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:	**Seatex**
Type:	**AIS300**
Applying test standards:	**IEC 61993-2 Ed. 2 [Sections 14, 16-21]: 2012** **IEC 61162-1 Ed. 4.0 (2010) / IEC 61162-2 (1998)**
Test Report No.:	**BSH/4543/001/4322719/15-1**
Applicant:	**Kongsberg Seatex AS** **Pirsenteret** **7462 Trondheim** **Norway**

Hamburg, 20 May 2015
For the Federal Maritime and Hydrographic Agency

Heinr. Bartels

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DAkkS
Deutsche Akkreditierungsstelle
D-PL-12084-01-01

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

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Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

Bundesamt für Seeschifffahrt und Hydrographie
Bundesoberbehörde im Geschäftsbereich
des BMVBS
Bernhard-Nocht-Straße 78
20359 Hamburg

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Schiffsausrüstung (Navigationsausrüstung, Funkausrüstung, Rettungsmittel)

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 08.03.2013 mit der Akkreditierungsnummer D-PL-12084-01 und ist gültig bis 07.03.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 9 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12084-01-01**

Frankfurt am Main, 08.03.2013

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

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1 General

1.1 Summary

Applicant:	Kongsberg Seatex AS, Pirsenteret, 7462 Trondheim, Norway
Equipment under test:	
Type:	Type
Manufacturer:	Kongsberg Seatex AS, Pirsenteret, 7462 Trondheim, Norway
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	2 April 2014
End of test:	18 May 2015

Test standards[1]:

Recommendation ITU-R M.1371-5 (2014)
Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band

IEC 61993-2 Ed. 2 (2011)
Maritime navigation and radiocommunication equipment and systems – Automatic Identification Systems (AIS) –
Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results

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

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

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

1.2 Equipment history

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

1.2.1 EUT system no 1

Transponder				
Type	AIS300		Part no.	A300-01
Delivery date	2014-04-01		Serial no.	AIS300-14002
HW Version:	Delivery date	2014-04-01	Version no.	
	Installation date	2014-04-01		
SW Version:	Delivery date	2014-04-01	Version no.	1.00.01.b10
	Installation date	2014-04-01		
SW Version:	Delivery date	2014-07-07	Version no.	1.00.01.b18
	Installation date	2014-07-07		
SW Version:	Delivery date		Version no.	
	Installation date			

MKD				
Type	Currently no MKD available		Part no.	
Delivery date			Serial no.	
HW Version:	Delivery date		Version no.	
	Installation date			
SW Version:	Delivery date		Version no.	
	Installation date			
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna 2			
Type	Procom GSP-4	Part No.:	-----
Delivery date	06.11.2003	Serial number	031004042

1.2.2 EUT system no 2

Transponder				
Type	AIS300		Part no.	A300-01
Delivery date	2014-04-29		Serial no.	AIS300-141001
HW Version:	Delivery date	2014-04-29	Version no.	
	Installation date	2014-04-29		
SW Version:	Delivery date	2014-04-29	Version no.	1.00.01.b11
	Installation date	2014-04-29		
SW Version:	Delivery date	2014-05-09	Version no.	1.00.01.b12
	Installation date	2014-05-09		
SW Version:	Delivery date	2014-08-15	Version no.	1.00.01.b19
	Installation date	2014-08-18		
SW Version:	Delivery date	2014-09-15	Version no.	1.00.01.b23
	Installation date	2014-09-15		
SW Version:	Delivery date	2014-10-08	Version no.	1.00.01.b24
	Installation date	2014-10-08		
SW Version:	Delivery date	2014-10-24	Version no.	1.00.01.b25
	Installation date	2014-10-24		
SW Version:	Delivery date	2014-10-27	Version no.	1.00.01.b26
	Installation date	2014-10-27		
SW Version:	Delivery date	2014-11-04	Version no.	1.00.01.b27
	Installation date	2014-11-04		
SW Version:	Delivery date	2014-11-05	Version no.	1.00.01.b28
	Installation date	2014-11-05		
SW Version:	Delivery date	2014-11-11	Version no.	1.00.01.b29
	Installation date	2014-11-14		
SW Version:	Delivery date	2014-11-24	Version no.	1.00.01.b30
	Installation date	2014-11-24		
SW Version:	Delivery date	2015-01-26	Version no.	1.00.01.b34
	Installation date	2015-01-26		
SW Version:	Delivery date	2015-02-09	Version no.	1.00.01.b35
	Installation date	2015-02-09		
SW Version:	Delivery date	2015-02-11	Version no.	1.00.01.b36
	Installation date	2015-02-11		
SW Version:	Delivery date	2015-02-23	Version no.	1.00.01.b38
	Installation date	2015-02-23		
SW Version:	Delivery date	2015-02-27	Version no.	1.00.01.b39
	Installation date	2015-03-04		
SW Version:	Delivery date	2015-03-09	Version no.	1.00.01.b43
	Installation date	2015-03-09		

SW Version:	Delivery date	2015-03-23	Version no.	1.00.01.b44
	Installation date	2015-03-24		
SW Version:	Delivery date	2015-03-25	Version no.	1.00.01.b45
	Installation date	2015-03-25		
SW Version:	Delivery date	2015-03-26	Version no.	1.00.01.b46
	Installation date	2015-03-26		
SW Version:	Delivery date	2015-03-27	Version no.	1.00.01.b47
	Installation date	2015-03-27		
SW Version:	Delivery date	2015-04-30	Version no.	1.00.01.b48
	Installation date	2015-05-04		
SW Version:	Delivery date	2015-05-12	Version no.	1.00.01.b50
	Installation date	2015-05-12		
SW Version:	Delivery date		Version no.	
	Installation date			

MKD				
Type	Data response		Part no.	---
Delivery date	2014-10-09		Serial no.	PW1450018957
HW Version:	Delivery date	2014-10-09	Version no.	Rev 1.1
	Installation date	2014-10-09		
SW Version:	Delivery date	2014-10-09	Version no.	1.00.00
	Installation date	2014-10-09		
SW Version:	Delivery date	2014-10-29	Version no.	1.00.01
	Installation date	2014-10-30		
SW Version:	Delivery date	2014-11-11	Version no.	1.00.02
	Installation date	2014-11-14		
SW Version:	Delivery date	2015-01-19	Version no.	1.00.01 (MKD display)
	Installation date	2015-01-19		
SW Version:	Delivery date	2015-02-09	Version no.	1.00.01b5
	Installation date	2015-02-09		
SW Version:	Delivery date	2015-02-23	Version no.	1.00.00b6
	Installation date	2015-02-23		
SW Version:	Delivery date	2015-03-02	Version no.	1.00.00b7
	Installation date	2015-03-04		
SW Version:	Delivery date	2015-03-09	Version no.	1.00.00b8
	Installation date	2015-03-09		
SW Version:	Delivery date	2015-03-27	Version no.	1.00.00b9
	Installation date	2015-03-27		
SW Version:	Delivery date	2015-04-01	Version no.	1.00.00b10
	Installation date	2015-04-02		
SW Version:	Delivery date		Version no.	
	Installation date			

GPS antenna 2			
Type	Procom GSP-4	Part No.:	-----
Delivery date	06.11.2003	Serial number	031004042

1.3 Test environment

Here it is intended to record for which time which EUT system is under test.
The test environment is completely equipped as described in Annex A.

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	2014-04-02	2014-04-10	Bartels
2	2014-04-29	2014-05-19	Bartels
2	2014-05-22	2014-05-27	Bartels
2	2014-07-07	2014-07-11	Bartels
2	2014-08-18	2014-08-20	Bartels
2	2014-09-16	2014-09-19	Bartels
2	2014-09-22	2014-09-22	Bartels
2	2014-10-08	2014-10-13	Bartels
2	2014-10-13	2014-10-16	Bartels
2	2014-10-28	2014-10-30	Bartels
2	2014-11-10	2014-11-14	Bartels, mainly K-Bridge test
---	2014-11-19	2014-11-19	Bartels, editorial correction
2	2014-11-25	2014-12-02	Bartels
2	2015-01-08	2015-01-16	Bartels
2	2015-01-26	2015-01-29	Bartels
2	2015-02-09	2015-02-13	Bartels
2	2015-02-23	2015-02-26	Bartels
2	2015-03-04	2015-03-04	Bartels
2	2015-03-24	2015-03-30	Bartels
2	2015-04-22	2015-04-27	Bartels
2	2015-05-04	2015-05-05	Bartels
2	2015-05-07	2015-05-07	Bartels
2	2015-05-12	2015-05-12	Bartels
Manual	2015-05-18	2015-05-20	Bartels

Date of test report template: 2014-04-03

1.4 Composition

Minimum Keyboard and Display (MKD)

☐ Internal ☒ Remote ☐ External

Internal GNSS

☐ Sync only ☒ Backup pos. sensor

1.5 Legend

Result marking (in the “result” column)2:

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

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

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

Template for additional test notes (copy if required):

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

[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

1.6 General observations

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

	General problems		
Date	**Item**	**Remark**	**Result**
2014-04-09	Slot drift	Since 2014-04-08 there is a slot drift to later slots of about 60 slots/ 40 min = 1.5 slot / min. Not only the Tx slot changes but also the slot number in the comm state. The sync timing (in slot timing) is fully correct during this problem. I checked also the free running clock (sync mode 3). The clock drift is –0.33 ppm. This is a very good value and seems not to be the reason of this problem. It is also in the other direction than the slot drift. This problem was not observed before 2014-04-09. Retest 2014-05-19 Ba: With the exchanged unit (EUT 2) the problem did not occure. Retest 2014-11-26 Ba: The problem happens again, with EUT2. After a first restart the problem continued, after a second restart some time later it was ok. See diagrams Remark 2015-01-29 Ba: The problem has not occurred again. Will be observed for the remaining test phases. Remark 2015-05-05 Ba: The problem has not been observed again. It is assumed that it is fixed.	Passed
2014-09-22	Timing offset at power on	When the unit was off for some time (e.g. over night) there is a timing offset of 1 s (38 slots and 1/2 slot) for about 10 minutes. It seems the leap second information is not stored and applied for the first 10 minutes Retest 2014-10-30 Ba: This offset was not observed during the current test phase. Will be further observed during the next test phase.	Passed

2014-10-16	MKD stop at VDL load	With the targelt list shown the MKD is blocked after a few seconds of 90% VDL load (45 targets) on both channels. A restart is required to make it working again. Retest 2014-10-30 Ba: The MKD continues work with 100% VDL load on one channel or with 90% VDL load on both channels.	Passed
2014-10-16	UTC time	It seems that the MKD does not have the correct UTC time. If something is recorded with UTC time there is in most cases an offset to the correct UTC of a few seconds Retest 2014-11-26 Ba: The problem still exists: A msg 14 transmitted at UTC 10:06:17 was recorded on the MKD with receiving time 10:09:58 The transponder has the correct time (e.g. UTC in message 1 at time-out 1), so it is an MKD problem Retest 2015-01-27 Ba: The MKD has the correct UTC	Passed
2014-10-16	Display standard	I have not yet performed a test according to the display standard IEC 62288, but on the fly I have seen some items which do not fulfill the requirements of the display standard. e.g.: in many cases the units of values are missing, some screens do not have an headline showing the function of this screen, there is not button to go back to the home screen ... Please check also the MKD against the display standard for the next software version. Retest 2014-12-02 Ba: Units have been added, further details will be checked in the display standard test	Passed

2014-10-16	EPFS lost alarm	At UTC 09:03 the ALR 025 EPFS lost was activated, perhaps by a short stop of external data. This alarm was not inactivated again, but the external position was used all the time. This is also indicated by the active position mismatch alarm which is activated only if there is an external position available. After a restart, with the same external data, the alarm was not active. <u>Retest 2014-10-28 Ba:</u> UTC 08:33 Same problem The alarm could be inactivated by removing the external data for some time and applying it again (UTC 09:33) <u>Retest 2014-11-25 Ba:</u> The problem happened again, UTC 08:28:15 <u>Remark 2015-01-29 Ba:</u> The problem has not occurred again. Will be observed for the remaining test phases. <u>Remark 2015-05-05 Ba:</u> The problem has not been observed again. It is assumed that it is fixed.	Passed
2014-10-29	Tx of message 10	When the EUT is in sync mode 3 and there is another station with sync mode 3 the EUT transmits message 10 once per minute addressed to the other station. The reason may by that the EUT tries to get the UTC time from the other station. This is not appropriate because: - The EUT has a valid UTC time because the GPS was valid until a few minutes before the test - The other station with sync mode 3 normally has not a valid UTC time. - It unnecessarily increases the VDL load - This behaviour is not defined in the standard <u>Retest 2014-11-27 Ba:</u> There is no message 10 in sync mode 3	Passed

2014-10-29	Undefined state	After test 17.3 in the SW quadrant the position was changed to the BSH position. The SW area settings have been automatically deleted. After applying the normal test area setting the ACA output indicated the area setting as "in-use" but the area channels were not used. The transmissions of the EUT could not be received and the EUT did not receive any transmissions on the test channels, and also not on AIS1 and AIS2. Additionally a speed of 25 kn was applied and used by the EUT in message 1, but the reporting rate remained on 10s. After a restart of the EUT everything was ok again. Remark 2015-01-29 Ba: The problem has not occurred again. Will be observed for the remaining test phases. Remark 2015-05-05 Ba: The problem has not been observed again. It is assumed that it is fixed.	Passed
2014-10-30	Change of area setting	An area which was changed by an MMSI addressed message 22 could not be changed by ACA more than 10 hours after message 22 was applied. After more than 2 hours the area should no longer protected from change by ACA Retest 2015-02-13 Ba: ACA sentences are accepted 2 hours after message 22.	Passed
2014-11-13	MMSI lost	At least two times during the K-Bridge test the AIS300 has reset the MMSI to 0 at the start in the morning. It may depend on the order if the AIS300 or the K-Bridge was started first Retest 2014-11-27 Ba: UTC 13:04 The MMSI was deleted at manual restart (power cycle). The K-Bridge was not connected, only the MKD Remark 2015-01-29 Ba: The problem has not occurred again. Will be observed for the remaining test phases. Remark 2015-05-05 Ba: The problem has not been observed again. It is assumed that it is fixed.	Passed

2014-11-13	MMSI discrepancy	There seems to be a discrepancy in the usage of the MMSI. In the EPV world the MMSI was 000000057 but in message 1 and also on the web interface the correct MMSI 211000001 was used. So all SPW protected configuration from the K-Bridge failed because the K-Bridge used 211000001 and the AIS300 expected 57 as MMSI. A restart did not change this. Only applying again the MMSI 211000001 using EPV (with 57 in the SPW sentence) solved this problem. The consistancy of the complete configuration should be carefully checked. Update 2014-11-14: This morning the EPV MMSI is 549 and IMO number = 0: After applying the MMSI 211000001 to the unit using the MMSI 549 there was no error message but EPV MMSI was not changed. After restart the MMSI of the unit was 0 (Msg 1). Long range request is also not responded. <u>Retest 2014-11-26 Ba:</u> The problem still exists. At UTC10:15 the EPV outputs the correct MMSI (211000001). At UTC 10:24 the EPV outputs the arbitrary MMSI 000000974. An SPW with MMSI 211000001 was not accepted (Data field problem) At UTC 10:33 again the correct MMSI was output. The unit was not restarted in between, and there was no configuration change. The only change was a change from external to internal source (and back). At UTC 10:33, after applying an SSD sentence, the correct MMSI was output again. In this state no configuration works, mainly not from MKD. <u>Remark 2015-01-29 Ba:</u> The problem has not occurred again. Will be observed for the remaining test phases. <u>Remark 2015-05-05 Ba:</u> The problem has not been observed again. It is assumed that it is fixed.	Passed

2014-11-13	TXT output on query	When the is using internal GPS with beacon input the AIS300 outputs on query TXT 024 (Msg 17) instead of TXT 023 (beacon). When switching to internal GPS using beacon the correct TXT 023 is output. This results in a confusing and incorrect status display on the K-Bridge. <u>Retest 2014-11-26 Ba:</u> UTC 10:19 The problem still exists <u>Retest 2015-01-27 Ba:</u> The EUT outputs TXT 23 on query	Passed
2014-11-13	Differention mode	At the transition from external position to internal differential position (beacon or Msg 17) the AIS300 uses for about 30 s the default position. <u>Retest 2014-11-26 Ba:</u> UTC 10:18 The problem still exists <u>Retest 2015-01-27 Ba:</u> The EUT switches directly from the external to the internal position	Passed
2014-12-01	Stop of Tx	After a rescheduling from 2s to 10s reporting interval the EUT stopped transmission of position reports. Message 5 continued transmisssion It was a special situation. After change of the satellite channels the EUT performed a rescheduling. Short time after this rescheduling there was again a rescheduling required by an SOG change from 25 kn to 10 kn 3 min before. <u>Retest 2015-01-27 Ba:</u> After changing a Msg 27 channel the EUT starts receiving on the AIS channels and stops transmission on channel B. About 1 minute later the EUT performs a rescheduling on the correct channels. <u>Retest 2015-02-09 Ba:</u> The EUT continues normal operation	Passed
The following 3 observations happend at the first day after applying a new software. A repetition of the same tests the next day (2015-01-09) were ok. The problems could not yet be reproduced. <u>Remark 2015-01-29 Ba:</u> The below problems have not occurred again. Will be observed for the remaining test phases. <u>Remark 2015-05-05 Ba:</u> The problems have not been observed again. It is assumed that they are fixed.			
2015-01-08	Area setting not used and deleted	The EUT did not use an area setting, position inside the area. After some minutes the area was removed. Unfortuantely there is no PI log of this event.	Passed

2015-01-08	Incorrect Tx start with SOG = 25 kn and stop of transmission (Diagrams Test 1)	UTC 15:34 The EUT started the transmission after power on very strange and stopped the transmission of position reports after a few minutes. The transmission of message 5 continued. The VDOs of the PI output were according to the logged transmissions but the log file was started later when the the transmissions had already stopped.	Passed
2015-01-08	Power on at SOG = 25 kn (Diagrams test 2)	UTC 16:08 Start of the EUT with 25 kn. The start of the EUT looks rather strange, the VDOs show changing to 2 s interval without slot allocation by message 3. Many messages are not received by the test equipment (at –60 dBm level after the attenuator network). The used slots in a selection interval are changing from frame to frame.	Passed
2015-02-11	Stop of Tx	UTC 14:25 and 14:54 Two times the EUT stopped transmission. The VDOs continued but the messages were not received. A power meter in the antenna line showed no output power. In both cases the EUT's transmissions were received again after a restart by power cycle. In the first case the antenna cable was also exchanged. But there was not VSWR alarm before, so it seems the cable was ok. <u>Retest 2015-04-01 Ba:</u> The problem has not occurred again. Will be observed for the remaining test phases <u>Remark 2015-05-05 Ba:</u> The problem has not been observed again. It is assumed that it is fixed.	Passed

2015-03-30	Elapsed time on MKD	When a message 4 is received the time of all targets are re-set by 20s. This sometimes results in negative values up to –19s. In a repetition of the test the elapsed times were set to completely different values. It seems that the clock of the MKD is hard set by the received message 4 resulting in strange elapsed time values if the time in message 4 is not correct. <u>Retest 2015-04-02 Ba:</u> The UTC time of the MKD is not affected by received messages 4. It seems that the elapsed time is not or not correctly recalculated when the MKD UTC time is changed, e.g. when the AIS300 has at beginning no UTC and the MKD corrects its time when the AIS300 gets UTC. This results in incorrect elapsed time values and wrong time-outs of up to several hours, depending on the amount time change. <u>Retest 2015-04-22 Ba:</u> The Elapsed time is displayed correctly when the UTC time is changed.	Passed Passed
2015-03-30	Stop of MKD	The MKD stops operation when 100% VDL load on 1 channel is received (50 targets) and the “System settings” screen is entered. The password cannot be entered. The MKD stop can only be finished by restart (power cycle). <u>Retest 2015-04-02 Ba:</u> Same problem exists In addition to 100% VDL load I performed some tests with 50% VDL load and 75 targets. ▪ Test 1:: the MKD displayed the first 30 target and then stopped operation. ▪ Test 2: all 75 targets were displayed and could be scrolled. The EUT stopped operation when entering the “System settings screen” ▪ Test 3: The MKD showed “Targets (75)” and stopped operation. ▪ Test 4: Same as test 3. <u>Retest 2015-04-22 Ba:</u> The MKD continued operation even with 100% VDL load on both channels.	Passed

1.7 4.3 Manuals

1.7.1 Operating and Installation

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

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

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

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

It is checked that the required documentation items are available.

2014-04-07	**Tester: Ba**	**Test details:** General documentation		
Test item		Check	Remark	Result
Composition of customer documentation		Check the composition of customer documentation	The documentation consists of: • AIS300 Instruction manual • Multi Function Display Instruction manual	
Operating information		Check that an operating manual is included	Included in the two Instruction Manuals	Passed
Technical information		Check that an technical manual is included	Included in the two Instruction Manuals	Passed
Installation information		Check that an installation manual is included	Included in the two Instruction Manuals	Passed
Language		Check that the documentation is written in English		Passed

2014-04-07	**Tester: Ba**	**Test details:** General documentation		
Test item		Check	Remark	Result
Details of installation information				
System overview		Check that an AIS system overview diagram is available		Passed
Mechanical dimensions		Check that mechanical dimension drawings of transponder are available		Passed
		Check that mechanical dimension drawings of MKD are available		Passed
		Check that mechanical dimension drawings of a Connection box available	Connection box is included Dimensions of the mounting brackets are provided	Passed
		Check that mechanical dimension drawings of GPS antenna are available	GPS-4	Passed
		Check that mechanical dimension drawings of VHF antenna are available	Comrod AV7	Passed

2014-04-07	**Tester: Ba**	**Test details:** Requirements of IEC 61993-2		
Test item		Check	Remark	Result
Connectors of external display		Check that the type and details of all connectors of external display are included	Phoenix 2x10 pin screw erminals	Passed
Siting of antennas		Check that information about siting the GPS antenna is included		Passed
		Check that information about siting the VHF antenna is included		Passed
RF cable requirements		Check that information about cable requirements for the GPS antenna is included		Passed
		Check that information about cable requirements for the VHF antenna is included		Passed
Illumination		Check that information about external illumination is included if required	Not required	N/A

1.7.2 Interface documentation

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

(61162-1; -2 section 4) 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.

2014-04-07	**Tester: Ba**	**Test details:** Requirements of interface documentation		
Test item		Check	Remark	Result
a) A and B signal lines		Check that identification of A and B signal lines is included	The identification of A and B lines is not used. The manual uses Tx+/Tx- and Rx+/Rx-. This is not standardized. Therefore the installer cannot be sure if e.g. an A line has to be connected to Tx+ or Tx -. <u>Retest 2015-05-04 Ba:</u> A note has been added that Tx-/Rx- correspondsto the A line and Tx+/Rx+ correspond to the B line	Passed
b) Output driver		Check that the output drive capability is included	Not found <u>Retest 2015-05-04 Ba:</u> A output drive capability of 10 listeners has been added	Passed

c) Approved Talker sentences	Check that list of approved sentences is included	The following sentences are missing: VSD, SSD VER LRF, LR1, LR2, LR3 TSR is listed but is not an output sentence of an AIS Class A <u>Retest 2015-05-04 Ba:</u> VER is still missing, LRF, LR1, LR2, LR3 are marked as input sentences but are output sentences. LRF is input and output sentence <u>Retest 2015-05-07 Ba:</u> VER has been added. LR1, LR2 and LR3 are marked as output sentences.	Passed
	Check that unused fields are noted	Not found <u>Retest 2015-05-07 Ba:</u> A remark has been added that all fields are used	Passed
c) Proprietary talker sentences	Check that list of proprietary sentences is included		Passed
d) Input load	Check that the input load is included	3.10.1.1: 2 mA at 2 V (1 kOhm)	Passed
e) Input sentences of PI and LR ports	Check that list of sentences is included	The following sentences are missing: HBT, ACK, LRI, LRF VDM is listed as in input sentence but is only an output sentence of a Class A <u>Retest 2015-05-04 Ba:</u> The missing sentences have been added.	Passed
	Check that required and unused fields are noted	Not found <u>Retest 2015-05-04 Ba:</u> Not found <u>Retest 2015-05-07 Ba:</u> A remark has been added that all fields are used	Passed

e) Input sentences of sensor inputs	Check that list of sentences is included	The following sentences are missing: VBW, VTG, HDT, THS, ROT DTM is listed as PI port input but is an sensor input Retest 2015-05-04 Ba: The missing sentences have been added.	Passed
	Check that required and unused fields are noted	Not found Retest 2015-05-04 Ba: Not found Retest 2015-05-07 Ba: Only the Navigational status indicator of the RMC is mentioned as unused. We are rather sure that there are other unused fields, e.g. the Nav status indicator in the GNS sentence, some fields in the DTM and GGA sentences, the water speed fields in VBW, ... Retest 2015-05-18 Ba: The unused fields have been added	Passed
f) Software version	Check that the relevant software version is included		Passed
f) Hardware version	Check that the relevant hardware version is included		Passed
g) Hardware input/output circuit	Check that information about hardware interface components is included	Not provided. This can be a separate document provided to BSH Retest 2015-05-04 Ba: The documentation has been provided in document "20091-4-BD SCH AIS interface_phoenix.pdf"	Passed

h) Standards	Check that the version number and date of update of the relevant standard is included	Related to 10 References: Some standards are missing in the lists (e.g. IEC 61162). The version of IEC 61993-2 is missing Retest 2015-05-04 Ba: • The edition of IEC 61993-2 has been added. • IEC 61162-1 has been added • The version of IEC 61162-1 is missing • IEC 62238 for DSC is irrelevant for AIS. The AIS related standard is ITU_R M.825 Retest 2015-05-07 Ba: ▪ The version of IEC 61162-1 has been added. ▪ IEC 62238 for DSC is has been replaced by ITU_R M.825	Passed

2 14 Operational tests

2.1 14.1 Identification and operating modes

(See 6.4)

2.1.1 14.1.1 Autonomous mode

2.1.1.1 14.1.1.1 Transmit position reports

Method of measurement

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

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

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

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

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

Required results

Confirm that

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

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

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

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

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

2014-04-02	**Tester: Ba**	**Test details:** Transmission of position reports		
Test item		Check	Remark	Result
MMSI = default = 0				
MMSI = 000000000		Check that the EUT does not transmit		Passed
		Check that ALR 001 is activated	No ALR 001 found Retest 2014-09-22 Ba: ALR 001 is activated	Passed
Invalid MMSI				
Try to set MMSI to an invalid value		Check that the invalid MMSI is rejected	Test 2014-09-22 Ba: UTC 11:03	Passed
		Check that the EUT does not transmit		Passed
		Check that ALR 001 is activated		Passed

Apply valid MMSI Enable Message 27 transmission			
MMSI	Check MMSI		Passed
Message 1	Check that the Message 1 is transmitted continuously		Passed
Message 27	Check that the Message 27 is transmitted continuously		Passed
Switch off for at least 12 h			
Static data	Check that all static data have been retained		Passed
Voyage data	Check that all voyage data have been retained	2014-04-09 Ba	Passed

2.1.1.2 <u>14.1.1.2 Receive position reports</u>

Method of measurement

Set up standard test environment as follows:

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

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

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

Required results

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

2014-04-02	**Tester: Ba**	**Test details:** a) Receive position reports		
Test item		Check	Remark	Result
a) Switch on test targets, then start operation of the EUT. Check the following items on VDM output of the PI compared with the transmitted values.				
Received targets		Check that the received targets are continosly output as VDM		Passed
b) Start operation of the EUT, then switch on test targets. Check the following items on VDM output of the PI compared with the transmitted values.				
Received targets		Check that the received targets are continosly output as VDM		Passed

2.1.2 14.1.2 Assigned mode

Method of measurement

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

a) slot offset and increment,

b) designated reporting interval.

Record transmitted messages..

Required results

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

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

2.1.3 14.1.3 Polled mode

2.1.3.1 14.1.3.1 Transmit an interrogation

Method of measurement

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

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

Record transmitted messages.

Required results

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

2014-04-29	**Tester: Ba**	**Test details:** Interrogation of message from AIS stations		
Test item		Check	Remark	Result
Request from mobile stations Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,211xxxxxx,3/5/9/18/19/24,,,,,,				
Request Message 3		Check the VDO output on PI		Passed
		Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
		Check that message is received by the addressed transponder (VDM)		Passed

Request Message 5	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
	Check that message is received by the addressed transponder (VDM)		Passed
Request Message 9	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
Request Message 18	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
Request Message 19	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
Request Message 24	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
Request from a base station Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_5.sst: $AIAIR,00211xxxx,4/24,,,,,,			
Request Message 4	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,2110010,,15,,3 Akkording to IEC61162-1 the MMSI field is a fixed length field of 9 digits, So the output should be $AIABK,**00**2110010,,15,,3 <u>Retest 2014-07-07 Ba:</u> $AIABK,002110010,,15,,3	Passed
Request Message 24	Check the VDO output on PI		Passed
	Record and check the AIABK acknowledgement	$AIABK,2110010,,15,,3 See above <u>Retest 2014-07-07 Ba:</u> $AIABK,002110010,,15,,3	Passed

2014-04-29	**Tester: Ba**	**Test details:** Interrogation with 2 requests		
Test item		Check	Remark	Result
Transmit an interrogation message 15 by sending an AIR sentence to the PI. Interrogation sentence: File AIAIR_35_5.sst: $AIAIR,ID1,3,,5,,ID2,5,,				
VDO output of EUT		Check the VDO output on PI		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgement	$AIABK,211001028,,15,,3	Passed
R_X of request		Check that message is received by the VDL analyser		Passed

2.1.3.2 14.1.3.2 Interrogation response

Method of measurement

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

Required results

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

2014-04-29	**Tester: Ba**	**Test details:** Interrogation of Message 3		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 5, slot offset = 0 (auto select), on channel A. A response shall automatically be transmitted by the EUT.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)		Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check the response on VDL with the VDL analyser, note slot offset	Slot offset = 13	Passed
Response channel		Check that the response is transmitted on the request channel		Passed

2014-04-29	**Tester: Ba**	**Test details:** Interrogation of Message 5		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 3 with given slot offset = 10, on channel B A response shall automatically be transmitted by the EUT.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)		Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check the response on VDL with the VDL analyser		Passed
Slot selection		Check that the slot offset defined in the request is used		Passed
Response channel		Check that the response is transmitted on the request channel		Passed

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

2014-04-29	**Tester: Ba**	**Test details:** Interrogation of Message 24		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 24, slot offset = 10, on channel A. A response shall automatically be transmitted by the EUT. Remark: This test for message 24 is not part of 14.1.3.2 but it is required by table 12, Remark to message 15				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)		Passed

T_X of response (VDO)	Check that Message 24 B is transmitted as response by EUT (VDO)	No response Retest 2014-07-07 Ba: Message 24A is transmitted with the ships name. Message 24B should be transmitted with the Vendor ID, the name is known from message 5. Retest 2014-08-18 Ba: No change, 24 A is transmitted Retest 2014-09-16 Ba: Message 24 B is transmitted The content of the Vendor ID field (as defined in ITU-R M.1371-5, Table 79A) is rather strange: • Manufacturer's id = K@@ • Unit model code = 0 • Unit serial number = 0 The length of the message is 160 bit, it shall be 168 bit. So a part of the dim/ref and the type of GNSS is missing Retest 2014-10-08 Ba: The content of the Vendor ID field is:: • Manufacturer's id = "KNX". According to the NMEA list it should be "KST" • Unit model code = 3 • Unit serial number = 189577. This is different to the type label. This may be correct in the serias production. Clarification required The message length is correct. Retest 2014-10-28 Ba: - Manufacturer ID = "KST" - Unit serial number = 141001 (according to the label)	Passed

2.1.4 14.1.4 Addressed operation

2.1.4.1 14.1.4.1 Transmit an addressed message

Method of measurement

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

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

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

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

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

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

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

Required results

Check that

a) *the EUT transmits the Message 6 as appropriate,*

b) *the EUT transmits the Message 12 as appropriate,*

c) *the EUT transmits the Message 25 as appropriate.*

d) *the EUT transmits the Message 25 as appropriate.*

e) *the EUT transmits the Message 26 as appropriate.*

f) *the EUT transmits the Message 26 as appropriate.*

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

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

Remark regarding message 25 and 26:

2014-10-08 Ba: The acknowledgment is output about 10s after the transmission of the message (except with the first message in the test). There is no reason to delay the ABK output because for message 25 and 26 no acknowledgement is expected.

Retest 2014-10-28 Ba:
The ABK is output immediately after transmission of message 25/ 26.

