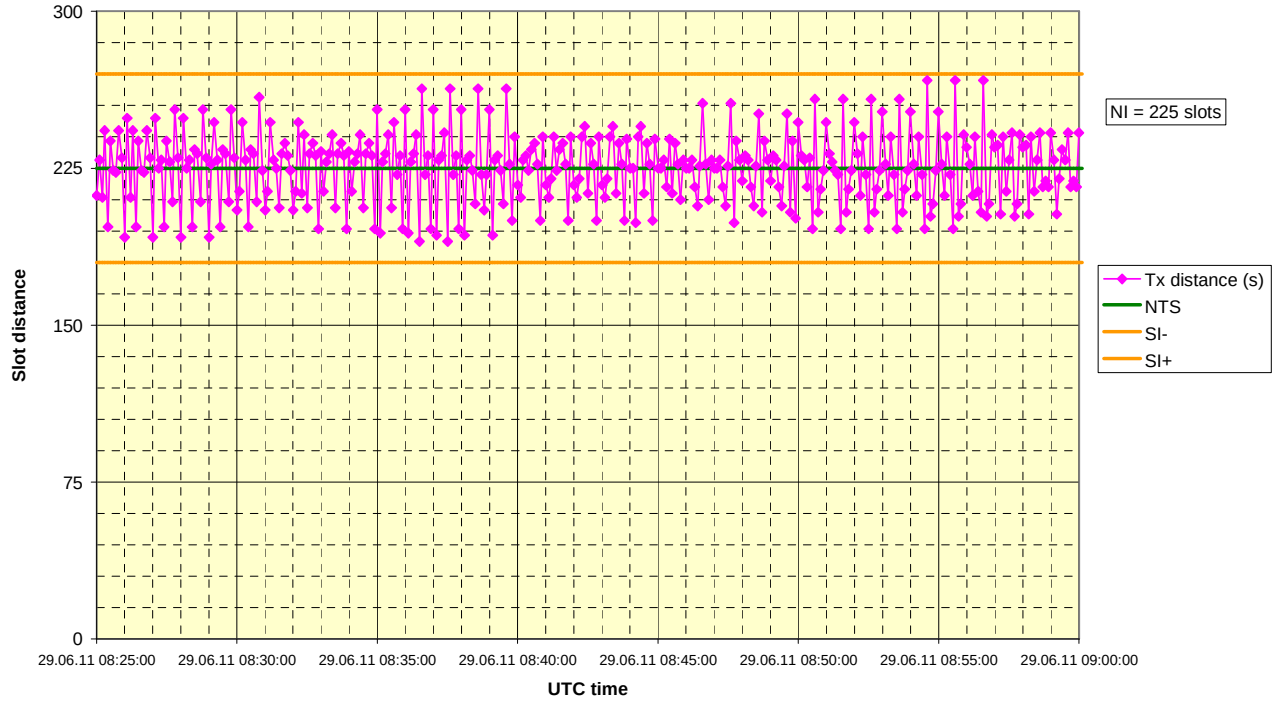


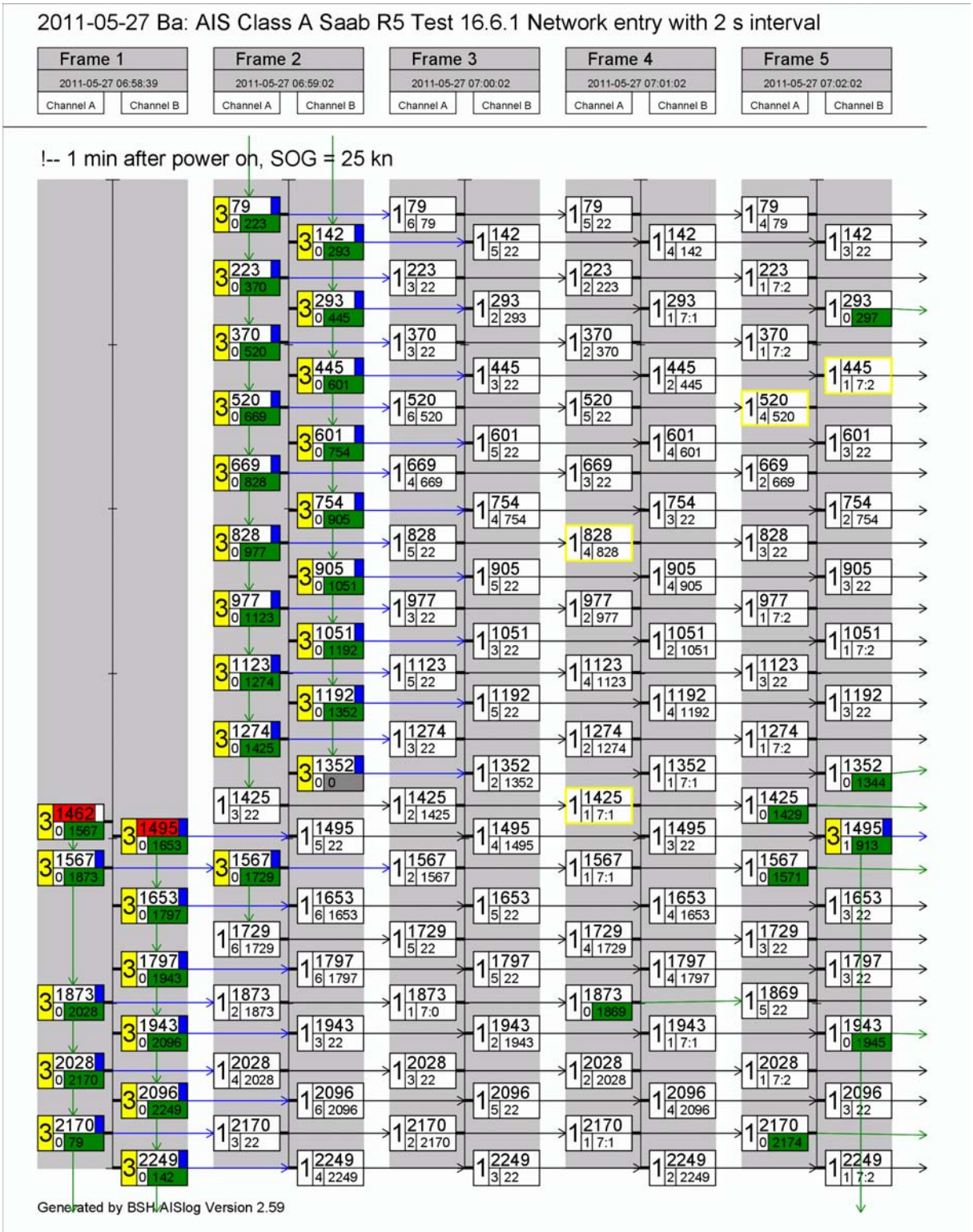

2011-05-27 Ba: AIS Class A Saab R5 Test 16.6.1 Network entry with 6 s interval
Frame 1
2011-05-27 06:42:49
Channel A
Channel B
Frame 2
2011-05-27 06:43:04
Frame 3
2011-05-27 06:44:04
Frame 4
2011-05-27 06:45:04
Frame 5
2011-05-27 06:46:04
!-- 1 min after power on, SOG = 15 kn
Generated by BSH AISlog Version 2.59

2011-06-29 Ba - Saab R5 - Test 16.6.2 Selection interval at 6 s reporting interval

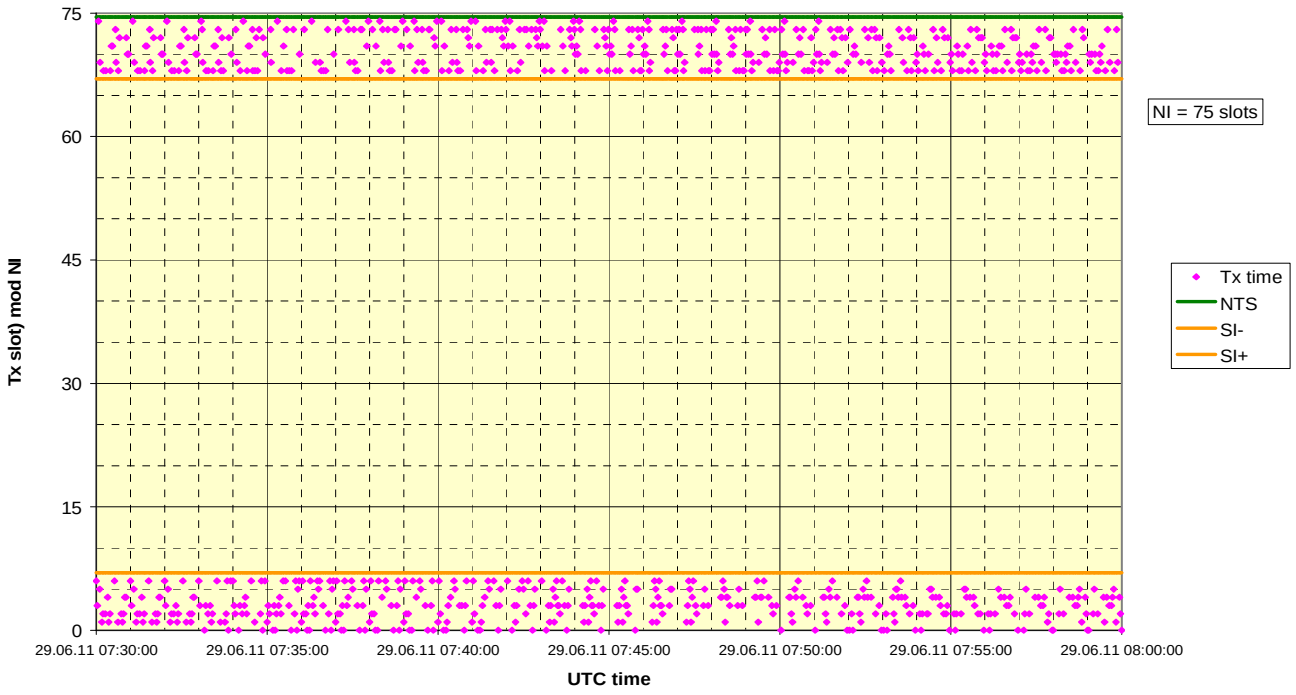


2011-06-29 Ba - Saab R5 - Test 16.6.2 Selection interval at 6 s reporting interval

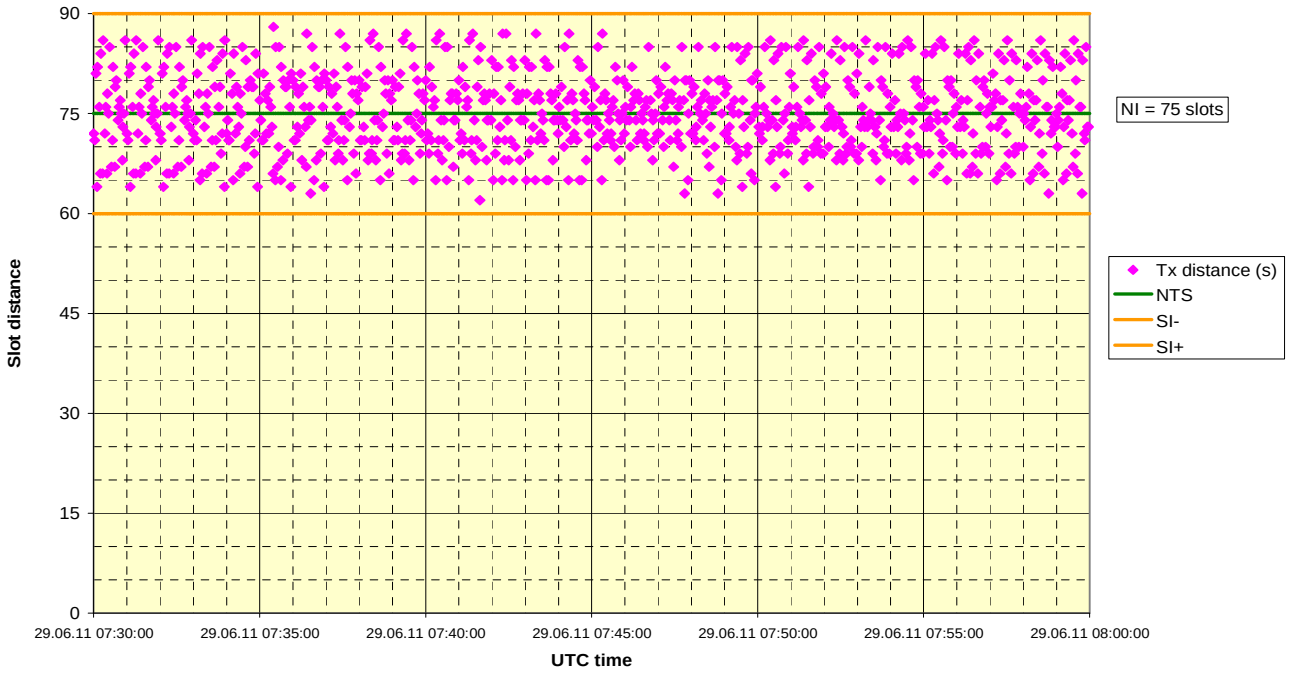



2011-05-27 Ba: AIS Class A Saab R5 Test 16.6.1 Network entry with 2 s interval
Frame 1
2011-05-27 06:58:39
Frame 2
2011-05-27 06:59:02
Frame 3
2011-05-27 07:00:02
Frame 4
2011-05-27 07:01:02
Frame 5
2011-05-27 07:02:02
Channel A
Channel B
!-- 1 min after power on, SOG = 25 kn
Generated by BSH/AISlog Version 2.59

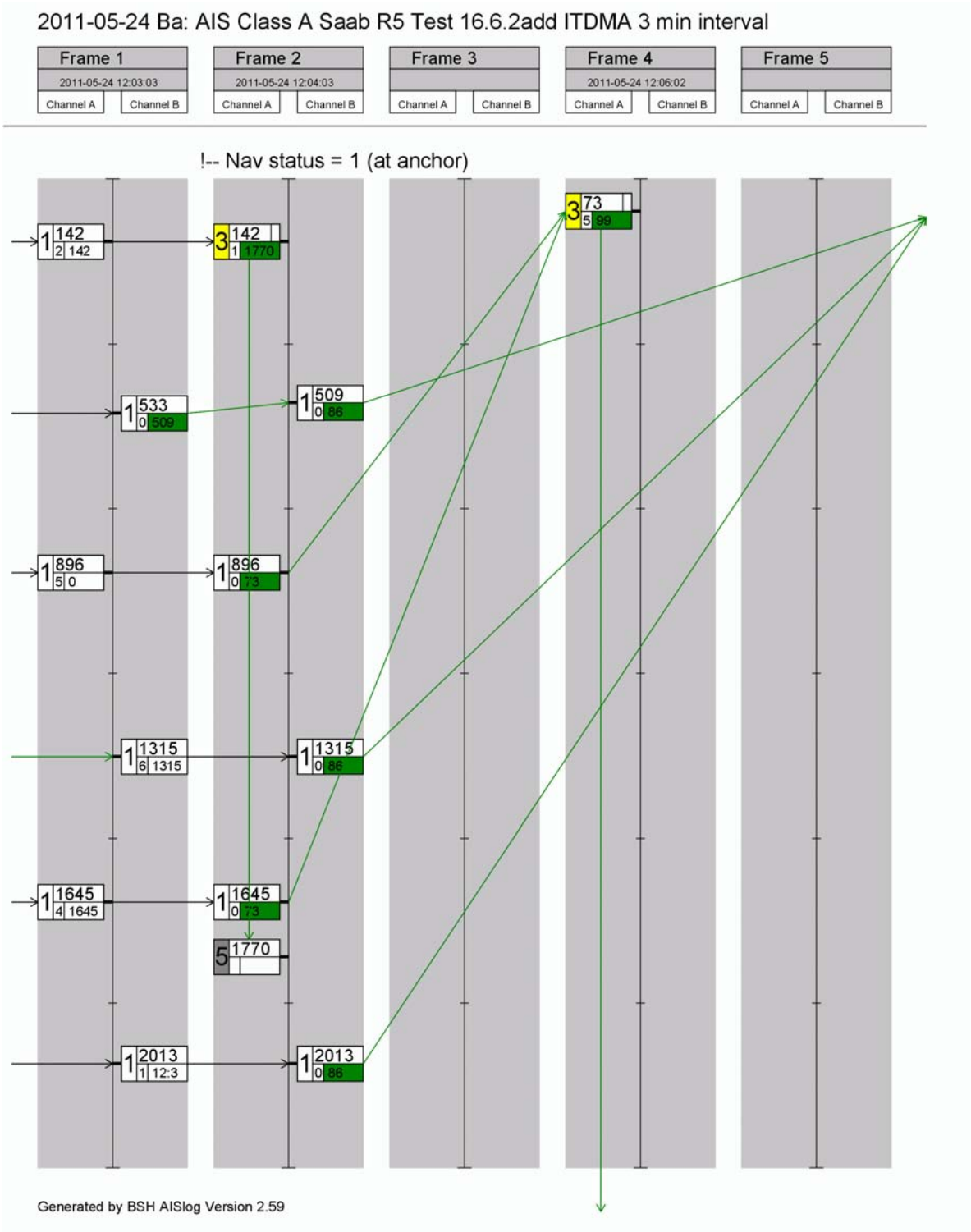
2011-06-29 Ba - Saab R5 - Test 16.6.2 Selection interval at 2 s reporting interval