2014-04-29	**Tester: Ba**	**Test details:** a) Addressed binary message 6		
Test item		Check	Remark	Result
Transmit an addressed binary message 6 by sending an ABM sentence to the PI PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,211000001,1,6,06P0test,0 An acknowledgement is automatically transmitted by the addressed transponder.				
VDO output of EUT		Check the VDO output on PI	UTC 13:26	Passed
Message sequence number		Check that sequence number in VDL message = Sequential message identifier of ABM sentence		Passed
R_X of message 6 (VDM)		Check that message is received by addressed transponder (VDM)		Passed
R_X of Message 7 (VDM)		Check that the ackn. Message 7 is received by EUT (VDM)		Passed
AIABK acknowledgement		Check AIABK. sentence	$AIABK,211001028,A,6,2,0	Passed

2014-04-29	**Tester: Ba**	**Test details:** b) Addressed safety related message 12		
Test item		Check	Remark	Result
Transmit an addressed safety related message 12 by sending an ABM sentence to the PI PI sentence: File AIABM_safety.sst: !AIABM,1,1,2,MMSI,1,12,D5CD,0 (D5CD = „TEST“) An acknowledgement is automatically transmitted by the addressed transponder.				
VDO output of EUT		Check the VDO output on PI	UTC 13:26	Passed
Channel		Check T_X on channel A		Passed
Message sequence number		Check that sequence number in VDL message = Sequential message identifier of ABM sentence		Passed
R_X of message 12 (VDM)		Check that message is received by addressed transponder (VDM)		Passed
R_X of Message 13 (VDM)		Check that the ackn. Message 13 is received by EUT (VDM)		Passed
Acknowledgement		Check AIABK		Passed

2014-04-29	**Tester: Ba**	**Test details:** c) Addressed unstructured message 25	
Test item	Check	Remark	Result
Transmit an addressed message 25 by sending an ABM sentence with message type 70 to the PI PI sentence: File AIABM_msg70.sst: There is no acknowledgement expected.			
VDO output of EUT	Check the VDO output on PI	UTC 13:30 No VDO, No Tx Retest 2014-07-07 Ba: UTC 13:41:51 No Tx, no VDO Retest 2014-08-18 Ba: UTC 10:59:24 No Tx, no VDO Retest 2014-09-16 Ba: UTC 11:33 No Tx, no VDO Retest 2014-10-08 Ba: There is a correct VDO	Passed
Channel	Check T_X on channel according to ABM	Retest 2014-10-08 Ba: The channel is correct	Passed
Message sequence number	Check that Message sequence number in ABK = Sequential message identifier in ABM sentence	Retest 2014-10-08 Ba: = 0 Remark: The Message sequence number is always 0, independent of the ABM	Passed
Acknowledgement	Check AIABK with message type 70	No ABK output Even if message 25 is not transmitted there should be an ABK with the appropriate status Retest 2014-07-07 Ba: No ABK Retest 2014-08-18 Ba: No ABK Retest 2014-09-16 Ba: UTC 11:33 ABK with status 2 Retest 2014-10-08 Ba: $AIABK,211001028,A,25,0,3 The message ID is incorrect (25 instead of 70) Retest 2014-10-28 Ba: `$AIABK,211001028,A,70,0,3`	Passed

Message content	Check message content	Retest 2014-10-08 Ba: The message content is correct., according to ITU-R M.1371-5. Remark: we recommend to set the spare bits to 0 Retest 2014-10-28 Ba: The spare bits are set to 0.	Passed

2014-04-29	**Tester: Ba**	**Test details:** d) Addressed structured message 25	
Test item	Check	Remark	Result
Transmit an addressed message 25 by sending an ABM sentence with message type 25 to the PI PI sentence: File AIABM_msg25.sst: There is no acknowledgement expected.			
VDO output of EUT	Check the VDO output on PI	UTC 13:30 <u>Retest 2014-07-07 Ba:</u> UTC13:41:00 No Tx, no VDO <u>Retest 2014-09-16 Ba:</u> Message is transmitted	Passed
Channel	Check T_X on channel according to ABM	ABM: channel 2 VDO: channel A <u>Retest 2014-07-07 Ba:</u> No Tx, no VDO <u>Retest 2014-09-16 Ba:</u> Channel B	Passed
Message sequence number	Check that Message sequence number in ABK = Sequential message identifier in ABM sentence	<u>Retest 2014-09-16 Ba:</u> =1 <u>Retest 2014-10-08 Ba:</u> = 0, should be 1 <u>Retest 2014-10-28 Ba:</u> Message sequence number is correct	Passed
Acknowledgement	Check AIABK with message type 25	There is no ABK <u>Retest 2014-07-07 Ba:</u> There is an ABK with status 2 $AIABK,211001028,B,25,,2 <u>Retest 2014-08-18 Ba:</u> There is an ABK with status 2 $AIABK,211001028,B,25,,2 <u>Retest 2014-09-16 Ba:</u> $AIABK,211001028,B,25,1,3 <u>Retest 2014-10-08 Ba:</u> $AIABK,211001028,B,25,0,2 Incorrect type of acknowledgement (2 instead of 3) <u>Retest 2014-10-28 Ba:</u> $AIABK,211001028,B,25,1,3	Passed

Message content	Check message content	All bits of the binary data part are set to 0 Retest 2014-07-07 Ba: No Tx Retest 2014-08-18 Ba: No Tx Retest 2014-09-16 Ba: The message length is 152 instead of 168 bit (see log file) Retest 2014-10-08 Ba: The message length and content is correct., according to ITU-R M.1371-5.	Passed

2014-04-29	**Tester: Ba**	**Test details:** e) Addressed unstructured message 26	
Test item	Check	Remark	Result
Transmit an addressed message 26 by sending an ABM sentence with message type 71 to the PI PI sentence: File AIABM_msg71.sst: There is no acknowledgement expected.			
VDO output of EUT	Check the VDO output on PI	UTC 13:30 No VDO, No Tx Retest 2014-07-07 Ba: UTC 13:42:11 No Tx, no VDO Retest 2014-08-18 Ba: UTC 10:59:43 No Tx, no VDO Retest 2014-09-16 Ba: UTC 11:34 No Tx, No VDO Retest 2014-10-08 Ba: There is a correct VDO	Passed
Channel	Check T_X on channel according to ABM	Retest 2014-10-08 Ba: Channel is correct	Passed

Message sequence number	Check that Message sequence number in ABK = Sequential message identifier in ABM sentence	<u>Retest 2014-10-08 Ba:</u> = 0, should be 2 <u>Retest 2014-10-28 Ba:</u> Message sequence number is correct	Passed
Acknowledgement	Check AIABK with message type 71	There is no ABK <u>Retest 2014-07-07 Ba:</u> No ABK <u>Retest 2014-08-18 Ba:</u> No ABK <u>Retest 2014-09-16 Ba:</u> UTC 11:34 ABK with status 2 <u>Retest 2014-10-08 Ba:</u> $AIABK,211001028,A,26,0,2 • Incorrect message ID (26 instead of 71) • Incorrect type of acknowledgement (2 instead of 3) <u>Retest 2014-10-28 Ba:</u> `$AIABK,211001028,A,71,2,3`	Passed
Message content	Check message content	<u>Retest 2014-10-08 Ba:</u> The binary data flag is set to 1. It should be set to 0 to indicate unstructured data Remark: for unstructured message 25 it is ok. Message 26 is according to ITU-R M.1371-5. <u>Retest 2014-10-28 Ba:</u> The binary data flag is set to 0	Passed

2014-04-29	**Tester: Ba**	**Test details:** f) Addressed structured message 26		
Test item		Check	Remark	Result
Transmit an addressed message 26 by sending an ABM sentence with message type 26 to the PI PI sentence: File AIABM_msg26.sst: There is no acknowledgement expected.				
VDO output of EUT		Check the VDO output on PI	UTC 13:30	Passed
Channel		Check T_X on channel according to ABM	ABM: channel 2 VDO: channel A Retest 2014-07-07 Ba: ABM and VDO: channel 2	Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier in ABM sentence	Retest 2014-07-07 Ba: There is no Message sequence number in ABK Retest 2014-08-18 Ba: There is no Message sequence number in ABK Retest 2014-09-16 Ba: The Sequence number is correct Retest 2014-10-08 Ba: = 0, should be 3 Retest 2014-10-28 Ba: Message sequence number is correct	Passed
Acknowledgement		Check AIABK with message type 26	There is no ABK Retest 2014-07-07 Ba: There is an ABK Retest 2014-09-16 Ba: $AIABK,211001028,B,26,3,3 Retest 2014-10-08 Ba: $AIABK,211001028,B,26,0,2 Incorrect type of acknowledgement (2 instead of 3) Retest 2014-10-28 Ba: $AIABK,211001028, B,26,3,3	Passed

Message content	Check message content	The binary data part is different to the reference data according to the ABM input. The message is 56 bit longer than expected according to the ABM input Retest 2014-07-07 Ba: The binary data content is correct. Retest 2014-08-18 Ba: On bit is different, changed from 0 to 1 Retest 2014-09-16 Ba: The message content is correct.. Message 26 is according to ITU-R M.1371-5. The spare bits are not set to 0 but that is not required.	Passed

2.1.4.2 14.1.4.2 Receive addressed message

Method of measurement

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

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

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

Record transmitted messages and frame structure.

Required results

Check that EUT transmits the appropriate acknowledgement message. Confirm that

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

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

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

2014-04-29	**Tester: Ba**	**Test details:** Addressed binary message 6		
Test item		Check	Remark	Result
Apply an addressed binary message on VDL.				
a) Addressed to EUT		Check that VDM output on PI of EUT	UTC 13:33	Passed
		Check DAC		Passed
		Check FI		Passed
		Check binary data		Passed
Transmission of ackn. Message 7		Check transmission of ackn. by VDO output of EUT		Passed
		Check that the ackn. message is received by transmitter (VDM/ABK)		Passed
b) Addressed to other AIS		Check that no VDM output on PI		Passed
		Check that the EUT does not transmit an acknowledgement		Passed

2014-04-29	**Tester: Ba**	**Test details:** Addressed safety related message 12		
Test item		Check	Remark	Result
Apply an addressed safety related message on VDL				
a) Addressed to EUT		Check that VDM output on PI of EUT	UTC 13:34	Passed
		Check message text		Passed
Transmission of ackn. Message 13		Check transmission of ackn. by VDO output of EUT		Passed
		Check that the ackn. message is received by transmitter (VDM/ABK)		Passed
b) Addressed to other AIS		Check that no VDM output on PI		Passed
		Check that the EUT does not transmit an acknowledgement		Passed

2014-04-29	**Tester: Ba**	**Test details:** Addressed message 25		
Test item		Check	Remark	Result
Apply an addressed message 25 on VDL				
a) Addressed to EUT		Check that VDM output on PI of EUT	UTC 13:37	Passed
		Check message content		Passed
Acknowledgement		Check that the EUT does not transmit an acknowledgement		Passed
b) Addressed to other AIS		Check that no VDM output		Passed

2014-04-29	**Tester: Ba**	**Test details:** Addressed message 26		
Test item		Check	Remark	Result
Apply an addressed message 26 on VDL				
a) Addressed to EUT		Check that VDM output on PI of EUT		Passed
		Check message content		Passed
Acknowledgement		Check that the EUT does not transmit an acknowledgement		Passed
b) Addressed to other AIS		Check that no VDM output		Passed

2.1.5 14.1.5 Broadcast operation

2.1.5.1 14.1.5.1 Transmit a broadcast message

Method of measurement

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

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

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

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

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

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

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

Required results

Check that

a) *the EUT transmits the Message 8 as appropriate,*

b) *the EUT transmits the Message 14 as appropriate,*

c) *the EUT transmits the Message 25 as appropriate.*

d) *the EUT transmits the Message 25 as appropriate.*

e) *the EUT transmits the Message 26 as appropriate.*

f) *the EUT transmits the Message 26 as appropriate.*

Remark regarding message 25 and 26:
2014-10-08 Ba: The acknowledgment is output about 10s after the transmission of the message (except with the first message in the test). There is no reason to delay the ABK output because for message 25 and 26 no acknowledgement is expected. There is no reason to handle the ABK different to message 8 and 14. For message 8 and 14 the ABK is correct.

Retest 2014-10-28 Ba:
The ABK is output immediately after transmission of message 25/ 26.

2014-04-29	**Tester: Ba**	**Test details:** a) Message 8		
Test item		Check	Remark	Result
Apply a BBM sentences with message type 8 for transmission of a binary message to the PI. PI sentence: File AIBBM_bin.sst:				
VDO output of EUT		Check the VDO output on PI	UTC 13:27	Passed
Channel		Check T_X on channel according to BBM		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 8		Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message content		Check message content		Passed

2014-04-29	**Tester: Ba**	**Test details:** b) Message 14		
Test item		Check	Remark	Result
Apply a BBM sentences with message type 14 for transmission of a safety related text message to the PI. PI sentence: File AIBBM_safety.sst:				
VDO output of EUT		Check the VDO output on PI	UTC 13:27	Passed
Channel		Check T_X on channel according to BBM		Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements with message type 14		Passed
Message sequence number		Check that Message sequence number in ABK = Sequential message identifier of BBM sentence		Passed
Message content		Check message content		Passed

2014-04-29	**Tester: Ba**	**Test details:** c) Unstructured binary broadcast message 25	
Test item	Check	Remark	Result
Apply a BBM sentences with message type 70 for transmission of unstructured message 25 to the PI. PI sentence: File AIBBM_bin_70.sst: AIS channel for broadcast is 0: autoselect			
VDO output of EUT	Check the VDO output on PI	No VDO, no transmission Retest 2014-07-07 Ba: UTC 13:42:30 No Tx, No VDO Retest 2014-08-18 Ba: UTC 13:42:30 No Tx, No VDO Retest 2014-09-16 Ba: UTC 11:34:18 No Tx, No VDO Retest 2014-10-08 Ba: There is a correct VDO	Passed
Channel	Check T_X on channel according to BBM	Retest 2014-10-08 Ba: The channel is correct	Passed

AIABK acknowledgement	Record and check the AIABK acknowledgements with message type 70	No ABK output
		Retest 2014-07-07 Ba:
		No ABK
		Retest 2014-08-18 Ba:
		No ABK
		Retest 2014-09-16 Ba:
		UTC 11:34:18
		ABK with status 2
		Retest 2014-10-08 Ba:
		• Incorrect message ID (25 instead of 70)
		• Incorrect type of acknowledgement (2 instead of 3)
		`$AIABK,,B,25,0,2`
		Retest 2014-10-28 Ba:
		`$AIABK,,A,70,4,3`	

Message sequence number	Check that Message sequence number in ABK = Sequential message identifier of BBM sentence	Retest 2014-10-08 Ba: = 0, should be 4 Retest 2014-10-28 Ba: Message sequence number is correct	Passed
Message content	Check message content	Retest 2014-10-08 Ba: The message content is correct	Passed

2014-04-29	**Tester: Ba**	**Test details:** d) Structured binary broadcast message 25	
Test item	Check	Remark	Result
Apply a BBM sentences with message type 25 for transmission of structured message 25 to the PI. PI sentence: File AIBBM_bin_25.sst: AIS channel for broadcast is 0: autoselect			
VDO output of EUT	Check the VDO output on PI		Passed
Channel	Check T_X on channel according to BBM	ABM: channel 2 VDO: channel A Retest 2014-07-07 Ba: No VDO, no TX Retest 2014-08-18 Ba: No VDO, no TX Retest 2014-09-16 Ba: UTC 11:34:23 Tx channel OK (B)	Passed

AIABK acknowledgement	Record and check the AIABK acknowledgements with message type 25	No ABK output
		Retest 2014-07-07 Ba:
		There is an ABK with status 2
		$AIABK,,B,25,,2
		Retest 2014-08-18 Ba:
		There is an ABK with status 2
		$AIABK,,B,25,,2
		Retest 2014-09-16 Ba:
		$AIABK,,B,25,5,3
		Retest 2014-10-08 Ba:
		Incorrect type of acknowledgement (2 instead of 3)
		`$AIABK,,B,25,0,2`
		Retest 2014-10-28 Ba:
		`$AIABK,,B,25,5,3`
			Passed

Message sequence number	Check that Message sequence number in ABK = Sequential message identifier of BBM sentence	Retest 2014-07-07 Ba: There is no Message sequence number in the ABK output Retest 2014-08-18 Ba: There is no Message sequence number in the ABK output Retest 2014-09-16 Ba: Message sequence number is ok (5) Retest 2014-10-08 Ba: = 0, should be 5 Retest 2014-10-28 Ba: Message sequence number is correct	Passed

Message content	Check message content	The binary data part is set to 0. The message is 16 bit longer than expected according to the BBM input <u>Retest 2014-07-07 Ba:</u> No Tx <u>Retest 2014-08-18 Ba:</u> No Tx <u>Retest 2014-09-16 Ba:</u> The message length is 152 instead of 168 bit (details see log file) <u>Retest 2014-10-08 Ba:</u> The message content is correct	Passed

2014-04-29	**Tester: Ba**	**Test details:** e) Unstructured binary broadcast message 26	
Test item	Check	Remark	Result
Apply a BBM sentences with message type 71 for transmission of unstructured message 26 to the PI. PI sentence: File AIBBM_bin_71.sst: AIS channel for broadcast is 0: autoselect			
VDO output of EUT	Check the VDO output on PI	No VDO, no transmission Retest 2014-07-07 Ba: No VDO, no TX Retest 2014-08-18 Ba: No VDO, no TX Retest 2014-09-16 Ba: UTC 11:34:28 No Tx, No VDO Retest 2014-10-08 Ba: There is a correct VDO	Passed
Channel	Check T_X on channel according to BBM	Retest 2014-10-08 Ba: The channel is correct	Passed
AIABK acknowledgement	Record and check the AIABK acknowledgements with message type 71	No ABK output Retest 2014-07-07 Ba: No ABK Retest 2014-08-18 Ba: ABK with status 2 Retest 2014-10-08 Ba: • Incorrect message ID (26 instead of 71) • Incorrect type of acknowledgement (2 instead of 3) $AIABK,,A,26,0,2 Retest 2014-10-28 Ba: `$AIABK,,A,71,6,3`	Passed
Message sequence number	Check that Message sequence number in ABK = Sequential message identifier of BBM sentence	Retest 2014-10-08 Ba: = 0, should be 6 Retest 2014-10-28 Ba: Message sequence number is correct	Passed
Message content	Check message content	Retest 2014-10-08 Ba: The message content is correct	Passed

2014-04-29	**Tester: Ba**	**Test details:** f) Structured binary broadcast message 26	
Test item	Check	Remark	Result
Apply a BBM sentences with message type 26 for transmission of structured message 26 to the PI. PI sentence: File AIBBM_bin_26.sst: AIS channel for broadcast is 0: autoselect			
VDO output of EUT	Check the VDO output on PI		Passed
Channel	Check T_X on channel according to BBM	ABM: channel 2 VDO: channel A <u>Retest 2014-07-07 Ba:</u> ABM and VDO: channel B	Passed

AIABK acknowledgement	Record and check the AIABK acknowledgements with message type 26	No ABK output
		<u>Retest 2014-07-07 Ba:</u>
		There is an ABK with status 2
		$AIABK,,B,25,,2
		Retest 2014-08-18 Ba:
		ABK with status 3
		<u>Retest 2014-10-08 Ba:</u>
		Incorrect type of acknowledgement (2 instead of 3)
		`$AIABK,,B,26,0,2`
		<u>Retest 2014-10-28 Ba:</u>
		`$AIABK,,B,26,7,3`
			Passed

Message sequence number	Check that Message sequence number in ABK = Sequential message identifier of BBM sentence	<u>Retest 2014-07-07 Ba:</u> There is no Message sequence number in the ABK output <u>Retest 2014-08-18 Ba:</u> There is no Message sequence number in the ABK output <u>Retest 2014-09-16 Ba:</u> UTC 11:34:33 Message sequence number is ok (7) <u>Retest 2014-10-08 Ba:</u> = 0, should be 4 <u>Retest 2014-10-28 Ba:</u> Message sequence number is correct	Passed
Message content	Check message content	The binary data part is set to 0. The message is 32 bit longer than expected according to the BBM input <u>Retest 2014-07-07 Ba:</u> The binary data content is correct.	Passed

2.1.5.2 14.1.5.2 Receive broadcast message

Method of measurement

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

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

Required results

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

2014-04-29	**Tester: Ba**	**Test details:** Receive roadcast binary messages		
Test item		Check	Remark	Result
Apply an broadcast binary message according to test item on VDL.				
Message 8		Check that Message 8 is output as VDM on the PI port	UTC 13:36	Passed
		Check the content of message 8		Passed
Message 14		Check that Message 14 is output as VDM on the PI port		Passed
		Check the content of message 14		Passed
Message 25		Check that Message 25 is output as VDM on the PI port		Passed
		Check the content of message 25		Passed
Message 26		Check that Message 26 is output as VDM on the PI port		Passed
		Check the content of message 26		Passed

2.1.6 14.1.6 Multiple slot messages

2.1.6.1 14.1.6.1 5 slot messages

Method of measurement

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

Required results

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

2014-04-29	**Tester: Ba**	**Test details:** Binary broadcast message 8		
Test item		Check	Remark	Result
Transmit a binary broadcast messages 8 with 121 data bytes of binary data by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin.sst: The file contains 4 BBM sentences with in total 121 data bytes or 162 characters.				
VDO output of EUT		Check the VDO output on PI	UTC 13:41	Passed
AIABK acknowledgement		Record and check the AIABK acknowledgements	$AIABK,,,8,6,3	Passed
Sequential message identifier in VDO		Check that message sequence number in ABK = sequential message identifier of BBM sentence		Passed
Message on VDL		Check that the broadcast message is received on the VDL		Passed
Message content		Check that the message content is correct		Passed

Note)
The limitation of 5 slots is in discrepancy to 16.6.4 which requires a maximum of 3 slot messages. This 3 slot requirement is in compliance with ITU-R M.1371-5 which requires in A.8 section 3.6 for message 8: „Occupies up to 3 slots".

2.1.6.2 14.1.6.2 Longer messages

Method of measurement

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

Required results

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

2014-04-29	**Tester: Ba**	**Test details:** Binary broadcast message 8		
Test item		Check	Remark	Result
Transmit a binary broadcast messages 8 with 122 data bytes of binary data, all bits "1", by sending 4 BBM sentences to the PI. PI sentence: File AIBBM_multi_bin_1.sst: The file contains 4 BBM sentences with in total 121 data bytes or 162 characters.				
VDO output of EUT		Check that no VDO is output on PI	UTC 13:42	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)	$AIABK,,,8,6,2	Passed

2.2 14.2 Information

(See 6.5)

2.2.1 14.2.1 Information provided by the AIS

Method of measurement

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

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

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

Required results

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

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

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

2014-05-07	**Tester: Ba**	**Test details:** Content of Message 1		
Test item		Check	Remark	Result
Internal GNSS is in use, no external sensor inputs.				
MMSI		Check MMSI		Passed
Navigational status		See below		
Position		Check the values of lat and lon		Passed
Speed		Check the values of SOG and COG		Passed
Heading/ROT		Check that the values of heading and ROT are default		Passed
Position accuracy flag		Is verified in special tests		
Time stamp		Check time stamp		Passed
Comm state		Check for availability, detailed test in 5		Passed
Default values		Check that default values for LAT, LON, SOG, COG are transmitted if internal GNSS is unavailable		Passed

2014-05-07	**Tester: Ba**	**Test details:** Navigational status		
Test item		Check	Remark	Result
Test of navigational status on VDL message. Check some different navigational status values. Change the navigational status using MKD or VSD input.				
Status = 0 (under way using engine)		Check Status in VDL message 1		Passed
Status = 1 (at anchor)		Check Status in VDL message 1		Passed
Status = 7 (fishing)		Check Status in VDL message 1		Passed
Status = 11 (towing astern)		Check Status in VDL message 1	Test 2015-03-26 Ba:	Passed
Status = 12 (towing ahead)		Check Status in VDL message 1	Test 2015-03-26 Ba:	Passed
Status = 15 (undefined)		Check Status in VDL message 1		Passed
Other status values		Check some other values		Passed
		Remark: The value 14 (AIS SART) can be configured. IEC61993-2 does not allow the selection of 14 on the MKD.		

2014-05-07	**Tester: Ba**	**Test details:** Content of Message 5		
Test item		Check	Remark	Result
Check of the contents of Message 5 (static and voyage related data). Data can be changed using MKD or VSD/SSD input at PI.				
MMSI		Check value in Message 5		Passed
AIS version indicator		Check that version is 2	<u>2014-07-08 Ba:</u> AIS version indicator = 1 Should be 2 according to ITU-R M.1371-5 <u>2014-08-18 Ba:</u> AIS version indicator = 2	Passed
IMO number		Check value in Message 5		Passed
Call sign		Check value in Message 5		Passed
Name of ship		Check value in Message 5		Passed
Type of ship and cargo type		Check value in Message 5		Passed

Reference point for internal GPS			
Reference point A	Check value in Message 5	Retest 2014-10-13 Ba: The external reference data are used Retest 2014-10-30 Ba: The dim/ref data are correctly used in message 5 Retest 2014-11-26 Ba: The internal dim/ref are displayed as external on the MKD static data input. For the internal input nothing is displayed. Retest 2015-01-26 Ba: The values are displayed correctly	Passed
Reference point B	Check value in Message 5		Passed
Reference point C	Check value in Message 5		Passed
Reference point D	Check value in Message 5		Passed
Reference point for EPFS			
Reference point A	Check value in Message 5	Retest 2014-10-13 Ba: The internal reference data are used Retest 2014-10-30 Ba: The dim/ref data are correctly used in message 5	Passed
Reference point B	Check value in Message 5		Passed
Reference point C	Check value in Message 5		Passed
Reference point D	Check value in Message 5		Passed
Voyage related data			
ETA	Check value in Message 5		Passed
Maximum present static draught	Check value in Message 5		Passed
Destination	Check value in Message 5		Passed
DTE flag can be checked in connection with 2.6.2.5 14.6.2.5 Remote MKD disconnection, when so configured. Check the flag during that test and enter result here.			
DTE on	Check that DTE flag = 0	DTE flag = 1 2014-07-08 Ba: Clarification required 2014-08-20 Ba: DTE = 0	Passed
DTE off	Check that DTE flag = 1		Passed

Type of EPFS			
Apply simulated GLL,VTG, GDT and ROT sentence to the sensor input. File name: ais01_gll_vtg_hdt_rot.sst Change talker according to test item.			
Talker = GP	Check type of EPFS = 1		Passed
Talker = GL	Check type of EPFS = 2		Passed
Talker = GN	Check type of EPFS = 3		Passed
Talker = LC	Check type of EPFS = 4		Passed
Talker = IN	Check type of EPFS = 6		Passed
Talker = GA	Check type of EPFS = 8	Device = 0 2014-07-08 Ba: EPFS = 0 Retest 2014-08-18 Ba: EPFS = 8	Passed
Talker = other	Check type of EPFS = 0		Passed
Stop external position Use internal GPS	Check type of EPFS = 15		Passed

2.2.2 14.2.2 Reporting intervals

2.2.2.1 14.2.2.1 Speed and course change

Method of measurement

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

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

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

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

d) *Make speed sensor unavailable.*

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

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

Required results

The following results are required.

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

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

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

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

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

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

2014-04-04	**Tester: Ba**	**Test details:** Average values		
Test item		Check	Remark	Result
Modify speed to establish the required reporting intervals. Run the test of each reporting interval for at least 10 min (preferable 1 hour minimum).				
a) Speed = 10 kn		Check that the average reporting interval is 10 s		Passed
		Check that the transmission slots are randomly distributed over the selection interval of 10s +/- 10% = 2 s = 75 slot		Passed
		Check that the slot offsets are in a range of 10 s +/- 2s = 375 +/- 75 slots		Passed
b) Speed = 15 kn		Check that the average reporting interval is 6 s		Passed
		Check that the transmission slots are randomly distributed over the selection interval of 6s +/- 10% = 1.2 s = 45 slots		Passed
		Check that the slot offsets are in a range of 6 s +/- 1.2s = 225 +/- 45 slots		Passed
b) Speed = 25 kn		Check that the average reporting interval is 2 s		Passed
		Check that the transmission slots are randomly distributed over the selection interval of 2s +/- 10% = 0.4 s = 15 slots		Passed
		Check that the slot offsets are in a range of 2 s +/- 0.4s = 755 +/- 15 slots		Passed

2014-04-03	**Tester: Ba**	**Test details:** Change of reporting rate by speed, 10 / 6 s interval		
Test item		Check	Remark	Result
Change speed according to the test items.				
a) Speed = 10 kn		Check that reporting interval is 10 s		Passed
b) Speed = 15 kn		Check slot allocation using Message 3 for new reporting rate		Passed
		Check that slot allocation for the new reporting rate has started after 2 transmissions		Passed
		Check that new rate is established within 1 minute		Passed
		Check that reporting interval is 6 s		Passed
c) Reduction of speed to Speed = 10 kn		Check slot allocation using Message 3 for new reporting rate		Passed
		Check that new rate starts after 3 min and is established within 4 min		Passed
		Check that reporting interval is 10 s		Passed

2014-04-03	**Tester: Ba**	**Test details:** Change of reporting rate by speed, 6 / 2 s interval		
Test item		Check	Remark	Result
Change speed according to the test items.				
a) Speed = 15 kn		Check that reporting interval is 6 s		Passed
b) Speed = 25 kn		Check slot allocation using Message 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 reporting interval is 2 s		Passed
c) Reduction of speed to Speed = 15 kn		Check slot allocation by deallocation of slots, Message 3 not required for new reporting rate		Passed
		Check that new rate starts after 3 min and is established within 4 min		Passed
		Check that reporting interval is 6 s		Passed

2014-04-10	**Tester: Ba**	**Test details:** Change of reporting interval by heading change, 10 s		
Test item		Check	Remark	Result
Set speed = 10 kn Change heading according to the test items				
a) Heading not changing		Check that reporting interval is 10 s		Passed
b) Increase heading 18°/min		Check that the reporting interval is 10 s	UTC 09:25	Passed
b) Increase heading 22°/min		Check that the reporting interval is 3 1/3 s	UTC 09:30	Passed
c) Stop heading change		Check that the reporting interval is 10 s		Passed
c) Increase heading 50°/min		Check that new rate starts within 150 slots (first transmission) after difference > 5°. That is 10 s after start of heading change.	The new rate starts with the next regular message 1 on each channel. Depending on the time of the next regular message this can be later than 150 slots. See Note) <u>Retest 2014-07-08 Ba:</u> The new rate starts within 150 slots	Passed
		Check slot allocation by inserting ITDMA slots (Message 3) for new reporting rate		Passed
		Check that the additional message 3 are randomly distributed in a selection interval of 25 slots	The selection interval is the same as for the 10 s reporting interval = 75 slots. It should be 25 slots according to the increased rate <u>Retest 2014-07-08 Ba:</u> SI = 25 slots	Passed
		Check that the NS of the SI of the additional messages is +/- 125 slot of the basic NS		Passed
c) Stop increasing heading		Check slot allocation by stopping insertion of ITDMA slots (Message 3)		Passed
		Check that increased interval is maintained for 30 s (10 s until diff < 5° +20 s delay)		Passed
		Check that reporting interval is 10 s		Passed

Note)
ITU-R M.1371-5 requires:
„When 5° is exceeded, the reporting interval should be decreased beginning with a broadcast within the next 150 slots (see § 3.3.4.2.1) using either a scheduled SOTDMA slot, or a RATDMA access slot (see § 3.3.5.5).

This indicates that the EUT should not wait in any case for the next regular transmission. If there is no regular transmission within 150 slots after the 5° condition is fulfilled the EUT has to start the decreased reporting interval with a RATDMA transmission.

2014-04-07 **Tester: Ba**	**Test details:** Change of reporting interval by heading change, 6 s		
Test item	Check	Remark	Result
Set speed = 15 kn Change heading according to the test items			
a) Heading not changing	Check that reporting interval is 6 s		Passed
b) Decrease heading 18°/min	Check that the reporting interval is 10 s	UTC 09:35	Passed
b) Decrease heading 22°/min	Check that the reporting interval is 2 s	UTC 09:38	Passed
c) Stop heading change	Check that the reporting interval is 6 s		Passed
b) Decrease heading - 50°/min	Check that new rate starts within 150 slots (first transmission) after the difference > 5°. That is 10 s after start of heading change	See above <u>Retest 2014-07-08 Ba:</u> The new rate starts within 150 slots	Passed
	Check slot allocation by inserting ITDMA slots (Message 3) for new reporting rate		Passed
	Check that the additional message 3 are randomly distributed in a selection interval of 15 slots	The selection interval 75 slots, the same as for the 10 s reporting interval. <u>Retest 2014-07-08 Ba:</u> SI = 15 slots	Passed
	Check that the NS of the SI of the additional messages is +/- 75 slot of the basic NS		Passed
c) Stop Decreasing heading	Check slot allocation by stopping insertion of ITDMA slots (Message 3)		Passed
	Check that increased interval is maintained for 30 s (10 s until diff < 5° +20 s delay)		Passed
	Check that reporting interval is 6 s		Passed

2014-04-10 **Tester: Ba**	**Test details:** Change of reporting interval by heading change, 2 s		
Test item	Check	Remark	Result
Set speed = 25 kn Change heading according to the test items			
a) Heading not changing	Check that reporting interval is 2 s		Passed
b) Increase heading 50°/min	Check that reporting interval is 2 s		Passed
c) Stop heading change	Check that reporting interval is 2 s		Passed

2014-04-10	**Tester: Ba**	**Test details:** d) Reporting rate: Speed sensor unavailable		
Test item		Check	Remark	Result
Change speed according to the test items and record VDL data.				
Speed = 10 kn		Check that reporting interval is 10 s		Passed
Speed = 15 kn		Check that reporting interval is 6 s		Passed
Speed sensor unavailable (internal source made unavailable)		Check that reporting interval of 6 s is maintained for 3 min	UTC 11:25	Passed
		Check that reporting interval after 3 min is 10 s	UTC 11:29 Reporting interval = 10s	Passed

2014-04-10	**Tester: Ba**	**Test details:** e) Reporting rate: Heading sensor unavailable		
Test item		Check	Remark	Result
Change speed according to the test items and record VDL data.				
Speed = 10 kn		Check that reporting interval is 10 s		Passed
Change heading with > 20°/min		Check that reporting interval is 3 1/3 s	UTC 11:18	Passed
Make heading unavailable		Check that reporting interval reverts to 10 s		Passed

2.2.2.2 <u>14.2.2.2 Change of navigational status</u>

Method of measurement

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

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

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

c) *set NavStatus to other values*

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

Required results

The following results are required:

a) *Reporting interval shall be 3 min.*

b) *Reporting interval shall be 10 s.*

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

NOTE Alarm conditions associated with NavStatus are tested in 14.6.3.6

2014-05-07	**Tester: Ba**	**Test details:** Reporting interval depending on Nav. status		
Test item		Check	Remark	Result
Apply simulated sensor data to the sensor input. File name: ais01_gll_vtg_hdt_rot.sst Change Navigation status and speed according to test items.				
a) Speed = 2 kn Nav. status = 1 (at anchor)		Check that reporting rate is 3 min	UTC 13:31	Passed
b) Speed = 4 kn Nav. status = 1 (at anchor)		Check that reporting rate is 10 s	UTC 13:36	Passed
c) Speed = 2 kn Nav. status = 5 (moored)		Check that reporting rate is 3 min	UTC 13:35	Passed
c) Speed = 2 kn Nav. status = 2 (not under command)		Check that reporting rate is 10 s	UTC 13:38	Passed
c) Speed = 2 kn Nav. status = 6 (aground)		Check that reporting rate is 10 s	UTC 13:49	Passed
c) Speed = 2 kn Nav. status = 3 or other		Check that reporting rate is 10 s	UTC 13:53	Passed

2.2.2.3 14.2.2.3 Assigned reporting intervals

Method of measurement

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

a) initial slot offset and increment,

b) designated reporting rate.

Change course, speed and NavStatus. Record transmitted messages.

Required results

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

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

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

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

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

2014-04-07	**Tester: Ba**	**Test details:** a) Slot offset and increment, course change		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn: Send assignment cmd Incr = 2 (375 slot = 10 s)		Check that EUT changes to slot assigned mode with 10 s reporting interval	<u>Test 2014-07-08 Ba:</u>	Passed
In assigned mode: • Change heading		Check that reporting interval is decreased to 3 1/3 s		Passed
		Check that 2 Message 3 are inserted between Message 2		Passed
		Check that message type of the basic message is 2		Passed
Speed = 10 kn: Send assignment cmd Incr = 3 (225 slot = 6 s)		Check that EUT changes to slot assigned mode with 6 s reporting interval	<u>Test 2014-07-08 Ba:</u>	Passed
In assigned mode: • Change heading		Check that reporting interval is decreased to 2 s		Passed
		Check that 2 Message 3 are inserted between Message 2		Passed
		Check that message type of the basic message is 2		Passed
Speed = 15 kn: Send assignment cmd Incr = 4 (125 slot = 3.333 s)		Check that EUT changes to slot assigned mode with 125 slot reporting interval		Passed

In assigned mode: • Change heading	Check that reporting interval is decreased to 1.111 s	The reporting interval is sometimes 1.111 s, sometimes longer <u>Retest 2014-07-08 Ba:</u> The reporting interval is 1.111s	Passed
	Check that 2 Message 3 are inserted between Message 2	Sometimes 1 message 3 is inserted, sometimes 2 message 3 are inserted <u>Retest 2014-07-08 Ba:</u> 2 Message 3 are inserted between Message 2	Passed
	Check that keep flag = 0	Keep flag = 1 This causes the allocation of slots which are not used At the same time the keep flag of message 3 of the basic reporting rate which are continued are set to 0. So no slot is reserved but used in the next frame. The setting of the keep flag seems to be just reversed. <u>Retest 2014-07-08 Ba:</u> The keep flag is set correctly	Passed
	Check that message type of the basic message is 2		Passed
Speed = 10 kn: Send assignment cmd Incr = 2 (375 slot = 10 s)	Check the transition from slot assignment 4 (3.33s) to 2 (10 s)	<u>Test 2014-07-08 Ba:</u> The EUT continues with assigned increment of 4 until time-out of message 2. Then it reschedules first to 6 s reporting interval and in the next frame to 10 autonomous reporting interval. After one further frame it changes to the slot assigned interval. <u>Retest 2014-08-19 Ba:</u> The EUT changes immediately from 3.33s to 10s interval. See Note)	Passed

Note)
At the change from 3.33s interval to 10 s interval the slots of the old interval are not released. This seems to be appropriate for slot assignment because the slots used for slot assignment are normally reserved by the base station which transmits the slot assignment messages.

2014-04-09	**Tester: Ba**	**Test details:** a) Slot offset and increment, longer interval		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn		Check that reporting interval = 10 s		Passed
Send assignment: Incr. = 1 (1125 slots = 30 s)		Check that the assignment command is ignored	UTC 08:35 The autonomous reporting interval continues The message type is changed to 2. I think this is incorrect because the EUT does not actually enter the assigned mode. See Note) <u>Retest 2014-07-08 Ba:</u> The EUT continues transmission of message 1	Passed Passed
Speed = 15 kn		Check that reporting interval = 6 s		Passed
Send assignment: Incr. = 2 (375 slots = 10 s)		Check that the assignment command is ignored	UTC 08:48 The autonomous reporting interval continues. Message type = 2 (see above)	Passed
Speed = 25 kn		Check that reporting interval = 2 s		Passed
Send assignment: Incr. = 4 (125 slots = 3 1/3 s)		Check that the assignment command is ignored	UTC 09:05 The autonomous reporting interval continues. Message type = 2 (see above)	Passed

The standard says (see above):
„the EUT transmits position reports Message 2 according to the parameters defined by Message 16 if the reporting interval of the assignment is shorter than the autonomous reporting interval“

Other way round this can be read as:
the EUT **does not transmit** position reports Message 2 according to the parameters defined by Message 16 if the reporting interval of the assignment is **not shorter** than the autonomous reporting interval“

Or from the receivers view: For the stations receiving message 1 and 2 it is not of interrest if they have received a message 16 which is ignored. It is of interest if the station is actually using an autonomous or assigned reporting interval, e.g. for calculation of the time-out of Radar system used as AIS display.