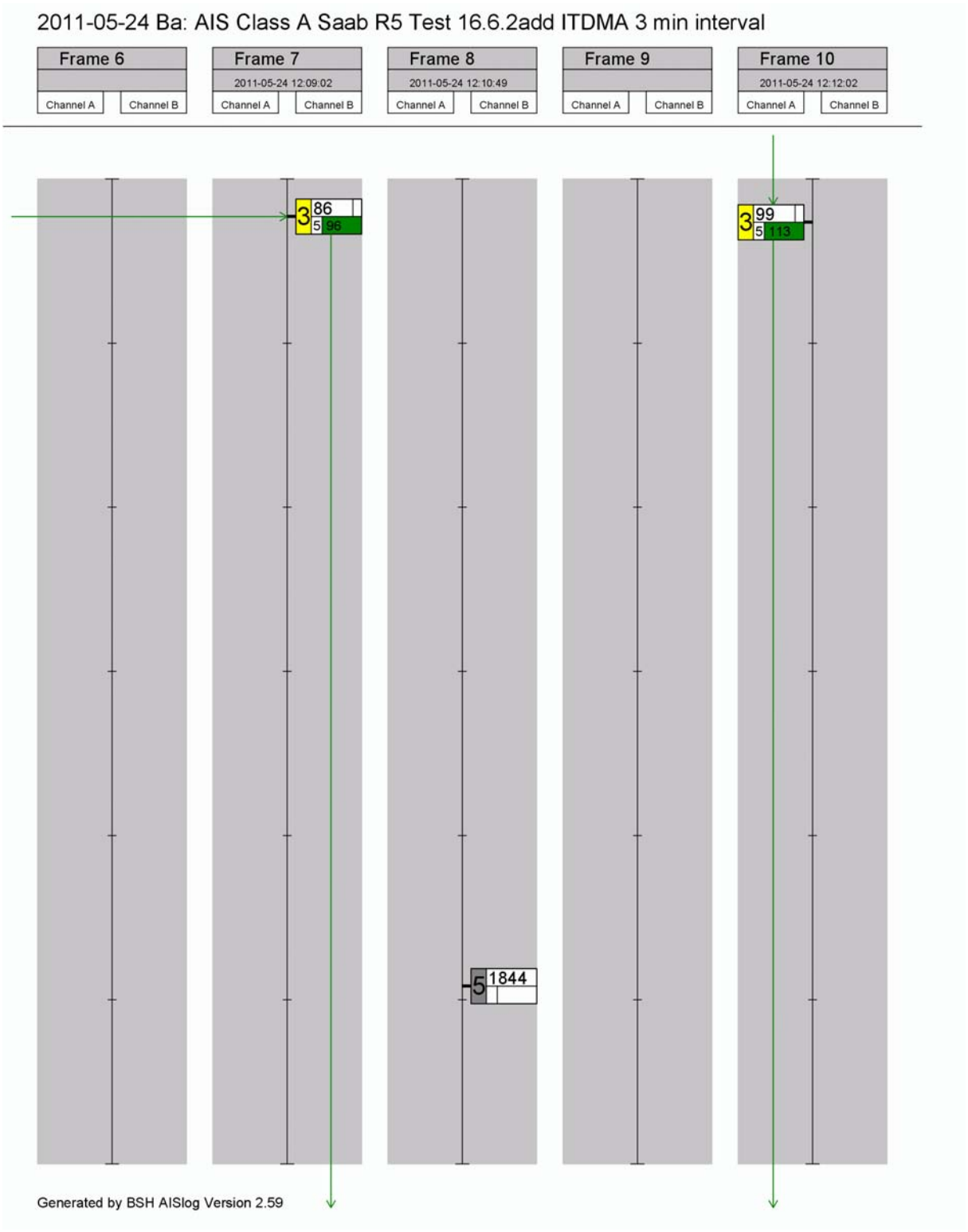


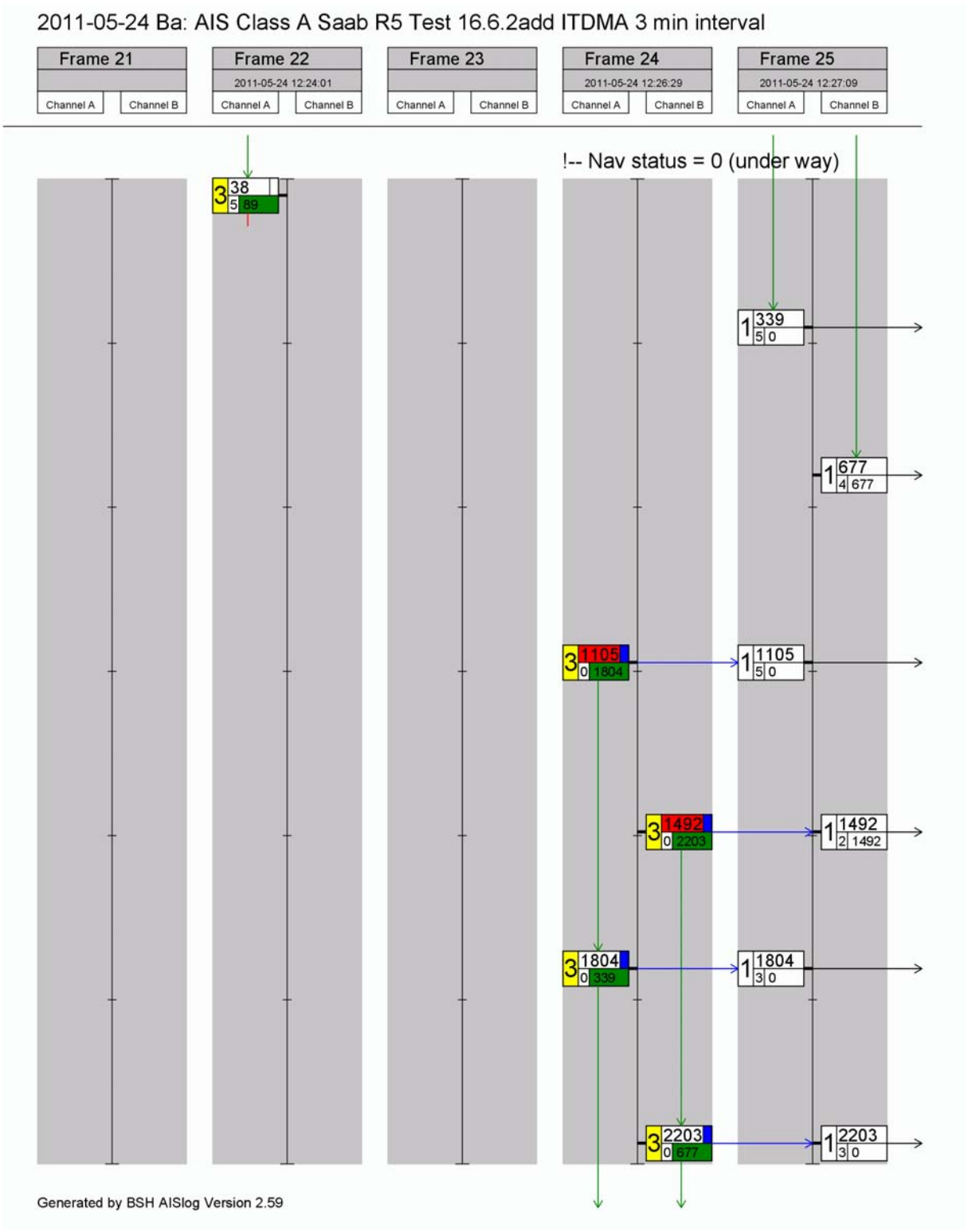
2011-06-29 Ba - Saab R5 - Test 16.6.2 Selection interval at 2 s reporting interval



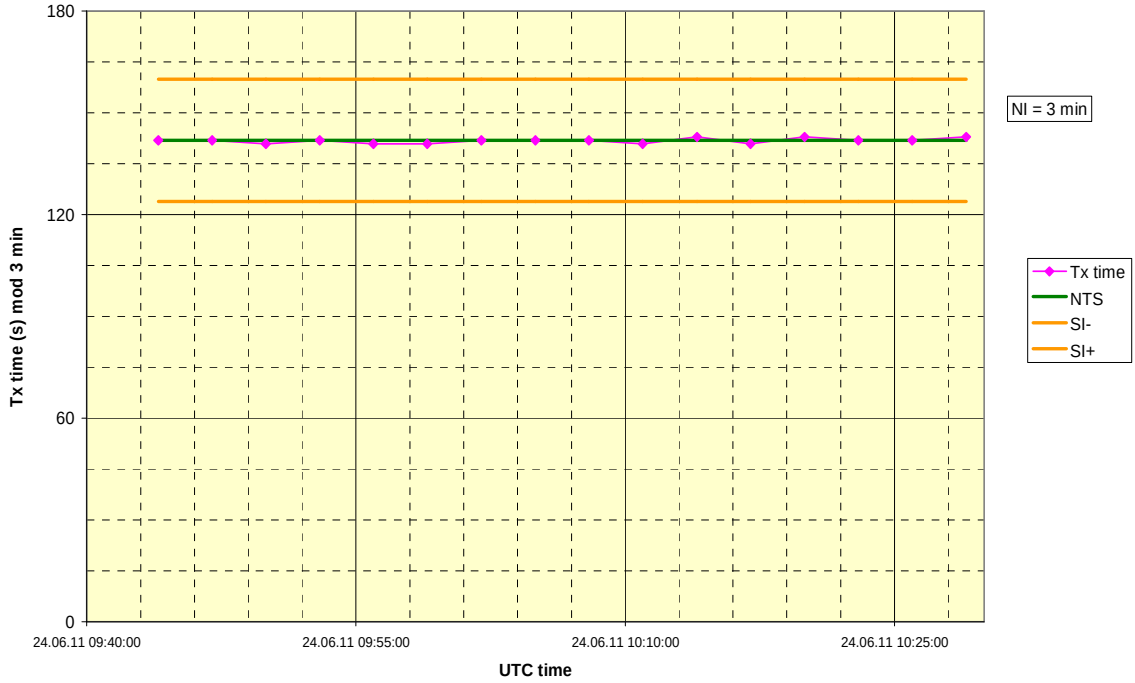
C.5 16.6.2 add Autonomous scheduled Tx (ITDMA)



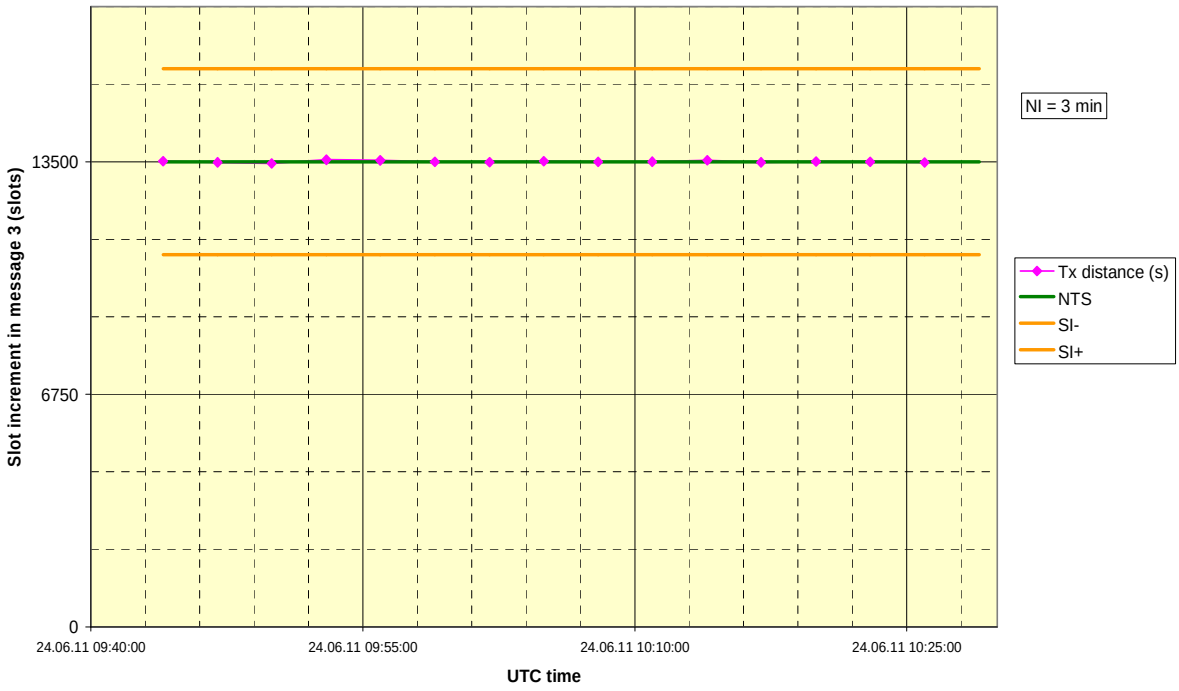

2011-05-24 Ba: AIS Class A Saab R5 Test 16.6.2add ITDMA 3 min interval
Frame 6
Frame 7
2011-05-24 12:09:02
Frame 8
2011-05-24 12:10:49
Frame 9
Frame 10
2011-05-24 12:12:02
Channel A
Channel B
3 86 5 96
3 99 5 113
5 1844
Generated by BSH AISlog Version 2.59


2011-05-24 Ba: AIS Class A Saab R5 Test 16.6.2add ITDMA 3 min interval
Frame 21
Frame 22
2011-05-24 12:24:01
Frame 23
Frame 24
2011-05-24 12:26:29
Frame 25
2011-05-24 12:27:09
Channel A
Channel B
!-- Nav status = 0 (under way)
Generated by BSH AISlog Version 2.59

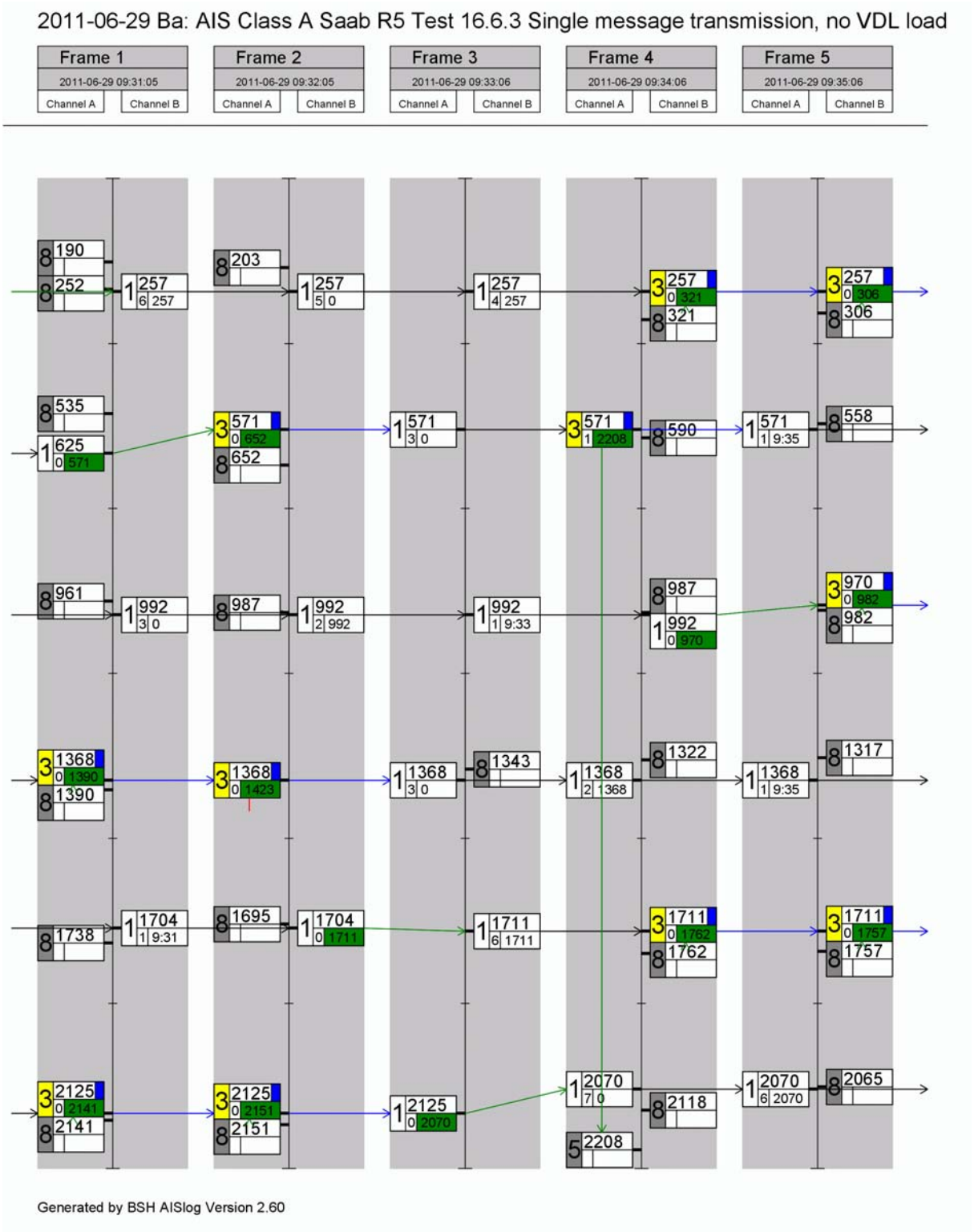
2011-06-24 - Ba - Saab R5 - Test 16.6.2add Reporting interval 3 min

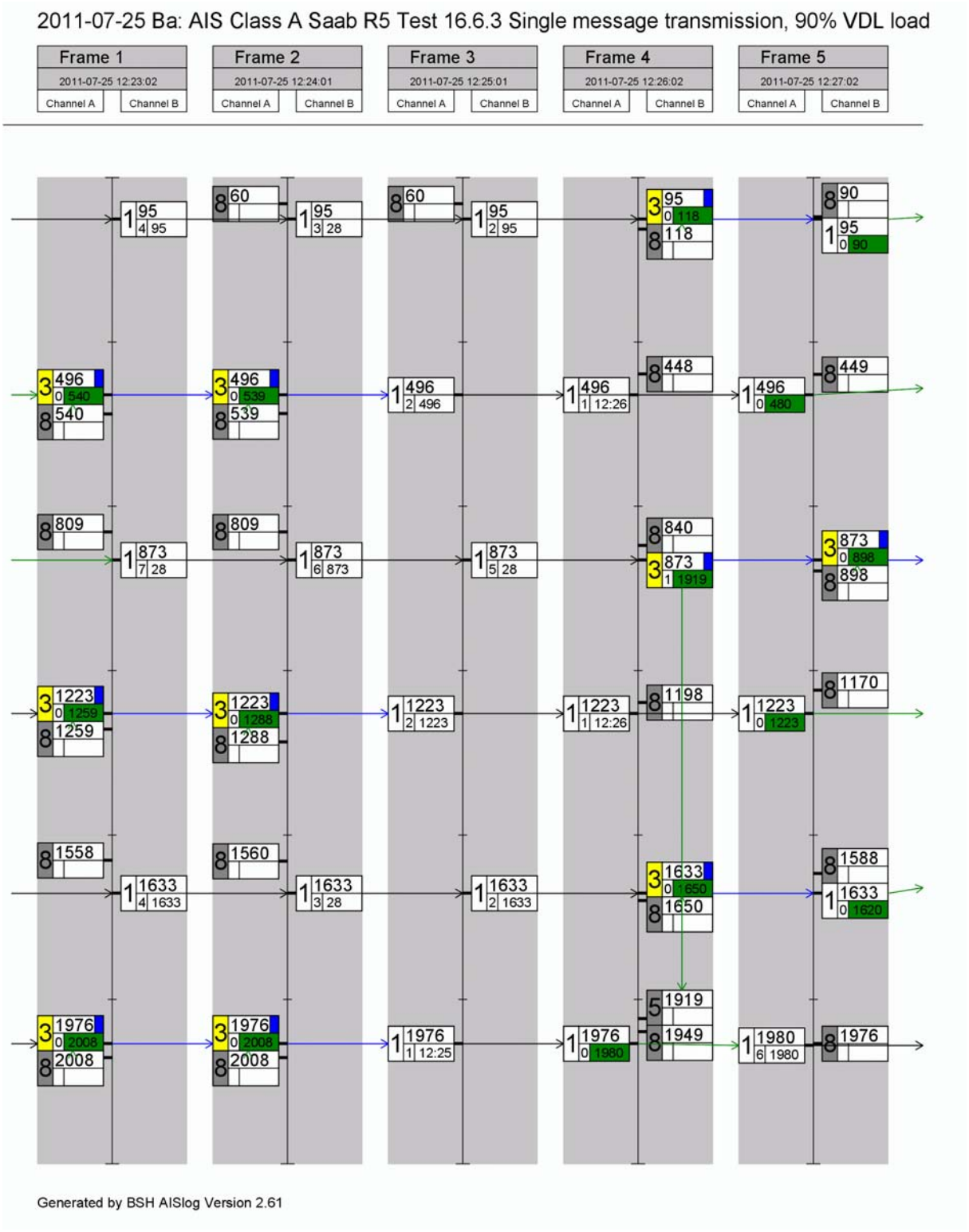


2011-06-24 - Ba - Saab R5 - Test 16.6.2add Reporting interval 3 min



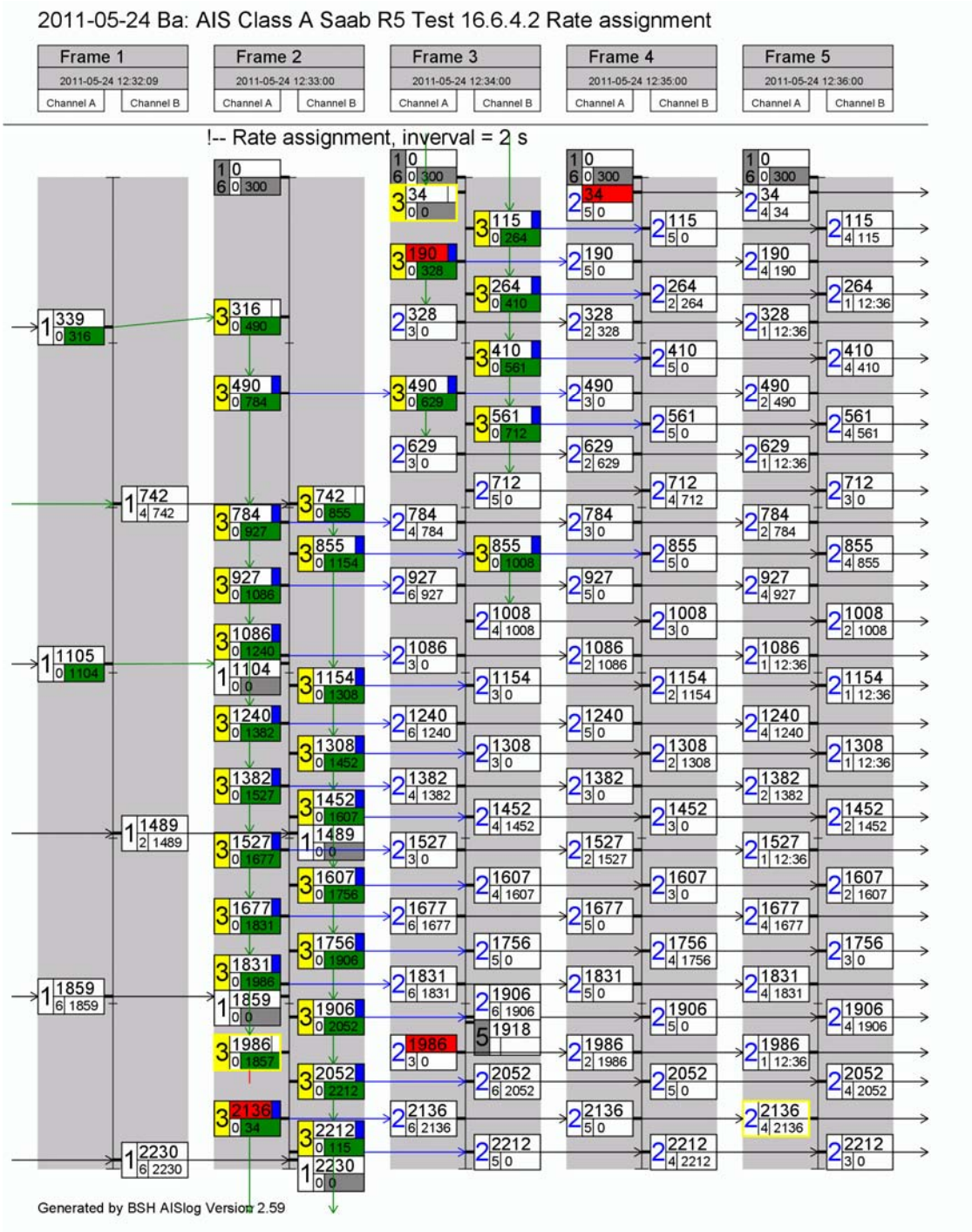
C.6 16.6.3 Single message transmissions

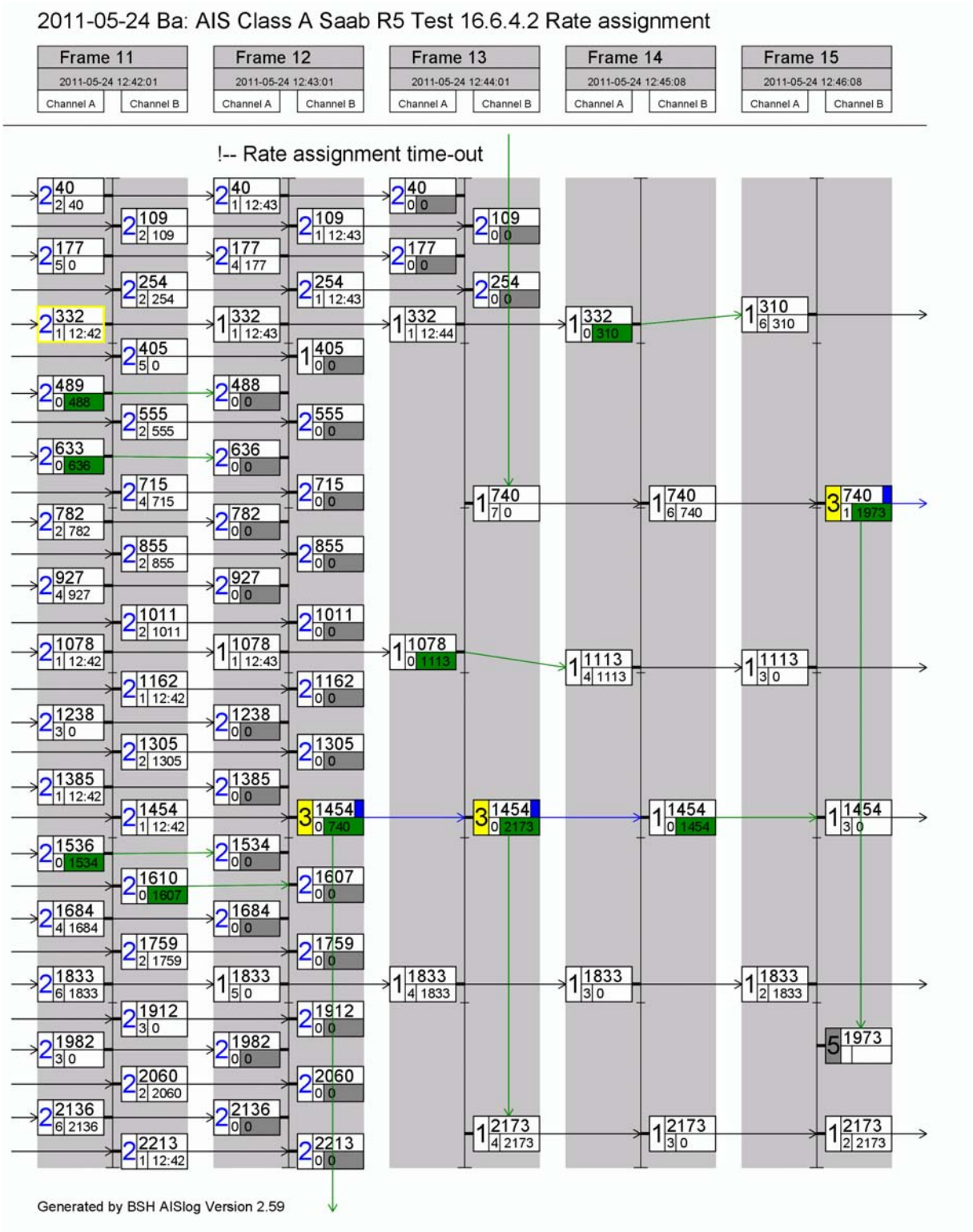



2011-07-25 Ba: AIS Class A Saab R5 Test 16.6.3 Single message transmission, 90% VDL load
Frame 1
2011-07-25 12:23:02
Channel A
Channel B
Frame 2
2011-07-25 12:24:01
Channel A
Channel B
Frame 3
2011-07-25 12:25:01
Channel A
Channel B
Frame 4
2011-07-25 12:26:02
Channel A
Channel B
Frame 5