2014-04-04	**Tester: Ba**	**Test details:** a) Slot offset and increment, higher speed	
Test item	Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item			
Speed = 10 kn • Send assignment: Incr. = 2 (375 slots = 10 s)	Check that assignment command is executed with a reporting interval of 10 s	2014-05-16 Ba: UTC 13:44	Passed
• Increase speed to 15 kn	Check that EUT returns to autonomous mode with a reporting interval of 6 s	2014-05-16 Ba: UTC 14:46 SOG = 15 kn	Passed
Decrease speed to 10 kn	Check that the EUT returns to slot assignment after 3 min.	UTC 14:48 SOG = 10 kn - The EUT immediately returns to an autonomous interval (msg1) of 10 s - After 4 minutes the EUT continues with the slot assignment (or with the next msg 16 after 3 min) Retest 2014-07-08 Ba: • The EUT maintains the autonomous interval for 3 minutes. • Then it reschedules to a 10 s autonomous interval for 2 frames before it switches to the assigned interval. Retest 2014-08-19 Ba: Same behaviour, the EUT reschedules to a 10 s autonomous interval for 2 frames before it switches to the assigned interval. Retest 2014-09-16 Ba: • The EUT returns directly to the assigned interval. • It returns after 2 minutes instead of 3 minutes. Retest 2014-10-28 Ba: The EUT starts the procedure of rescheduling 2 min after speed change. Retest 2014-11-26 Ba: UTC 14:38 (Test 2) The EUT returns 3 min after speed change to slot assignment.	Passed
Speed = 15 kn • Send assignment: Incr. = 3 (225 slots = 6s)	Check that assignment command is executed with a reporting interval of 6 s		Passed
• Increase speed to 25 kn	Check that EUT returns to autonomous mode with a reporting interval of 2 s	Message type = 1	Passed

2014-05-16	**Tester: Ba**	**Test details:** a) Slot offset and increment, Nav status change	
Test item	Check	Remark	Result
Assignment message 16: Slot offset A = 40 Slot increment parameter = 3 (increment = 225 = 6 s).			
NavStatus = 0 Speed = 2 kn • Send assignment cmd	Check that assignment command is executed with a reporting interval of 6 s	UTC 13:55 The EUT is running 2 slot assignments in parallel (see <u>Retest 2014-07-08 Ba:</u> The new assignment with incr. 3 replaces the old assignment	Passed
In assigned mode: • change NavStatus to 1 (at anchor)	Check that the EUT maintains the assigned mode	UTC 14:05	Passed
NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd with increment = 1 (30s)	Check that assignment command is executed with a reporting interval of 30 s	UTC 14:13	Passed

2014-04-07	**Tester: Ba**	**Test details:** b) Rate assignment, course change		
Test item		Check	Remark	Result
Nav status = 0, Offset A = Reporting interval is set according to the test item				
Speed = 10 kn: Send assignment cmd Offset = 60 (10s)		Check that EUT changes to slot assigned mode with 10 s reporting interval		Passed
In assigned mode: • Change heading		Check that reporting interval is decreased to 3 1/3 s		Passed
		Check that 2 Message 3 are inserted between Message 2		Passed
		Check that message type of the basic message is 2		Passed
Speed = 10 kn: Send assignment cmd Offset = 100 (6s)		Check that EUT changes to slot assigned mode with 6 s reporting interval		Passed
In assigned mode: • Change heading		Check that reporting interval is decreased to 2 s		Passed
		Check that 2 Message 3 are inserted between Message 2		Passed
		Check that message type of the basic message is 2		Passed
Speed = 15 kn: Send assignment cmd Offset = 200 (3s)		Check that EUT changes to slot assigned mode with 3 s reporting interval		Passed
In assigned mode: • Change heading		Check that reporting interval is decreased to 1 s		Passed
		Check that 2 Message 3 are inserted between Message 2		Passed
		Check that message type of the basic message is 2		Passed

2014-04-09	**Tester: Ba**	**Test details:** b) Rate assignment, longer interval	
Test item	Check	Remark	Result
Nav status = 0, Slot Offset of message 16 according to the test item, Slot increment = 0			
Speed = 10 kn	Check that reporting interval = 10 s		Passed
Send assignment: Offset = 40 (15 s)	Check that the assignment command is ignored	UTC 10:42 The autonomous reporting interval continues. Message type = 2 (see above)	Passed
Speed = 15 kn	Check that reporting interval = 6 s		Passed
Send assignment: Offset = 60 (10 s)	Check that the assignment command is ignored	UTC 09:36 The autonomous reporting interval continues. Message type = 2 (see above)	Passed
Speed = 25 kn	Check that reporting interval = 2 s		Passed
Send assignment: Offset = 100 (6 s)	Check that the assignment command is ignored	UTC 09:27 The autonomous reporting interval continues. Message type = 2 (see above)	Passed

2014-04-04	**Tester: Ba**	**Test details:** b) Rate assignment, higher speed		
Test item		Check	Remark	Result
Nav status = 0, Offset of message 16 = 40, Slot increment according to the test item				
Speed = 10 kn • Send assignment: Offset = 60 (10 s)		Check that assignment command is executed with a reporting interval of 10 s	<u>Test 2014-07-10 Ba:</u> UTC 10:21	Passed
• Increase speed to 15 kn		Check that EUT returns to autonomous mode with a reporting interval of 6 s	UTC 10:24	Passed
• Decrease speed to 10 kn		Check that the EUT returns to the assigned reporting interval after 3 min.	UTC 10:27	Passed
Speed = 15 kn • Send assignment: Offset = 100 (6s)		Check that assignment command is executed with a reporting interval of 6 s		Passed
• Increase speed to 25 kn		Check that EUT returns to autonomous mode with a reporting interval of 2 s	The message type is rather confusing: In the first frame after rescheduling the message type is 1, In the next frame, after receiving a new Msg 16, it is changed to 2. The message type should be consistent, I would prefer message type 1 to indicate that the autonomous rate is performed. <u>Retest 2014-07-10 Ba:</u> The message type is 1 during the autonomous mode phase.	Passed
• Decrease speed to 15 kn		Check that the EUT returns to the assigned reporting interval after 3 min.	The EUT returns immediately to the assigned reporting interval. I think the general rule that a reporting rate continues for 3 min when the speed is reduced applies here also. <u>Retest 2014-07-10 Ba:</u> The EUT returns from 2 s interval after 3 minutes.	Passed

2014-05-16	**Tester: Ba**	**Test details:** b) Rate assignment, Nav status change		
Test item		Check	Remark	Result
Assignment message 16:				
NavStatus = 0 Speed = 2 kn • Send assignment cmd Offset = 100 (6 s)		Check that assignment command is executed with a reporting interval of 6 s		Passed
In assigned mode: • change NavStatus to 1 (at anchor)		Check that the EUT maintains the assigned mode		Passed
NavStatus = 1 (at anchor), speed = 2 kn • Send assignment cmd Offset = 20 (30 s)		Check that assignment command is executed with a reporting interval of 30 s		Passed

2.2.2.4 14.2.2.4 Static data reporting intervals

Method of measurement

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

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

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

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

Required results

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

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

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

2014-04-25	**Tester: Ba**	**Test details:** Static data reporting rates		
Test item		Check	Remark	Result
Record Message 5 and check repetition rate.				
Default update rate		Check that update rate is 6 min	See 16.6.5, 2014-04-04	Passed

a) Change static data using SSD sentence	Check that Message 5 is transmitted within 1 min	Message 5 is transmitted within 1 min. Message 5 is transmitted immediately using an unallocated slot. See Note) Retest 2014-07-10 Ba: Message 5 is transmitted after slot allocation by message 3	Passed
b) Repead SSD input with same data	Check that no Message 5 is transmitted		Passed
a) Change voyage related data using VSD sentence	Check that Message 5 is transmitted within 1 min	Message 5 is transmitted within 1 min. Message 5 is transmitted immediately using an unallocated slot. See Note) Retest 2014-07-10 Ba: Message 5 is transmitted after slot allocation by message 3	Passed
b) Repead VSD input with same data	Check that no Message 5 is transmitted		Passed
Change position source with different ref. point data (see 61993 6.10.3.4)	Check that Message 5 with ref point of new source is transmitted before next transmission of position report. Remark: if this is not done before next transmission of position report there will be a position jump on the display system of near targets.	Test has to be repeated when a) has been fixed Retest 2014-09-19 Ba: Message 5 is transmitted after slot allocation by message 3, that means about 10 to 20 s after change of position source, and not before the next position report after the change of position report. Retest 2014-10-08 Ba: UTC 14:58 No change Retest 2014-10-28 Ba: Message 5 is transmitted immediately after change of position source.	Passed

Note
Because there is 1 minute time for the transmission of message 5 the EUT should wait for the next position report and use a message 3 to allocate the slots for message 5.

This is different when the A, B, C and D values are changed which are currently in use.

The test with SSD was performed without changing the A,B,C and D values and also with a Source identifier currently not used for transmission (e.g. external position was in use but the SSD was with Source identifer AI)

2.3 14.3 Event log

(See 6.6)

Method of measurement

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

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

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

Required results

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

2014-05-12	**Tester: Ba**	**Test details:** Security		
Test item		Check	Remark	
Switch EUT off for 16 minutes and on again.				
Display of non-functioning times		Check that the non-functioning times are displayed	2014-05-07: Remark: There is a response on query for TRL	Passed
Read out recorded data		Check that all switch off times > 15min are correctly recorded	There is only one TRL line in response on a query. The power off date and time are “????”, the power on time is correct. It seems that only the last power on time is recorded and available for display Retest 2014-07-10 Ba: There are 10 lines, but only the latest power on time is recorded and output in line 1. All other data are set to 0 Retest 2014-08-19 Ba: No change, same behaviour Retest 2014-09-19 Ba: No change, same behaviour Retest 2014-10-23 Ba: The non-functining times are output correctly	Passed
If the EUT supplies a “silent mode” (no transmission)		Check that all silent mode times > 15min are correctly recorded	Test 2014-09-22 Ba: Silent mode applied via web interface.	Passed

2.4 14.4 Initialization period

(See 6.7)

Method of measurement

Set up standard test environment with all sensors available.

Switch on EUT with EUT operating in autonomous mode.

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

Required results

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

2014-04-04	**Tester: Ba**	**Test details:** Initialisation period		
Test item		Check	Remark	Result
Set up standard test environment with all sensors available.				
a) Switch on of EUT		Check that EUT starts transmission within 2 min		Passed
b) Switch off EUT for approx. 0.5 s		Check that EUT starts transmission within 2 min		Passed

2.5 14.5 Technical characteristics

(See 6.9)

2.5.1 14.5.1 Channel selection

Method of measurement

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

a) manually;

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

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

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

Record the VDL messages.

Required results

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

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

<table>
<tr><td>2014-05-27</td><td>Tester: Ba</td><td colspan="3">Test details: Channel selection</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Select channels and bandwidth according to the test items in a regional area around the actual position so that is in use.
The VDL analyser has to be switched to the selected channels.</td><td></td></tr>
<tr><td colspan="2" rowspan="3">a) Enter <u>manually</u>:
2 simplex channels
25 kHz spacing
25 kHz bandwidth</td><td>Check that channels are used</td><td>Remark:
Simplex channels are only accepted as 2 digit number (e.g. 68, 73). An input as 4 digit number (1068, 1073) is not accepted.
This should at least be mentioned in the manual.</td><td>Passed</td></tr>
<tr><td>Check TXT output at PI</td><td></td><td>Passed</td></tr>
<tr><td>Check ACA output at PI</td><td>There is an ACA output
The ACA output is incorrect.
The channel number is a 4 digit number according to IEC 61162-1
<u>Retest 2014-10-28 Ba:</u>
No change
<u>Retest 2014-11-26 Ba:</u>
I could not enter a simplex channel. It was either refused by the MKD (0068 or 68) or by the transponder (1068)
<u>Retest 2015-01-26 Ba:</u>
The input in the format xx and 00xx is accepted
Remark: The input in the format 10xx is refused by the MKD</td><td>Passed

Passed</td></tr>
<tr><td colspan="2" rowspan="4">b) Enter by <u>using Message 22 to an area</u>:
1 duplex channel
25 kHz spacing
25 kHz bandwidth</td><td>Check that channels are used</td><td></td><td>Passed</td></tr>
<tr><td>Check bandwidth</td><td></td><td>Passed</td></tr>
<tr><td>Check TXT output at PI</td><td></td><td>Passed</td></tr>
<tr><td>Check ACA output at PI</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="4">b) Enter by <u>using Message 22 MMSI addressed</u>:
1 duplex channel
25 kHz spacing
25 kHz bandwidth</td><td>Check that channels are used</td><td></td><td>Passed</td></tr>
<tr><td>Check bandwidth</td><td></td><td>Passed</td></tr>
<tr><td>Check TXT output at PI</td><td></td><td>Passed</td></tr>
<tr><td>Check ACA output at PI</td><td></td><td>Passed</td></tr>
</table>

c) Enter by ACA sentence: 2 duplex channel 25 kHz spacing Upper band channels	Check that channels are used		Passed
	Check bandwidth		Passed
	Check TXT output at PI		Passed
	Check ACA output at PI		Passed
d) Enter by DSC: 2 duplex channel 25 kHz spacing Lower band channels	Check that channels are used	Channel setting is not accepted. This is a general DSC problem Retest 2014-12-02 Ba: The channels are used	Passed
	Check bandwidth		Passed
	Check TXT output at PI	No TXT output Retest 2014-12-02 Ba: There is TXT output	Passed
	Check ACA output at PI	No ACA output Retest 2014-12-02 Ba: There is an ACA output	Passed

2.5.2 14.5.2 Transceiver protection

Method of measurement

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

Required results

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

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

2014-04-27	**Tester: Ba**	**Test details:** Transceiver protection		
Test item		Check	Remark	Result
Open circuit of VHF antenna terminal		Check that EUT starts transmission within 2 min after refitting the antenna	UTC 11:30	Passed
Short circuit of VHF antenna terminal		Check that EUT starts transmission within 2 min after refitting the antenna	UTC 11:41	Passed

2.5.3 14.5.3 Automatic power setting

Method of measurement

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

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

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

c) Change the NavStatus to underway.

Required results

Verify that

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

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

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

NOTE Other mechanisms for power setting are tested in 17.5

2014-05-07	**Tester: Ba**	**Test details:** Automatic power setting		
Test item		Check	Remark	Result
Ship type = "Tanker"				
SOG = 2 kn		Check that Tx power = 12.5 W		Passed
a) Nav status = 5 (moored)		Check that Tx power = 1 W		Passed
		Check that MKD displays low power setting	Test 2014-10-16 Ba: There is no indication of low power mode Remark: There is no standardized sentence on the PI interface which indicates low power to the MKD Retest 2014-12-02 Ba: No indication found Retest 2015-01-26 Ba: On the own vessel screen the power indication changes between high and low. There is no indication of low power on the main working screen (target list). Retest 2015-02-09 Ba: The AIS indicats "Low power mode" on the main screen, lower right corner.	Passed
b) Apply valid message 22 with high power setting, position inside		Check that Tx power = 1 W		Passed
		Check that MKD displays low power setting	Test 2015-02-09 Ba:	Passed
c) change nav status to 0 (under way)		Check that Tx power = 12.5 W		Passed
		Check that MKD does not display the low power mode	Test 2015-02-09 Ba:	Passed

2.6 14.6 Alarms and indicators, fall-back arrangements

(See 6.10)

2014-05-07	**Tester: Ba**	**Test details:** General alarm tests		
Test item		Check	Remark	Result
No alarm pending				
Alarm output repetition		Check that the ALR sentence output rate is not < 1 min	> 60 s	Passed

2.6.1 14.6.1 Loss of power supply

Method of measurement

Disconnect power supplies of the EUT.

Required result

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

2014-05-07	**Tester: Ba**	**Test details:** Loss of power supply	
Test item	Check	Remark	Result
Switch off power supply	Check that alarm relay output is active.		Passed

2.6.2 14.6.2 Monitoring of functions and integrity

2.6.2.1 14.6.2.1 T_X malfunction

Method of measurement

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

Required result

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

2015-05-04	**Tester: Ba**	**Test details:** Tx malfunction		
Test item		Check	Remark	Result
Check the manufacturer's documentation				
Transmitter shutdown function (4.1.5)		Check that documentation describes how the transmitter shutdown function works	<u>2015-05-18 Ba:</u> An e-mail dated 2015-05-18 describes the function. A circuit diagram of the connections of the FPGA which includes the shutdown funcktion has been provided	Passed
		Verify that the shutdown function is independent of the software control		Passed
		Check that an ALR 001 is output on PI		Passed
Transmitter malfunction (6.10.2.2)		Check that the documentation describes how the AIS detects Tx malfunction	A very short description is included in the manual. <u>2015-05-18 Ba:</u> It has more detailled been explained in an e-mail.	Passed
		Check that an ALR 001 is output on PI		Passed

2.6.2.2 <u>14.6.2.2 Antenna VSWR</u>

Method of measurement

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

Required result

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

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

<table>
<tr><td>2014-10-28</td><td>Tester: Ba</td><td colspan="3">Test details: Antenna VSWR</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Test with acknowledgement</td><td></td></tr>
<tr><td colspan="2" rowspan="3">Connect a mismatched dummy load with a VSWR of 3:1 to the VHF antenna terminal</td><td>Check that transmission continues</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR sentence ID 002 is output on PI</td><td>With 16 Ohm and 150 Ohm load at the antenna connector and at a 3 m coax cable (for VSWR 3:1) there was no ALR 002.
With an open antenna connector ALR 002 was active. The threshold seems to need justification
Retest 2014-07-10 Ba:
No change
Retest 2014-10-28 Ba:
ALR ID002 is activated</td><td>Passed</td></tr>
<tr><td>Check that the alarm relay is activated</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="2">Send an ACK sentence</td><td>Check that the alarm relay is deactivated</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR sentence is updated</td><td></td><td>Passed</td></tr>
<tr><td colspan="2">Reconnect a matching antenna</td><td>Check that ALR sentence is updated</td><td></td><td>Passed</td></tr>
<tr><td colspan="5">Test without acknowledgement</td></tr>
<tr><td colspan="2" rowspan="3">Connect a mismatched dummy to the VHF antenna terminal</td><td>Check that alarm relay activated</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR sentence is updated</td><td></td><td>Passed</td></tr>
<tr><td>Check that alarm is display on the MKD</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="3">Reconnect a matching antenna</td><td>Check that the alarm relay is deactivated</td><td></td><td>Passed</td></tr>
<tr><td>Check that ALR sentence is updated</td><td></td><td>Passed</td></tr>
<tr><td>Check that alarm display on the MKD is updated (the alarm indication is cleared)</td><td></td><td>Passed</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td></tr>
</table>

2.6.2.3 14.6.2.3 R_x malfunction

Method of measurement / Required result

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

2014-05-04	**Tester:**	**Test details:** R_x malfunction		
Test item		Check	Remark	Result
Check the documentation				
Detection of R_X malfunction		Check that documentation describes how the AIS detects R_x malfunction	A very short description is included in the manual	Passed
ALR output		Check that documentation describes that an ALR sentence with ID 003 (RX1), ID 004 (RX2) and ID 005 (DSC) is sent.		Passed

2.6.2.4 14.6.2.4 Loss of UTC

Method of measurement

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

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

b) *Reconnect the GNSS antenna.*

Required result

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

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

2014-05-07	**Tester: Ba**	**Test details:** UTC clock lost		
Test item		Check	Remark	Result
Disconnect GNSS antenna				
Continuation of operation		Check that transmission of position report continues	UTC 14:26	Passed
Synchronisation		Check that EUT switches to indirect synchronisation	Sync mode = 0 Remark: If the unit is started without GNSS the sync mode is 3 Retest 2014-07-10 Ba: Sync mode = 3	Passed
ALR output		Check that an ALR sentence with ID 007 is output at PI		Passed
Alarm relay		Check that the alarm relay output is		Passed

	activated		
Reconnect the GNSS antenna			
Synchronisation	Check that EUT changes sync state to UTC direct synchronisation	After start of EUT without GNSS	Passed
ALR output	Check that the ALR sentence with ID 007 is updated		Passed
Alarm relay	Check that the alarm relay output is deactivated		Passed

2.6.2.5 14.6.2.5 Remote MKD disconnection, when so configured

Method of measurement

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

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

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

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

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

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

Required result

Verify that:

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

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

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

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

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

2014-05-07	**Tester: Ba**	**Test details:** Remote MKD disconnection		
Test item		Check	Remark	Result
This test is applicable only with a remote or external MKD				
Disconnect the connection to the remote MKD.				
a) after two times the specified repeat interval defined in HBT plus 1 s:		Check that transmission continues	UTC 14:37 Retest 2014-09-17 Ba: UTC 11:56:04	Passed
		Check that the DTE flag in Message 5 is set to 1		Passed
		Check that ALR sentence ID 008 is output at PI	ALR ID 008 is not active Retest 2014-07-10 Ba: ALR ID 008 is not active Retest 2014-09-17 Ba: UTC 11:57:06 ALR ID 008 is active	Passed
		Check that alarm relay is activated	The alarm relay is not activated Retest 2014-09-17 Ba: The alarm relay is activated	Passed
b) Send an ACK sentence		Check that alarm relay deactivated	Retest 2014-09-17 Ba:	Passed
		Check that ALR sentence is updated		Passed
Apply SSD sentence with DTE flag set to 0 to the PI port		Check that the DTE flag in Message 5 is set to 0	DTE = 1 Retest 2014-09-17 Ba: DTE = 0	Passed
c) Reconnect MKD		Check that ALR sentence is updated		Passed
		Check that the DTE flag in Message 5 is set to 0		Passed
Apply SSD sentence with DTE flag set to 1 to the PI port		Check that the DTE flag in Message 5 is set to 0	DTE flag = 1 Retest 2014-10-28 Ba: UTC 09:48 DTE flag = 1 The DTE flag should not be set to 1 because the MKD is available and can display text messages. Retest 2014-11-26 Ba: UTC 15:05 No change, DTE flag = 1 Retest 2015-01-26 Ba: UTC 10:30 No change, DTE flag = 1 Retest 2015-02-09 Ba: UTC 13:29 DTE = 0	Passed

The following test items check how the DTE flag is affected by display equipment connected to the PI port. Disconnect the MKD for the following test items.			
d) Apply HBT sentence with status "Not ok" on the PI port	Check that transmission continues		Passed
	Check that the DTE flag in Message 5 is set to 1		Passed
	Check that ALR sentence ID 008 is output at PI		Passed
	Check that alarm relay is activated		Passed
e) Apply HBT sentence with status "Passed" on the MKD connection Apply SSD sentence with DTE flag set to 1 on the PI port	Check that the DTE flag in Message 5 is set to 1	DTE flag = 0 ALR ID 008 is inactivated Alarm relay is inactivated Retest 2014-10-28 Ba: Not changed Retest 2014-12-02 Ba: DTE = 1	Passed
Apply SSD sentence with DTE flag set to 0 to the PI port	Check that the DTE flag in Message 5 is set to 0		Passed

2.6.2.6 14.6.2.6 Status query

Method of measurement

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

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

Required result

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

2014-05-07	**Tester: Ba**	**Test details:** Status query		
Test item		Check	Remark	Result
Send a query sentence to the EUT ($xxAIQ,TXT).		Check that there is a TXT output for position status (ID21 ... 25)	ID 022	Passed
		Check that there is a TXT output for SOG/COG status (ID27,28)	ID 027	Passed
		Check that there is a TXT output for Heading status (ID31)	ID 031	Passed
		Check that there is a TXT output for ROT status (ID33, 34)	ID 033	Passed

2014-05-07	**Tester: Ba**	**Test details:** Version query		
Test item		Check	Remark	Result
Send a query sentence to the EUT ($xxAIQ,VER).		Check that the VER sentence is output in response to the query	There is no response Retest 2014-07-10 Ba: There is an VER output Retest 2014-08-18 Ba: There is no response Retest 2014-09-17 Ba: There is a response again	Passed
		Check the device type	AI	Passed
		Check the Vendor ID	Seatex	Passed
		Check the Unique identifier	211000001	Passed
		Check the Manufacturer serial number	141001	Passed
		Check the Model code	AIS300	Passed
		Check the Software revision	1.00.01.b18	Passed
		Check the Hardware revision	NBAIS-BA_@	Passed

Note)
In IEC 61993-2 Ed.2 there is a requirement to respond on a query for VER (7.6.3.4, Table 16) but there is no test for it.

Therefore I have added a test for VER query/ response at this place.

2.6.3 14.6.3 Monitoring of sensor data

2.6.3.1 14.6.3.1 Priority of position sensors

Method of measurement

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

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

a) external DGNSS in use (corrected);

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

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

d) external EPFS in use (uncorrected);

e) internal GNSS in use (uncorrected) if implemented

f) no sensor position in use

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

Required result

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

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

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

2014-05-07	**Tester: 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	UTC 14:55	Passed
		Check that position accuracy flag = 0		Passed
		Check that RAIM flag is according to internal sensor (= 1)	RAIM flag = 0 <u>Retest 2014-08-19 Ba:</u> RAIM flag = 1	Passed
		Check that msg 5 is output with new (internal) ref. point		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	<u>Retest 2014-10-13 Ba:</u> UTC 12:02 ID 25 Internal GNSS ID 27 External SOG/COG <u>Retest 2014-10-28 Ba:</u> UTC 10:03 ID 28: internal SOG/COG	Passed
		Check that status has been changed after 30 s	After 3 s. Accepted	Passed
d) Change from e: • Internal GNSS is available • Apply external GNSS input		Check that external position is used	UTC 14:56	Passed
		Check that position accuracy flag = 0		Passed
		Check that RAIM flag is according external sensor (= 0)		Passed

	Check that Message 5 is output with new (external) ref. point		Passed
	Check that ALR message with ID 025 is updated		Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI	Retest 2014-10-13 Ba: UTC 12:01 ID 22 External GNSS ID 28 Internal SOG/COG Retest 2014-10-28 Ba: UTC 10:07 ID 27: external SOG/COG	Passed
	Check that status has been changed after 30 s	Retest 2015-01-16 Ba: The status is changed after about 18 seconds Retest 2015-01-26 Ba: The status is changed after 30 seconds	Passed

a) Change from d: • Internal GNSS • Change external mode to DGNSS	Check that external position is used	UTC 14:57	Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 021 is output on PI		Passed
	Check that status has been changed after 30 s	Retest 2015-01-16 Ba: The status is changed immediately, within 1 s Retest 2015-01-26 Ba: The status is changed after 32 seconds	Passed
Highest Level: Changing downwards			
d) Change from a: • Internal GNSS available • Change external sensor mode to GNSS	Check that external position is used	UTC 14:58	Passed
	Check that position accuracy flag = 0		Passed
	Check that TXT sentence with ID 022 is output on PI		Passed
	Check that status has been changed after 5 s	Retest 2015-01-16 Ba: The status is changed immediately, within 1 s Retest 2015-01-26 Ba: The status is changed after 6 seconds	Passed
e) Change from d: • Internal GNSS available • Remove external GNSS input	Check that internal position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag is set according to documentation of internal GPS (= 1)	RAIM flag = 0 Retest 2014-08-19 Ba: RAIM flag = 1	Passed
	Check that msg 5 is output with new ref. point		Passed
	Check that ALR message with ID 025 (external EPFS lost) is output on PI		Passed
	Check that TXT sentence with ID 025 (position) and ID 028 (SOG/COG) is output on PI	Retest 2014-10-13 Ba: UTC 12:02 ID 25 Internal GNSS ID 27 External SOG/COG Retest 2014-10-28 Ba: UTC 10:08 ID 28: internal SOG/COG	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	Retest 2014-08-20 Ba: UTC 06:55 The EUT uses the last valid position with the last time stamp. Additionally there is a VDO output only every 2 s Retest 2014-09-19 Ba: The problem could not be reproduced, there was either a valid position with changing time stamp, or no position with time stamp = 63	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 status has been changed after 5 s		Passed

2014-09-19	**Tester: Ba**	**Test details:** Position priority: DGNSS test Message 17		
Test item		Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: no RAIM				
No correction data: Changing upwards				
d) Start with: • Internal GNSS is available • External GNSS input		Check that external position is used		Passed
		Check that position accuracy flag = 0		Passed
		Check that RAIM flag = 0		Passed
b) Change from d: • External mode is GNSS • Apply correction data by Message 17		Check that internal position is used	2014-05-07 Ba: External position is used. The EUT does not switch to internal DGNSS Retest 2014-08-19 Ba: Not changed Retest 2014-09-19 Ba: Internal position is used. Remark: Works only with RTCM message 1, not with message 9	Passed
		Check that position accuracy flag = 1		Passed
		Check that RAIM flag is set according to internal GNSS (= 1)		Passed

	Check that Message 5 is output with new (internal) ref. point	Retest 2015-01-26 Ba: Message 5 is transmitted 2 s after applying Message 17, but 28 s before the change of the sensor data source. So for 28 s the A,B,C,D values do not match the transmitted position reports Retest 2015-02-12 Ba: UTC 09:19 Same result, Messge 5 with internal A,B,C,D values is transmitted when the first message 17 is received. Retest 2015-02-24 Ba Message 5 is transmitted when the position is switched to internal DGNSS.	Passed
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI	Retest 2014-10-28 Ba: UTC 10:10, 10:24 There is no output of TXT ID 28, only ID 24 Retest 2014-11-26 Ba: UTC 15:08 There is no output of TXT ID 28, only ID 24 Retest 2015-01-16 Ba: UTC 13:28:13 There is an output of ID24 and 28	Passed
	Check that status is changed after 30 s	Retest 2015-01-16 Ba: The status is changed after about 7 s in one test and within 1 s in a second test Retest 2015-01-26 Ba: The status is changed after 31 seconds	Passed
a) Change from b: • Change external mode to DGNSS • Internal DGNSS	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

(Message 17)	Check that msg 5 is output with new (external) ref. point	<u>Retest 2015-02-12 Ba:</u> UTC 09:20 There is no message 5 with external A,B,C,D values <u>Retest 2015-02-24 Ba</u> Message 5 is transmitted when the position is switched to external DGNSS.	Passed
	Check that TXT sentence with ID 21 (position) and ID 27 (SOG/COG) is output on PI	<u>Retest 2014-10-28 Ba:</u> UTC 10:25 There is no output of TXT ID 27, only ID 21 <u>Retest 2014-11-26 Ba:</u> UTC 15:09 There is an output of TXT ID 27 at 15:09:02 when the internal SOG is still in use There is no TXT ID 27 at 15:09:30 when the external SOG/COG are used <u>Retest 2015-01-16 Ba:</u> UTC 13:37:01 There is a TXT ID 27 and ID 21	Passed
	Check that status display of MKD is updated according to TXT ID 21 and ID 27	<u>Retest 2014-11-26 Ba:</u> TXT ID 21 (position) is displayed correctly on the MKD The update of ID 27 cannot be checked because it was not updated to intern <u>Retest 2015-01-26 Ba:</u> The sensor status of ID27 was updated on the MKD	Passed Passed
	Check that status is changed after 30 s	<u>Retest 2015-01-16 Ba:</u> The status is changed immediately, within 2 s <u>Retest 2015-01-26 Ba:</u> The status is changed after 32 seconds	Passed

Highest Level: Changing downwards			
c) Change from a: • Internal DGNSS by Message 17 • Change external sensor mode to GNSS	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Transmission of message 5	Retest 2015-01-26 Ba: Message 5 is transmitted 2 s after changing external sensor to GNSS, but 5 s before the change of the sensor data source. There is one position report not matching the A,B,C,D values Retest 2015-02-12 Ba: UTC 09:21 Same result, Messge 5 with internal A,B,C,D values is transmitted 3 s after change of external sensor mode and 4 s before the actual change of the source. Retest 2015-02-24 Ba Message 5 is transmitted when the position is switched to internal DGNSS.	Passed
	Check that TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI	Retest 2014-10-28 Ba: UTC 10:26 There is no output of TXT ID 28, only ID 24 Retest 2014-11-26 Ba: UTC 15:10 There is no output of TXT ID 28, only ID 24 Retest 2015-01-16 Ba: UTC 13:30:01 TXT ID 28, use of external data UTC 13:30:04 TXT ID 24	
	Check that status is changed after 5 s	Retest 2015-01-16 Ba: The status is changed immediately, within 2 s Retest 2015-01-26 Ba: The status is changed after 6 seconds	Passed

d) Change from c: • External GNSS input • Remove Message 17 (correction data for Internal GNSS)	Check that external position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that PA flag is set according to external sensor input data (= 0)		Passed
	Check that Message 5 is output with new ref. point	Retest 2015-	Passed
	Check that TXT sentence with ID 022 (position) and ID 027 (SOG/COG) is output on PI	<u>Retest 2014-10-28 Ba:</u> UTC 10:11, 10:28 There is no output of TXT ID 27, only ID 22 <u>Retest 2014-11-26 Ba:</u> UTC 15:11 There is an output of TXT ID 27 and ID 22	Passed
	Check that status is changed after 5 s + max age of correction data	After 63 s	Passed

2014-09-19	**Tester: Ba**	**Test details:** Check of Message 17 from an non-base station MMSI		
Test item		Check	Remark	Result
Connect sensor inputs and correction data according to the test items.				
• External mode is GNSS • Apply correction data by Message 17 from a non-base station MMSI		Check that external position is used	Internal position is used The source MMSI seems not to be evaluated <u>Retest 2014-10-28 Ba:</u> External position is used	Passed
		Check that position accuracy flag = 0	= 1 <u>Retest 2014-10-28 Ba:</u> PA flag = 0	Passed
		Check that no TXT sentence with ID 024 (position) and ID 028 (SOG/COG) is output on PI	Output of TXT 24 and 28 <u>Retest 2014-10-28 Ba:</u> No TXT 24 and 28 output	Passed

2014-09-19	**Tester: Ba**	**Test details:** Position priority: DGNSS test beacon		
Test item		Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: No RAIM.				
No correction data: Changing upwards				
d) Start with: • Internal GNSS is available • External GNSS input		Check that external position is used		Passed
		Check that position accuracy flag = 0		Passed
		Check that RAIM flag = 0		Passed
c) Change from d: • External mode is GNSS • Apply correction data for DGNSS by beacon		Check that internal position is used	<u>2014-05-07 Ba:</u> UTC 15:06:44, 15:09:30 A soon as the RTCM data are applied the PI port output and the transmission of position report stops. The EUT performs a restart. The baud rate of the RTCM Data was correct. <u>Retest 2014-09-19 Ba:</u> Internal position is used	Passed
		Check that position accuracy flag = 1		Passed
		Check that Message 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
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 Message 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
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

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
Status change time	Check that status is changed after 5 s		Passed

2014-09-19	**Tester: Ba**	**Test details:** Position priority: DGNSS test beacon + Message 17		
Test item		Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01g_gll_vtg_gbs_hdt_rot.sst Internal GPS: RAIM, external: No RAIM.				
No correction data: Changing upwards				
d) Start with: • Internal GNSS is available • External GNSS input		Check that external position is used		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 Message 5 is output with new (internal) ref. point	<u>Retest 2015-02-12 Ba:</u> UTC 09:29 Messge 5 with internal A,B,C,D values is transmitted 28 s before the actual change of the source. <u>Retest 2015-02-24 Ba</u> Message 5 is transmitted when the position is switched to internal DGNSS (beacon).	Passed
	Check that TXT sentence with ID 023 (position) and ID 028 (SOG/COG) is output on PI	<u>Retest 2014-10-28 Ba:</u> UTC 10:34 There is no output of TXT ID 28, only ID 23 <u>Retest 2014-11-26 Ba:</u> UTC 15:27 There is no output of TXT ID 28, only ID 23 <u>Retest 2015-02-12 Ba:</u> There is an output of TXT ID 23 and 28	Passed
b) Change from c: • External mode is GNSS • Correction data for DGNSS by beacon • Apply Message 17 with correction data	Check that internal position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that TXT sentence with ID 024 is output on PI		Passed
a) Change from b: • Change external mode to DGNSS • Internal DGNSS (Message17)	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that Message 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
Status change time	Check that status is changed after 30 s	The status from Internal DGNSS (beacon) to Internal DGNSS (Msg 17) is changed after 2 s instead of 30s <u>Retest 2014-10-28 Ba:</u> The status is changed after 30 s.	Passed

Highest Level: Changing downwards			
b) Change from a: • Message 17 for internal DGNSS • Internal DGNSS by beacon • Change external sensor mode to GNSS	Check that internal position is used		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
c) Change from b: • External sensor mode is GNSS • Internal DGNSS by beacon • Stop Message 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	75 s after end of Message 17	Passed
		Retest 2015-02-12 Ba: UTC 09:34 The EUT to external data for about 30s. There is a message 5 with internal A,B,C,D value when switching to external data. Retest 2015-02-24 Ba The EUT does not switch to external data. Message 5 is not transmitted.	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 Message 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	63 s after end of beacon data	Passed
Status change time	Check that status is changed after 5 s		Passed

2.6.3.2 14.6.3.2 Multiple Message 17 from different DGNSS reference stations

Method of measurement

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

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

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

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

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

Required Result

Verify the following:

a) the use Message 17 for position determination;

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

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

2014-10-28	**Tester: Ba**	**Test details:** Multiple Messages 17	
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items.			
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
a) Change • External mode is GNSS • Apply correction data by Message 17 from a distant reference station	Check that internal position is used	UTC 11:36	Passed
	Check that position accuracy flag = 1		Passed
	Check that the reference station in use is the distant station		Passed
b) • Distant ref. station • Apply additionally correction data by Message 17 from a near reference station	Check that internal position is used	UTC 11:38	Passed
	Check that position accuracy flag = 1		Passed
	Check that the reference station in use is the near station		Passed
c) • Distant ref. station • Remove message 17 from the near reference station	Check that internal position is used	UTC 11:39	Passed
	Check that position accuracy flag = 1		Passed
	Check that the reference station in use is the distant station		Passed

2.6.3.3 14.6.3.3 Heading sensor

Method of measurement

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

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

b) Reconnect the inputs for HDG and ROT

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

d) Reconnect the ROT input

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

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

Required Result

Check that:

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

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

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

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

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

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

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

2014-05-08	**Tester: Ba**	**Test details:** Heading and ROT		
Test item		Check	Remark	Result
Connect Heading and ROT input according to test items.				
Start with: • Valid heading • Valid ROT		Check that heading and ROT are used in VDL message		Passed
		Check that alarm relay is inactive		Passed
		Check that no ALR output is active		Passed

a) Disconnect heading and ROT • No heading • No ROT	Check that heading in VDL = default		Passed
	Check that ROT in VDL = default		Passed
	Check that ALR message with ID 032 (heading invalid) is output on PI		Passed
	Check that ALR message with ID 035 (ROT invalid) is output on PI		Passed
	Check that alarm relay is active		Passed
b) Reconnect heading and ROT • Valid heading • Valid ROT	Check that heading in VDL ok		Passed
	Check that ROT in VDL ok		Passed
	Check that ALR message with ID 032 (heading valid) and status V is output on PI		Passed
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI		Passed
	Check that TXT message with ID 031 (Heading valid) is output on PI		Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI		Passed
	Check that alarm relay is inactive		Passed
c) Disconnect ROT • Valid heading • No ROT Change heading > 5 °/30s	Check that ROT in VDL is + 127 for increasing heading	At 20°/min the ROT is toggling between 0 and 127. At 18°/min (9°/30s) ROT = 0 Retest 2014-08-19 Ba: ROT = 127 for heading change > 10°/min	Passed
	Check that ROT in VDL is - 127 for decreasing heading	At -20°/min the ROT is toggling between 0 and -127. At -18°/min (9°/30s) ROT = 0 Retest 2014-08-19 Ba: ROT = -127 for heading change < -10°/min	Passed
	Check that TXT message with ID 034 (other ROT in use) is output on PI	Retest 2014-11-27 Ba: UTC 15:19 There is no TXT ID 34 output It seems that TXT ID 34 is output only when the position sensor is changed Retest 2015-01-26 Ba: TXT ID 34 is output	Passed

d) Reconnect ROT • Valid heading • Valid ROT	Check that ROT in VDL ok		Passed
	Check that ALR message with ID 035 (ROT valid) and status V is output on PI	No active ALR 035	Passed
	Check that TXT message with ID 033 (ROT in use) is output on PI	Retest 2014-11-27 Ba: UTC 15:20 There is no TXT ID 033 output Retest 2015-01-26 Ba: TXT ID 33 is output	Passed
	Check that alarm relay is inactive		Passed
e) Check of heading sensor offset SOG = 4 kn Difference SOG to Heading > 45° for > 5 min	Check that ALR 011 is not activated	UTC 09:10 Test has to be repeated when f) is ok Retest 2014-09-17 Ba: UTC 13:12	Passed
f) SOG = 6 kn Difference SOG to Heading = 40° for > 5 min	Check that ALR 011 is not activated	UTC 09:17 Test has to be repeated when f) is ok Retest 2014-09-17 Ba: UTC 12:25 ALR 011 is activated with COG = 350° and HDG = 1° (Diff. = 11°). Problem seems to be the transition from 359° to 0°. It seems to be calculated 350°-1° = 349° which is incorrect. Retest 2014-10-13 Ba: UTC 07:31 / 07:36 There is no ALR 011	Passed
f) SOG = 6 kn Difference SOG to Heading > 45° for >5 min	Check that ALR 011 is activated after 5 min	UTC 09:25 No active ALR 011 Retest 2014-08-19 Ba: UTC 07:18/07:23 No active ALR 011 Retest 2014-09-17 Ba: UTC 12:11 .- 12:16 ALR 011 is activated	Passed
	Check that the alarm relay is activated	Relay not activated Retest 2014-08-19 Ba: UTC 07:18/07:23 Relay is not activated Retest 2014-09-17 Ba: The alarm relay is activated	Passed

2.6.3.4 14.6.3.4 Speed sensors

Method of measurement

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

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

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

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

Required Result

Check that:

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

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

2014-05-08	**Tester: Ba**	**Test details:** Speed sensor		
Test item		Check	Remark	Result
Connect external speed sensor input according to test items. Internal GPS is available.				
a) Connect external 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
b) Disconnect external position and 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
		Check that TXT message with ID 028 (internal COG/SOG in use) is output on PI		Passed

2.6.3.5 14.6.3.5 GNSS position mismatch

Method of measurement

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

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

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

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

Required Result

The following checks need to be performed.

a) Check that no alarm sentence ALR is output.