2011-07-25 12:27:02
Channel A
Channel B
Generated by BSH AISlog Version 2.61

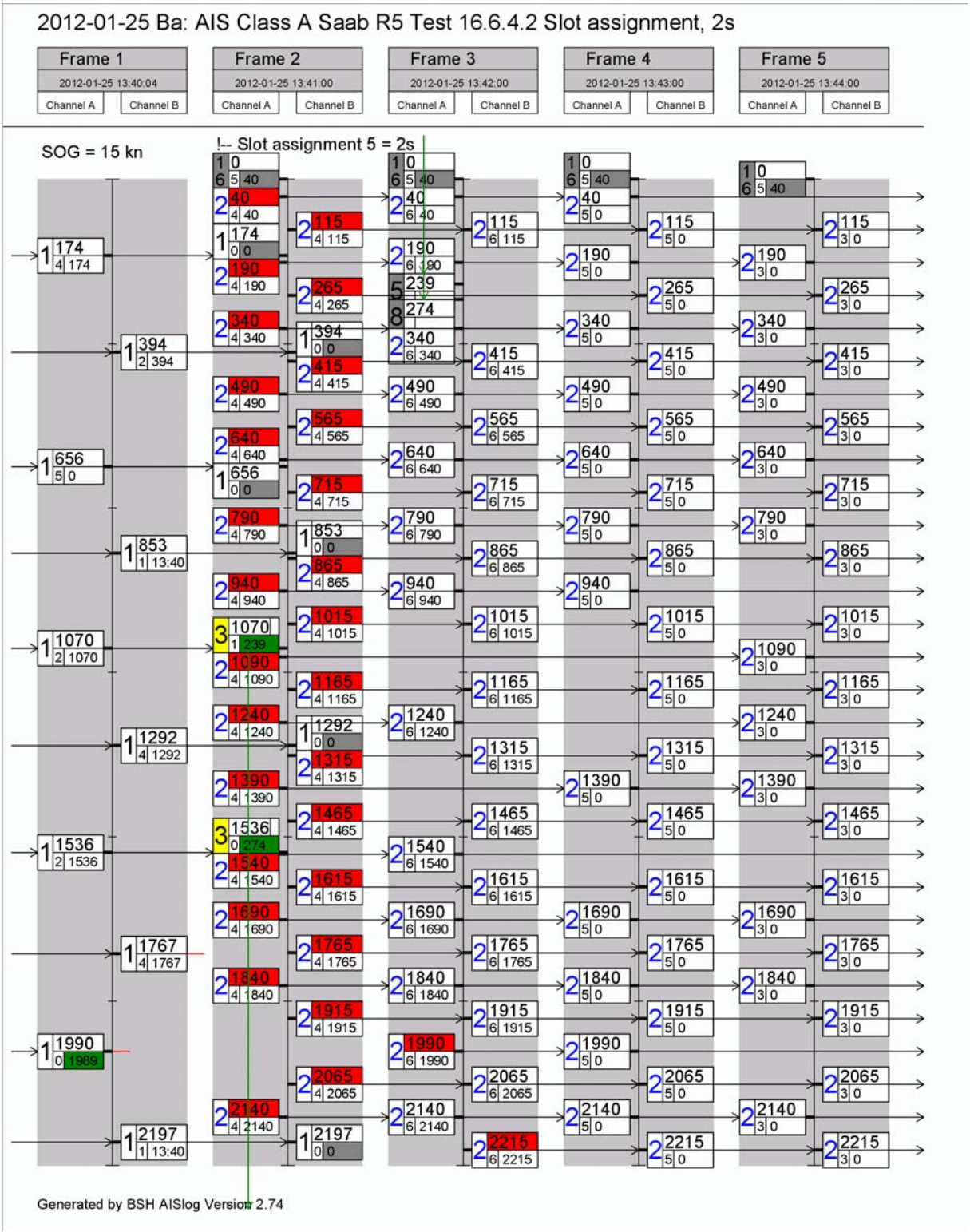
C.7 16.6.4.2 Assigned mode, Receiving test

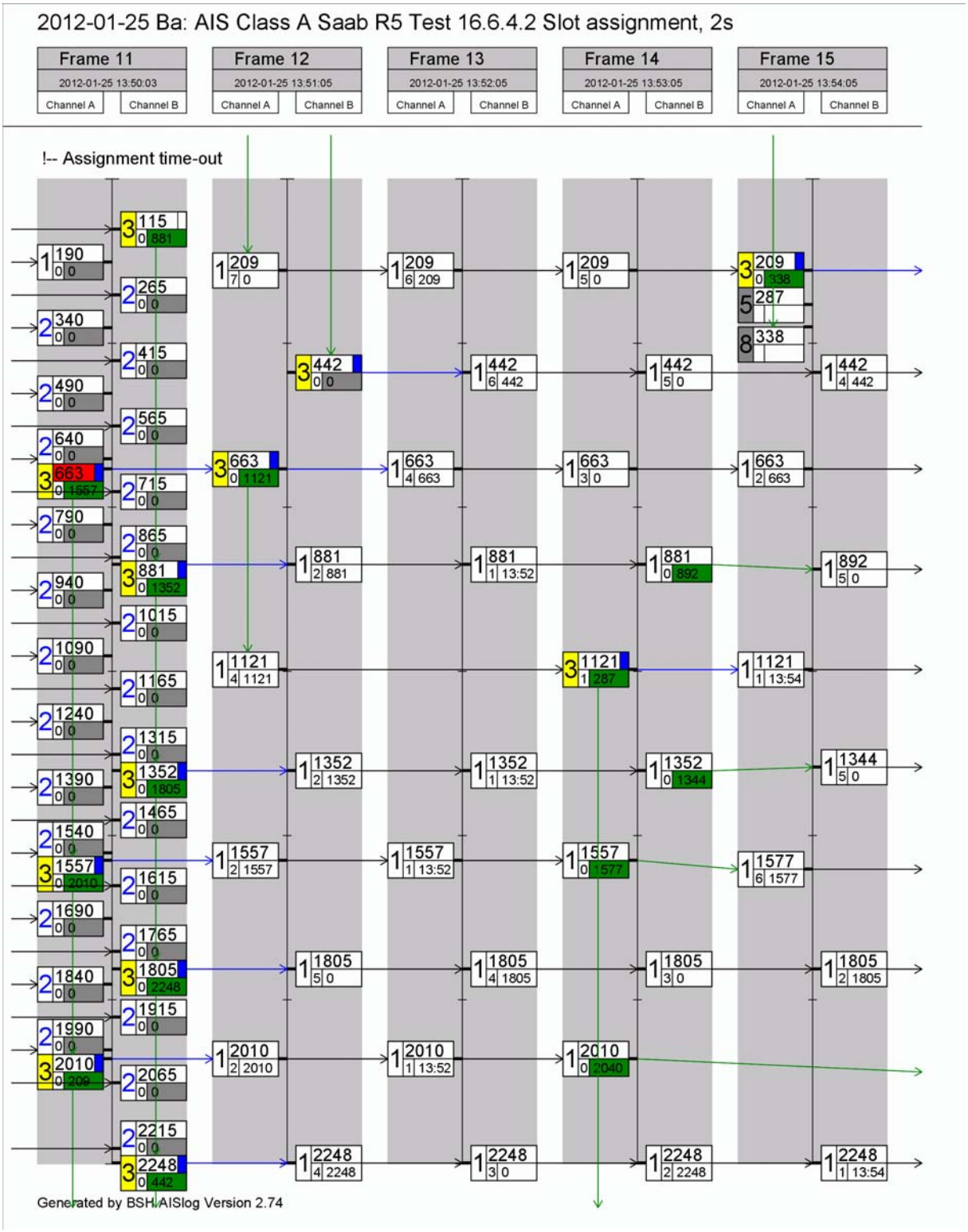
C.7.1 Rate assignment




2011-05-24 Ba: AIS Class A Saab R5 Test 16.6.4.2 Rate assignment
Frame 11
2011-05-24 12:42:01
Frame 12
2011-05-24 12:43:01
Frame 13
2011-05-24 12:44:01
Frame 14
2011-05-24 12:45:08
Frame 15
2011-05-24 12:46:08
Channel A
Channel B
!-- Rate assignment time-out
Generated by BSH AISlog Version 2.59

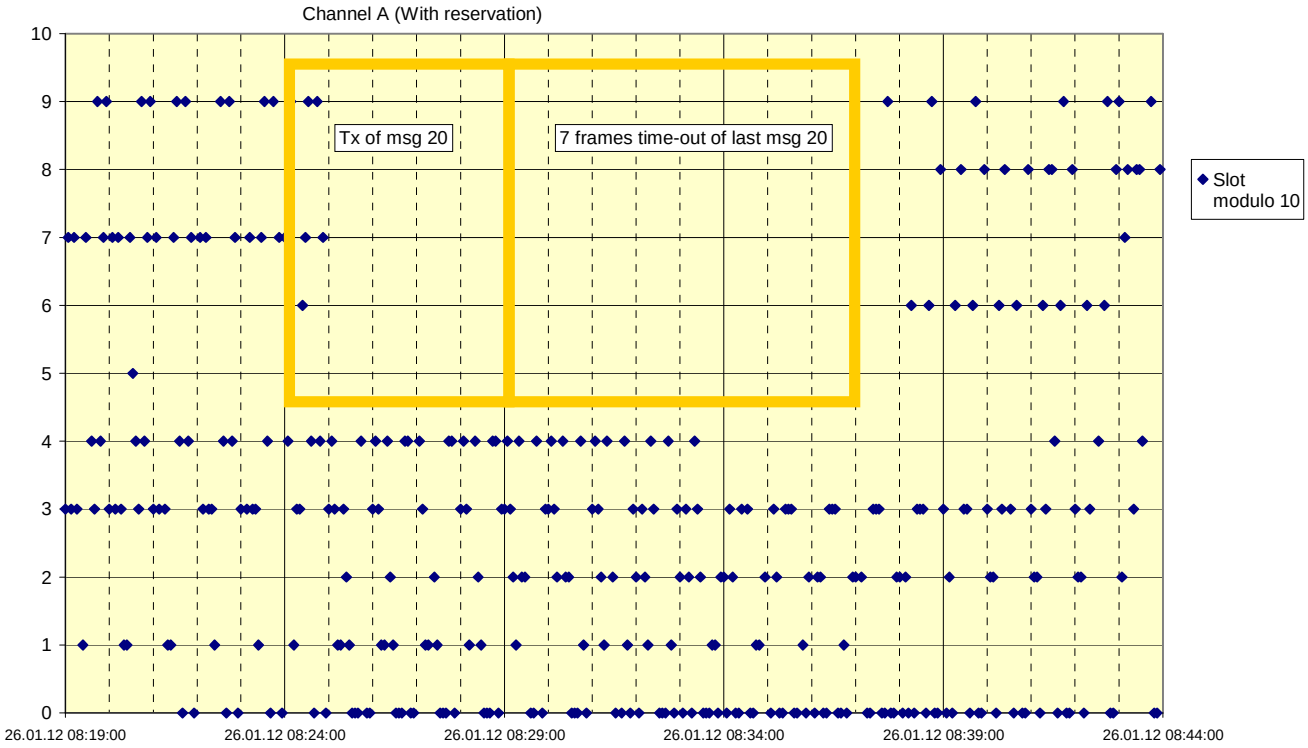
C.7.2 Slot assignment



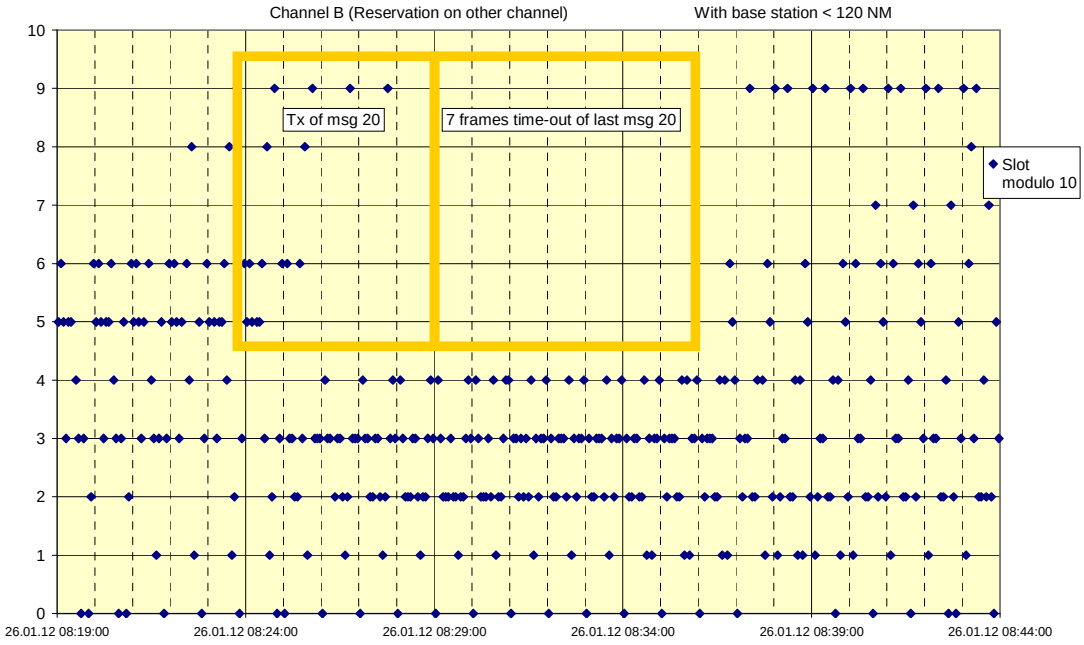

2012-01-25 Ba: AIS Class A Saab R5 Test 16.6.4.2 Slot assignment, 2s
Frame 11
2012-01-25 13:50:03
Frame 12
2012-01-25 13:51:05
Frame 13
2012-01-25 13:52:05
Frame 14
2012-01-25 13:53:05
Frame 15
2012-01-25 13:54:05
Channel A
Channel B
!-- Assignment time-out
Generated by BSH/AISlog Version 2.74

C.8 16.6.5 Fixed allocated transmissions (FATDMA)

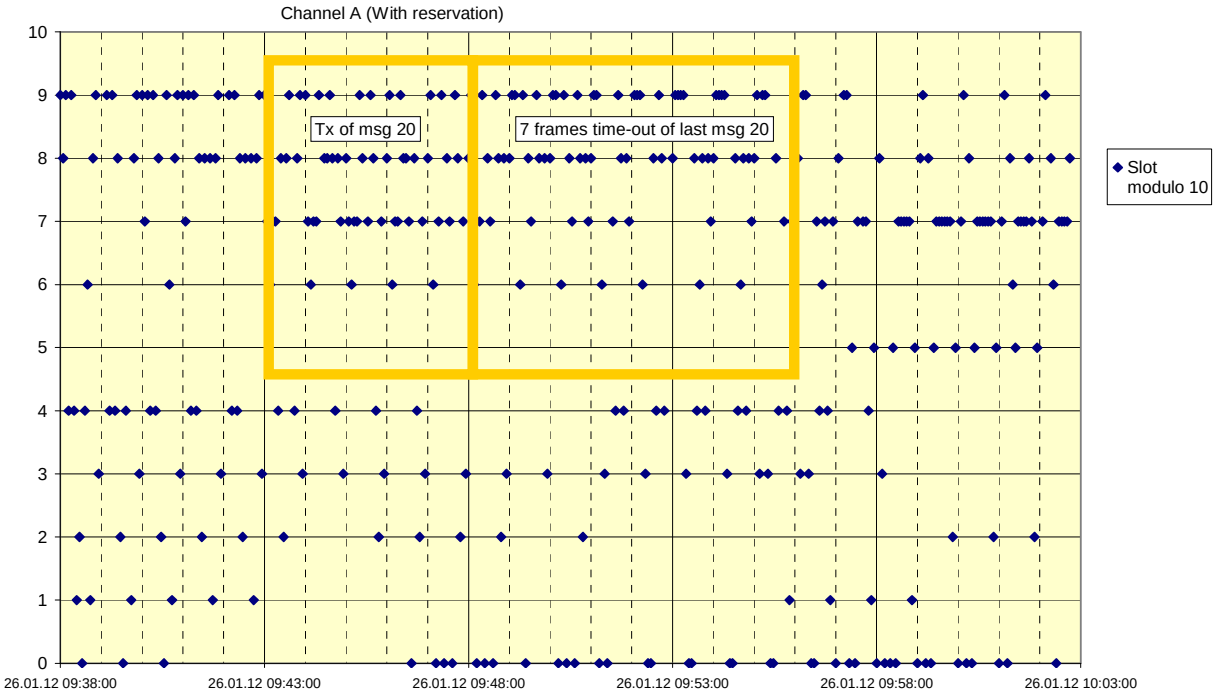
2012-01-26 Ba - Saab R5 - 16.6.5 Base station reservation, Msg 4 < 120 NM



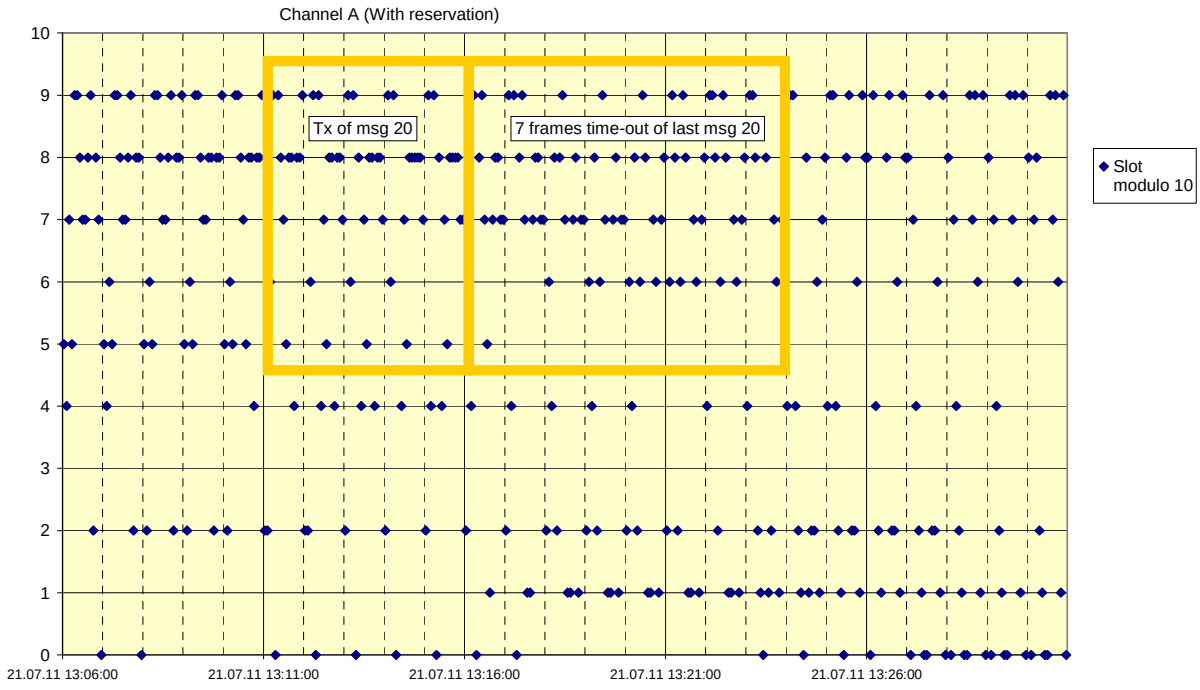
2012-01-26 Ba - Saab R5 - 16.6.5 Base station reservation, Msg 4 < 120 NM