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

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

2014-05-08 / **Tester: Ba**	**Test details:** GNSS position mismatch		
Test item	Check	Remark	Result
Valid internal GNSS and external position sensor data Dimension/Reference data: Distance between internal and external Position = 80 m			
Start with: • Internal GNSS • External GNSS input, distance < 170 m	Check that ALR sentence 009 is not output active	<u>Retest 2014-09-19 Ba:</u> Distance = 170 m: ALR is activated after 15 min <u>Retest 2014-10-28 Ba:</u> UTC 12:03 – 12:20 ALR 009 is not activated	Passed
a) for 3 minutes: • Change external positon to a distance > 190 m	Check that ALR sentence 009 is not active	UTC 09:39:08	Passed
a) for more than 15 minutes: • Change external positon to a distance > 190 m	Check that ALR sentence 009 is not output active for 15 minutes	UTC 09:54	Passed
	Check that ALR sentence 009 is output active after 15 minutes	UTC 09:59:51 ALR 009 is active after 20 min <u>Retest 2014-10-28 Ba:</u> UTC 12:20 – 12:35 ALR 009 is activated after 15 min	Passed

c) • Change external positon to a distance of 170 m	Check that ALR sentence 009 is updated to status "inactive"	UTC 10:39 distance = 170 m UTC 10:56 The ALR is still active After a restart the ALR is inactive. It seems the distance is calculated correctly but there is not event to inactivate the alarm. It seems the ALR 009 is also not inactivated when the EUT switches to internal position because the external position is not available Retest 2014-09-19 Ba: ALR is not deactivated, even with a distance of 0 m Waited for more than 18 min. The ALR should be immediately inactivated when the distance becomes < 100 m. Retest 2014-10-28 Ba: UTC 13:10 ALR 009 is inactivated	Passed

Note)
The test conditions of 14.6.3.5 do not consider the distance between internal and external reference position. So far the standard is incomplete.

But 6.10.3.5 clearly states *„greater than 100 m + distance between the two GNSS antennas*". Funtionally this is necessary, otherwise the ALR 009 would be always active on ships where the distance between the 2 antennas is > 100 m.

2.6.3.6 <u>14.6.3.6 Incorrect NavStatus</u>

Method of measurement

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

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

b) Repeat test with NavStatus "moored".

c) Repeat test with NavStatus "aground".

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

e) Try to set NavStatus to 14.

Required Result

Check that:

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

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

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

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

e) setting of NavStatus 14 is rejected.

2014-05-08	**Tester: Ba**	**Test details:** Incorrect Nav status	
Test item	Check	Remark	Result
Valid internal GNSS and external position sensor data NavStatus = 1 (at anchor) , SOG < 3 kn			
a) Set SOG = 4 kn	Check that ALR sentence 010 is output on PI port	UTC 13:22	Passed
	Check that the reporting interval is 10 s		Passed
	Check that the MKD prompts the user to correct the NavStatus	There is a popup window saying "Nav status incorrect". It would be better to ask the operator to change the Nav status. <u>Retest 2014-11-27 Ba:</u> After ok for the message window the screen to change the nav status is shown	Passed
Set SOG = 1 kn	Check that ALR sentence 010 updated to status "Inactive"		Passed
b) Set SOG = 4 kn Set NavStatus = 5 (moored)	Check that ALR sentence 010 is output on PI port		Passed
	Check that the reporting interval is 10 s		Passed
c) Set SOG = 4 kn Set NavStatus = 6 (aground)	Check that ALR sentence 010 is output on PI port		Passed
	Check that the reporting interval is 10 s		Passed
d) For more than 2 hours: Set SOG = 0 Set NavStatus to 0 (under way)	Check that there is no active ALR sentence 010 output for 2 hours	<u>Test 2014-05-15 Ba:</u> UTC 07:04 SOG = 0 UTC 09:04 ALR output	Passed
	Check that ALR sentence 010 is output on PI port after two hours		Passed
	Check that the reporting interval is 10 s		Passed
	Check that the MKD prompts the user to correct the NavStatus	<u>Test 2014-12-02 Ba:</u>	Passed

e) Try to set NavStatus to 14	Check that Navstatus cannot be set to 14	Setting a nav status of 14 is accepted Retest 2014-08-19 Ba: Nav status 14 is still accepted Retest 2014-09-17 Ba: • Nav status 14 is not accepted • But nav status 15 is also not accepted. There is no reason not to accept nav status 15. Retest 2014-10-16 Ba: Nav status 15 is accepted.	Passed

2.7 14.7 Display and control

(See 6.11)

2.7.1 14.7.1 Data input/output facilities

Method of measurement

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

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

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

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

d) Record transmitted messages and check contents of MKD.

Required results

Confirm that:

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

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

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

d) all transmitted data is displayed correctly.

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

2014-10-13	**Tester: Ba**	**Test details:** a) MKD size of display		
Test item		Check	Remark	Result
Target display lines				
a) Size of display		Check that at minimum 3 lines of target data are available		Passed
		Check that target range is displayed without horizontal scrolling		Passed
		Check that target bearing is displayed without horizontal scrolling		Passed
		Check that elapsed time of target is displayed without horizontal scrolling	It is not clear what the MKD actually displays, but it is not the elapsed time. Retest 2014-11-27 Ba: The elapsed time is displayed, either in seconds (if < 120s) or in minutes	Passed
6 bit character set		This is tested under c) Input static and voyage related data		N/A
b) display of received messages		The is tested in 14.7.5 (received targets) and 14.7.8 (received safety related messages.		N/A

2014-10-14	**Tester: Ba**	**Test details:** c) Input of data	
Test item	Check	Remark	Result
General problem	If more than one values are input one after the other the default value of the new input is not the existing value of current input field but the last input value of the previous input field. Therefore the default input value is in most cases inappropriate for the new input (e.g. "Hamburg" as default input for the ETA. This is very inconvenient for the operator and does not allow to check the input values once more when more than one value has been entered <u>Retest 2014-11-27 Ba:</u> Generally the existing value of the different field are displayed when entering the input of this field		Passed
MMSI number	Check that number can be input		Passed
IMO number	Check that number can be input		Passed
Call sign	Check that Call sign can be input		Passed
Name of ship	Check that name can be input		Passed
Navigational status	Check that data can be input		Passed
	Check if input by number or by selection of items	By selection of items	Passed
	Check that nav status 11 can be input.	<u>Test 2015-03-27 Ba:</u>	Passed
	Check that nav status 12 can be input.	<u>Test 2015-03-27 Ba:</u>	Passed
	If input by selection of items: Check that 14 for AIS SART can not be input		Passed
Type of ship and cargo	Check that data can be input		Passed
	Check if input by number or by selection of items	By selection of items	Passed
	If input by selection of items: Check that the new values for dangerous cargo (X, Y, Z, OS) are used for selection		Passed
Dimension/Reference for position	Check that data for internal EPFS antenna position can be input	Remark: Dim A... input is used for internal position	Passed
	Check that data for external EPFS position can be input	Loc A ... input is used for external position	Passed
Maximum static draught	Check that data can be input		Passed

Destination	Check that name of destination can be input		Passed
	Verify that all 64 characters of ITU-R M.1371-4 Table 44 can be input See a)	<u>Test 2014-10-15 Ba:</u> The following characters are not accepted: “,”, “^”, “!”, “$”, “*”, “?”. This are the reserved characters of IEC 61162-1. They have to be send by hex representation to the transponder as defined in IEC 61162-1 7.1.4 (“^hh”). The complete setting is not accepted, without any negative feedback. The not accepted text is still displayed on the MKD as long as the voyage data setting is not left. <u>Retest 2014-11-27 Ba:</u> The hex representation sequence is put directly into message 5.(e.g instead of a "," the string “^2C” is transmitted in message 5. With a VSD sentence at the PI port the transponder works correctly. E.g. “^2C” in the VSD sentence is “,” in message 5. It seems the evaluation of the hex representation sequences is not implemented at the MKD interface. <u>Retest 2015-01-26 Ba:</u> The ? is still not accepted. If there is a ? in the destination field the complete field is not accepted. <u>Retest 2015-02-09 Ba:</u> The ? is now accepted.	Passed
	Check that estimated time of arrival can be input	The input is very inconvenient because the operator does not see the input format. I propose to present the old ETA value in the required format as default value	Passed
Remark	The password protection of input is tested in 14.7.4 System control		N/A

2014-10-13	**Tester: Ba**	**Test details:** d) Display of transmitted data		
Test item		Check	Remark	Result
Dynamic data (Message 1,2,3)				
Update of data		I could not recognize the update strategy of the display of own data. Many fields are updated immediately, others seems to be updated never or under conditions which I could not identify. It should be consistant for the user. If the MKD is restarted it seems that it immediately gets dynamic data but never gets static and voyage related data. Even re-entering the screen, forcing SSD/VSD output and transmission of message 5 did not get the data on MKD. Only a restart of the transponder did get the data on the screen. Retest 2014-11-27 Ba: After restart of the MKD all data are available. If data are changed they are available after next message 5 or next opening of the own data display		Passed
Internal GNSS data		Check Position		Passed
		Check SOG/COG		Passed
		Check PA flag		Passed
		Check RAIM flag		Passed
External GNSS data		Check Position		Passed
		Check SOG/COG		Passed
		Check PA flag		Passed
		Check RAIM flag		Passed

Other dynamic data	Check navigational status		Passed
	Nav status, value 11 (ITU 1371-5)	Test 2015-03-27 Ba:	Passed
	Nav status, value 12 (ITU 1371-5)	Test 2015-03-27 Ba:	Passed
	Check Heading		Passed
	Check ROT	No Unit	Passed
	Check that the actual source is indicated (external/internal)	The external/ internal source indication is not updated correctly. Retest 2014-11-27 Ba: The sensor status fields are updated according to the TXT sentences from the transponder. It is not updated if e.g. the MKD is started. It seems that the MKD does not query the transponder for TXT. It should query the transponder at start of the unit and perhaps every time when entering the sensor status screen Retest 2015-01-26 Ba: The sensor status is set to the	Passed Passed
Static data (Message 5)			
Static data	MMSI		Passed
	IMO number		Passed
	Call sign		Passed
	Name of ship	The display field is too short, it displays only 12 of 20 characters Retest 2014-11-27 Ba: The name field has been extended and displays the full name	Passed
	Type of ship and cargo Check that the new categories according to Clar. 2.2 (X, Y, Z, OS) are displayed		Passed
	Dimension/Reference for position	Values are not updated when switching between external and internal.. It seems the MKD always shows the data used at power on of the transponder Retest 2014-11-27 Ba: Both the internal and external dim/ref data are displayed	Passed

	Type of EPFD, external position	"Internal GNSS" The field is not updated when the type of EPFD changes. <u>Retest 2014-11-27 Ba:</u> The type of EPFD is updated	Passed
	Type of EPFD, internal position (value = 15)	"Internal GNSS" The field is not updated when the type of EPFD changes. <u>Retest 2014-11-27 Ba:</u> The type of EPFD is updated	Passed
	Estimated time of arrival	"05.20 13:10"	Passed
	Maximum present static draught	The draught is rounded down to m resolution. (display: 11.0 instead of 11.5) <u>Retest 2014-11-27 Ba:</u> The draught is displayed in dm resolution (11.5m)	Passed
	Destination	The destination is not updated when it is changed. The display field is too short, Destinations longer than 20 characters overwrite the labels before and behind the destination field. This is different to the name of ship which is cut to 12 characters <u>Retest 2014-11-27 Ba:</u> The destination field has been extended to display the full destination. It is updated when it is changed, e.g. by VSD to the transponder	Passed
	DTE flag	=1, should be 0 when the MKD is connected This is a problem of the transponder, DTE flag in message 5 is also 1 <u>Retest 2014-11-27 Ba:</u> DTE = 0	Passed

2.7.2 14.7.2 Initiate message transmission

Method of measurement

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

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

Required results

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

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

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

2014-10-16 **Tester: Ba**	**Test details:** Message transmission		
Test item	Check	Remark	Result
Transmission of safety related broadcast message	Check selection between broadcast and addressed message	Selection field	Passed
	Check selection of T_X channel		Passed
	Check data input		Passed
	Check that pre-configured text messages are not available		Passed
	Check handling of invalid characters (e.g. lower case letters)	Only valid characters are available on the virtual keyboard	Passed
	Check display of transmission status (indication that message is transmitted)	There is no indication that the message has been transmitted. After pressing the "Send" button the message screen is closed. <u>Retest 2014-11-27 Ba:</u> No indication found <u>Retest 2015-01-26 Ba:</u> Indication of successful transmission	Passed
	Message length	If the message length, (header + text) does not match byte boundaries the last character of the text is not transmitted. See Note) <u>Retest 2014-11-27 Ba:</u> All characters are transmitted	Passed

Transmission of addressed safety related message	Check selection of T_X channel		Passed
	Check data input		Passed
	Check input of MMSI		Passed
	Note if selection of MMSI from received message (e.g. position report) is possible	Not possible	Passed
	Check that pre-configured text messages are not available		Passed
	Check display of transmission status (indication that message is transmitted and acknowledged)	The transmission status is not displayed, Retest 2014-11-27 Ba: No indication found Retest 2015-01-26 Ba: Indication of successful and failed delivery	Passed
	Message length	If the message length, (header + text) does not match byte boundaries the last character of the text is not transmitted. See Note) Retest 2014-11-27 Ba: All characters are transmitted	Passed
	Message list	The repetition of not acknowledged messages are listed as separate messages. This is not appropriate because it is one message. The operator should not be affected by AIS internal procedures. Retest 2014-11-27 Ba: The repeated messages are not listed as separate messages	Passed
Transmission of other messages	Check for a sample of Message 4, 16, 17, 18, 19, 20, 21, 22 that a transmission is not possible.	In addition to message 12 and 14 a message 6, DAC 001, FI 0 (text message) can be transmitted.	Passed

Note)
The message should be filled up with fill bits.
ITU-R M.1371 does not provide spare bits for message 12 and 14, but nevertheless it is not acceptable that not all characters typed in by the operator are transmitted.
In this case it is a problem of the MKD. A test with ABM/BBM at the PI port of the transponder showed that the transponder fills up the message to byte boundaries. So it seems the MKD cuts the message.

Different to binary message with a fixed structure it cannot be guaranteed that a message 12 and 14 matches byte bounderies because it depends on the number of characters typed in by the operator.

2.7.3 14.7.3 Communication test

Method of measurement

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

a) MKD using proposed target;

b) MKD using alternative target;

c) AIR sentence;

d) another transmitter (EUT as destination)

Required results

Confirm that:

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

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

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

d) the EUT transmits Message 11 as the response.

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

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

2014-10-14	**Tester: Ba**	**Test details:** Communicaton test		
Test item		Check	Remark	Result
a) Communication test using proposed target				
Activate Communication test on MKD Only a Class B SO target available		Check that no target is proposed		Passed
Successful test Activate Communication test on MKD Class A and Class B SO targets available Select the proposed target		Check that a Class A target is proposed	See Note 1) With 2 targets available, one with 1 NM range and one with 20 NM range the 20 NM target was proposed	Passed
		Check that Message 10 is transmitted		Passed
		Check content of Message 10		Passed
		Check VDO output of message 10		Passed
		Check VDM output of messages 11		Passed
		Check that the successful result is displayed on the MKD	Response received successfully	Passed
Unsuccessful test Activate Communication test on MKD Class A and Class B SO targets available Select the proposed target No response from target		Check that a Class A target is proposed		Passed
		Check that Message 10 is transmitted		Passed
		Check that there is no VDM output of messages 11		Passed
		Check that the unsuccessful result is displayed on the MKD	The result is not displayed After an appropriate time-out the unsuccessful result should be displayed. The normal operator is not aware of the response times in the communication test. <u>Retest 2014-11-27 Ba:</u> The EUT always displayed “Test timed out”. I could not get a message 11 accepted by the EUT. All message 11 were output correctly on the PI port but were not accepted for the test result <u>Retest 2015-01-26 Ba:</u> The EUT displays “Test timed out” in case of no response and “Response received successfully” in case of received response.	Passed

b) Communication test using alternate target			
Successful test Activate Communication test on MKD Class A and Class B SO targets available Select an alternate target	Check that a Class A target is proposed		Passed
	Check that it is possible to select an alternate target	From the list of received class A targets	Passed
	Check that Message 10 is transmitted		Passed
	Check content of Message 10, address = selected target		Passed
	Check VDO output of message 10		Passed
	Check VDM output of messages 11		Passed
	Check that the successful result is displayed on the MKD		Passed
Unsuccessful test Activate Communication test on MKD Class A and Class B SO targets available Select an alternate target No response from target	Check that a Class A target is proposed		Passed
	Check that it is possible to select an alternate target		Passed
	Check that Message 10 is transmitted to the selected target		Passed
	Check that there is no VDM output of messages 11		Passed
	Check that the unsuccessful result is displayed on the MKD	The result is not displayed <u>Retest 2014-11-27 Ba:</u> The EUT always displayed “Test timed out”, independent of success or not <u>Retest 2015-01-26 Ba:</u> The EUT displays “Test timed out” in case of no response and “Response received successfully” in case of received response.	Passed
c) Communication test using AIR input			
Apply an AIR sentence Requested message = 11	Check that Message 10 is transmitted	2014-05-27 Ba: UTC 12:30 Message 15 is transmitted <u>Retest 2014-09-22 Ba:</u> Message 10 is transmitted	Passed
	Check content of Message 10		Passed
	Check VDO output of message 10		Passed
	Check VDM output of messages 11		Passed
d) Communication test response			
Apply message 10 on VDL, addressed to the EUT	Check that Message 11 is transmitted	2014-05-27 Ba: UTC 12:32	Passed

Note 1)

For the communication test targets at a range of 15...25 NM should be preferred and therefore proposed by the AIS unit (See 61993-2 §6.11.2). In this range the test is only successful if the full transmission power and full sensitivity is available.

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

2.7.4 14.7.4 System control

Method of measurement

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

Required results

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

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

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

If two password levels are used (a higher level 1 to protect data according to section 6.11.4 and a lower level 2 for operational data), data which may be changed during normal operation should be protected by the level 2 password, not by the level 1 password.

A possible higher level than level 1 (manufacturer or engineering password) is not affected by this test.

2014-10-15	**Tester: Ba**	**Test details:** Password protection			
Input item		Level 1 Requirement	Level 2 Recommendation	Implemented type of protection	Result
Static data					
MMSI		Required	---		Passed
IMO-Number		Required	---		Passed
Call sign		Required	---		Passed
Name of ship		Required	---		Passed
Dimension/Reference for position		Required	---		Passed

Type of ship	Required	---	The type of ship is handled together with the type of dangerous cargo. To be able to handle the protection correctly the Type of ship should be input as part of the static data, and the type of dangerous cargo should be input as part of the voyage related data Retest 2014-11-27 Ba: The Type of cargo is input separately in the Voyage data. The ship type is password protected	Passed
Voyage data				
Navigational status	Not allowed	Not recommended	The voyage data are protected with the same password as the static data (see Note) Retest 2014-11-27 Ba: The Voyage data are not protected	Passed
Type of cargo	Not allowed	Not recommended		Passed
Destination	Not allowed	Not recommended		Passed
ETA	Not allowed	Not recommended		Passed
Maximum static draught	Not allowed	Not recommended		Passed
Persons on board	Not allowed	Not recommended		Passed

Other operational data				
Area settings	Not allowed	Recommended if a level 2 password is implemented.	The area settings are protected with the same password as the static data (see Note) Retest 2014-11-27 Ba: The area settings are not protected	Passed
Message transmission	Not allowed	Not recommended	Retest 2014-11-27 Ba: The message transmission is not protected	Passed
SART test mode	Not allowed	Not recommended	Retest 2014-11-27 Ba: The SART test mode is not protected (part of voyage data) The actual setting is not displayed. So there is no way to check which mode is active. Retest 2015-01-26 Ba: The actual SART mode is displayed	Passed Passed
Long range confirmation	Not allowed	Not recommended	Retest 2014-11-27 Ba: The long range confirmation is not protected	Passed
Configuration data				
Interface configuration	Required	---	Retest 2014-11-27 Ba: The interface configuration is protected	Passed
Message 27 tx channels	Required		Retest 2014-11-27 Ba: The message 27 channel configuration is protected Retest 2015-01-26 Ba: The actual setting displayed	Passed Passed
Change of passwords	Required (same password level)		Retest 2014-11-27 Ba: The password change is protected	Passed
Long range autoackn.	Not required	Recommended if a level 2 password is implemented.	The LR mode is not protected (part of the voyage data)	Passed

Note)
The static data which are input at installation time should not use the same password /password level as the voyage data.

The voyage data and other operational inputs like area settings, message transmission or SART test mode activation are part of the normal operation, that means, all operators on the bridge need access to it.

It the password for the operational data is the same as the password for the static data there is not protection of the static (installation) data because all operator know the password.

2014-10-15	**Tester:**	**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	Only one area is displayed on the MKD It seems to be the area which is output first on ACA query. Retest 2014-11-27 Ba: All 8 areas are displayed	Passed
		Check display of Channel A and B		Passed
		Check display of R_X/T_X mode		Passed
		Check display transmission power		Passed
		Check display of NE point of area		Passed
		Check display of SW point of area		Passed
		Check display of transitional zone		Passed
Entry of a new area		Check selection between changing an existing area and creating a new regional area entry	A new area can be created by klicking the “+”. The new area was stored (ACA output) but is not displayed in the list on the MKD and therefore is not accessible via MKD. The reason seems to be that the EUT generally displays only one area in the area list. Retest 2014-11-27 Ba: The new area is displayed in the area list	Passed
		Check input of Channel A and B		Passed
		Check input of R_X/T_X mode		Passed
		Check input transmission power		Passed
		Check input of NE point of area		Passed
		Check input of SW point of area		Passed
		Check input of transitional zone		Passed
		Check that the user has to confirm a second time that the new data shall be stored	No second confirmation is implemented Retest 2014-11-27 Ba: A second confirmation is required	Passed

Enter invalid channel	Check that entry is refused	The invalid channel is accepted on the MKD and displayed until the channel management screen is completely left. When trying to re-enter the channel management screen the MKD stops after entering the password and pressing ok. The invalid channel is not accepted by the transponder (ACA output) <u>Retest 2014-11-27 Ba:</u> The MKD displays: Channel A/B is not in valid range	Passed
Enter too small area (<20 NM)	Check that entry is refused	Similar to the channel, the invalid area is accepted on the MKD It is not accepted by the transponder <u>Retest 2014-11-27 Ba:</u> The MKD displays: Area is too small <20Nm	Passed
Enter too large area (> 200 NM)	Check that entry is refused	Similar to the channel, the invalid area is accepted on the MKD It is not accepted by the transponder <u>Retest 2014-11-27 Ba:</u> The MKD displays: Area is too large >200 Nm The invalid data are kept in the area definition on the MKD. When the Channel management screen is left and the “Channel Mgmt” button is pressed the MKD stops operation. Only a power cycle brings it back to operation. <u>Retest 2015-01-26 Ba:</u> The invalid data are removed. The MKD does not crash.	Passed Passed
Enter a region according to M.1371-1 A2/4.1 figure 4.1.5A (4 adjacent areas)	Check that entry is refused	Test 2014-11-27 Ba: The area is refused	Passed

Changing an existing area	Check that existing area for changes can be selected		Passed
	Check change of Channel A and B		Passed
	Check change of R_X/T_X mode		Passed
	Check change transmission power		Passed
	Check change of NE point of area		Passed
	Check change of SW point of area		Passed
	Check change of transitional zone		Passed
	The new values are not displayed in the area list before the Regions menu has been left and re-entered. <u>Retest 2014-11-27 Ba:</u> The new values are displayed in the area list.		Passed
	Check that the user has to confirm a second time that the new data shall be stored	No second confirmation implemented <u>Retest 2014-11-27 Ba:</u> A second confirmation is required	Passed
Changing of default values	Check that the default Channels (AIS1 and AIS2) cannot be changed without entering a complete area	There is no way to change the default channels without entering a complete area After changing the channels in an existing area (not in use) the MKD was stopped when re-entering the channel management screen. After a restart of the MKD it was possible to show the area setting. <u>Retest 2014-11-27 Ba:</u> The channels in an existing area could be changed to the default channels.	Passed Passed
	Check that the T_X/R_x mode cannot be changed without entering a complete area		Passed
	Check that the transmission power cannot be changed without entering a complete area		Passed
Erase of area settings	Check that areas cannot be deleted manually		Passed

2014-10-14	**Tester: Ba**	**Test details:** Alarms display		
ID	Test item	Check	Remark	Result
001	T_x malfunction	Check of documentation	Documentation required	Passed
002	Antenna VSWR exceeds limit	Check is done in 14.6.2.2		Passed
003	R_x channel 1 malfunction	Check documentation	Documentation required	Passed
004	R_x channel 2 malfunction	Check documentation	Documentation required	Passed
005	R_x channel 70 malfunction	Check documentation	Documentation required	Passed
006	General AIS failure	Check documentation	Documentation required	Passed
007	UTC sync invalid	Check is done in 14.6.2.4		Passed
008	MKD connection lost	Check is done in 14.6.2.5		Passed
009	Internal / external GNSS position mismatch	Check is done in 14.6.3.5		Passed
010	Nav status incorrect	Check is done in 14.6.3.6		Passed
011	Heading sensor offset	Check is done in 14.6.3.3		Passed
014	Active AIS SART	Check is done in 14.7.5	No Alarm because MKD blocks when SART message 1 is received Retest 2014-11-27 Ba: The MKD is not blocked and the alarm is displayed	Passed
025	External EPFS lost	Check is done in 14.6.3.1		Passed
029	No valid SOG information	Check is done in 14.6.3.4		Passed
030	No valid COG information	Check is done in 14.6.3.4		Passed
032	Heading lost/invalid	Check is done in 14.6.3.3	After inactivation of ALR 032 it is still displayed but with the number, text and time of another active alarm. When selected for ackn. the number 32 is displayed Retest 2014-11-27 Ba: The alarm ID 032 is removed but the last alarm of the list is still displayed even if it is not displayed. This can be also ALR ID 032. In a repetition of the test, after a restart of the MKD, all alarms were deleted. It seems this problem cannot reliable reproduced. Retest 2015-01-26 Ba: The problem could not be reproduced. All alarms are removed.	Passed
035	No valid ROT information	Check is done in 14.6.3.3		Passed

2014-11-27	**Tester: Ba**	**Test details:** Status display		
ID	Test item	Check	Remark	Result
21	External DGNSS in use	Check is done in 14.6.3.1	<u>2014-10-16 Ba:</u> There is no status display On the own data screen there is one field which displays the last received TXT message, but this is not a useful status display. The sensor status display has to display the actual status of - position (21...25) - SOG/COG (27,28) - Heading (31) - ROT (33,34 <u>Retest 2014-11-27 Ba:</u> There is a status display ID 21 is displayed correctly	Passed
22	External GNSS in use	Check is done in 14.6.3.1		Passed
23	Internal DGNSS in use (beacon)	Check is done in 14.6.3.1		Passed
24	Internal DGNSS in use (Message 17)	Check is done in 14.6.3.1		Passed
25	internal GNSS in use	Check is done in 14.6.3.1		Passed
27	External SOG/COG in use	Check is done in 14.6.3.4	This is normally not updated. It seems to be caused by the missing output of the transponder . If the transponder outputs TXT 027 it is displayed correctly. <u>Retest 2015-01-26 Ba:</u> SOG/COG is updated	Passed
28	Internal SOG/COG in use	Check is done in 14.6.3.4		Passed
31	Heading valid	Check is done in 14.6.3.3		Passed
33	Rate of Turn indicator in use	Check is done in 14.6.3.3		Passed
34	Other ROT source in use	Check is done in 14.6.3.3	Not displayed Reason is that the transponder does not output TXT ID 34 (see 14.6.3.3) <u>Retest 2015-01-26 Ba:</u> ROT source is updated	Passed

2.7.5 14.7.5 Display of received targets

Method of measurement

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

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

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

b) Remove all targets from VDL.

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

d) Switch off one AIS-SART.

e) Apply 200 targets to the EUT.

f) Apply 300 targets to the EUT.

Required results

The following results are required:

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

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

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

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

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

Confirm that all targets can be selected for detailed view.

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

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

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

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

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

e) Confirm that the MKD displays 200 targets.