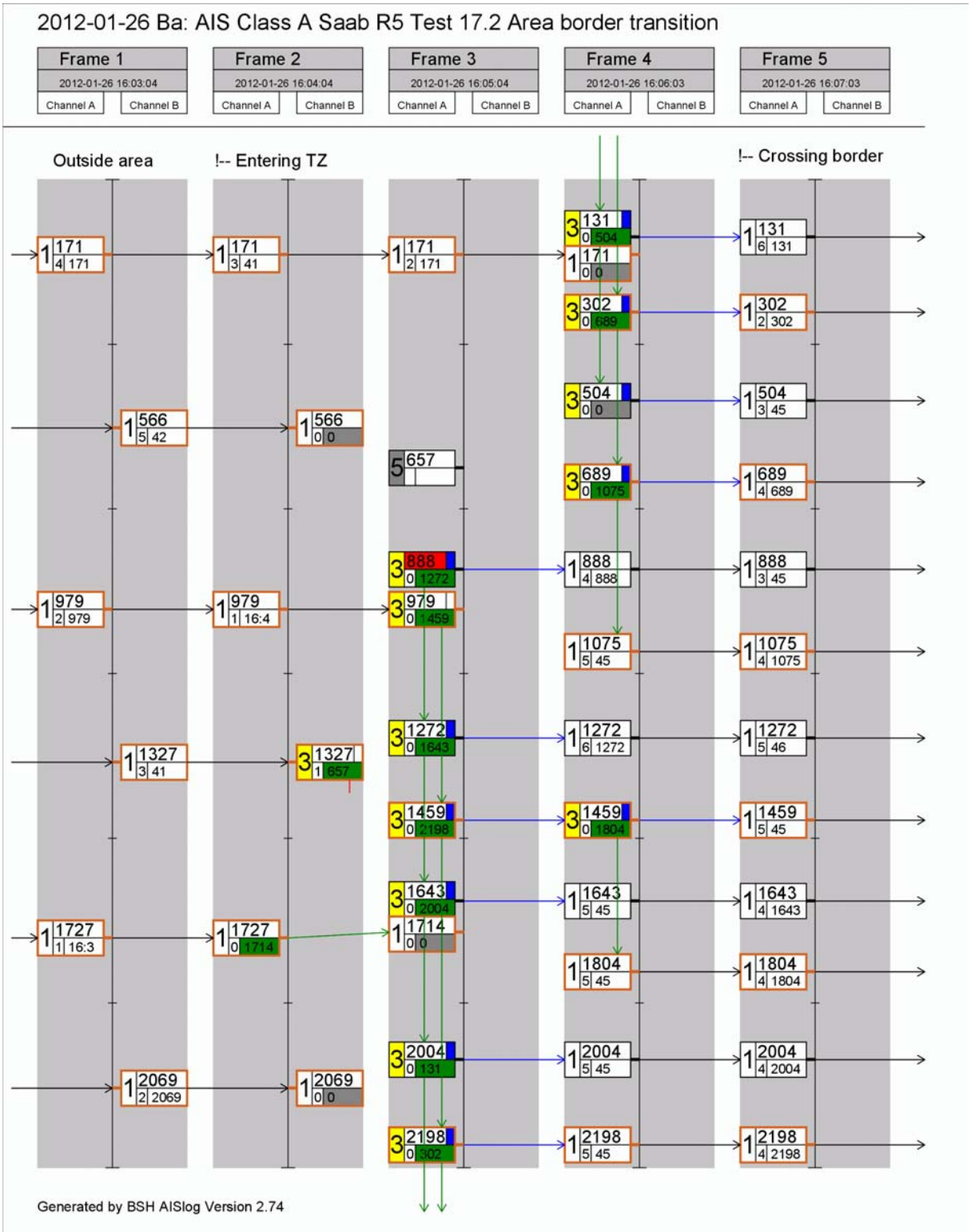
2012-01-26 Ba - Saab R5 - 16.6.5 Base station reservation, Msg 4 > 120 NM (124 NM)