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

2014-10-14	**Tester: Ba**	**Test details:** a) Display of target list	
Test item	Check	Remark	Result
Receive messages and check target list			
General requirements of the target list	Confirm that the targets (except SART) are displayed in an order according to the range, nearest target first		Passed
	Display target problems	2014-11-03 Ba: The MKD sometimes shows scrambled target lines (screen shots sent per E-mail dated 2014-11-03. <u>Retest 2014-11-28 Ba:</u> The problem still sometimes exist. A video will be provided. <u>Retest 2015-01-26 Ba:</u> The problem was not observed again	Passed

	Confirm that all targets can be selected for a detailled view -> The detailled view is checked in a separate list	If there are more than 22 targets only the first 22 targets can practically be seen and displayed in detail in most cases. If the screen is manually scroll down to see the more distant targets the screen is automatically scrolled up to update nearer targets when a new message from the nearer targets is received. <u>Retest 2014-11-27 Ba:</u> Not changed <u>Retest 2015-01-26 Ba:</u> ▪ The target list is not scrolled back to top when a target is updated by a new position report. ▪ It seems that the target list is still scrolled to top when a target is removed from the list (time-out). <u>Retest 2015-02-09 Ba:</u> The target list is not scrolled to the top	Passed
Message 1 + 5 Class A station, 10 s interval	Check that received target is displayed in the target list		Passed
	Name of ship		Passed
	Position (RNG, BRG)		Passed
	Time since last position report	Incorrect, see 14.7.1 <u>Retest 2014-11-27 Ba:</u> The time since last report is displayed correctly. It is displayed in seconds or minutes depending on the time value.	Passed

Message 2 + 5 Class A station, 3 min interval	Check that received target is displayed in the target list	Message 3 is not displayed Retest 2014-11-27 Ba: Message 3 is displayed	Passed
	Name of ship	From message 5	Passed
	Position (RNG, BRG)	Not displayed because message 3 seems not to be accepted. Retest 2014-11-27 Ba: The position is correct.	Passed
	Time since last position report	Incorrect, see 14.7.1 Retest 2014-11-27 Ba: The time since last report is displayed correctly.	Passed
Message 3 + 5 Class A station, 3 min interval	Check that received target is displayed in the target list	Message 3 is not displayed Retest 2014-11-27 Ba: Message 3 is displayed	Passed
	Name of ship	From message 5	Passed
	Position (RNG, BRG)	Not displayed because message 3 seems not to be accepted. Retest 2014-11-27 Ba: The position is correct.	Passed
	Time since last position report	Incorrect, see 14.7.1 Retest 2014-11-27 Ba: The time since last report is displayed correctly.	Passed
Message 4 Base station	Check that received target is displayed in the target list		Passed
	Name shall show: “BS:<MMSI>” or name from Msg 24A	: “BS:<MMSI>” is displayed Base station name from messages 24A is not displayed Retest 2014-11-27 Ba: The name from message 24A is displayed	Passed Passed
	Position (RNG, BRG)		Passed
	Time since last position report	Incorrect, see 14.7.1 Retest 2014-11-27 Ba: The time since last report is displayed correctly.	Passed

Message 9 + 5 Airborne station, 10 s interval	Check that received target is displayed in the target list	<u>Retest 2015-02-09 Ba:</u> The received message 9 was displayed in the list without any information (all fields "—" or "0"). The details view did also not show any valid values. Message 9 was repeated every 2 s. After applying message 9 from a different target both targets were displayed with full information (list and detailled view). The behaviour could not be reproduced. <u>Retest 2015-02-24 Ba:</u> In some retests message 9 was displayed correctly.	Passed
		If there is no other target each received message 9 is displayed in a new line. If there exist other targets in the list (tested with Message 1 and message 4) one of these targets is duplicated for each received message 9. <u>Retest 2014-11-27 Ba:</u> The SAR target is displayed in one line only	Passed
	Name shall show = "SAR"	I recommend to display, similar to the base station, '"SAR:<MMSI>". Otherwise different SAR targets cannot be differentiated in the list. <u>Retest 2015-02-25 Ba:</u> The MKD displays: SAR:<MMSI>	Passed
	Position (RNG, BRG)		Passed
	Time since last position report	Incorrect, see 14.7.1 <u>Retest 2014-11-27 Ba:</u> The time since last report is displayed correctly.	Passed

Message 18 + 19 Class B SO station, 30 s interval	Check that received target is displayed in the target list	Target list shows two lines with: 0.0m 0.0° 0 -- -- -- -- After a restart of the MKD the Class B target is displayed correctly. <u>Retest 2014-11-27 Ba:</u> One line with correct target data is displayed	Passed
	Name of ship	Shows “BSO:” without message 19 or 24. It should at least also show the MMSI. With message 19 it shows: “BSO:<Name>” <u>Retest 2014-11-27 Ba:</u> Without message 19 it displays BSO:<MMSI> With message 19 it displays BSO:<name>	Passed Passed
	Position (RNG, BRG)		Passed
	Time since last position report	Incorrect, see 14.7.1 <u>Retest 2014-11-27 Ba:</u> The time since last report is displayed correctly.	Passed
Message 18 + 24 Class B CS station, 3 min interval	Check that received target is displayed in the target list		Passed
	Name of ship	Only “BSO:” The name from message 24 A is not displayed <u>Retest 2014-11-27 Ba:</u> ▪ The name is displayed correctly ▪ but the leading “BSO” is incorrect for a Class B CS <u>Retest 2015-01-26 Ba:</u> A leading BSC is displayed for a Class B CS.	Passed Passed
	Position (RNG, BRG)	<u>Retest 2014-11-27 Ba:</u> RNG, BRG = 0, 0 <u>Retest 2015-01-26 Ba:</u> RNG and BRG is displayed correctly.	Passed
	Time since last position report	Incorrect, see 14.7.1 <u>Retest 2014-11-27 Ba:</u> The time since last report is displayed correctly.	Passed

Message 21 AtoN station, 1 min interval	Check that received target is displayed in the target list	Not displayed Retests 2014-11-28 Ba: Message 21 is displayed	Passed
	Name of AtoN station		Passed
	Position (RNG, BRG)		Passed
	Time since last position report		Passed
Message 1 + 14 SART under test, 1 TDMA burst SART test disabled	Check that received target is not displayed in the target list	Test 2014-11-28 Ba:	Passed
	Check that received message 1 s not output as VDM		Passed
	Check that message 14 is not displayed on the MKD		Passed
	Check that received message 14 is not output as VDM		Passed
Message 1 + 14 SART under test, 1 TDMA burst SART test enabled	Check that received target is displayed in the target list	Test 2014-11-28 Ba:	Passed
	Check that message 1 is output as VDM		Passed
	Name = “SART TEST”		Passed
	Position (RNG, BRG)		Passed
	Time since last position report		Passed
	Check that message 14 is output as VDM		Passed
	Check that message 14 is displayed on the MKD		Passed
Message 1 + 14 Active SART, 1 min reporting interval SART test disabled	Check that received target is displayed in the target list	The MKD is totally blocked short time after receiving the SART message A power cycle re-animates it. Retest 2014-11-28 Ba: No blocking, the SART is displayed	Passed
	Check that the SART is displayed on top of the list Range of other targets must be lower in the test.		Passed
	Check that ALR ID 014 is output on PI		Passed
	Name of ship = “SART ACTIVE”		Passed
	Position (RNG, BRG)		Passed
	Time since last position report		Passed
	Check that message 14 is output as VDM		Passed
	Check that message 14 is displayed on the MKD		Passed

2014-10-16	**Tester: Ba**	**Test details:** Target time-outs	
Test item	Check	Remark	Result
Receive messages and check target list			
b) Remove all targets from VDL	Confirm that the time of the last received message is counting down every minute for all targets	The time from last received message is not displayed. It seems that the time when the targed was received first, with an error of about 2 minutes, is displayed <u>Retest 2014-11-28 Ba:</u> The time of the last received message is counting down every minute for all targets	Passed
	Confirm that all targets except the active SART are removed from the list after 7 min.	UTC 09:16 Msg 1 stopped UTC 09:23 Msg 1 removed UTC 09:18 Msg 18 stopped UTC 09:25 Msg 18 removed <u>Retest 2014-11-28 Ba:</u> The SART in test mode is not removed after 7 min but after 18 min <u>Retest 2015-01-26 Ba:</u> The SART in test mode is removed after 7 min	Passed Passed
	Confirm that the active SART is not removed after 7 min	<u>Test 2014-11-28 Ba:</u> The active SART is not removed after 7 min	Passed
c) Apply again all targets after 17 min, without static data Messages 5, 19 and 24	Confirm that all targets are displayed again.	UTC 10:33 Msg 1 UTC 10:35 Msg 18 The targets are displayed again	Passed
	Confirm that all static data from all targets are displayed correctly	<u>Test 2014-11-28 Ba:</u> The static data are not displayed <u>Retest 2015-01-26 Ba:</u> The static data are displayed	Passed
d) Remove a SART from VDL	Confirm that the time from the last received message is counting down every minute for all targets	Has to be tested when the SART message does not block the MKD <u>Retest 2014-11-28 Ba:</u> The time of the last received message is counting down every minute for all targets	Passed
	Confirm that ALR 014 is deactivated	<u>Test 2014-11-28 Ba:</u> UTC 08:25:38	Passed
	Confirm that the SART is removed after 18 min	UTC 08:27	Passed

2014-10-14	**Tester: Ba**	**Test details:** Multiple targets		
Test item		Check	Remark	Result
Receive messages and check target list				
e) Apply 200 targets to the EUT		Confirm that 200 targets are displayed in the list		Passed
f) Apply 300 targets to the EUT		Confirm that at least the 200 nearest targets are displayed in the list	> 250 targets are displayed	Passed

2014-10-14	**Tester: Ba**	**Test details:** a) Detailed target view		
Test item		Check	Remark	Result
Receive messages and check display of data.				
Message 1,2,3 Class A station,		MMSI		Passed
		Position (LAT, LON)	Required	Passed
		Position quality acc. Table 8	Required Passed means that the position quality is displayed. If it is correct is evaluated in 14.7.6.	Passed
		SOG and COG		Passed
		True heading, ROT		Passed
		Navigational status		Passed
		Special manoeuvre indicator		Passed
Message 5 Display of static and voyage related ship data		IMO number		Passed
		Call sign		Passed
		Type of ship and cargo (With categories X, Y, Z, OS)		Passed
		Dimension/Reference for position		Passed
		Type of EPFD Verify value 15 for internal GNSS		Passed
		Estimated time of arrival		Passed
		Maximum present static draught	The draught is rounded down to 1 m resolution (e.g. 11.0 instead of 11.5). There is no reason for it. <u>Retests 2014-12-02 Ba:</u> The draught is displayed with dm resolution (e.g. 11.5)	Passed
		Destination		Passed
		DTE flag		Passed

Message 4 Base station report	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Required	Passed
Message 9 SAR aircraft position report	MMSI	= 0 <u>Retests 2014-12-02 Ba:</u> The MMSI is displayed correctly	Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Required	Passed
	SOG and COG SOG must be in kn, not 0.1 kn as in other message!	SOG is displayed in 1/10 kn COG is correct <u>Retests 2014-12-02 Ba:</u> The SOG is still displayed in 1/10 kn <u>Retest 2015-01-26 Ba:</u> The SOG is still displayed in 1/10 kn <u>Retest 2015-02-09 Ba:</u> The SOG is displayed in kn. <u>Retest 2015-02-26 Ba:</u> Only COG values < 36° are displayed. <u>Retest 2015-03-04 Ba:</u> All COG values are displayed correctly	Passed
	Altitude	Not displayed	---

Message 18,19 Class B position report - required -	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Required	Passed
	SOG and COG	Retest 2014-11-27 Ba: SOG and COG are not displayed (“---“) Retest 2015-01-26 Ba: SOG and COG are displayed	Passed
	True heading	“---“ Retest 2014-11-27 Ba: The heading is not displayed Retest 2015-01-26 Ba: The heading is displayed	Passed
	Name	“---“ Retest 2014-11-27 Ba: The name is displayed Retest 2015-01-26 Ba: The name displayed	Passed
	Type of ship and cargo	“---“ Retest 2014-11-27 Ba: Display: “Error” (value = 37) Retest 2015-01-26 Ba: The ship type is displayed	Passed
	Dimension/Reference for position	0, 0, 0, 0 Retest 2014-11-27 Ba: Display: 0, 18296, 241, 126 instead of 40, 30, 10, 5 Retest 2015-01-26 Ba: The dim/ref values are displayed	Passed
	Type of EPFD	Undefined Retest 2014-11-27 Ba: Empfy field Retest 2015-01-26 Ba: The type of EPFD is displayed	Passed
	DTE flag (Msg 19)/ Class B display flag (Msg 18)	= 0 Display flag of Msg 18 = 0 DTE flag of Msg 19 = 1 Retest 2014-11-27 Ba: Display: No It is set according to the DTE flag of Msg 19	Passed

Message 18,24 Class B CS	MMSI		Passed
	Position (LAT, LON)	Required	Passed
	Position quality acc. Table 8	Required	Passed
	SOG and COG	Retest 2014-11-27 Ba: SOG and COG are not displayed (“---“) Retest 2015-01-26 Ba: SOG and COG are displayed	Passed
	True heading	“---“ Retest 2014-11-27 Ba: The heading is not displayed Retest 2015-01-26 Ba: The heading is displayed	Passed
	Name	Retest 2014-11-27 Ba: Without msg 24: BSO:<MMSI> BSO is incorrect for a CS With msg 24 A: BSO:<name> The name is correct Retest 2015-01-26 Ba: For a Class B BSC is displayed	Passed Passed
	Type of ship and cargo	“---“ Retest 2014-11-27 Ba: Display: Pleasure craft	Passed
	Dimension/Reference for position	0, 0, 0, 0 Retest 2014-11-27 Ba: Displayed correctly	Passed
	Class B display flag (Msg 18)	= 0 (Display flag of Msg 18 = 0) Retest 2014-11-27 Ba: Display “No”, independent of the Display flag of message 18 Retest 2015-01-26 Ba: The display flag is set according to the display flag of Msg 18	Passed

<table>
<tr><td rowspan="9">Message 21
Aids to navigation report</td><td>MMSI</td><td>Not displayed
<u>Retest 2014-11-28 Ba:</u>
Message 21 is displayed</td><td>Passed</td></tr>
<tr><td>Name of AtoN</td><td>Only the name is displayed, the name extension is not displayed
<u>Retest 2015-01-26 Ba:</u>
▪ The name extension is displayed.
▪ The full name exceed the display field and overwrites a part of the field tilel.
▪ There is an space sign between the name field and the name extension.
<u>Retest 2015-02-09 Ba:</u>
▪ The name field has been extended. The name text does not exceed the name field.
▪ There is no space between the two parts.</td><td>Passed</td></tr>
<tr><td>Type of Aids to navigation</td><td></td><td>Passed</td></tr>
<tr><td>Position (LAT, LON)</td><td>Required</td><td>Passed</td></tr>
<tr><td>Position quality acc. Table 8</td><td>Required</td><td>Passed</td></tr>
<tr><td>Virtual/Pseudo AtoN flag</td><td></td><td>Passed</td></tr>
<tr><td>Dimension/Reference for position</td><td></td><td>Passed</td></tr>
<tr><td>Type of EPFD</td><td></td><td>Passed</td></tr>
<tr><td>Off position indicator</td><td>Required</td><td>Passed</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

2.7.5.1 Range and Bearing calculation

2014-10-14	**Tester: Ba**	**Test details:** Range and bearing values **Test 1: NE quadrant**		
Test item		Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.				
Own ship position on standard position in NE quadrant (Lat = 53°30 N Lon = 10° E				
Target in NE direction 54°00 N 010°30 E		Check range = 34.9 NM	34.9 Nm	Passed
		Check bearing = 30.6 °	30.5 °	Passed
Target in N direction 54°00 N 010°00 E		Check range = 30 NM	30.0 Nm	Passed
		Check bearing = 0°	0.0 °	Passed
Target in NW direction 54°00 N 009°30 E		Check range = 34.9 NM	34.9 Nm	Passed
		Check bearing = 329.4°	329.5°	Passed
Target in W direction 53°30 N 009°30 E		Check range = 17.8 NM	17.8 Nm	Passed
		Check bearing = 270°	270.2°	Passed
Target in SW direction 53°00 N 009°30 E		Check range = 35 NM	35.0 Nm	Passed
		Check bearing = 210.9°	211.2°	Passed
Target in S direction 53°00 N 010°00 E		Check range = 30 NM	30.0 Nm	Passed
		Check bearing = 180°	180°	Passed
Target in SE direction 53°00 N 010°30 E		Check range = 35 NM	35.0 Nm	Passed
		Check bearing = 149,1°	148.8°	Passed
Target in E direction 53°30 N 010°30 E		Check range = 17.8 NM	17.9Nm	Passed
		Check bearing 90°	89.8°	Passed

2014-10-14	**Tester: Ba**	**Test details:** Range and bearing values **Test 2: Lat=0°, Lon=180°**		
Test item		Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.				
Own ship position on standard position in NE quadrant (Lat = 00°00 N Lon = 179°59.9999 E/W)				
Target in NE direction		Check range = 42,4 NM	42.4 Nm	Passed
00°30 N 179°30 W		Check bearing = 45 °	45.2°	Passed
Target in N direction		Check range = 30 NM	29.9 Nm	Passed
00°30 N 179°59.9999 W		Check bearing = 0°	0.0°	Passed
Target in NW direction		Check range = 42.4 NM	42.4 Nm	Passed
00°30 N 179°30 E		Check bearing = 315°	314.8°	Passed
Target in W direction		Check range = 30 NM	30.1 Nm	Passed
00°00 N 179°30 E		Check bearing = 270°	270.0°	Passed
Target in SW direction		Check range = 42.4 NM	42.4 Nm	Passed
00°30 S 179°30 E		Check bearing = 225°	225.2°	Passed
Target in S direction		Check range = 30 NM	29.9 Nm	Passed
00°30 S 179°59.9999 E		Check bearing = 180°	180.0°	Passed
Target in SE direction		Check range = 42.4 NM	42.4 Nm	Passed
00°30 S 179°30 W		Check bearing = 135°	134.8°	Passed
Target in E direction		Check range = 30 NM	30.1 Nm	Passed
00°00 S 179°30 W		Check bearing 90°	90.0°	Passed

2014-10-14	**Tester: Ba**	**Test details:** Range and bearing values **Test 3: SW quadrant**		
Test item		Check	Remark	Result
Receive position report from special positions and check displayed range and bearing data.				
Own ship position on standard position in NE quadrant (Lat = 30°30S Lon = 012°00 W)				
Target in NE direction		Check range = 39.6 NM	39.6 Nm	Passed
30°00 S 11°30 W		Check bearing = 40.8°	41.1°	Passed
Target in N direction		Check range = 30 NM	29.9 Nm	Passed
30°00 S 12°00 W		Check bearing = 0°	0.0°	Passed
Target in NW direction		Check range = 39.6 NM	39.6 Nm	Passed
30°00 S 12°30 W		Check bearing = 319.2°	318.9	Passed
Target in W direction		Check range = 25.8 NM	25.9 Nm	Passed
30°30 S 12°30 W		Check bearing = 270°	269.9°	Passed
Target in SW direction		Check range = 39.6 NM	39.6 Nm	Passed
31°00 S 12°30 W		Check bearing = 220.7°	220.7°	Passed
Target in S direction		Check range = 30 NM	29.9 Nm	Passed
31°00 S 12°00 W		Check bearing = 180°	180.0°	Passed
Target in SE direction		Check range = 39.6 NM	39.5 Nm	Passed
31°00 S 11°30 W		Check bearing = 139.3°	139.3°	Passed
Target in E direction		Check range = 25.8 NM	25.9 Nm	Passed
30°30 S 11°30 W		Check bearing 90°	90.1°	Passed

2.7.6 14.7.6 Display of position quality

Method of measurement

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

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

a) *Time stamp = 63;*

b) *Time stamp = 61;*

c) *Time stamp = 62;*

d) *Time stamp = 60*

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

f) *PA = 0, RAIM = 1;*

g) *PA = 1, RAIM = 0;*

h) *PA = 1, RAIM = 1;*

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

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

Required results

Confirm that:

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

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

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

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

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

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

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

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

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

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

2014-10-14	**Tester: Ba**	**Test details:** Display of position quality	
Test item	Check	Remark	Result
Apply message 1 with settings according to the test item			
a) Time stamp = 63	Check position quality = “No position”	No position	Passed
b) Time stamp = 61	Check position quality = “Manual position”	Manual pos	Passed
c) Time stamp = 62	Check position quality = “Dead reakoning position”	Dead reakoning	Passed
d) Time stamp = 60	Check position quality =“valid position with no time stamp”	“Outdated > 200m” The reason may be that the MKD has a wrong time (about 3 min later) <u>Retest 2014-11-28 Ba:</u> “Valid pos no TS”	Passed
e) Time stamp = 0..59, PA = 0, RAIM = 0	Check position quality =“Position > 10m”	“Outdated > 200m” <u>Retest 2014-11-28 Ba:</u> “Pos > 10m”	Passed
f) Time stamp = 0..59, PA = 0, RAIM = 1	Check position quality =“Position with RAIM > 10m”	“Outdated > 200m” <u>Retest 2014-11-28 Ba:</u> “Pos RAIM > 10m”	Passed
g) Time stamp = 0..59, PA = 1, RAIM = 0	Check position quality =“Position <= 10m”	“Outdated > 200m” <u>Retest 2014-11-28 Ba:</u> “Pos < 10m”	Passed
h) Time stamp = 0..59, PA = 1, RAIM = 1	Check position quality =“Position with RAIM <= 10m”	“Outdated > 200m” <u>Retest 2014-11-28 Ba:</u> “Pos RAIM < 10m”	Passed
i) SOG = 10 kn Stop transmission	Check that 40 s after stop of transmission position quality = “Outdated position > 200 m”	Has to be tested when e) to h) are ok <u>Test 2014-11-28 Ba:</u> “Outdated > 200m”	Passed
j) SOG = 20 kn Stop transmission	Check that 20 s after stop of transmission position quality = “Outdated position > 200 m”	<u>Test 2014-11-28 Ba:</u> “Outdated > 200m”	Passed

2.7.7 14.7.7 Display of targets if optional filter is implemented

Method of measurement / Required results

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

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

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

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

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

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

There is no target filter implementation

2.7.8 14.7.8 Display of received safety related messages

Method of measurement

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

a) Transmit 20 Message 12 addressed to the EUT.

b) Acknowledge displayed message on the MKD.

c) Transmit 20 Message 12 addressed to the EUT.

d) Transmit Message 14.

Required results

Confirm that:

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

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

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

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

2014-10-14	**Tester: Ba**	**Test details:** Multiple safety related text messages		
Test item		Check	Remark	Result
Transmit addressed safety related text message (Msg 12) to the EUT and evaluate display				
a) Transmit 20 Message 12		Check that all 20 messages are available for display	Retest 2014-11-28 Ba: Only the latest message is available for display. The text of all message is similar but not identical. It is not sufficient to check the MMSI for message repetition. The complete message including the full text has to be verified. Retest 2015-01-26 Ba: All 20 Messages are displayed.	Passed
		Check that the most recently received Message 12 is displayed foremost	The most recently received message 12 is displayed at the end of the list. There is no indication on the main screen that there is a new message Retest 2014-11-28 Ba: There is a bright star on the letter symbol in the upper right corner Retest 2015-01-26 Ba: The most recently received message is display on top of the list.	Passed
b) Acknowledge the displayed message		Check that the message is removed from the foremost display	The “New” marking is removed. The place in the list is not changed Retest 2015-01-26 Ba: The acknowledged message is not removed from top of the list. This seems to be appropriate for practical use. A re-ordering of the message would be confusing	Passed

c) Transmit further 20 Message 12	Check that all new 20 messages are available for display		Passed
	Check that the most recently received Message 12 is displayed foremost	The most recently received message 12 is displayed at the end of the list. The last received message is not visible if there are more than 22 messages on the screen <u>Retest 2014-11-28 Ba:</u> Has to be retested when all messages are displayed again. <u>Retest 2015-01-26 Ba:</u> If more than 20 messages are received the addition of the new messages does not work properly. E.g. the new message is displayed in more than one line, overwriting the existing messages. This happend when the last messages had been acknowledged and one message (no. 16) had been removed. <u>Retest 2015-02-09 Ba:</u> The MKD displayed all 40 message correctly	Passed
d) Filter criteria	Check that there is an indication that the Message 14 has been received	There is no indication that a message has been received, not for message 12 and not for message 14.. <u>Retest 2014-11-28 Ba:</u> There is a bright star on the letter symbol in the upper right corner	Passed
	Check that the Message 14 is available for display		Passed

2.7.9 14.7.9 Presentation of navigation information

Method of measurement / Required results

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

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

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

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

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

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

There is no graphical display of the targets

2.7.9.1 CPA/ TCPA alarm

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

CPA/ TCPA alarming is not implemented

3 15 Physical tests

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

4 16 Specific tests of link layer

(See 7.3)

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

4.1 16.1 TDMA synchronisation

4.1.1 16.1.1 Synchronisation test using UTC

Method of measurement

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

a) UTC direct;

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

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

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

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

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

Required result

The following results are required:

a) transmitted communication state shall fit the synchronisation mode;

b) the EUT shall synchronise to the other station;

c) the EUT shall go to syncstate 3.

d) the SynchState = 2;

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

2014-05-08	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn				
To c) Start EUT without GPS		Check that the EUT does not have correct UTC date and time	UTC 13:30 The EUT outputs the default date and correct UTC time	Passed
Apply a base station with UTC (msg 4) to VDL		Check that the EUT derives the correct UTC date and time from Message 4	The UTC date is still default. It is not derived from message 4 <u>Retest 2014-07-10 Ba:</u> The UTC date is derived from message 4	Passed
a)	Operate with GPS	Check that sync state is 0 (UTD direct)	Sync state = 0	Passed
		Check that report rate is 10 s		Passed
b)	Disable GPS by disconnection of GPS antenna, at least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect	Sync state = 1 After removing the sync source the sync state remains in sync state 1. Checked for at least 30 min. The sync timing was drifting away during this phase which indicates that there was no synchronisation. <u>Retest 2014-07-10 Ba:</u> Sync mode = 3 within a few seconds	Passed Passed
		Check that report rate is 10 s		Passed
c)	GPS disabled, one base station with UTC direct within range	Check that sync state is 1 (UTC indirect)		Passed
		Check that report rate is 10 s		Passed
d)	GPS disabled, one base station without GPS within range	Check that sync state is 2 (base station indirect)	UTC 13:50	Passed
		Check that report rate is 10 s	Reporting interval = 10s	Passed

Remove base station	Check sync state = 3	UTC 13:53 Sync state = 2 Checked for 10 min Retest 2014-07-10 Ba: UTC 12:19 Sync mode = 3 after about 45s	Passed
	Check reporting interval = 10 s	Reporting interval = 2 s Retest 2014-07-10 Ba: Reporting interval = 2 s. Checked for 10 min UTC 12:30 Retest 2014-08-18 Ba: UTC 12:19 Reporting interval = 2 s, until 12:32 Retest 2014-09-17 Ba: Reporting interval = 10 s	Passed
	Enable GPS	30 s after enabling GPS the EUT outputs for about 30 s up to 8 VDOs per second, instead of 1 VDO per second Retest 2014-08-18 Ba: UTC 12:25 No additional VDO outputs	Passed
e) GPS disabled, Class B SO with UTC direct within range	Check that sync state is 3 (no UTC source)	UTC 14:10 Sync state = 1 Retest 2014-07-10 Ba: UTC 13:07 Sync state = 3	Passed
	Check that EUT does not syncronize to the Class B	EUT remains at an offset of 18 ms	Passed

4.1.2 16.1.2 Synchronisation test using UTC with repeated messages

Method of measurement

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

a) UTC direct;

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

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

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

Required results

The following results are required:

a) transmitted communication state shall fit the synchronisation mode;

b) the EUT shall synchronise to the other station;

c) the EUT shall go to syncstate 3.

2014-07-10	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn				
a)	Operate with GPS	Check that sync state is 0 (UTD direct)		Passed
b)	Disable GPS, At least one other AIS transponder with UTC direct	Check that sync state is 1 (UTC indirect		Passed
c)	GPS disabled, at least one other AIS station with UTC direct within range, RI = 1	Check that sync state is 3	Sync state = 1 <u>Retest 2014-08-18 Ba:</u> Sync state = 1 <u>Retest 2014-09-17 Ba:</u> Sync state = 3	Passed
		Check that report rate is 10 s		Passed

4.1.3 16.1.3 Synchronisation test without UTC, semaphore

Method of measurement

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

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

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

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

Required results

Transmitted CommState shall fit the synchronisation mode. Check that

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

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

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

2014-07-10	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate EUT without GPS, other transponders all without GPS, SOG = 10 kn a) different number of received stations				
EUT has highest number of received stations		Check that sync state is 3		Passed
		Check that report rate is 2 s	Reporting interval = 2s After 2 min Retest 2014-09-17 Ba: Reporting interval = 10s, observed for 5 min Remark: EUT has also the lowest MMSI Retest 2014-10-28 Ba: Reporting interval = 2 s Retest 2014-11-27 Ba: UTC 07:55 to 08:44 The EUT continues 10 s reporting interval. Conditions: Number of received stations: EUT:2 Other: 0 and 1 MMSI: EUT has lower MMSI Retest 2015-01-27 Ba Reporting interval = 2s	Passed

Apply another station with higher number of received stations than EUT	Check that sync state is 3	UTC 13:19:30	Passed
	Check that report rate changes to 10 s after 3 min	The EUT remains at 2 s reporting interval for 10 min instead of 3 min Retest 2014-10-28 Ba: UTC 13:28 The EUT remains at 2 s reporting interval for 3 after receiving message 1 from the other station with higher number of received stations.	Passed
Stop the other station	Check that the report rate remains at 10 s.	UTC 13:30 The EUT switches to 2 s interval for 10 minutes Retest 2014-10-28 Ba: UTC 13:30 EUT remains at 10s interval	Passed
b) Same number of received stations			
EUT has lowest MMSI	Check that sync state is 3	UTC 13:45	Passed
	Check that report rate is 2 s		Passed
Apply another station with lower MMSI than EUT	Check that sync state is 3	UTC 13:50	Passed
	Check that report rate changes to 10 s after 3 min	UTC 13:52: Number of received station equal for both stations. After 10 min the reporting interval is still 2 s Retest 2014-09-17 Ba: UTC 14:00 Other station with lower MMSI UTC 14:03 Number of received station equal UTC 14:13 Reporting interval is still 2 s. Stop of test Retests 2014-10-29 Ba: UTC 07:30 Other station with lower MMSI UTC 07:33 Number of received station equal UTC 07:38 Reporting interval = 10 s (not semaphore)	Passed

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

4.1.4 16.1.4 Synchronisation test without UTC

Method of measurement

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

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

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

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

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

Required results

The following results are required:

a) transmitted communication state shall fit the synchronisation mode;

b) transmitted communication state shall fit the synchronisation mode;

d) synchronisation mode shall revert to UTC direct

2014-07-11	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Operate the EUT in an environment according to the test items and check the synchronisation state. Speed = 10 kn				
a)	Disable GPS, one mobile station with sync mode 2 within range	Check that sync state is 3 (base station indirect)	UTC 06:48	Passed
		Check that report rate is 10 s		Passed
	GPS disabled, remove mobile station	Check that sync state is 3 (no UTC source)	UTC 06:48	Passed
b)	Operate without GPS, other transponders all without GPS, not semaphore[1)]	Check that sync state is 3	UTC 06.53	Passed
		Check that report rate is 10 s		Passed
c)	Enable GPS, other transponders all without GPS	Check that sync state is 0		Passed
		Check that report rate is 10 s		Passed

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

4.1.5 16.1.5 Reception of un-synchronised messages

Method of measurement

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

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

Required results

Verify that the transmitted test messages are received and processed

2014-05-08	**Tester: Ba**	**Test details:** a) Receive un-synchronised messages		
Test item		Check	Remark	Result
Apply position reports with a timing offset of more than +/- 10 ms				
Received targets		Check that the received targets are continously output as VDM	UTC 13:33	Passed

4.2 16.2 Time division (frame format)

Method of measurement

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

Required results

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

2014-04-02	**Tester: Ba**	**Test details:** TDMA Synchronisation		
Test item		Check	Remark	Result
Check the data recorded in 2.2.2.1 14.2.2.1 Speed and course change according to the test items. Check the frames with 2 s reporting rate.				
Slot number		Check that slot number used and slot number indicated in CommState match		Passed
Slot count		Check that slot number does not exceed 2249		Passed
Slot length		Check that slot length does not exceed 26,67 ms		Passed

4.3 16.3 Synchronisation and jitter accuracy

Definition

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

Method of measurement

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

a) UTC direct synchronisation,

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

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

Required results

The synchronisation, including its jitter, shall not exceed

a) ±104 μs using UTC direct synchronisation,

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

2014-04-04	**Tester: Ba**	**Test details:** Synchronisation jitter		
Test item		Check	Remark	Result
Operate device at 25 kHz bandwidth at a reporting rate of 2 s (speed = 25 kn). Check the slot start time T2 using the VDL analyser.				
UTC direct		Check that T2 is in the range of 3.328 ms +/- 0.108 ms		Passed
UTC indirect		Check that T2 is in the range of +/- 0.312 ms compared to the T2 value of the sync source	<u>Test 2014-04-09 Ba:</u> The transmissions of the EUT are about 0,15 ms earlier than the sync source. This is within the limits but I recommend to adjust this offset. <u>Retest 2015-02-25 Ba:</u> The sync mode 1 has the correct timing	Passed

4.4 16.4 Data encoding (bit stuffing)

Method of measurement

Setup standard test environment as follows:

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

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

Required results

Confirm that

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

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

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

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

2014-05-08 **Tester: Ba**	**Test details:** Data encoding (bit stuffing)		
Test item	Check	Remark	Result
File name for BBM sentence: AIBBM_bin_stuffing.sst			
a) R_X of BBM message Transmit Message 8 from VDL generator	Check that VDM is according transmitted data		Passed
b) T_X of BBM message Apply BBM sentence to the PI	Check that VDO output of PI is according to BBM sentence		Passed
	Check that the VDL message is according to BBM		Passed

4.5 16.5 Frame check sequence

Method of measurement

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

Required results

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

2014-05-19	**Tester: Ba**	**Test details:** Frame check sequence		
Test item		Check	Remark	Result
Transmit position report message from VDL generator.				
Set CRC bit sequence to ok		Check that the target is displayed on the MKD	Test 2014-10-16 Ba:	Passed
		Check that the position reports are output as VDM on the PI port		Passed
Set CRC bit sequence to false		Check that the target is not displayed on the MKD	Test 2014-10-16 Ba:	Passed
		Check that the position reports are not output as VDM on the PI port		Passed

4.6 16.6 Slot allocation (Channel access protocols)

4.6.1 16.6.1 Network entry

Method of measurement

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

Required results

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

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

2014-04-02	**Tester: Ba**	**Test details:** Channel access protocol	
Test item	Check	Remark	Result
Switch on EUT and record data with VDL analyser. Note the switch on time in UTC.			
Transmission time	Check that first transmission of position report is within 2 min after switch on		Passed
Initial message type	Check that the network entry is done with Message 3		Passed
Keep flag	Check that the keep flag is set in Message 3		Passed
Slot offsets	Check that the slot offsets of Message 3 are in the range 750 +/- 75= 675 ... 825		Passed
Slot use	Check that the allocated slots are used in the next frame		Passed
Message type	Check that the message type is changed to 1 after initial frame		Passed
Timeout	Check that the timeout in the 2nd frame is between 2 and 6 (decremented from initial 3..7)		Passed

2014-04-04	**Tester:**	**Test details:** Channel access at increased reporting rate		
Test item		Check	Remark	Result
Supply external speed data of 15 kn. Switch on EUT and record data with VDL analyser.				
Initial reporting rate		Check that the EUT performs network entry with a reporting rate of 6s		Passed
Slot offsets		Check that the slot offsets of Message 3 are in the range 450 +/- 45 = 405....495		Passed
Supply external speed data of 25 kn. Switch on EUT and record data with VDL analyser.				
Initial reporting rate		Check that the EUT performs network entry with a reporting rate of 2 s	Test 2014-04-07	Passed
Slot offsets		Check that the slot offsets of Message 3 are in the range 150 +/- 15 = 135...165		Passed

4.6.2 16.6.2 Autonomous scheduled transmissions (SOTDMA)

Method of measurement

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

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

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

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

Required results

Check that

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

b) *only free slots are used for transmission,*

c) *only free slots are used for transmission.*

2014-04-02	**Tester: Ba**	**Test details:** a) Autonomous scheduled transmissions (SOTDMA)	
Test item	Check	Remark	Result
Record the VDL data of 8 frames operating with autonomously scheduled transmissions. Generate a table and diagram from that data and check the following test items using the recorded data. Set the condition so that the reporting rate is 10 s.			
Reporting rate	Check that the reporting rate is 10 s, 6 messages per frame		Passed
Nominal increment and selection interval	Check that the allocated slots match the nominal and selection interval of 10 s reporting rate		Passed
Slot interval	Check that the slot intervals are in the range 375 +/- 75 = 300 ... 450		Passed
Timeout	Check that the timeout is counting down from 3...7 to 0		Passed
Slots used	Check that the slots indicated in CommState match the slots used		Passed
Slots allocated at timeout 0	Check that the slots are used in the next frame		Passed
	Check the slot offset is 2250 +/- Selection Interval (2175...2325)		Passed
CommState sub message	Check that for timeout 3,5,7 the number of received stations is indicated		Passed
	Check that Class B CS stations are not counted as received stations	UTC 10:43 Class B SO and Class B CS stations are counted as received stations <u>Retest 2014-07-11 Ba:</u> Class B CS and Class B SO stations are not counted as received stations. <u>Retest 2014-11-27 Ba:</u> The EUT shows 1 station more than actually received. See Note) <u>Retest 2015-02-09 Ba:</u> The problem could not be reproduced again.	Passed
	Check that for timeout 2,4,6 the slot number is indicated		Passed
	Check that for timeout 1 the correct value of UTC is indicated		Passed
	Check that for timeout 0 the slot increment is indicated		Passed
Alternating channels	Check that the position reports are transmitted on alternating channels		Passed

Others	Check the recorded data for other possibly incorrect items	No other incorrect items found	Passed

Note)
The EUT started after power on with 18 stations (actually received from the harbour). Additionally one simulated target was applied.

After timeout of the real targets the EUT showed 2 received stations (1 simulated targed received). After stop of the simulated target the EUT showed 1 received station (no target received).

It seems that one of the real target was not affected by the time-out.

The EUT operated in sync mode 3.

2014-04-07	**Tester: Ba**	**Test details:** SOTDMA at 50% channel load		
Test item		Check	Remark	Result
Set the condition so that the reporting rate is 2 s. b) Apply 50% channel load with position reports				
Slot usage		Check that only free slots are used for transmission		Passed
c) Apply 50% channel load with scheduled messages 26				
Slot usage		Check that only free slots are used for transmission		Passed

4.6.3 16.6.3 Autonomous scheduled transmissions (ITDMA)

Method of measurement

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

Required results

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

Check that nominal reporting interval is achieved ±20 %.

2014-04-04	**Tester: Ba**	**Test details:** Autonomous scheduled transmissions (ITDMA)		
Test item		Check	Remark	Result
Record the VDL data of at least 20 frames operating with autonomously scheduled transmissions. Generate a table and diagram from that data and check the following test items using the recorded data. Set the condition so that the reporting rate is 3 min (at anchor, SOG < 3 kn)				
Reporting rate		Check that the reporting rate is 3 min		Passed
Message type		Check that Message 3 is used		Passed
Slot interval		Check that the slot intervals are 3 min +/- 20 %		Passed
Slot increment		Check that the slot increment = 13500 +/- 10 %		Passed
Number of slots		Check that the number of slots = 1 (value in comm state = 5)		Passed
Keep flag		Check that the keep flag = 0		Passed
Alternating channels		Check that the position reports are transmitted on alternating channels		Passed
Transition to 3 min interval		At the transition to the 3 min interval there are two problems:	In the first frame of the 3 min interval there are two message 1 in the same slots as the message 3 in the previous frame which were used to allocate slots for the 3 min interval transmissions. See Note) <u>Retest 2014-07-11 Ba:</u> The transition to the 3 min interval is correct.	Passed
			The first message 3 of the 3 minutes interval (in frame UTC 09:03) on channel A is not transmitted. There is no VDO, and the message has not been received <u>Retest 2014-07-11 Ba:</u> All messages 3 are transmitted	Passed

4.6.4 <u>16.6.4 Safety related/binary message transmission</u>

Method of measurement

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

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

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

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

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

Required results

Confirm that

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

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

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

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

2014-05-08	**Tester: Ba**	**Test details:** ITDMA transmission		
Test item		Check	Remark	Result
Apply an binary broadcast message 8 to the PI port of the EUT < 4 s before next scheduled transmission. File name: AIBBM_bin.sst.				
Standard test environment		Check that Message 8 is transmitted within 4 s		Passed
		a) Check that **ITDMA** is use, if there is a position report in the next **4 s** The position report is changed from Message 1 to 3 to announce the Message 8 slot		Passed
		b) Check that **RATDMA** is used if there is no position report within **4 s**		Passed
90 % channel load Generate channel load as described below 1).		Check that Message 8 is transmitted within 4 s		Passed
		a) Check that **ITDMA** is used, if there is a position report in the next **4 s**		Passed
		b) Check that **RATDMA** is used if there is no position report within **4 s**		Passed
		In frame UTC 14:22, Slot 1734, channel A: Message 3 has an slot increment of 3645 (Resulting in a Tx slot of 879 two frames later) instead of 43. The VDO shows the same slot increment value, therefore it is not a transmission error. <u>Retest 2014-07-11 Ba:</u> The problem did not occur in the retest		Passed

2014-04-09	**Tester:**	**Test details:** c) Multi RATDMA transmissions		
Test item		Check	Remark	Result
Apply more than 20 Messages 6,8,12,14, 25, 26 to the PI port of the EUT within one frame. File name: AIBBM_25.sst.				
Maximum transmissions per frame		Check that only 20 messages are transmitted in one frame. Further message in a frame have to be rejected	The EUT stops transmission of single messages after 20 transmissions at all, not per frame. The counter seems not to be reset after start of a new frame. After transmission of 20 messages the transmission of further messages is stopped forever (checked it for 10 minutes). Only a restart allows transmissions again. <u>Retest 2014-07-11 Ba:</u> UTC 10:43 The EUT continues transmission in the next frame	Passed
		Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.		Passed
Apply a message longer then 3 slots		Check that the message is not transmitted	A message longer then 3 slots but shorter than 5 slots is transmitted <u>Retest 2014-07-11 Ba:</u> 5 slot message are transmitted. <u>Retest 2014-09-17 Ba:</u> UTC 11:50 5 slot messages are transmitted <u>Retest 2014-10-29 Ba:</u> UTC 07:45 5 slot messages are transmitted <u>Retest 2014-11-28 Ba:</u> A 5 slot message is not transmitted. A 3 slot message is transmitted	Passed
		Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.	ABK type = 3 <u>Retest 2014-11-28 Ba:</u> ABK type = 2	Passed

2014-04-09	**Tester: Ba**	**Test details:** d) Multi message 15		
Test item		Check	Remark	Result
Apply more than 5 AIR sentences to the PI port of the EUT within one frame.				
Maximum message 15 transmissions per frame		Check that only 5 message 15 are transmitted in one frame. Further message in a frame have to be rejected	No limit found for the transmission of message 15 Checked with more than 20 messages Retest 2014-07-11 Ba: More than 5 message 15 per frame are rejected	Passed
		Check that ABK sentence is output with acknowledgement type = 2 for the rejected sentences.	Retest 2014-07-11 Ba: Type = 2	Passed

4.6.5 16.6.5 Transmission of Message 5 (ITDMA)

Method of measurement

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

Required results

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

2014-04-04	**Tester: Ba**	**Test details:** ITDMA transmission of Message 5	
Test item	Check	Remark	Result
Record the VDL data of at least 20 frames operating with autonomously scheduled transmissions. Set the condition so that the reporting rate is 10 s.			
Reporting rate	Check that the reporting rate of msg 5 is 6 min	See Note)	Passed
Message type for allocation	Check that a Message 1 before Message 5 on the same channel is changed to Message 3 to allocate the slots for Message 5		Passed
Number of slots	Check that the number of slots = 2 (value in commstate = 1)		Passed
Keep flag	Check that the keep flag = 1		Passed
Slot allocation	Check that the slots allocated by Message 3 are used for $T_{\underline{x}}$ of Message 5		Passed
Alternating channels	Check that Message 5 is transmitted on alternating channels		Passed

Note)
The typical interval from message 5 to message 5 is between 358 and 359 s instead of 360 s. It seems that sometimes the interval is longer (415 s) to get an average of 360 s.

This behaviour is rathe strange but fulfills the requirements.

4.6.6 16.6.6 Assigned operation

4.6.6.1 16.6.6.1 Assigned mode using reporting rates

Method of measurement

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

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

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

Required results

Confirm that

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

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

2014-04-09	**Tester: Ba**	**Test details:** Assigned Mode	
Test item	Check	Remark	Result
Send a Message 16 rate assignment with invalid offset values.			
a) Offset value = 110 (not a multiple of 20) EUT = destination ID A	Check that the reporting rate is 120/10min = 12/min = 5 s	UTC 15:04	Passed
b) Offset value = 1000 (> 600 messages/10 min) EUT = destination ID B	Check that the reporting rate is 600/10min = 60/min = 1 s	UTC 15:30 The reporting interval seems to be 1 s, but because of the problem desrcibed in 1.6 General observations this cannot be onfirmed clearly. The test has to be repeated when the slot shift problem is solved. <u>Retest 2014-07-11 Ba:</u> UTC 13:11 Reporting interval = 1s	Passed

4.6.6.2 <u>16.6.6.2 Receiving test</u>

Method of measurement

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

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

Record transmitted messages.

Required results

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

.

2014-04-04	**Tester: Ba**	**Test details:** a) Slot offset and increment		
Test item		Check	Remark	Result
Send an assignment message 16 with offset A = offset to first assigned slot = 40 and slot increment parameter = 4 (increment = 125). Within the timeout time repeat the Message 16. Record VDL messages and evaluate record.				
VDM output		Check VDM output of Message 16		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 Message 2 frame have the same timeout		Passed
		Check that the timeout is between 3 and 7		Passed
		Check that the timeout is decremented after 1 min		Passed
Comstate		Check that the ComState is like the ComState of Message 1		Passed

Switch back to autonomous mode	Check that the EUT deallocates all msg 2 slots with timeout 0		Passed
	Check that the EUT changes slots with timeout 0 on each channel to ITDMA slot message 3 to start autonomous mode		Passed
	Check that EUT initialises autonomous mode like network entry	The EUT does not revert to the correct autonomous reporting interval of 6 s but changes to the same interval as the slot assignment (3.333...s) Two messages could not be received by the VDL analyser. See Note) Retest 2014-07-11 Ba: The EUT reverts to the correct autonomous interval. Retest 2015-03-05 Ba: The EUT is able able to transmit in two consecutive slots on different channels.	Passed Passed

Note)
There are two pairs of transmitted messages in consecutive slots but on different channels:
B=165, A=166,
B=1165, A = 1166.
In both cases the second message could not be received by the analyser. This must be a problem of the transmitter because the receivers of the VDL analyser do not have a problem to receive messages in consecutive slots. It is a problem for the transmitter because the channel has to be changed between the 2 transmissions. It is not required that the transmitter can do this.

But the controlling software has to avoided that there are messages in consecutive slots on different channels.

2014-07-11 Ba:
This problem cannot be re-tested because the EUT cannot be forced to transmit in two consecutive slots.

2015-03-05 Ba:
The manufacturer has declared that the EUT is able to transmit in two consecutive slots on different channels. This has been verified by test.

2014-04-09	**Tester: Ba**	**Test details:** b) Rate assignment		
Test item		Check	Remark	Result
Send an assignment message 16 with offset=reporting rate of 300 messages/10 min, increment=0 Within the timeout time repeat the Message 16. Record VDL messages and evaluate record.				
VDM output		Check VDM output of Message 16		Passed
Initialisation phase		Check that EUT starts immediately with rescheduling to the new reporting rate		Passed
Message type		Check that message type of position report is 2 instead of Message 1		Passed
Reporting rate		Check that the reporting is 300 messages/10 min = 30 messages/frame = 2 s		Passed
Alternating channels		Check that position report is sent alternating on channel A and B		Passed
Initialisation		Check that the Initialisation is according to changing reporting rate using Message 3 to allocate new slots		Passed
Timeout		Check that the assigned timeout is between 2 and 6		Passed
Assignment repetition		Check that the timeout is extended by repetition of Message 16.		Passed
Switch back to autonomous mode		Check that the EUT reverts to normal reporting rate between 4 and 8 min after last Message 16		Passed

2014-04-09	**Tester: Ba**	**Test details:** non-base station MMSI		
Test item		Check	Remark	Result
Send an assignment message 16 with a non-base station MMSI				
Slot assignment with: offset A = 40 and slot increment parameter = 4 (increment = 125).		Check that the assignment command is ignored		N/T
Rate assignment with: offset=reporting rate of 300 messages/10 min, increment=0		Check that the assignment command is ignored		N/T

4.6.6.3 16.6.6.3 Slot assignment to FATDMA reserved slots

Definition

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

Method of measurement

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

Required results

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

2014-05-09	**Tester: Ba**	**Test details:** Slot assignment to FATDMA reserved slots		
Test item		Check	Remark	Result
Send a Message 20 from VDL Generator with slot offset and increment for slot reservation: Offset = 23, slots = 5, time-out = 7, incr. = 25 Send a Message 16 from VDL Generator assigning one or more of these reserved slots: Offset = 25, incr. = 5 (= 75 slots)				
R_x of Message 20		Check that Message 20 has been received by EUT (VDM output)		Passed
Slot use		Check that slots assigned by the Message 16 are used by the EUT		Passed

4.6.7 16.6.7 Group assignment

4.6.7.1 16.6.7.1 Assignment priority

Method of measurement

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

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

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

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

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

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

Record transmitted messages.

Required results

Verify that:

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

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

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

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

2014-09-17	**Tester: Ba**	**Test details:** Assignment priority		
Test item		Check	Remark	Result
The test sequence is modified to improve testability (Test d) before a)..c)). Set up EUT in autonomous mode.				
Transmit Message 23 with Tx/Rx mode = 1		Verify that Message 23 is received and content is correct.	UTC 11:12, 11:15	Passed
Reporting rate		Check that reporting rate is as expected by Message 23.	10s (autonomous)	Passed
T_x/R_x mode		Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).	Channel A	Passed
Message 22 to an area				
d) Transmit Message 22 (T_x/R_x mode = 0)		Verify that Message 22 is received (ACA output).	UTC 11:16	Passed
T_x/R_x mode		Check T_x/R_x mode = 1 (T_x on channel A) according to Message23		Passed
Wait for time-out of Message 23				
Reporting rate		Check that reporting rate = autonomous reporting rate.	UTC 11:21	Passed
T_x/R_x mode		Check T_x/R_x mode = mode of Message 22 = 0 (T_x on channel A and B).		Passed
Message 22 individually addressed				
Transmit Message 23 (T_x/R_x mode = 1)		Verify that Message 23 is received and content is correct.	UTC 11:25	N/T
T_x/R_x mode		Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).		N/T
a) Transmit Message 22 individually addressed (MMSI) (T_x/R_x mode = 2)		Verify that Message 22 is received and content is correct.	UTC 11:28	N/T
T_x/R_x mode		Check T_x/R_x mode = mode of Message 22 = 2 (T_x on channel B)		N/T

b) Transmit Message 23 with T_x/R_x mode 1 within 10 min after Message 22	Verify that Message 23 is received and content is correct.	UTC 11:32 ...	Passed
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 22 (T_x on channel B).		Passed
c) Transmit Message 23 with T_x/R_x mode 1 at 15 min min after Message 22	Verify that Message 23 is received and content is correct.		Passed
T_x/R_x mode	Confirm that EUT transmit position reports on the channel specified in Message 23 (T_x on channel A).	UTC 11:39	Passed

4.6.7.2 <u>16.6.7.2 Increased reporting interval assignment</u>

Method of measurement

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

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

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

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

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

Record transmitted messages.

Required results

Confirm that

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

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

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

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

2014-09-17	**Tester: Ba**	**Test details:** Increased reporting interval	
Test item	Check	Remark	Result
SOG = 10 kn, reporting interval = 10 s			
Reporting rate	Check VDO output and verify that the reporting interval is as given by autonomous mode (10 s)		Passed
a) Transmit Message 23 (reporting interval > 10 s)	Verify that EUT receives the msg 23	UTC 10:49	Passed
Report rate	Check that transponder declines Message 23 command: Reporting interval = 10 s		Passed
b) Transmit Message 23 with quiet time	Verify that EUT receives the Message 23	UTC 10:50	Passed
Report rate	Check that transponder declines Message 23 command, EUT continues transmission with 10 s reporting interval		Passed
Nav status = moored or at anchor, SOG < 3 kn, reporting interval = 3 min			
Reporting rate	Check that the reporting interval = 3 min		Passed
c) Transmit Message 23 (reporting interval < 3 min)	Verify that EUT receives the msg 23		Passed
	Check that transponder declines Message 23 command: Reporting interval = 3 min	UTC 11:00	Passed
Nav status = moored or at anchor, SOG > 3 kn, reporting interval = 10s			
Reporting rate	Check that the reporting interval 10 s		Passed
d) set SOG > 3 kn Transmit Message 23 (reporting interval 8=5s)	Verify that EUT receives the msg 23	UTC 11:03	Passed
	Check reporting interval = 5s		Passed

4.6.7.3 16.6.7.3 Entering interval assignment

Method of measurement

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

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

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

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

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

Monitor the VDL.

Required results

Verify that:

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

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

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

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

2014-09-17	**Tester: 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 Message 23		Passed
Initialisation phase	Check that EUT starts immediately with rescheduling to the new reporting rate	<u>Test 2014-05-12 Ba:</u> No rescheduling <u>Retest 2014-08-18 Ba:</u> No rescheduling <u>Retest 2014-09-17 Ba:</u> EUT starts rescheduling	Passed
Message type	Check that message type of position report is 2 instead of Message 1		Passed
Reporting rate	Check that the reporting interval = 5 s	<u>Test 2014-05-12 Ba:</u> UTC 11:09 Reporting interval = 10 s <u>Retest 2014-08-18 Ba:</u> Reporting interval = 10 s <u>Retest 2014-09-17 Ba:</u> Reporting interval = 2 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 autonomous reporting interval are released using time-out = 0 and slot offset = 0		Passed
Initialisation/ Slot allocation	Check that the slot of the assigned reporting interval are allocated according to the network entry procedure		Passed
Timeout	Check that the assigned timeout is between 2 and 6 in the next frame		Passed
b) Send a group assignment message 23 with a reporting interval of 2 s (value 11).			
VDM output	Check VDM output of Message 23	UTC 09:13	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 2 s	<u>Test 2014-05-12 Ba:</u> Reporting interval = 10s <u>Retest 2014-08-18 Ba:</u> Reporting interval = 10 s <u>Retest 2014-09-17 Ba:</u> UTC 08:47 Interval = 2s	Passed

c) Send a group assignment message 23 with reporting interval = next longer interval (value 10).			
VDM output	Check VDM output of Message 23	UTC 09:01	Passed
Message type	Check that message type of position report is 1		Passed
Reporting rate	Check that the reporting interval = 10 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 Message 23	UTC 09:04	Passed
Message type	Check that message type of position report is 2		Passed
Reporting rate	Check that the reporting interval = 2 s		Passed

4.6.7.4 <u>16.6.7.4 Assignment by region</u>

Method of measurement

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

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

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

Required result

Verify that:

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

a) EUT declines Message 23.

2014-09-17	**Tester: Ba**	**Test details:** Assignment by region	
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that the reporting interval is 10 seconds (SOG = 10 kn).			
a) Transmit Message 23, EUT inside region (Reporting interval value = 11 = 2s)	Check that Message 23 is received (VDM output)	UTC 09:13	Passed
	Check that the reporting interval is changed to 2 s		Passed
	Verify that EUT reverts to normal operation mode after 4... 8 min		Passed
EUT outside the addressed region			
Transmit Message 23, EUT outside region (Reporting interval = 2 s)	Verify that EUT declines Message 23 Reporting interval = 10 s	UTC 09:11 Interval = 10s	Passed
Message 23 from a non-base station MMSI			
Transmit Message 23, EUT inside region (Reporting interval = 2 s) MMSI is a non-base station MMSI	Verify that EUT declines Message 23 Reporting interval = 10 s	UTC 09:14 Group assignment is accepted, Interval = 2s, Message type = 2 Retest 2014-10-29 Ba: The group assignment is ignored	Passed

4.6.7.5 16.6.7.5 Assignment by station type

Method of measurement

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

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

b) 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 4 (A to N).

c) 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 5 s and the station type to 1 (Class A Mobile). Apply this message to the VDL again within 4 min.

Record VDL and check reaction of the EUT.

Required results

Verify that

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

b) EUT declines Message 23,

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

2014-09-17	**Tester: Ba**	**Test details:**		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that reporting interval is 10 s (SOG).				
a) Transmit Message 23 EUT inside area, station type = 0, Reporting interval = 2 s		Check that Message 23 is received (VDM output)	09:13	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) Transmit Message 23 with station types not valid for EUT, Reporting interval = 2 s			
station type = 2 (all types of Class B mobile stations),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 3 (SAR airborne mobile station),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 4 (Class B SO mobile stations only),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 5 (Class B CS mobile stations only),	Check that Message 23 has been received (VDM output)		Passed
	Check reporting interval = 10 s		Passed
station type = 6 (Inland Waterways),	Check that Message 23 has been received (VDM output)	UTC 09:25	Passed
	Check reporting interval = 10 s	Interval = 2 s The unit is not configured as an Inland AIS (e.g. no message 8 after message 5) Retest 2014-10-29 Ba: The group assignment is ignored	Passed
c) Transmit Message 23 with station types valid for EUT, Reporting interval = 2 s			
station type = 1 (Class A mobile stations only),	Check that Message 23 has been received (VDM output)	UTC 09:37	Passed
	Check reporting interval = 2 s		Passed
Apply message 23 again within 4 min	Check that Message 23 has been received (VDM output)		Passed
	Verify that EUT reverts to normal operation mode at 4... 8 min after the last Message 23	5 min after last message 23	Passed

4.6.7.6 16.6.7.6 Addressing by ship and cargo type

Method of measurement

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

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

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

Required results

Verify that

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

b) EUT declines Message 23.

2014-09-17	**Tester: Ba**	**Test details:** a) Matching type of ship		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG). Set EUT to ship and cargo type = 72.				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 0		Check that Message 23 is received (VDM output)	UTC 09:13	Passed
		Check that the reporting interval is changed to 2 s		Passed
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 72		Check that Message 23 is received (VDM output)	UTC 10:37	Passed
		Check that the reporting interval is changed to 2 s		Passed
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 70		Check that Message 23 is received (VDM output)	UTC 10:27	Passed
		Check that the reporting interval is changed to 2 s		Passed

2014-09-17	**Tester: Ba**	**Test details:** b) Type of ship not matching		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG). Set EUT to ship and cargo type = 72.				
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 2 s Cargo type = 82		Check that Message 23 has been received (VDM output)	UTC 10:26	Passed
Reporting rate		Check that EUT transmit position reports with autonomous reporting interval..		Passed

4.6.7.7 16.6.7.7 Reverting from interval assignment

Method of measurement

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

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

Required results

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

2014-09-17 **Tester: Ba**	**Test details:** Reverting from interval assignment		
Test item	Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Apply sensor information in that way that RR is 10 s (SOG).			
Transmit Message 23 EUT inside area, station type = 0 Reporting interval = 5 s	Check that Message 23 has been received. Record R_x time	UTC 08:23 to 08.28	Passed
Reporting rate	Check that EUT transmit position reports with reporting interval of 5 s.		Passed
Time-out	Check that the EUT reverts to 10 s reporting rate after 4.. 8 min	6 min after last message 23	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 (10 s) are allocated according to the network entry procedure		Passed

4.6.8 16.6.8 Fixed allocated transmissions (FATDMA)

Method of measurement

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

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

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

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

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

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

Required results

Confirm that

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

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

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

d) *the EUT treats the slots as free,*

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

2014-05-12	**Tester: Ba**	**Test details:** FATDMA reserved slots		
Test item		Check	Remark	Result
a) Send base station report Message 4 with distance < 120 NM. Send a Message 20 from VDL Generator with slot offset and increment for slot reservation according to the description below. To get enough new slot allocations within timeout time set reporting rate to 2 s (speed > 25 kn).				
Record VDL messages		Check that the reserved slots are not used by the EUT within a timeout of 4-8 min	2014-04-04 Ba: Remark: The time-out is not forced to 0. After up to 8 frames the reserved slots are not used.	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)		Passed

b) Repeat the test when EUT has no position	Check that the reserved slots are not used by the EUT within a timeout of 4-8 min	The reserved slots are used Retest 2014-09-18 Ba: The reserved slots are used Retest 2014-10-29 Ba: The reserved slots are used Retest 2014-12-01 Ba: The reserved slots are used Retest 2015-01-27 Ba: The reserved slots are not used	Passed
c) Repeat test with base station, distance > 120 NM	Check that all slots are used	UTC 11:28	Passed
d) Repeat test without Message 4	Check that all slots are used	UTC 11:41	Passed
e) Send message 4, distance < 120 NM, and message 20	Check that the reserved slots are not used by the EUT within a timeout of 4-8 min		Passed
Stop message 4	Check that messages 20 which are received after the target time-out of message 4, are ignored and all slots are used	Msg 4 timeout = 10 min	Passed
Check with non-base station MMSI			
Send base station report Message 4 with distance < 120 NM and a Send a Message 20 with slot offset and increment for slot reservation according to the description below			
MMSI of message 4 and 20 is a non-base station MMSI	Check that the reservation is ignored and all slots are used	The reserved slots are not used Retest 2014-09-18 Ba: The reserved slots are used	Passed

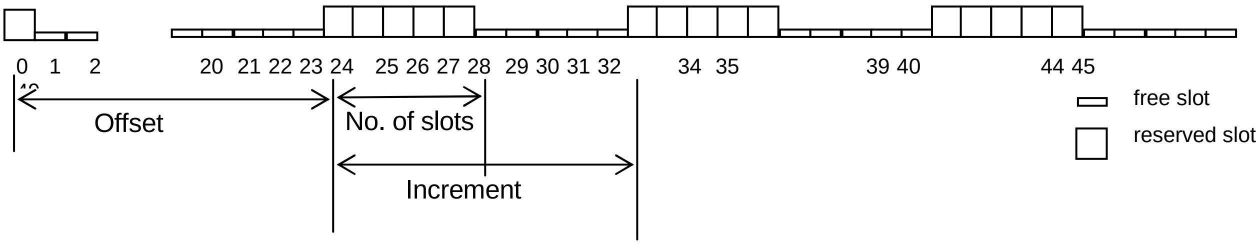
NOTE According to ITU-R M1371-4, §4.4.1 and clarification 2.56 a slot reserved by a base station on the other channel has got the lowest possible priority, that means it can be used for candidate slots, but only if no other slot with higher priority is available.

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

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

Message 20 parameters:
Message 20 is transmitted in slot 0 in each frame
Offset number 1: 25
Number of slots: 5
Time out 1: 7
Increment: 10

FATDMA reservation:



4.6.9 16.6.9 Randomisation of message transmissions

Method of measurement

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

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

Required results

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

2014-05-13	**Tester: Ba**	**Test details:** Randomisation of message transmissions		
Test item		Check	Remark	Result
Switch on the EUT for 3 minutes, switch it on and record the transmissions for 10 minutes. Repeat this procedure 10 times Evaluate the selection intervals for each of the on periods.				
Random check		Check that the selection intervals are randomly distributed over the reporting interval	The EUT uses in all 10 operation periods nearly the same SI Retest 2014-09-18 Ba: The selection intervals are randomly selected	Passed

4.7 16.7 Message Formats

4.7.1 16.7.1 Received messages

Method of measurement

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

Required results

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

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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 Ba	Test details – Content of msg 15 Interrogation		
Test item	Check	Remark	Result
Transmit a message 15 from other AIS transponder or VDL generator . Response on this msg is tested under 6.2 18.2 Interrogation responses			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed
Message content	Check the the message content is correct.		Passed

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 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

2014-05-12 Ba	Test details – Long range position report message 27		
Test item	Check	Remark	Result
Transmit a message 6 from other AIS transponder or VDL generator . Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (msg length = 96 bit)		Passed
Message content	Check the the message content is correct.		Passed

4.7.2 16.7.2 Transmitted messages

Method of measurement

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

Record transmitted messages.

Required results

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

The message contents are checked using the VDL analyser.

2014-05-27	**Tester: Ba**	**Test details:** Message 1,2,3 Position report		
Test item		Check	Remark	Result
The message content of Message 1,2,3 is checked in 14.2.1				
Number of sentences		Check that value = 1		Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
		Check that the channel field is empty (NULL) if not T_x		Passed
Fill bits		Check that value = 0		Passed

2014-05-27	**Tester: Ba**	**Test details:** Message 5 Static data	
Test item	Check	Remark	Result
The message content of Message 5 is checked in 14.2.1			
Number of sentences	Check that value = 2		Passed
Check sentence number	Check that value = 1,2		Passed
Sequential message ident.	Check that counting from 0...9 modulo 10		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 6 Addressed binary message	
Test item	Check	Remark	Result
This test can be done in combination with test 2.1.4.1 14.1.4.1 Transmit an addressed message Apply PI sentence: File AIABM_bin.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1	UTC 12:25	Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 112 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Sequence number	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Retransmit flag	Check the field content		Passed
DAC	Check the field content		Passed
FI	Check the field content		Passed
Binary data	Check the field content		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 7 Binary acknowledge		
Test item		Check	Remark	Result
This test can be done in combination with test 6.1.2 18.1.2 Acknowledgement. Message 6 has to be transmitted by other AIS or VDL generator. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1		Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination ID 1 (MMSI)		Check the field content		Passed
Sequence number 1		Check the field content		Passed
Destination ID 2 (MMSI)		Omitted		
Sequence number 2		Omitted		
Destination ID 3 (MMSI)		Omitted		
Sequence number 3		Omitted		
Destination ID 4 (MMSI)		Omitted		
Sequence number 4		Omitted		

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 8 Binary broadcast message		
Test item		Check	Remark	Result
Apply PI sentence: File AIBBM_bin.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1		Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 4(message length = 80 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
DAC		Check the field content		Passed
FI		Check the field content		Passed
Binary data		Check the field content		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 10 UTC and date inquiry	
Test item	Check	Remark	Result
This test can be done in combination with 14.7.3 Communication test Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1	Message 10 cannot be transmitted. The EUT transmits message 15 on AIR for message 11 <u>Retest 2014-09-17 Ba:</u> Message 10 is transmitted	Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 11 UTC date response	
Test item	Check	Remark	Result
Transmit a Message 10 from VDL generator to request transmission of Message 11 by EUT. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message id	Check the field content		Passed
User ID (MMSI)	Check the field content		Passed
UTC year, month, day, hour, minute, second	Check the field content		Passed
Position accuracy flag	Check the field content		Passed
Longitude	Check the field content		Passed
Latitude	Check the field content		Passed
Type of EPFD	Check the field content		Passed
RAIM flag	Check the field content		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 12 Addressed safety related message	
Test item	Check	Remark	Result
This test can be done in combination with test 2.1.4.1 14.1.4.1 Transmit an addressed message Apply PI sentence: File AIABM_safety.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (message length = 96bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Sequence number	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Retransmit flag	Check the field content		Passed
Safety related text	Check the field content		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 13 Safety related acknowledge	
Test item	Check	Remark	Result
This test can be done in combination with test 6.1.2 18.1.2 Acknowledgement. Send Message 12 from other transponder or VDL generator. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Sequence number 1	Check the field content		Passed
Destination ID 2 (MMSI)	Omitted		
Sequence number 2	Omitted		
Destination ID 3 (MMSI)	Omitted		
Sequence number 3	Omitted		
Destination ID 4 (MMSI)	Omitted		
Sequence number 4	Omitted		

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 14 Safety related broadcast message	
Test item	Check	Remark	Result
This test can be done in combination with 2.1.5.1 14.1.5.1 Transmit a broadcast message. Apply PI sentence: File AIBBM_safety..sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 64 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Safety related text	Check the field content		Passed

2014-05-27	**Tester: Ba**	**Test details:** Content of Message 15 Interrogation	
Test item	Check	Remark	Result
This test can be done in combination with 6.2 18.2 Interrogation responses. Apply PI sentence: File AIAIR_35_5_bin.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 2 (message length = 160 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination ID 1 (MMSI)	Check the field content		Passed
Message ID 1.1	Check the field content		Passed
Slot offset 1.1	Check the field content = 0		Passed
Message ID 1.2	Check the field content		Passed
Slot offset 1.2	Check the field content = 0		Passed
Destination ID 2 (MMSI)	Check the field content		Passed
Message ID 2.1	Check the field content		Passed
Slot offset 2.1	Check the field content = 0		Passed

2014-10-28	**Tester: Ba**	**Test details:** Content of addressed messages 25	
Test item	Check	Remark	Result
Transmit Message 25 by applying an ABM PI sentence: File AIABM_msg25.sst. Check the field content of the fields listed under Test item.			
Number of sentences	Check that value = 1	See test 14.1.4.1	Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (message length = 168 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination indicator	Check that value = 1		Passed
Binary data flag	Check the field content		Passed
Destination ID (MMSI)	Check the field content		Passed
Binary data	Check the field content		Passed

2014-10-28	**Tester: Ba**	**Test details:** Content of broadcast messages 25	
Test item	Check	Remark	Result
Transmit Message 25 by applying an BBM PI sentence: File AIBBM_msg25.sst. Check the field content of the fields listed under Test item			
Number of sentences	Check that value = 1	See test 14.1.5.1	Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value A and B is output		Passed
Fill bits	Check that value = 0 (message length = 168 bit)		Passed
Message ID	Check the field content		Passed
Source ID (MMSI)	Check the field content		Passed
Destination indicator	Check that value = 0		Passed
Binary data flag	Check the field content		Passed
Binary data	Check the field content		Passed

2014-10-28	**Tester: Ba**	**Test details:** Content of addressed messages 26		
Test item		Check	Remark	Result
Transmit Message 26 by applying an ABM PI sentence: File AIABM_msg26.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1	See test 14.1.4.1	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 168 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination indicator		Check that value = 1		Passed
Binary data flag		Check the field content		Passed
Destination ID (MMSI)		Check the field content		Passed
Binary data		Check the field content		Passed
Comm. state		Check the field content		Passed

2014-10-28	**Tester: Ba**	**Test details:** Content of broadcast messages 26		
Test item		Check	Remark	Result
Transmit Message 26 by applying an BBM PI sentence: File AIBBM_msg26.sst. Check the field content of the fields listed under Test item.				
Number of sentences		Check that value = 1	See test 14.1.5.1	Passed
Check sentence number		Check that value = 1		Passed
Sequential message ident.		Check that field is empty (NULL)		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 168 bit)		Passed
Message ID		Check the field content		Passed
Source ID (MMSI)		Check the field content		Passed
Destination indicator		Check that value = 0		Passed
Binary data flag		Check the field content		Passed
Binary data		Check the field content		Passed
Comm. state		Check the field content		Passed

2014-08-19	**Tester: Ba**	**Test details:** Message 27 Long range broadcast	
Test item	Check	Remark	Result
The message content of Message 27 is checked in			
Number of sentences	Check that value = 1		Passed
Check sentence number	Check that value = 1		Passed
Sequential message ident.	Check that field is empty (NULL)		Passed
Channel	Check that the correct value C and D is output	No channel in the VDO sentence Retest 2014-09-17 Ba: Channels C and D are in the VDO sentence	Passed
Fill bits	Check that value = 0		Passed
Message ID	Check the field content		Passed
Repeat indicator	Check that Repeat indicator = 3		Passed
User ID (MMSI)	Check the field content		Passed
Position accuracy	Check the field content	= 0	Passed
RAIM flag	Check the field content	= 0	Passed
Navigational status	Check the field content	= 0	Passed
Longitude (1/10 min)	Check the field content		Passed
Latitude (1/10 min)	Check the field content		Passed
SOG (kn)	Check the field content		Passed
COG (degree)	Check the field content		Passed
GNSS position status	Check the field content	= 1 (position latency > 5 s) This seems to be inappropriate because it is expected that the latency is < 2 s Retest 2014-09-17 Ba: GNSS status = 0	Passed

5 17 Specific tests of network layer

(See 7.4)

5.1 17.1 Dual channel operation - Alternate transmissions

Method of measurement

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

Required results

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

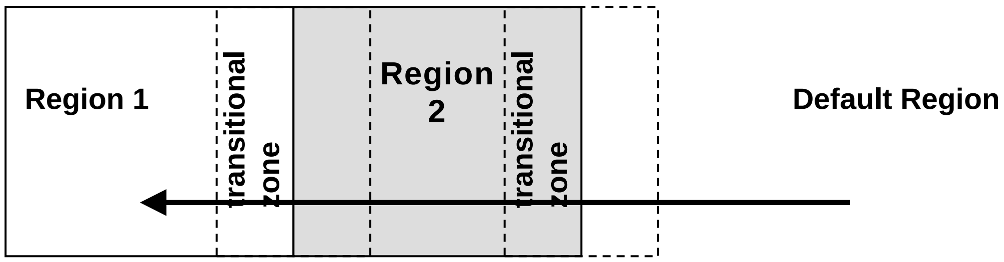
2014-05-12	**Tester: Ba**	**Test details:** Alternate transmissions		
Test item		Check	Remark	Result
Set up EUT in autonomous mode, set report rate to 10 s with external sensor input. Record transmitted scheduled position reports on both channels. Check CommState for slot allocation.				
Alternate transmissions		Check that the EUT transmission is alternating		Passed
CommState		Check that the slots of each channel are allocated on the same channel		Passed
Same test on network entry (data link access period)				
Alternate transmissions		Check that the EUT transmission is alternating		Passed
CommState		Check that the slots of each channel are allocated on the same channel		Passed

5.2 17.2 Regional area designation by VDL message

Method of measurement

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

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



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

Figure 13 – Regional area scenario

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

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

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

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

Required results

Check that:

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

Table 24 – Primary channels for each region

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

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

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

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

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

d) the EUT does not accept the channel management.

e) the EUT does not accept the channel management.