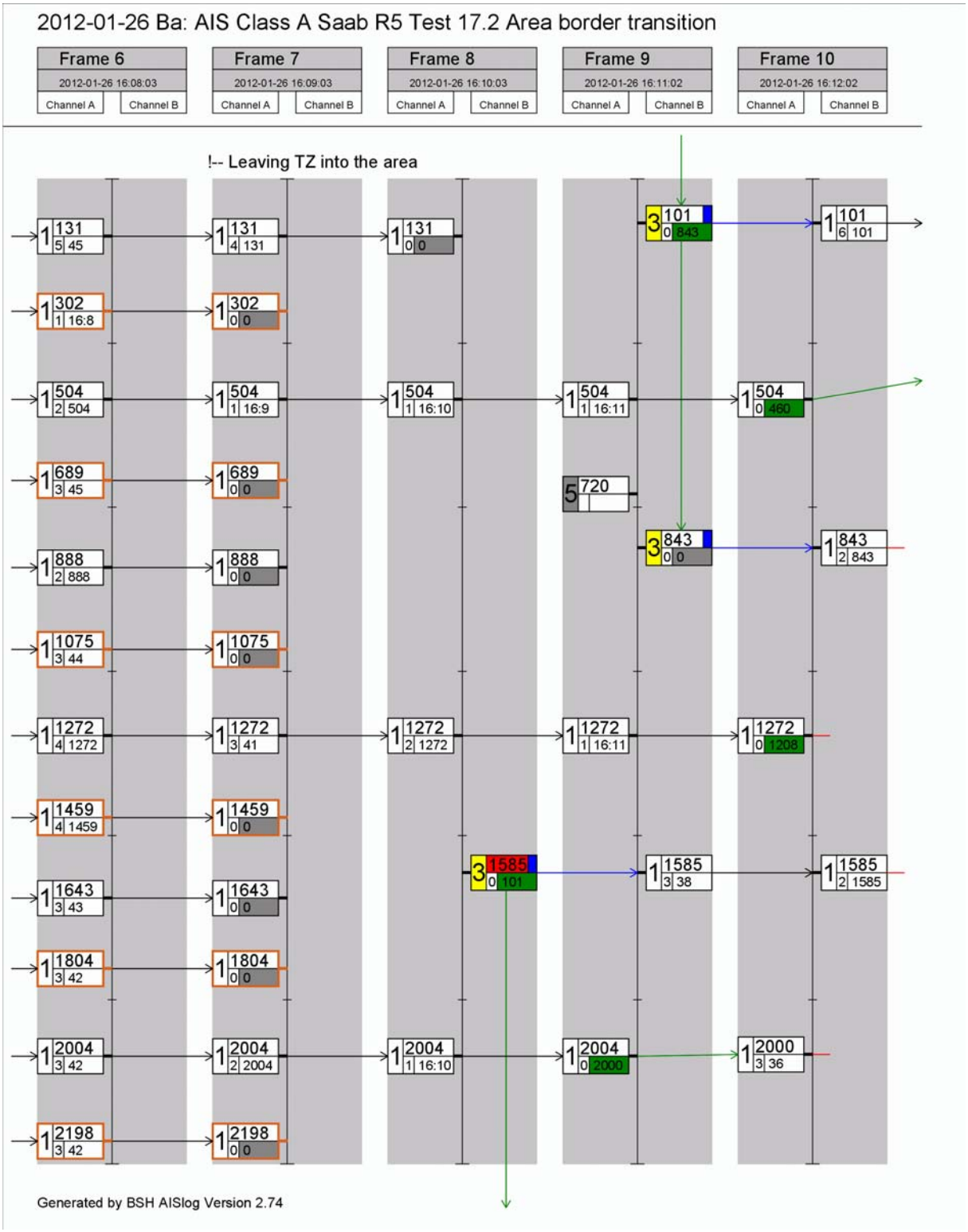


2011-07-21 Ba - Saab R5 - 16.6.5 Base station reservation, No message 4

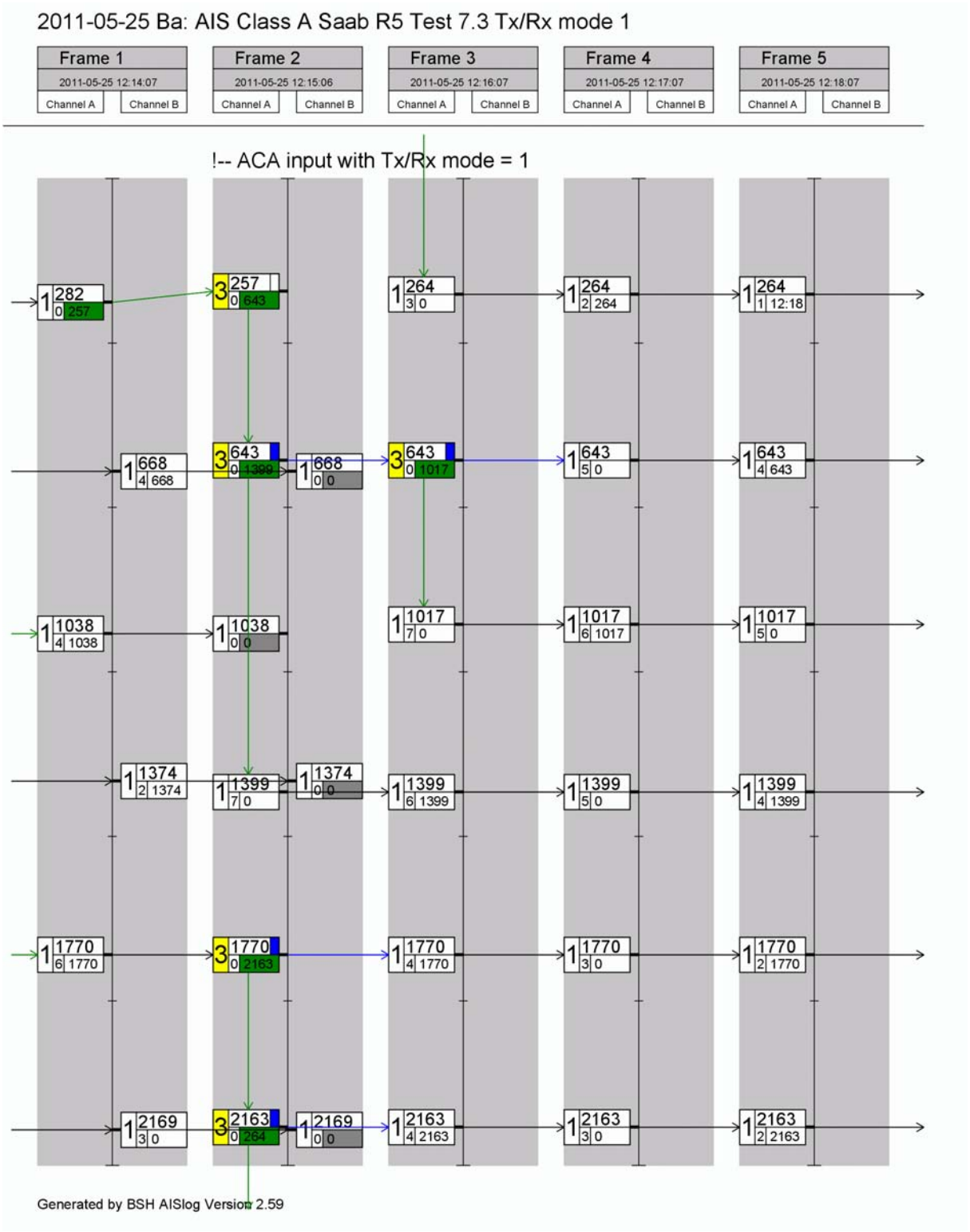


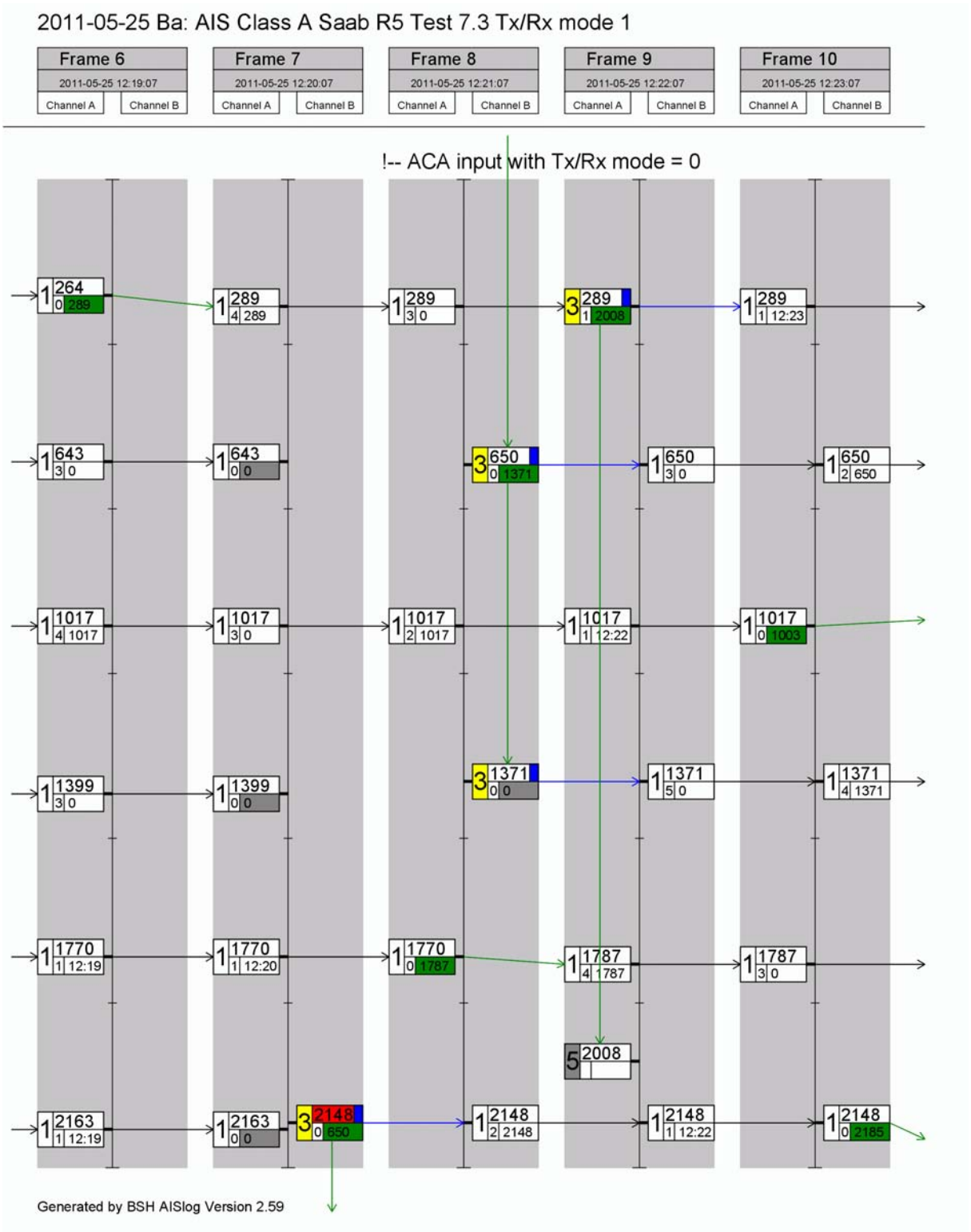
C.9 17.2 Area entry through transitional zone




2012-01-26 Ba: AIS Class A Saab R5 Test 17.2 Area border transition
Frame 6
2012-01-26 16:08:03
Frame 7
2012-01-26 16:09:03
Frame 8
2012-01-26 16:10:03
Frame 9
2012-01-26 16:11:02
Frame 10
2012-01-26 16:12:02
Channel A
Channel B
!-- Leaving TZ into the area
Generated by BSH AISlog Version 2.74

C.10 17.3 Tx/ Rx mode 1



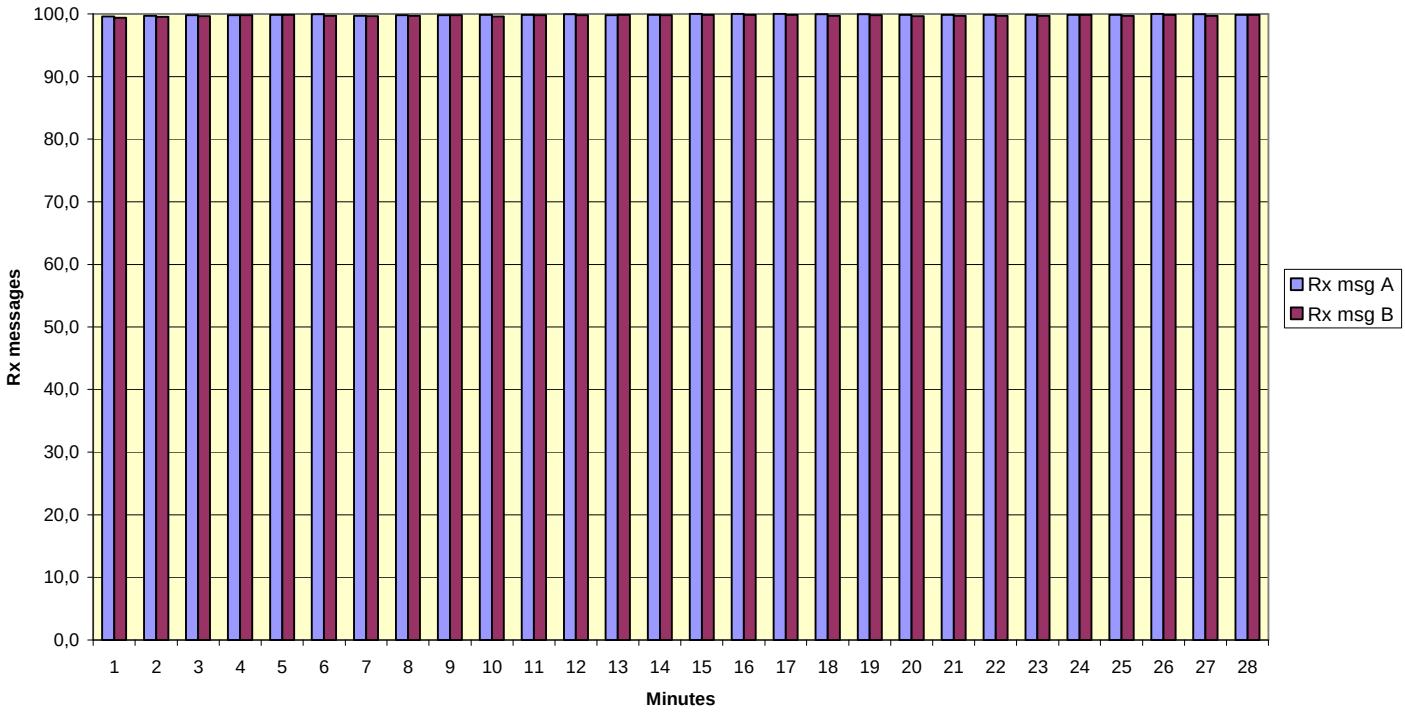

2011-05-25 Ba: AIS Class A Saab R5 Test 7.3 Tx/Rx mode 1
Frame 6
2011-05-25 12:19:07
Frame 7
2011-05-25 12:20:07
Frame 8
2011-05-25 12:21:07
Frame 9
2011-05-25 12:22:07
Frame 10
2011-05-25 12:23:07
Channel A
Channel B
!-- ACA input with Tx/Rx mode = 0
Generated by BSH AISlog Version 2.59

C.11 19.7 High speed output performance

2011-07-25 - Saab R5 - Test 19.7 Output performance, PI-Port

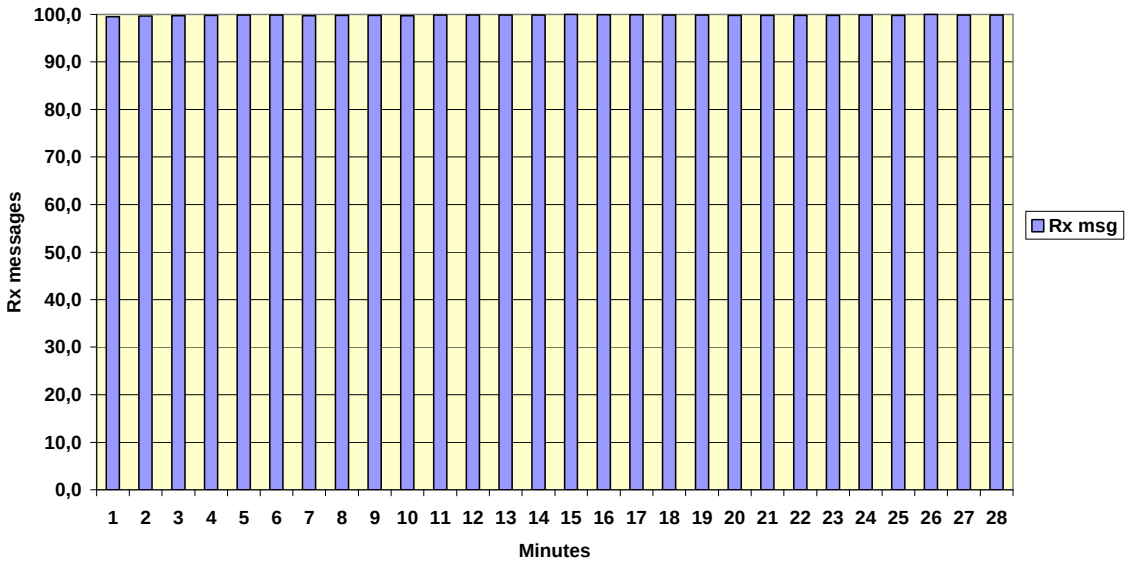
Result: Average (%): A = 99,9 B = 99,7

Ch A: 2084 Ch B: 2086



2011-07-25 - Saab R5 - Test 19.7 Output performance, PI-Port

Result: Average (%) = 99,8 **Reversed Transmitters** **Ch A: 2084 Ch B: 2086**

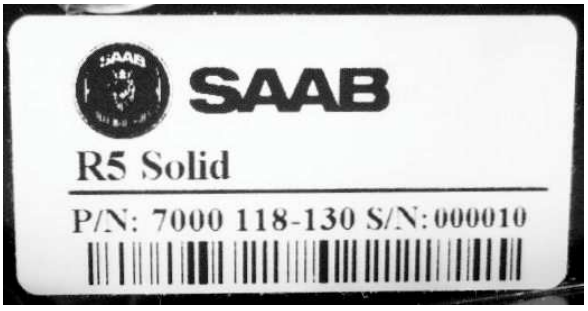


Annex D Photos of equipment under test

D.1 Transponder Unit


STATUS
RX
TX
LS
ESC
OPT
R5 SOLID


RS232
RS422
GPS
VHF
12-24 V DC
SAAB
R5 Solid


SAAB
R5 Solid
P/N: 7000 118-130 S/N: 000010

D.2 GPS antenna