This test is divided in 2 parts:

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

2014-05-13	**Tester: Ba**	**Test details:** a) Part 1 - Channel management by VDL message 22		
Test item		Check	Remark	Result
Set up EUT in autonomous mode transmitting on channel AIS 1/AIS 2, send 2 Messages 22 by VDL generator, defining 2 adjacent areas with channels A 1, B 1 and A 2, B 2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 4 NM. Set the position outside the areas. "TZ" is used for "transitional zone". Set the positions near the limits of the transitional zones to check the dimensions.				
PI output		Check that the Message 22 are output on PI	UTC 14:45	Passed
Display of defined area		Check that the defined area is correctly stored (displayed on MKD)	The area settings are stored only if the position is inside the area. This is valid also for ACA input. The have to be stored if the distance is less than 500 NM <u>Retest 2014-08-19 Ba:</u> UTC 12:47 Area settings are accepted if the position is outside	 Passed
		Check ACA and TXT output on PI (Not required but recommended)		Passed
		ACA: check in use flag and time of in use flag		Passed

Item 1: In high sea area	Check that channels AIS 1 and AIS 2 are in use		Passed
Item 2: Move position into outer TZ of region 2	Check ACA and TXT output (Not required)	UTC 11:56 No ACA output	Passed
	If ACA output: check in use flags and time of in use flag		N/A
	Check the limit of the TZ (5 NM = 8.8 minutes)		Passed
	Check that channels AIS 1 and A 2 are used		Passed
	Check that reporting rate is doubled		Passed
Item 3: Move position into inner TZ of region 2 (crossing the area border)	Check ACA and TXT output (Required)	UTC 11:59	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 12:01 No ACA output	Passed
	Check the limit of the TZ (4 NM = 7 minutes)		Passed
	Check that channels A 2 and B 2 are used		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed
Item 5: Move position into TZ between region 1 and 2, inside area 2	Check that channels A 2 and A 1 are used	UTC 12:11	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 12:14	Passed
	Check the border of area		Passed
Item 7: Move position into region 1 (out of TZ)	Check that channels A 1 and B 1 are used	UTC 12:18	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 A 1 and AIS 1 are used	UTC 12:22	Passed
	Check that reporting rate is doubled		Passed
Move position out of the TZ of region 1, into high sea	Check that channels AIS 1 and AIS 2 are used	UTC 12:26	Passed
	ACA: check in use flags and time of in use flag		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

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

2014-05-12	**Tester: Ba**	**Test details:** a) Part 2 - Channel management by VDL message 22		
Test item		Check	Remark	Result
The same area and movement is used as in test part 1.				
Item 1: In high sea area		Record 1 frame before entering the area		
		Check that channels AIS 1 and AIS 2 are in use		Passed
Item 2: Move position into transitional area of region 2, first frame after transition		Check that EUT continues T_X on AIS 1 and AIS 2 for 1 frame		Passed
		Check that EUT releases the slots on AIS 2 by Message 1 with time-out 0 and no slot offset		Passed
		Check that channels AIS 1 and **A 2** are used for $\mathbf{R_x}$		Passed

<u>Item 3:</u> In outer transitional area of region 2, next frames after transition	Check allocation of additional slots on channel A (AIS 1) using Message 3	Generally the slot allocation is correct. The allocation of slots starts with a delay of 40 s. So there is a period of 40s with 20 s reporting interval <u>Retest 2014-09-22 Ba:</u> The allocation of slots starts with a delay of 20 s. So there is a period of 20 s with no message <u>Retest 2014-10-29 Ba:</u> There is a complete new rescheduling on channel A (AIS1) . This is not nice, it would be better to keep the existing slots and add additional slots but it seems to be acceptable.	Passed Passed
	Check complete slot allocation on channel B (A 2) using Message 3	Generally the slot allocation is correct. The allocation of slots starts with a delay of 40 s. <u>Retest 2014-09-22 Ba:</u> The allocation of slots starts with a delay of 20 s. So there is a period of 20 s with no message <u>Retest 2014-10-29 Ba:</u> The allocation on slot for channel B (A2) is correct	Passed
	Check that channels AIS 1 and A 2 are used for T_x		Passed
	Check that channels AIS 1 and A 2 are used for R_x		Passed
	Check that reporting rate is doubled		Passed
	Check that messages on AIS 1 are output on PI (VDM/VDO) as channel A and A 2 as channel B		Passed
<u>Item 4:</u> Move into inner transitional area of region 2, crossing the area border	Check that messages on AIS 1 are output on PI (VDM/VDO) as channel B and A 2 as channel A (channels reverted)		Passed

<table>
<tr><td rowspan="4"><u>Item 5:</u>
Move position into the area of region 2 (out of TZ),
first frame after transition</td><td>Check that EUT continues T_X on AIS 1 and A 2 for 1 frame</td><td></td><td>Passed</td></tr>
<tr><td>Check that EUT releases all slots on AIS 1 by Message 1 with timeout 0 and no slot offset</td><td></td><td>Passed</td></tr>
<tr><td>Check that EUT releases every second slot on channel A 2 by Message 1 (for reversion to normal reporting rate)</td><td>This is done in the next frame
So there are unnecessarily 2 transmissions nearly at the same time.
<u>Retest 2014-09-22 Ba:</u>
Releasing the slots is correct.
<u>Retest 2014-10-29 Ba:</u>
The rescheduling is completely incorrect. It is not possible to recognize the errors in detail. Please evaluate the diagram.
<u>Retest 2014-11-28 Ba:</u>
▪ No slots are released
▪ The transmission of all messages is stopped in the next frame.
<u>Retest 2015-01-27 Ba:</u>
All slots which are not continued are released, the slots of channel AIS1 in the first frame and the slots of the additional messages on channel A1 in the next frame. A new schedule on channel B is started in the next frame.</td><td>Passed

Passed</td></tr>
<tr><td>Check that channels A 2 and **B 2** are used for $\mathbf{R_X}$</td><td></td><td>Passed</td></tr>
</table>

Item 6: Inside area of region 2, next frames after transition	Check allocation of slots on channel B (B 2) using Message 3	Retest 2014-10-29 Ba: See above, item 5 Retest 2014-11-28 Ba: The network entry on B2 starts too late, about 40 s after end of the transmission on AIS1. The network entry is incorrect. The second message is not a message 3 but a message 1, so the third message uses an unallocated slot, and it is also a message 1 instead of 3. Retest 2015-01-29 Ba: The network entry is correct. There is still a delay of about 40 s but because the old messages are stopped later there is no transmission gap.	Passed
	Check that channels A 2 and B 2 are used for T_x		Passed
	Check that channels A 2 and B 2 are used for R_x		Passed
	Check that reporting rate is back to normal reporting rate		Passed
	Check that messages on A 2 are output on PI (VDM/VDO) as channel A and B 2 as channel B		Passed

2014-05-13	**Tester: Ba**	**Test details:** Check of T_x/R_x-Mode	
Test item	Check	Remark	Result
b) Set T_x/R_x-Mode in Message 22 to 1	Check that mode is correctly stored		Passed
	Check that channel A only is used for T_x		Passed
	Slot allocation	On channel A a message 3 in an unallocated slot is used to start the rescheduling from mode 0 to mode 1 and from mode 1 to mode 0. It is possible to allocate the slot and should therefore be done (e.g. using message in frame 12:37, slot 7 and frame 12:43, slot 375). <u>Retest 2014-09-22 Ba:</u> • Same problem, unallocated slots are used to start rescheduling. • The rescheduling from mode 1 to 0 starts with a delay of 20 s, so there is a gap of 20 s without transmission. • Additionally there is an unexpected Message 1, using an unallocated slot, in frame UTC 08:16, slot 945 (see diagram) <u>Retest 2014-10-29 Ba:</u> Still an unallocated slot is used to start the re-scheduling There is no technical reason to use an unallocated slot. <u>Retest 2014-12-01 Ba:</u> Only one unallocated slot on channel B is used. This cannot be avoided.	Passed
	Check that channels A and B are used for R_x		Passed
	Check that the reporting rate is correct		Passed

c) Set T_x/R_x-Mode in Message 22 to 2	Check that mode is correctly stored		Passed
	Check that channel B only is used for T_x		Passed
	Check that channels A and B are used for R_x		Passed

2014-05-13	**Tester: Ba**	**Test details:** Check of message 22 acceptance	
Test item	Check	Remark	Result
Transmit message 22 with a new area setting			
d) Transmit message 22 from a base station transmitting message 4, distance > 120 NM	Check that the area setting is not stored	Message 22 is accepted and stored Distance of message 4 about 180 NM (LAT UTC: 52°, Msg4: 55°) <u>Retest 2014-09-22 Ba:</u> Message 22 is not received (no VDM output) and not accepted	Passed
e) Transmit message 22 from a base station not transmitting message 4	Check that the area setting is not stored	No VDM output, area is not stored	Passed
Check of message 22 from a non-base station MMSI			
Transmit message 22 from a base station transmitting message 4, distance < 120 NM MMSI of message 4 and 22 is a non-base station MMSI	Check that the area setting is not stored	Message 22 is accepted and stored <u>Retest 2014-09-22 Ba:</u> Message 22 is not received (no VDM output) and not accepted	Passed

5.3 Hello 17.3 Regional area designation by serial message

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

<table>
<tr><td>2014-05-14</td><td>Tester: Ba</td><td colspan="3">Test details: Channel management by ACA sentence on PI</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Set up EUT in autonomous mode transmitting on channels AIS 1/AIS 2, send 2 ACA sentences to the PI, defining 2 adjacent areas with channels A 1, B 1 and A 2, B 2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 1 NM. Set the position outside the areas.
Areas are in SW quadrant.
File name: AIACA_Region_17_3_SW.sst
Set the positions near the limits of the transitional zones to check the dimensions.</td><td></td></tr>
<tr><td colspan="2" rowspan="2">Display of defined area</td><td>Check that the defined area is correctly stored (displayed on MKD)</td><td>The area settings are stored only if the position is inside the area.
<u>Retest 2014-08-20 Ba:</u>
Areas are accepted if the position is outside the areas</td><td>Passed</td></tr>
<tr><td>Check ACA and TXT output on PI (Not required but recommended)</td><td></td><td>Passed</td></tr>
<tr><td colspan="2"><u>Item 1</u>:
In high sea area</td><td>Check that channels AIS 1 and AIS 2 are in use</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="4"><u>Item 2:</u>
Move position into outer TZ of region 2</td><td>Check ACA and TXT output
(Not required)</td><td>UTC 12:09
No ACA / TXT output</td><td>Passed</td></tr>
<tr><td>Check the limit of the TZ
(5 NM = 5.8 minutes)</td><td></td><td>Passed</td></tr>
<tr><td>Check that channels AIS 1 and A 2 are used</td><td></td><td>Passed</td></tr>
<tr><td>Check that reporting rate is doubled</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="2"><u>Item 3:</u>
Move position into inner TZ of region 2
(crossing the area border)</td><td>Check ACA and TXT output
(Required)</td><td>UTC 12:22</td><td>Passed</td></tr>
<tr><td>Check the border of area</td><td></td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="4"><u>Item 4:</u>
Move position into region 2
(out of TZ)</td><td>Check ACA and TXT output
(Not required)</td><td>UTC 12:24
No ACA / TXT output</td><td>Passed</td></tr>
<tr><td>Check the limit of the TZ
(2 NM = 2.3 minutes)</td><td></td><td>Passed</td></tr>
<tr><td>Check that channels A 2 and B 2 are used</td><td></td><td>Passed</td></tr>
<tr><td>Check that reporting rate is changed back to normal reporting rate</td><td></td><td>Passed</td></tr>
</table>

Item 5: Move position into TZ between region 1 and 2, inside area 2	Check that channels A 2 and A 1 are aisused	Between 1 and 2 NM from border: A2 and **AIS1** are used Less than 1 NM from border: A2 and A1 are used Retest 2014-08-20 Ba: No change Retest 2014-09-22 Ba: No change Retest 2014-10-29 Ba: The channels A2 and B2 are used, but the behaviour in this test was very strange and therefore cannot be explained in detail. Please evaluate the diagrams. Retest 2015-02-11 Ba: ▪ The transition procedure is correct. ▪ A TZ size of 1 NM is used, as defined for area 1. The TZ size of 2 NM as defined for area 2 shall be used because the position was in area 2.. Retest 2015-02-25 Ba: UTC 10:13 ▪ A TZ size of 2 NM is used ▪ After entering area 1 the transmission structure is very irregular. It may be the same effect which was observed 2015-02-19 (PI port log only). Retest 2015-03-26 Ba: The area border transition is correct.	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 12:38	Passed
	Check the border of area		Passed
Item 7: Move position into region 1 (out of TZ)	Check that channels A 1 and B 1 are used	UTC 13:15	Passed
	Check the limit of the TZ 1 NM = 1.15 minutes)		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

Item 8: Move position into TZ of region 1 to high sea	Check that channels A 1 and AIS 1 are used		Passed
	Check that reporting rate is doubled		Passed
Move position out of the TZ of region 1, into high sea	Check that channels AIS 1 and AIS 2 are used		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

2014-05-14	**Tester: Ba**	**Test details:** Check of T_x/R_x-Mode		
Test item		Check	Remark	Result
Set T_x/R_x -Mode to 1		Check that mode is correctly stored	Utc 13:31	Passed
		Check that channel A only is used for T_x		Passed
		Check that channels A and B are used for R_x		Passed
		Check that the reporting rate is correct		Passed
Set T_x/R_x -Mode to 2		Check that mode is correctly stored	UTC 13:34	Passed
		Check that channel B only is used for T_x		Passed
		Check that channels A and B are used for R_x		Passed
Set T_x/R_x -Mode to 3		Check that mode is correctly stored	UTC 13:37	Passed
		Check that EUT is not transmitting		Passed
		Check that channels A and B are used for R_x		Passed

5.4 17.4 Regional area designation with lost position

Method of measurement

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

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

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

Required result

Verify that

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

b) *all area settings are still available.*

2014-05-15	**Tester: Ba**	**Test details:** Regional areas with lost position	
Test item	Check	Remark	Result
Set position inside an area applied by ACA sentence.			
a) • Disable position • Send an addressed message 22 to EUT	Check that the area settings are still used	UTC 11:39	Passed
	Check that the area settings are modified according to the addressed message 22	Message 22 is only accepted when message 4 from the same base station is received. See Note) <u>Retest 2014-08-20 Ba:</u> No change <u>Retest 2014-09-22 Ba:</u> A MMSI addressed Message 22 is accepted without Message 4, with and without position	Passed
b) Make position information available again	Check by ACA query that the area settings are still available		Passed

Note)
In this situation it does not make sense to require a message 4 from the base station. The distance cannot be calculated because the own position is not known. So message 4 has no purpose.

I think that generally for a message 22 addressed to an MMSI no message 4 is required. Different to an area addressed message 22 a specific target is addressed which does not need additional filtering. This is similar to message 16 which is also addressed to a specific station and does not require a message 4.

5.5 17.5 Power setting

Method of measurement

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

Repeat test using ACA sentence and manual input.

Required result

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

NOTE Automatic power setting for tankers is tested in 14.5.3

2014-05-15	**Tester: Ba**	**Test details:** Power setting by Message 22		
Test item		Check	Remark	Result
The EUT has to be inside an area with regional operating settings Apply a message 22 to the VDL which modifies the power setting to 1 = low power.				
Channel switch		Check that the EUT doesn't switch channels	UTC 11:59	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	Test 2014-10-16 Ba:	Passed
Transmit the same Message 22, but power setting to 0 = high power				
Power high		Check that EUT reverts to high power		Passed

2014-05-15	**Tester: Ba**	**Test details:** Power setting by ACA		
Test item		Check	Remark	Result
Apply the following message to the PI: File name: AIACA_region_in_ch86.sst Set power flag to 1 = low power				
Power low		Check that the transmitting power is changed from high to low	UTC 11:56	Passed
MKD		Check the low power settings are displayed on MKD	<u>Test 2014-10-16 Ba:</u> Low power is displayed in the area setting	Passed
Transmit the same ACA sentence, but power setting to 0 = high power.				
Power high		Check that EUT reverts to high power		Passed

2014-10-16	**Tester: Ba**	**Test details:** Power setting by manual input		
Test item		Check	Remark	Result
Set the power level of the region in use to low power.				
Power low		Check that the transmitting power is changed from high to low		Passed
Set power level back to high power.				
Power high		Check that EUT reverts to high power		Passed

5.6 17.6 Message priority handling

Method of measurement

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

Required results

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

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

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

2014-05-15	**Tester: Ba**	**Test details:** Message priority handling		
Test item		Check	Remark	Result
Simulate a channel load of 90% on both channels, set reporting rate to 2 s. Apply an BBM sentence with a 3 slot message 8 and immediately following an ABM sentences with a 3 slot message 12 to the PI port. File name: AIBBM_ABM_17_6.sst				
Transmission order		Check that Message 12 is transmitted first because of higher priority	UTC 12:10, 12:12, 12:14	Passed

5.7 17.7 Slot reuse and FATDMA reservations

Method of measurement

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

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

Available slots are: Distant station slots.

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

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

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

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

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

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

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

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

Required results

Confirm that

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

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

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

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

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

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

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

The targets are numbered from 1 to 45 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) and are transmitted in even slots,
- the odd numbered targets have a high distance to the EUT (about 30 NM) and are transmitted in odd slots.

2014-05-15	**Tester: Ba**	**Test details:** Slot reuse		
Test item		Check	Remark	Result
Operate the EUT with 2 s reporting interval a) Test for using free slots if available				
• Apply 50% VDL load on channel A • Apply 0% VDL load on channel B		Check that only free slots are used on channel A	UTC 12:17	Passed
		Check that only slots which are free on channel A are used on channel B		Passed

b) Test for using slots of most distant targets Operate the EUT with 6 s reporting interval			
• Apply 100% VDL load on channel A • Apply 0% VDL load on channel B	Check that only the slots of odd numbered targets are used	UTC 12:41 start of targets UTC 12:44 stop of transmissions on both channels (no VDO, no VDL messages). The last transmitted message has all data set to default. Retest 2014-08-19 Ba: Same behaviour, 3 min after end of the targets the transmission continues (msg 1 time-out) Retest 2014-09-19 Ba: No change UTC 11:58 Start targets 12:00 Stop of Tx 12:03 stop targets 12:06 Tx continues Retest 2014-10-29 Ba: • Tx continues • slots of near and distant targets are used Retest 2014-11-28 Ba: Slots of near (and distant) targets are used Retest 2015-01-27 Ba: Sometimes slots of near targets are reused. It seems to be caused by a problem receiving in the next slot after the own transmission. See Note 1) Retest 2015-02-13 Ba: Near targets are re-used which used a slot after the EUT's own transmissions. Retest 2015-02-25 Ba: Only a small number of messages are transmitted (Ch.A:11 of 55, Ch.B:5 of 55). There is a VDO of all scheduled messages, but no output power. Therefore a real retest cannot be performed Retest 2015-03-24 Ba: Only slots of distant targets are reused.	Passed

	Check that the slot of a target is not used twice in a frame	Retest 2015-01-27 Ba: The same target is reused up to 4 times in a frame . A possible reason has not yet been evaluated. Retest 2015-02-13 Ba: The same target is reused more than once in a frame Retest 2015-02-25 Ba: Only a small number of messages are transmitted, Therefore a real retest cannot be performed. Retest 2015-03-24 Ba: In some cases targets are reused 2 or 3 times in a frame. See Note 2) Retest 2015-03-26 Ba: In some cases targets are reused 2 times in a frame. Retest 2015-03-27 Ba: The targets are reused only once in a frame	Passed
c) Test for using slots of most distant targets Operate the EUT with 6 s reporting interval			
• Apply 0% VDL load on channel A • Apply 100% VDL load on channel B	Check that only the slots of odd numbered targets are used on channel A	UTC 13:26 start of targets UTC 13:29 stop of all transmissions (see b) Retest 2014-10-29 Ba: • Tx continues • slots of near and distant targets are used Retest 2015-02-13 Ba: Same problems as in b) Retest 2015-03-30 Ba: Only slots of distant targets are re-used	Passed
d) Check for slot reservation by message 20 < 120 NM			
Apply message 20 with slot reservations, apply message 4 with distance < 120 NM	This test is performed in 16.6.8 a)		N/A
e) Check for slot reservation by message 20 > 120 NM			
Apply message 20 with slot reservations, apply message 4 with distance > 120 NM	This test is performed in 16.6.8 c)		N/A
f) Check for slot reservation by message 20, no message 4			
Apply message 20 with slot reservations, no message 4	This test is performed in 16.6.8 d)		N/A
g) Check for slot reservation by message 20 < 120 NM in combination with near and distant targets			

• Apply message 20 with slot reservations on channel A and message 4 with distance < 120 NM • Transmit near and distant test targets in the unreserved slots on channel A	Check that only unreserved slots are used on channel A	Test 2015-02-13	Passed
	Check that the most distant targets are reused on channel A	Retest 2015-03-30 Ba: The most distant targets are re-used on channel A	Passed
	Check that on channel B only slots which are not reserved on channel A are selected at time-out 0		Passed

Note 1)
In the cases when a near target has been reused the EUT has transmitted during the previous frames in the slot before the slot used by the reused target. The EUT has not received the target in the slot after the own transmission and therefore handled the slot as a free slot.

Note 2)
Some remarks regarding reused targets:

- All targets are applied always with time-out 4. This is different to normal targets, but we assume that the time-out is always updated when a new message is received.
- when reusing a target it is no longer received in this selection interval. The EUT has to count down internally the time-out of this target. That means that it has to be considered as reused for at least 4 frames (time-out values 3, 2, 1, 0).
- For these four frames it is not allowed to reuse the target again in another selection interval.
- We recommend to consider the reused target as reused for the whole time the slot of this target is used, independent of the time-out. This is easier to implement and on the safe side, because the target may select the same slot again after time-out.

5.8 17.8 Management of received regional operating settings

5.8.1 17.8.1 Test for replacement or erasure of dated or remote regional operating settings

Method of measurement

Set up the standard test environment and operate EUT in autonomous mode. Using a base station MMSI, send a valid regional operating setting to the EUT by Message 22 with the regional operating area, including the own position of the EUT (area 1). Consecutively, send another seven valid regional operating settings to the EUT, using both Messages 22 and DSC telecommands, with regional operating areas neither overlapping with the first nor with one another. Perform the following in the order shown:

a) *Send another Message 22 to the EUT, with a ninth regional operating area (area 9) not overlapping with the previous eight regional operating areas.*

b) Send a tenth telecommand to the EUT, with a regional operating area (area 10) which partly overlaps a regional operating area.

c) Move own position of EUT to a distance of more than 500 NM from one region defined by previous commands.

d) Move own position of EUT to a distance of more than 500 NM from all regions defined by previous commands.

e) Restart the EUT and make sure it cannot receive UTC. Apply a channel management area setting by message 22 and by ACA input. Wait for 24 hours.

Query for area settings (ACA request) after a), b), c) and d).

Required results

Check that, after the initialisation, the EUT operates according to the regional operating settings defined by area 1 and

a) the most distant area is deleted and the other areas are available,

b) area 10 is stored and that the old overlapped area is deleted,

c) this area is deleted by the output of TXT and ACA sentences showing the remaining area settings,

d) all areas are deleted by the output of a single TXT and ACA sentences showing high sea settings,

e) all area settings have been removed.

<table>
<tr><td>2014-08-20</td><td>Tester: Ba</td><td colspan="3">Test details: Test of replacement or erasure of dated or remote regional operating settings</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">The following check of area entries can be done by MKD or by request of ACA</td><td></td></tr>
<tr><td colspan="2" rowspan="2">Send by message 22
• 1 area including own position
• 7 areas not overlapping, not including own position</td><td>Check that area 1...7 are displayed on MKD</td><td>Only 1 area is displayed on the MKD
<u>Retest 2014-11-27 Ba:</u>
All 8 areas are displayed</td><td>Passed</td></tr>
<tr><td>Check that all 8 areas are output on PI after request by sentence xxAIQ,ACA</td><td></td><td>Passed</td></tr>
<tr><td colspan="2">a) Send a ninth Message 22 to the EUT</td><td>Check that the most distant area is deleted (area 8)</td><td>Area 1 is deleted which is the oldest and nearest area (position inside).
<u>Retest 2014-09-22 Ba:</u>
The most distant area is deleted.</td><td>Passed</td></tr>
<tr><td colspan="2" rowspan="2">b) Send an area overlapping the area of step 1 not including own position</td><td>Check the overlapped area is deleted and replaced by the new one</td><td>UTC 09:12</td><td>Passed</td></tr>
<tr><td>Check that the EUT reverts to the default operating settings</td><td></td><td>Passed</td></tr>
<tr><td colspan="2">c) Erasure by distance:
Move own position of EUT to a distance of more than 500 miles from one region</td><td>Check by TXT and ACA output that this area is deleted</td><td></td><td>Passed</td></tr>
</table>

d) Erasure by distance: Move own position of EUT to a distance of more than 500 miles from all regions	Check by TXT and ACA output that all areas are deleted		Passed
e) Erasure by time • Restart EUT without UTC • Apply area settings by message 22 and ACA • Wait for 24 hours	Check that all areas have been deleted after 24 hours	<u>Test 2014-05-15 Ba</u> 7 days after applying an area it is still not yet deleted <u>Retest 2014-08-20 Ba:</u> The areas are deleted after 24 hours when applied with valid UTC. <u>2015-05-20 Ba:</u> The manufacturer has provided log data of the test without valid UTC. This item is passed based on these log files.	Passed
Area update with change of borders	When an area with position inside is replaced with an area with the same settings but different corners the new area is for some time handled with position outside, that means that for some minutes AIS1 and AIS2 are used until the EUT reschedules with the channels of the area setting. If the area settings do not change the EUT should continue using the channels defined by the area settings <u>Retest 2014-10-29 Ba:</u> UTC 14:31 There is no rescheduling		Passed
Acceptance of new areas after MMSI addressed message 22s	When the area in use has been changed with an MMSI addressed message 22 the EUT does not accept any new area settings by message 22 for 10 minutes. This is incorrect. The 10 minutes protection is related only to the area affected by the MMSI addressed message 22. It shall not prohibit the reception any new area settings which do not overlapp the area changed by the MMSI addressed message 22. <u>Retest 2014-10-29 Ba:</u> UTC 14:35 Area settings are accepted		Passed

5.8.2 17.8.2 Test of correct input via presentation interface or MKD

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, perform the following tests in the following order.

a) Send Message 22 or a DSC telecommand with valid regional operating settings to the EUT with a regional operating area, which contains the current position of own station.

b) Input a different, valid regional operating setting (not overlapping the area defined under a)) via the MKD.

c) Send a different regional operating setting with a regional operating area which partly overlaps the regional operating area input via the MKD to the EUT via the presentation interface in the previous step, and which contains the present position of own station.

d) *Input the default operating settings via the MKD for the regional operating area, which was received by the previous command via the presentation interface.*

e) *Send Message 22 or a DSC telecommand with a different regional operating setting to the EUT with a regional operating area, which contains current position of own station.*

f) *Within two hours, after e), send a different regional operating setting to the EUT via the presentation interface with a valid regional operating area overlapping the regional operating area sent to the EUT by Message 22 or a DSC telecommand.*

Required results

The following results are required:

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

b) *Step 1: Confirm that the regional operating settings of the previous Message 22 or DSC telecommand are displayed to the user on the MKD for editing.*

Step 2: Check, that the EUT allows the user to edit the displayed regional operating settings. Check, that the EUT does not accept incomplete or invalid regional operating settings. Check, that the EUT accepts a complete and valid regional operating setting.

Step 3: Check, that the EUT prompts the user to confirm the intended change of regional operating settings. Check, that the EUT allows the user to return to the editing menu or to abort the change of the regional operating settings.

Step 4: Check, that the EUT uses the regional operating settings input via the MKD.

c) *Check, that the EUT uses the regional operating settings received via the presentation interface.*

d) *Check, that the EUT accepts the default operating settings for the regional operating area received in c). Check, that the EUT uses the default operating settings.*

e) *Check, that the EUT uses the regional operating settings commanded to it by Message 22 or DSC telecommand.*

f) *Check, that the EUT does not use the regional operating setting commanded to it via the presentation interface.*

2014-11-27	**Tester: Ba**	**Test details:** Correct input via presentation interface or MKD		
Test item		Check	Remark	Result
Send a valid Message 22, set position of own ship into this area.				
a) Use of settings		Confirm that the EUT uses the regional operating settings commanded by Message 22		Passed

<u>b) MKD input</u> Entering new area by MKD	<u>Step 1:</u> Confirm that the regional operating settings of the previous Message 22 is displayed to the user on the MKD for editing		Passed
	<u>Step 2:</u> Check, that the EUT allows the user to edit the displayed regional operating settings		Passed
	Check, that the EUT does not accept incomplete or invalid regional operating settings		Passed
	Check, that the EUT accepts a complete and valid new regional operating setting		Passed
	<u>Step 3:</u> 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	<u>Step 4:</u> Check, that the EUT uses the regional operating settings input via the MKD		Passed
<u>c) New area by ACA</u> 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
<u>d) Default settings via MKD</u> 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		Passed
	Check, that the EUT uses the default operating settings		Passed
e) <u>Area setting by VDL</u> 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
<u>f) Priority of VDL message</u> Apply a new area via ACA, overlapping the area of e) within 2 hours	Check, that the EUT does not accept the regional operating setting commanded to it via the presentation interface within 2 hours		Passed

5.8.3 17.8.3 Test of addressed telecommand

Method of measurement

Set up a standard test environment and operate EUT in autonomous mode. Using a base station MMSI, perform the following tests in the following order:

a) Send Message 22 or a DSC telecommand with valid regional operating settings, that are different from the default operating settings, to the EUT with a regional operating area, which contains the current position of own station.

b) Send an addressed Message 22 or an addressed DSC telecommand to the EUT with different regional operating settings than the previous command.

c) Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

Required results

Check, that

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

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

c) the EUT reverts to default.

2014-09-22	**Tester: Ba**	**Test details:** Test of addressed telecommand		
Test item		Check	Remark	Result
a) Send a valid Message 22, position inside		Check, that the EUT uses the regional operating settings		Passed
b) Send an addressed message 22 to the EUT with different regional operating settings		Check, that the EUT uses the regional operating settings		Passed
b) Send an addressed Message 22, addressed **as ID 2**, to the EUT with different regional operating settings		Check, that the EUT uses the regional operating settings		Passed
c) Move the EUT out of the regional operating area defined by the previous addressed telecommand		Check, that the EUT reverts to default		Passed

5.8.4 17.8.4 Test for invalid regional operating areas

Purpose

This test simulates invalid regional operating areas (three regional operating areas with the same corner).

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Using a base station MMSI, perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

a) Send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by Message 22 or DSC telecommand, presentation interface input and manual input via MKD. The current own position of the EUT shall be within the regional operating area of the third regional operating setting.

b) Move current own position of the EUT consecutively to the regional operating areas of the first two valid regional operating settings.

Required test results

Check, that

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

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

2014-09-22	**Tester: Ba**	**Test details:** Test for invalid regional operating areas		
Test item		Check	Remark	Result
ACA input				
a) Send three different valid regional with adjacent corners by ACA. File name: AIACA_region_17_8_4.sst Position inside third area.		Check, that the third area is refused and settings are not used		Passed
b) Move own position to the first 2 areas		Check, that the EUT uses the operational settings of these areas		Passed
MKD input				
a) Input three different valid regional with adjacent corners by MKD. Position inside third area.		Check, that the third area is refused and settings are not used	<u>Test 2014-11-27 Ba:</u>	Passed
b) Move own position to the first 2 areas		Check, that the EUT uses the operational settings of these areas	<u>Test 2014-11-27 Ba:</u>	Passed

Msg 22 input			
a) Send three different valid regional with adjacent corners by message 22 Position inside third area.	Check, that the third area is refused and settings are not used	Test 2014-10-16 Ba:	Passed
b) Move own position to the first 2 areas	Check, that the EUT uses the operational settings of these areas		Passed

5.9 17.9 Continuation of autonomous mode reporting interval

Method of test

When in the presence of an assigned mode command and in a transition zone, check that the EUT continues to report at the autonomous mode reporting interval.

Required result

Ensure that the autonomous reporting rate is maintained.

2014-05-15	**Tester: Ba**	**Test details:** Continuation of autonomous mode reporting rate		
Test item		Check	Remark	Result
Set the EUT into a transitional zone Send assignment commands message 16 with an higher update rate to the EUT				
Rate assignment command in a transitional zone		Check that an rate assignment command is ignored in a transitional zone	UTC 13:59	Passed
Slot assignment command in a transitional zone		Check that an slot assignment command is ignored in a transitional zone	UTC 14:01	Passed

6 <u>18 Specific tests of transport layer</u>

(See 7.5)

6.1 <u>18.1 Addressed messages</u>

6.1.1 <u>18.1.1 Transmission</u>

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Set up a test target for scheduled transmissions on channel AIS 1 only. Initiate the transmission of an addressed binary message (Message 6) by the EUT (test target as destination). Record transmitted messages on both channels.

Required results

Check that the EUT transmits Message 6 on channel AIS 1. Repeat test for AIS 2.

Basic test of addressed message is made in 2.1.4.1 14.1.4.1 Transmit an addressed message**.**

2014-05-15 **Tester: Ba**	**Test details:** Addressed binary message 6		
Test item	Check	Remark	Result
Transmit an addressed binary message 6 by sending an ACA sentence to the PI. PI sentence: File AIABM_bin.sst: !AIABM,1,1,2,<MMSI>,x,6,06P0test,0 Change transmission channel x according to test item. The addressed target is transmitting on channel A only			
Channel = 0 (autoselect)	Check T_x on channel A	UTC 14:15	Passed
Channel = 2 (ch. B)	Check T_x on channel B		Passed
Channel = 3 (ch. A+B)	Check T_x on channels A+B		Passed
The addressed target is transmitting on channel B only			
Channel = 0 (autoselect)	Check T_x on channel B	UTC 14:24 EUT transmits message 6 on channel A <u>Retest 2014-08-19 Ba:</u> The first transmission is on channel B. Further transmissions us alternating channels	Passed
Channel = 1 (ch. A)	Check T_x on channel A		Passed

6.1.2 <u>18.1.2 Acknowledgement</u>

Method of measurement

Operate standard test environment and EUT in autonomous mode. Apply up to 4 addressed binary messages (Message 6; EUT as destination) to the VDL on channel AIS 1. Record transmitted messages on both channels. Repeat with AIS 2.

Required results

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

2014-05-16	**Tester: Ba**	**Test details:** Acknowledgement of binary message 6		
Test item		Check	Remark	Result
Transmit 4 addressed binary message with consecutive sequential message identifiers from other transponder. File name: AIABM_4_bin.sst				
RX of messages (VDM)		Check that the messages are received by VDM output on PI of EUT	UTC 11:44	Passed
Transmission of ackn. Message 7		Check transmission of ackn. by VDO output of EUT		Passed
Sequence numbers		Check that sequence number in ackn. = sequence number of R_X message		Passed
Ackn. channel		Check that ackn. T_X channel = R_x channel		Passed

6.1.3 18.1.3 Transmission retry

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of up to 4 addressed binary messages by the EUT which will not be acknowledged (i.e. destination not available). Record transmitted messages.

Required results

Confirm that EUT retries the transmission up to 3 times (configurable) for each addressed binary message. Confirm that the time between transmissions is 4 s to 8 s. Confirm that EUT transmits the overall result with an appropriate message to PI.

2014-05-15	**Tester: Ba**	**Test details:** Addressed binary message 6		
Test item		Check	Remark	Result
Transmit an addressed binary message 6 by sending an ABM sentence to the PI. PI sentence: File AIABM_bin.sst The message is addressed to a not available transponder. So no acknowledgement is received. Record the VDO output of VDE with time stamp.				
VDO output of EUT		Check the transmission by VDO		Passed
Number of repetitions		Note and check the number or repetitions		Passed

Repetition timing	Record the repetition timing. Note the time between repetitions and check that it is 4...8 s	1, 6, 7, 4, 5 2, 6, 9, 8, 4	Passed
ABK sentence	Note and check the ABK sentence Confirm the type = 1 (broadcast but no acknowledgement)		Passed
Message sequence numbers	Check message sequence numbers of transmissions and ABK		Passed

6.1.4 18.1.4 Acknowledgement of addressed safety related messages

Repeat test under 18.1.2 with addressed safety related message.

2014-05-16	**Tester: Ba**	**Test details:** Acknowledgement of safety related text message 12	
Test item	Check	Remark	Result
Transmit 4 safety related text messages 12 with consecutive sequential message identifiers from other Transponder			
R_x of messages (VDM)	Check that the messages are received by VDM output on PI of EUT		Passed
Transmission of acknowledgement message 13	Check transmission of ackn. by VDO output of EUT		Passed
Sequence numbers	Check that sequence number in ackn. = sequence number of R_x message		Passed
Ackn. channel	Check that ackn. T_x channel = R_x channel		Passed

6.1.5 18.1.5 Behaviour of NavStatus 14 reception

Purpose

This test verifies the correct behaviour of the received Message 1 with NavStatus 14.

Method of measurement

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

a) Initiate the transmission of a Message 1 with NavStatus 14.

b) Acknowledge the alarm.

c) Initiate the transmission of a Message 1 from the same user ID with NavStatus 14 within the time out.

d) Initiate the transmission of a Message 1 from the same user ID with NavStatus other than 14 within the time out.

e) Initiate the transmission of a Message 1 from different user ID with NavStatus 14.

Required results

Check that

a) the MKD indicates the received message at the top of the target list and the EUT activates the alarm relay and output an ALR sentence with alarm ID 14 via the PI,

b) the EUT deactivates alarm relay and changes the alarm status in the ALR sentence,

c) the EUT does not activate the alarm relay and does not change the alarm status in the ALR sentence,

d) the EUT does not activate the alarm relay and does not output an ALR sentence with alarm ID 14,

e) the MKD indicates the received message at the top of the target list and the EUT activates the alarm relay and output an ALR sentence with alarm ID 14 via the PI.

2014-05-15	**Tester: Ba**	**Test details:** Navstatus 14 reception		
Test item		Check	Remark	Result
Apply some test targets to the VDL, distance to the EUT less than the AIS SART position				
a) apply message 1 with nav status 14 on VDL		Check that there is a VDM on PI port	UTC 14:44	Passed
		Check that the MKD displays the AIS SART on top of the target list	2014-10-16 Ba: The MKD is completely blocked after receiving the AIS SART message 1 2014-10-30 Ba: The MKD is blocked only if there are other targets in the list Retest 2014-11-28 Ba: The MKD is not blocked, The SART is displayed on top of the list	Passed
		Check that the alarm relay is activated	The alarm relay is not activated Retest 2014-08-19 Ba: The alarm relay is not activated Retest 2014-09-19 Ba: The alarm relay is activated	Passed
		Check that there is an ALR ID 014 output on PI	There is no ALR 014 output Retest 2014-08-19 Ba: There is no ALR 014 output Retest 2014-09-19 Ba: An actival ALR 014 is output	Passed
b) Acknowledge the alarm		Check that the alarm relay is deactivated	Retest 2014-09-19 Ba: The alarm relay is inactivated	Passed
		Check that the ALR ID 014 is updated	Retest 2014-09-19 Ba: The ALR 014 is updated (A;A)	Passed
c) apply message 1 with nav status 14 on VDL from same user ID within the time-out of 18 minutes		Check that the alarm relay is not activated	2014-09-19 Ba:	Passed
		Check that the ALR ID 014 is not changed	2014-09-19 Ba:	Passed
d) apply message 1 with nav status not 14 on VDL from same user ID.		Check that the alarm relay is not activated	The alarm relay is not activated	Passed
		Check that there is no ALR ID 014 output on PI		Passed

e) apply message 1 with nav status 14 from different user ID	Check that the MKD displays the AIS SART on top of the target list	Has to be tested when the MKD is not blocked by a received SART Msg 1 Test 2014-12-01 Ba: The SART is not displayed on top of the list, even if it is nearer than the first SART. It is displayed on the second place, after the first SART Retest 2015-01-26 Ba: If there are different SARTs they are displayed in the order of the range. The last received SART is not necessarily on top of the list, depending on the range.	Passed
	Check that the alarm relay is activated	2014-09-19 Ba: The alarm relay is not activated Retest 2014-10-30 The alarm relay is activated	Passed
	Check that there is an ALR ID 014 output on PI	2014-09-19 Ba: The ALR is not updated to A,V, it remains at A,A Retest 2014-10-30 The ALR sentence is updated to A,V	Passed

6.2 18.2 Interrogation responses

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply an interrogation message (Message 15; EUT as destination) to the VDL according to Table 12 for responses with Message 5 and slot offset set to 10 on channel AIS 1. Record transmitted messages on both channels.

Required results

Check that EUT transmits the appropriate interrogation response message as requested on channel AIS 1. Repeat test for AIS 2.

2014-05-16	**Tester: Ba**	**Test details:** Interrogation of Message 5, ch. A		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 5 with given slot offset = 10. A response shall automatically be transmitted by the EUT. Request is transmitted on channel A.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)		Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check that the response is transmitted in the correct slot		Passed
Response channel		Check that the response is transmitted on the request channel		Passed

2014-05-16	**Tester: Ba**	**Test details:** Interrogation of Message 5, ch. B		
Test item		Check	Remark	Result
Transmit an interrogation message 15 requesting Message 5 with given slot offset = 10. A response shall automatically be transmitted by the EUT. Request is transmitted on channel B.				
R_X of request by EUT		Check that the request message is received by the EUT (VDM)		Passed
T_X of response (VDO)		Check that response is transmitted by EUT (VDO)		Passed
Response on VDL		Check that the response is transmitted in the correct slot		Passed
Response channel		Check that the response is transmitted on the request channel		Passed

7 19 Specific presentation interface tests

(See 7.6)

7.1 19.1 General

The EUT including all necessary test equipment shall be set-up and checked that it is operational before testing commences.

The manufacturer shall provide sufficient technical documentation of the EUT and its interfaces in particular.

Where appropriate, tests according to various subclauses of this clause as well as other Clauses of this standard may be carried out simultaneously.

2014-05-16	**Tester: Ba**	**Test details:** General interface tests		
Test item		Check	Remark	Result
Checksum of output sentences		Check that the output sentences include a checksum		Passed
		Check that the checksum is correct		Passed
Checksum of input sentences		Check that the input sentences with correct checksum are accepted	Test 2015-05-07 Ba:	Passed
		Check that the input sentences with incorrect checksum are not accepted	Test 2015-05-07 Ba:	Passed
		Check that the input sentences without checksum are not accepted	Test 2015-05-07 Ba: ▪ Input sentences without checksum are not accepted if there has not been a sentence with checksum before. ▪ Input sentences without checksum are accepted if on that port has been a sentence with checksum before, even if it was a sentence with a different format. See Note) Retest 2015-05-12 Ba: The usage of sensor input sentences stops when the checksum is removed	Passed

Note)
It can be configured on the web interface if the checksum for PI and Sensor input sentences has to be verified. This setting has been activated for the test.

It is important to notice that this has to be activated in the factory default settings!

7.1.1 New general tests introduced in IEC 61162-1 Ed. 4

7.1.1.1 Test for B.4.10 Correct use of special characters starting a sentence

The AIS Class A has to implement sentences with “$” and “!”.
It has to be checked that there is no malfunction when valid sentences are interleaved with tag block starting character “\”.

2015-05-07 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

7.1.1.2 Test for B.4.11 Correct parsing of received sentences

It has to be checked that any characters between the end of a valid line and the starting character of the next line are ignored

2015-05-07 Ba	Test details - Positon input with additional characters		
Test item	Check	Remark	Result
Apply a set of position input data interleaved with lines containing a number of valid and invalid characters.			
Sensor data	Verify that the sensor data are correctly used		Passed
	Confirm that no malfunction is observed		Passed
Apply a set of position input data to a sensor input. The sensor data sentences are headed by a number of valid or invalid characters			
Sensor data	Verify that the sensor data are correctly used		Passed
	Confirm that no malfunction is observed		Passed

7.1.1.3 Test for B.4.12 Future extensions of received sentences

It has to be checked that known input sentences are accepted if additional fields are added at the end. The additional fields can be ignored.

This test does not check all possible sentences. It is assumed that there is a general methode to ignore additional fields.

2015-05-07 Ba	Test details - Positon input with future extensions		
Test item	Check	Remark	Result
Apply know PI port input sentences with additional fields			
SSD input	Verify that the SSD input data are correctly used		Passed
VSD input	Verify that the VSD input data are correctly used		Passed
ACA input	Verify that the ACA input data are correctly used		Passed
Apply known sensor input sentences with additional fields			
GLL input	Verify that the GLL input data are correctly used		Passed
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 ROT input data are correctly used		Passed

7.2 19.2 Checking manufacturer's documentation

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

- *approved sentences against the IEC 61162-1;*
- *proprietary sentences against the IEC 61162-1;*
- *usage of fields as required for different functions including provided default values or settings;*
- *transmission intervals against the IEC 61162-1 and IEC 61162-2;*
- *configuration of hardware and software if this is relevant to the interface performance and port selection.*

The following checks shall be made for compliance with the IEC 61162-1 and IEC 61162-2:

- *output drive capability;*
- *load on the line of inputs;*

- *electrical isolation of input circuits.*

This test does not check the documentation, this is done in 1.7 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.

2014-04-07	**Tester: Ba**	**Test details:** Check of manufacturers documentation	
Test item	Check	Remark	Result
Approved sentences	Check approved sentences against IEC 61162	The Information provided in the manual is not sufficient for the check. At least the format of all sentences and information about used/unused fields should be provided in the manual. Therefore the check of the documented sentences against IEC 61162 cannot be performed. But all input and output sentences have been tested. Therefore we assume that they are implemented correctly, based on the test result.	Passed
Proprietary sentences	Check proprietary sentences against IEC 61162	The Information provided in the manual is not sufficient for the check. Retest 2015-05-07 Ba: The format of the proprietary sentences in the manual is correct.	Passed
Usage of Fields	Check usage of fields	Information not provided in the manual Retest 2015-05-07 Ba: The usage of fields is not documented completely for sensor data. Retest 2015-05-18 Ba: The usage of fields has been added.	Passed
Transmission intervals	Check transmission intervals	Retest 2015-05-04 Ba:	Passed
Hardware configuration	Check hardware configuration		Passed
Output drive capability	Check output drive capability	Retest 2015-05-04 Ba:	Passed
Input load	Check input load	Accepted	Passed
Electrical Isolation	Check electrical isolation	Retest 2015-05-04 Ba:	Passed

7.3 19.3 Electrical test

Method of test

Input/output ports configured in accordance with IEC 61162-1 or IEC 61162-2 shall be tested according to the relevant standard with regard to minimum and maximum voltage and current at the input terminals.

Required results

The interfaces shall fulfil the requirements of the relevant standards.

2014-05-27	**Tester: Ba**	**Test details:** Electrical test of inputs		
Test item		Check	Remark	Result
Minimum voltage		Check that input works with minimum input voltage		Passed
Maximum voltage		Check that input is not damaged by maximum input voltage		Passed
Input current		Check the input current against the IEC 61162-1 or IEC 61162-2	For all ports: +/- 5 V: +/- 41 mA +/- 10 V: +/- 81 mA +/- 15 V: +/- 120 mA This current is according to a termination with 125 Ohm. The currents are too high for unterminated inputs. No information and no way found to switch off the termination. Retest 2015-02-13 Ba: The manufacturer has modified the input termination from 120 Ohm to 1 kOhm and has provided a measurement of the input current. The requirements of IEC 61162-2 with reference to V.11 are still exceeded. See Note) 2015-02-25 Ba: According to the e-mail exchange of 2015-02-17 we can accept this 1 kOhm termination, with an appropriate remark in the certificate.	Passed
Electrical Isolation		Check that sensor inputs are electrically isolated		Passed
		Check that high speed inputs are electrically isolated		Passed

Note)

IEC 61993-2 defines in 7.6.3.1: Each port shall meet the requirements of IEC 61162-2.
IEC 61162-2 defines in 3.5.3 that the listener's receive circuits shall comply with ITU-T V.11.
ITU-T V.11 defines in 6.1 the maximum input load. It results in e.g. a maximum current of 3.25 mA at 10 V differential voltage. The current implementation of 1 kOhm results in 10 mA at 10 V.

7.4 19.4 Test of input sensor interface performance

Method of measurement

Connect all inputs and outputs of the EUT as specified by the manufacturer and simulate VDL-messages using the test system. Operate inputs with simulated sensor data that are both the relevant data and additional data with formatters not provided for the relevant input. Each sensor input shall be loaded with 70 % to 80 % of the interface's capacity. Record the VDL and output from the EUT's high speed port.

Required results

Verify that the output on the VDL and the presentation interface agree with the simulated input and that all output data is transmitted without loss or additional delay

2014-05-27	**Tester: Ba**	**Test details:** Test of input sensor interface performance	
Test item	Check	Remark	Result
Load all 3 sensor inputs with 70-80 % of the interface's capacity. 1 Sensor input at 4800 with position data 1 Sensor input at 4800 with log data 1 Sensor input at 38400 with heading and ROT data			
VDL contents	Check that the VDL contents agree with in input data		Passed
VDO output	Check that VDO outputs on both high speed ports agree with the sensor input data		Passed
Loss of data	Check that VDL messages are transmitted without loss of sensor data		Passed
	Check that output data at VDO output are sent without loss of sensor data		Passed
Delay of data	Check that there is no delay from sensor input change to VDL messages		Passed
	Check that there is no delay from sensor input change to VDO output		Passed

7.5 19.5 Test of sensor input

7.5.1 19.5.1 Test of GNS input

Method of measurement

Set up standard test environment and apply a GNS sentence with simulated sensor data. Record VDL output as follows:

a) Set mode indicator to AA (Autonomous).

b) Set mode indicator to AD, DA and DD (Differential).

c) Set mode indicator to P (Precise)

d) Set mode indicator to E (Estimated).

e) Set mode indicator to M (Manual).

f) Set mode indicator to S (Simulator).

g) Set mode indicator to N and NN (Data not valid).

h) Set mode indicator to A (GPS Autonomous) and time stamp field null.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag and time stamp).

Required results

Confirm that

a) all of the content is correct and PA flag = 0,

b) all of the content is correct and PA flag = 1,

c) all of the content is correct and PA flag = 1,

d) external position is not used or time-stamp = 62,

e) external position is not used or time-stamp = 61,

f) the external position is not used,

g) the external position is not used,

h) all of the content is correct and PA flag = 0 and time stamp = 60.

2014-05-09	**Tester: Ba**	**Test details:** GNS satellite position input		
Test item		Check	Remark	Result
Apply simulated GNS sentence to the sensor input, check on VDL. File name: ais03_gns_vtg_hdt_rot.sst				
a) Set Mode = **AA** (autonomous GPS/GLONASS) Check on VDL		Check latitude		Passed
		Check longitude		Passed
		Check RAIM-Flag = 0	Retest 2014-10-13 Ba: Raim flag = 1 I checked if it is the RAIM flag of the internal GNSS. It is also 1 if the internal GNSS has no position and the internal RAIM flag is set to 0 Retest 2014-10-30 Ba: No change, RAIM flag = 1 This is not a problem of the GNS sentence but the RAIM flag is set for all external sensor data. Retest 2014-11-28 Ba: RAIM flag = 0	Passed
b) 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)		Check data ok		Passed
		Check PA-Flag = 1 on VDL		Passed
Set Mode = DN (differential GPS/ no GLONASS)		Check data ok		Passed
		Check PA-Flag = 1 on VDL		Passed
Set Mode = AD (autonomous GPS/ differential GLONASS)		Check data ok		Passed
		Check PA-Flag = 1 on VDL		Passed
c) Set mode = P(Precise position.)		Check PA-Flag = 1 on VDL	Default position, data are not accepted Retest 2014-08-18 Ba: Default position Retest 2014-09-18 Ba: Position is used, PA flag = 1	Passed
d) Set mode = E (estimated position.)		Check that timestamp = 62 Or data = default	Default position Time stamp = 60 Retest 2014-08-18 Ba: No change, time stamp = 60 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed

e) Set mode = M (manual position)	Check that timestamp = 61 Or data = default	Default position Time stamp = 60 Retest 2014-08-18 Ba: No change, time stamp = 60 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed
f) Set mode = S (simulated position)	Check that timestamp = 63 Check default data	Default data Time stamp = 60 Retest 2014-08-18 Ba: No change, time stamp = 60 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed
g) Set Mode = **NN** (no GPS/ no GLONASS)	Check data = default		Passed
	Check PA-Flag = 0		Passed
	Check that time stamp = 63	Retest 2014-08-20 Ba: Time stamp = 60 Remark: This is not a problem of the GNS sentence. It is incorrect in all cases without valid position Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed
Set Mode = **N** (no GPS/ no GLONASS)	Check data = default		Passed
	Check PA-Flag = 0		Passed
h) Set Mode = **A** UTC of position field = null	Check latitude	= default	Passed
	Check longitude	= default	Passed
	Check PA-Flag = 0		Passed
	Check time stamp = 60		Passed

7.5.2 19.5.2 Test of RMC input

Method of measurement

Set up standard test environment and apply an RMC sentence with simulated sensor data.

a) Set status to valid and mode indicator to A (Autonomous).

b) Set mode indicator to D (Differential).

c) Set mode indicator to E (Estimated).

d) Set Mode indicator to M (Manual).

e) Set mode indicator to S (Simulator).

f) Set status to invalid and mode indicator to N (Data not valid).

g) Set mode indicator to A (Autonomous) and time stamp field null.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag, time stamp, SOG and COG).

Required results

Confirm that

a) all of the content is correct and PA flag = 0,

b) all of the content is correct and PA flag = 1,

c) external position and SOG/COG are not used or time-stamp = 62,

d) external position and SOG/COG are not used or time-stamp = 61,

e) external position and SOG/COG are not used,

f) external position and SOG/COG are not used,

g) all of the content is correct and PA flag = 0 and time stamp = 60,

2014-05-09	**Tester: Ba**	**Test details:** RMC position input		
Test item		Check	Remark	Result
Apply simulated RMC sentence to the sensor input. File name: ais04_rmc_hdt_rot.sst				
a) Set status/mode to **A,A** Check on VDL		Check latitude	UTC 13:10	Passed
		Check longitude		Passed
		Check PA-Flag = 0		Passed
b) Set status/mode to **A,D** (differential mode)		Check data	UTC 13:12	Passed
		Check PA-Flag = 1		Passed
c) Set status/mode to **A,E** (estimated position)		Check data = default or time stamp = 62	Data are used, PA = 0 time stamp = 0...59 Retest 2014-08-18 Ba: time stamp = 0...59 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed

d) Set <u>status/mode to **A,M**</u> (manual position)	Check data = default or time stamp = 61	Data are used, PA = 0 time stamp = 0...59 <u>Retest 2014-08-18 Ba:</u> time stamp = 0...59 <u>Retest 2014-09-18 Ba:</u> Default position, time stamp = 63	Passed
e) Set <u>status/mode to **A,S**</u> (simulated position)	Check data = default		Passed
f) Set <u>status/mode to **V,N**</u> (invalid data) Check on VDL	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check PA-Flag = 0		Passed
	Check that time stamp = 63	<u>Retest 2014-08-20 Ba:</u> Time stamp = 60 <u>Retest 2014-09-18 Ba:</u> Default position, time stamp = 63	Passed
h) Set <u>Mode = **A**</u> UTC of position field = null	Check latitude		Passed
	Check longitude		Passed
	Check PA-Flag = 0		Passed
	Check time stamp = 60	Time stamp = 0 <u>Retest 2014-09-18 Ba:</u> time stamp = 60	Passed

7.5.3 19.5.3 Test of DTM input

Method of measurement

Set up standard test environment and apply a GNS and DTM sentence with simulated sensor data.

a) Set local datum in the DTM sentence to "W84", set Reference datum to other value than "W84".

b) Set local datum in the DTM sentence to other value than "W84".

c) Set local datum in the DTM sentence to "W84" again.

Repeat the test with RMC input.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag and time stamp).

Required results

Confirm that

a) the position data from the sensor input are used,

b) the position data from the sensor input are not used,

c) the position data from the sensor input are used.

2014-05-09	**Tester: Ba**	**Test details:** DTM reference datum	
Test item	Check	Remark	Result
Apply simulated position sentences with DTM. Apply **GNS** sentence with DTM, Set Reference datum to other then W84 File name: ais03d_dtm_gns_vtg_hdt_rot.sst			
a) Set Local datum = W84	Check that data are valid	UTC 13:18	Passed
b) Set Local Datum not W84	Check on VDL that data are default		Passed
c) Set Local datum = W84	Check that data are valid		Passed
Apply **RMC** sentence with DTM, Set Reference datum to other then W84 File name: ais03d_dtm_gns_vtg_hdt_rot.sst			
a) Set Local datum = W84	Check that data are valid		Passed
b) Set Local Datum not W84	Check on VDL that data are default		Passed
c) Set Local datum = W84	Check that data are valid		Passed

7.5.4 19.5.4 Test of GBS input

Method of measurement

Set up standard test environment and apply a GNS and GBS sentence with simulated sensor data.

The expected RAIM error is calculated from expected error in longitude and expected error in latitude of the GBS sentence according to ITU-R M.1371 Table 47 as follows:

a) Set the position sentence to non-differential modeSet expected RAIM error to a value <=10 m.

b) Set expected RAIM error to a value >10 m.

c) Remove the expected error in longitude and/or latitude (null field).

Set the position sentence to differential mode.

d) Set expected RAIM error to a value <=10 m.

e) Set expected RAIM error to a value >10 m.

f) Remove the expected error in longitude and/or latitude (null field).

Repeat the test with RMC input as position sentence.

Record the VDL position reports and evaluate the contents (Position, PA flag, RAIM flag and time stamp).

Required results

Confirm that

a) RAIM flag = 1 and PA flag = 1,

b) RAIM flag = 1 and PA flag = 0,

c) RAIM flag = 0 and PA flag = 0,

d) RAIM flag = 1 and PA flag = 1,

e) RAIM flag = 1 and PA flag = 0,

f) RAIM flag = 0 and PA flag = 1.

2014-05-09	**Tester: Ba**	**Test details:** GBS input		
Test item		Check	Remark	Result
Apply simulated GNS sentence with GBS sentence to the sensor input File name: ais03g_gns_gbs_vtg_hdt_rot.sst Mode indicator = A (non-differential)				
a) Set expected error in GPS sentence to < 10 m		Check that PA flag = 1		Passed
		Check that RAIM-Flag = 1		Passed
b) Set expected lat error in GPS sentence to > 10 m		Check that PA flag = 0		Passed
		Check that RAIM-Flag = 1		Passed
Set expected lon error in GPS sentence to > 10 m		Check that PA flag = 0		Passed
Set expected lon error and lon error in GPS sentence to 8 m		Check that PA flag = 0		Passed
c) Fields with expected error of Lat and Lon are empty (NULL fields)		Check that PA-Flag = 0		Passed
		Check that RAIM-Flag = 0		Passed
Mode indicator = D (differential)				
d) Set expected error in GPS sentence to < 10 m		Check that PA flag = 1		Passed
		Check that RAIM-Flag = 1		Passed
e) Set expected error in GPS sentence to > 10 m		Check that PA flag = 0		Passed
		Check that RAIM-Flag = 1		Passed
c) Fields with expected error of Lat and Lon are empty (NULL fields)		Check that PA-Flag = 1		Passed
		Check that RAIM-Flag = 0		Passed

7.5.5 19.5.5 Test of VBW input

Method of measurement

Set up standard test environment and apply a GNS, HDT and VBW sentence with simulated sensor data.

NOTE The HDT sentence is applied additionally to the VBW sentence in order to make the calculation of SOG and COG.

a) Set status, ground speed, to valid.

b) Set status, ground speed, to invalid.

c) Set status, ground speed, to valid, set heading to invalid.

d) Set status, ground speed, to valid and remove transverse ground speed.

Record the VDL position reports and evaluate the contents (SOG and COG).

Required results

Confirm that

a) SOG and COG are correctly calculated from VBW and HDT,

b) SOG and COG is set to default,

c) COG is set to default,

d) Confirm that SOG and COG is set to default.

2014-05-09	**Tester: Ba**	**Test details:** VBW input		
Test item		Check	Remark	Result
Apply simulated VBW sentence to the sensor input, GPS disconnected. No VTG speed available. Check on VDL File name: ais08_gns_vbw_hdt_rot.sst				
a) Status of bottom track: **A** (valid) Ahead and across speed available.		Check that SOG = resultant of ahead and across speed		Passed
		COG = calculated from speed vector and heading		Passed
b) Status of bottom track: **V** (invalid) Ahead and across speed not empty. Water speed valid !		SOG = default		Passed
		COG = default		Passed
c) Status of bottom track: A (valid) Ahead and across speed available, **Heading invalid**		SOG valid		Passed
		COG = default		Passed
d) Status of bottom track: A (valid) Ahead available, **transverse speed empty**		SOG = default		Passed
		COG = default		Passed

7.5.6 19.5.6 Test of VTG input

Method of measurement

Set up standard test environment and apply VTG sentence with simulated sensor data.

a) Set mode indicator to a valid value.

b) Set mode indicator to "N" (data not valid).

Record the VDL position reports and evaluate the contents (SOG and COG).

Required results

Confirm that

a) SOG and COG are correctly used,

b) SOG and COG is set to default,

2014-05-09	**Tester: Ba**	**Test details:** VTG speed input		
Test item		Check	Remark	Result
Apply simulated VTG sentence to the sensor input. File name: ais01_gll_vtg_hdt_rot.sst				
a) Set mode to **A** (autonomous) Check on VDL		Check SOG		Passed
		Check COG		Passed
b) Set mode to **N** (invalid) Check on VDL		Check SOG = 102.3 (default)		Passed
		Check COG = 360 (default)		Passed

7.5.7 19.5.7 Test of HDT/THS input

Method of measurement

Set up standard test environment and apply a RMC and a HDT/THS sentence with simulated sensor data.

a) Set valid heading data in HDT/THS.

b) Remove heading data from HDT/THS.

c) Set SOG > 5 kn and heading data different from COG by >45° for 5 min.

Record the VDL position reports and evaluate the contents (heading).

Required results

Confirm that

a) the heading value is correct,

b) the heading value is set to default,

c) ALR 11 is generated.

Note)
Test c) is performed under 14.6.3.3

2014-05-09	**Tester: Ba**	**Test details:** HDT heading input		
Test item		Check	Remark	Result
Apply simulated RMC and HDT sentence to the sensor input. Check the heading value on VDL File name: ais04_rmc_hdt_rot.sst				
a) Valid Heading		Check heading value	The heading value is not rounded but cut to full degrees. I recommend to do correct rounding.	Passed
b) Delete heading value (empty field)		Check that heading = default		Passed

2014-05-09	**Tester: Ba**	**Test details:** THS heading input		
Test item		Check	Remark	Result
Apply simulated RMC and THS sentence to the sensor input. Check the heading value on VDL File name: ais04_rmc_hdt_rot.sst				
a) Valid Heading, mode indicator = A		Check heading value		Passed
b) Mode indicator = V		Check that heading = default		Passed
Mode indicator = A Change talker to “HC” (Magnetic compass)		Check that heading is not used		Passed
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		N/A

7.5.8 19.5.8 Test of ROT input

Method of measurement

Set up standard test environment and apply a HDT and ROT sentence with simulated sensor data. Set talker id of ROT = “TI”. Set ROT status to valid (“A”).

a) Set ROT to several values between 0 and 708°/min turning left and right.

b) Set ROT to a value of more than 708°/min turning left and right.

c) Set ROT status to invalid (“V”).

Set the ROT status to valid again and set the ROT talker ID to “HE”.

When ROT values are used do as in d), e), and f):

d) Set ROT to 9°/min turning left and right.

e) Set ROT to 11°/min turning left.

f) Set ROT to 11°/min turning right.

When ROT values are not used but are calculated from the HDT data do as in g), h) and i):

g) Change the heading value in HDT with 9°/min and –9°/min.

h) Change the heading value in HDT with 11°/min.

i) Change the heading value in HDT with −11°/min.

Record the VDL position reports and evaluate the contents (ROT).

Required results

Confirm that

a) the ROT value is calculated as defined in Table 6,

b) the ROT value is –126 turning left and 126 turning right,

c) ROT = default (-128) or 0 or ±127 if calculated from HDT,

d) ROT = 0,

e) ROT = −127,

f) ROT = 127,

g) ROT = 0,

h) ROT = −127,

i) ROT = 127.

2014-05-09	**Tester: Ba**	**Test details:** ROT Rate of Turn input		
Test item		Check	Remark	Result
Apply simulated ROT sentence to the sensor input, Talker = TI. File name: ais01_gll_vtg_hdt_rot.sst				
a) ROT status = **A** (valid) ROT value = 0.0 degr./min		Check ROT on VDL		Passed
Change rate of turn to different values according to the check column and check the VDL value. The VDL value has to be the nearest value according the conversion formula (see conversion table)		10 converted to 10.0 (15)		Passed
		20 converted to 19.7 (21)		Passed
		60 converted to 61.1 (37)		Passed
		180 converted to 177.2 or 182.8 (63/64)	177.2	Passed
		360 converted to 361.6 (90)		Passed
		-20 converted to 19.7 (-21)		Passed
b) Change rate of turn to values > +/- 708.7°/min		720 converted to 708.7 (126)		Passed
		-720 converted to –708.7 (-126)		Passed
c) Set ROT status = **V** (invalid)		Check that ROT = default (default = -731.4 = -128) If ROT is not default check g), h), i)	= 0	Passed
If Other ROT source is used				
Change rate of turn to different values according to the check column and check the VDL value. Values have to be according to 6.10.3.6		0 converted to 0		Passed
		d) 9 converted to 0		Passed
		f) 11 converted to 127		Passed
		d) - 9 converted to 0		Passed
		e) -11 converted to -127		Passed
If Other ROT source is not used but ROT value is calculated from heading. Change heading value in HDT or THS sentence				
Heading not changing		ROT = 0	Retest 2014-10-30 Ba: ROT = default	Passed
g) Changing with 9°/min		ROT = 0	Retest 2014-10-30 Ba: ROT = default	Passed
h) Changing with 11°/min		ROT = 127	= 0, with 20°/min the ROT is toggling between 0 and 127. With 22°/min it is 127 Retest 2014-10-30 Ba: ROT = default	Passed
g) Changing with -9°/min		ROT = 0	Retest 2014-10-30 Ba: ROT = default	Passed
i) Changing with -11°/min		ROT = -127	= 0, with 20°/min the ROT is toggling between 0 and 127. With 22°/min it is 127 Retest 2014-10-30 Ba: ROT = default	Passed

7.5.9 19.5.9 Test of different inputs

Method of measurement

Set up standard test environment and apply a GNS, VBW, HDT/THS and ROT sentence with simulated sensor data to the specified sensor inputs.

a) Apply RMC, VBW, HDT and ROT to sensor input 1.

b) Apply RMC, VBW, HDT and ROT to sensor input 2.

c) Apply RMC, VBW, HDT and ROT to sensor input 3.

d) Apply RMC to sensor input 1, VBW to sensor input 2, HDT and ROT to sensor input 3.

Record the VDL position reports and evaluate the contents of SOG and COG.

Required results

Confirm that

a) all sensor data are correct,

b) all sensor data are correct,

c) all sensor data are correct,

d) all sensor data are correct.

2014-05-09	**Tester: Ba**	**Test details:** Different inputs		
Test item		Check	Remark	Result
Apply simulated sensor sentences to the sensor inputs. File name of 1st part: ais01_rmc_hdt_rot.sst				
a) Apply the sensor input sentences to sensor input 1		Check position		Passed
		Check SOG/COG		Passed
		Check heading		Passed
		Check ROT		Passed
b) Apply the sensor input sentences to sensor input 2		Check position		Passed
		Check SOG/COG		Passed
		Check heading		Passed
		Check ROT		Passed
c) Apply the sensor input sentences to sensor input 3		Check position		Passed
		Check SOG/COG		Passed
		Check heading		Passed
		Check ROT		Passed
• Apply RMC to sensor input 1. • Apply VBW to sensor input 2. • Apply HDT and ROT to sensor input 3.		Check position		Passed
		Check SOG and COG	2014-05-12 Ba:	Passed
		Check heading		Passed
		Check ROT		Passed

7.5.10 <u>19.5.10 Test of multiple inputs</u>

Method of measurement

Check the manufacturer's documentation for the method of handling multiple sensor inputs, for instance:

- *priority of sensor ports;*
- *assigning sensor sentences to ports by configuration.*

Set up standard test environment and apply RMC, VBW, HDT and ROT sentences with different simulated sensor data to 2 or 3 sensor inputs. Record the VDL position reports and evaluate the contents.

Required results

Confirm that for each parameter (position, SOG/COG, heading, ROT) the data from only one sentence is used, according to the manufacturer's definition.

<table>
<tr><td>2014-05-09</td><td>Tester: Ba</td><td colspan="3">Test details: Different inputs</td></tr>
<tr><td colspan="2">Test item</td><td>Check</td><td>Remark</td><td>Result</td></tr>
<tr><td colspan="4">Apply simulated sensor sentences to the sensor inputs.
File name of 1st part: ais01_gll_vtg_hdt_rot.sst</td><td></td></tr>
<tr><td colspan="2" rowspan="4">Apply the sensor input sentences with different data to sensor input 1, 2 and 3 simultanuously
Check that data from only one sentence is used</td><td>Check position</td><td>With RMC on all ports the priority order is sensor 1, sensor 2 and sensor 3</td><td>Passed</td></tr>
<tr><td>Check SOG/COG</td><td>SOG/COG follows the position source
<u>Retest 2015-02-10 Ba:</u>
▪ If RMC is used SOG/COG is taken from sensor 1 (like the position)
▪ If GLL/VTG is used for port 1 COG is taken from sensor 1 (like Heading and ROT) and SOG is taken from sensor 2 (like position). SOG/COG are the speed vector and should always be derived from the same source.
<u>Retest 2015-02-24 Ba</u>
SOG is taken from sensor 2</td><td>Passed</td></tr>
<tr><td>Check heading</td><td>There is no clear priority, the transmitted data are changing between all 3 ports
<u>Retest 2014-12-02 Ba:</u>
No change
<u>Retest 2015-02-10 Ba:</u>
The transmitted data are stable, with priority Sensor1 / Sensor 2 / sensor 3</td><td>Passed</td></tr>
<tr><td>Check ROT</td><td>There is no clear priority, the transmitted data are changing between all 3 ports
<u>Retest 2014-12-02 Ba:</u>
No change
<u>Retest 2015-02-10 Ba:</u>
The transmitted data are stable, with priority Sensor1 / Sensor 2 / sensor 3</td><td>Passed</td></tr>
</table>

7.5.11 Test of optional GLL input

2014-05-09 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
Set status/mode to **A,D** (differential mode)	Check PA-Flag = 1 on VDL		Passed
	Check PA-Flag = 1 in VDO		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
Set status/mode to **A,E** (Estimated position) Check on VDL or PI output	Check latitude		Passed
	Check longitude		Passed
	Check time stamp = 62	Time stamp = 0....59 Retest 2014-08-20 Ba: Time stamp = 0....59 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed
Set status/mode to **A,M** (manual position) Check on VDL or PI output	Check latitude	Default LAT	Passed
	Check longitude	Default LON	Passed
	Check time stamp = 61	Time stamp = 0....59 Retest 2014-08-20 Ba: Time stamp = 0....59 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed

7.5.12 Test of optional GGA input

2014-05-09 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	Default position	Passed
Set mode = 7 (manual) Check on VDL	Check that timestamp = 61 Note if data = default	Default position	Passed
Set mode = 8 (simulated) Check on VDL	Check that timestamp = 63 Short check default data	Default position	Passed
Set mode = 0 (**no fix**) Check on VDL	Check latitude = 91º		Passed
	Check longitude = 181º		Passed
	Check that timestamp = 63	Time stamp = 60 Retest 2014-08-20 Ba: Time stamp = 60 Retest 2014-09-18 Ba: Default position, time stamp = 63	Passed
	Check PA-Flag = 0		Passed

7.6 19.6 Test of high speed output

Method of measurement

Set up standard test environment and simulate VDL-position reports using the test system. Record output from the EUT high speed port (see Table 16).

Required results

Verify that the recorded message contents agree with the simulated VDL contents (VDM sentence), its own transmitted data (VDO sentence) and its own position, SOG, COG information derived from the internal position sensor and in accordance with the sentence specifications of IEC 61162-1.

This contents of VDM and VDO are checked in

- 4.7.1 16.7.1 Received messages and
- 4.7.2 16.7.2 Transmitted Messages

2014-05-22	**Tester: Ba**	**Test details:** Content of received VDM messages		
Test item		Check	Remark	Result
Transmit all types of messages from other AIS transponder or VDL generator. Check the field content of the fields listed under Test item.				
Message ID		8 binary broadcast message, multi slot File name: AIBBM_multi_bin.sst		
Number of sentences		Check that value = 3	UTC 14:12	Passed
Check sentence number		Check that value = 1,2,3 according to length of message		Passed
Sequential message ident.		Check that counting from 0...9 modulo 10		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 1008 bit)		Passed
Message ID		14 Safety related broadcast message, multi slot File name: AIBBM_multi_safety.sst		
Number of sentences		Check that value = 3		Passed
Check sentence number		Check that value = 1,2,3		Passed
Sequential message ident.		Check that counting from 0...9 modulo 10		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 1008 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

2014-05-22	**Tester: Ba**	**Test details:** Content of transmitted VDO messages		
Test item		Check	Remark	Result
Transmit all applicable types of messages. Check the field content of the fields listed under Test item.				
Message ID		8 binary broadcast message, multi slot File name: AIBBM_multi_bin.sst		
Number of sentences		Check that value = 3		Passed
Check sentence number		Check that value = 1,2,3 according to length of message		Passed
Sequential message ident.		Check that counting from 0...9 modulo 10		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 0 (message length = 1008 bit)		Passed
Message ID		14 Safety related broadcast message, multi slot File name: AIBBM_multi_safety.sst		
Number of sentences		Check that value = 3		Passed
Check sentence number		Check that value = 1,2,3		Passed
Sequential message ident.		Check that counting from 0...9 modulo 10		Passed
Channel		Check that the correct value A and B is output		Passed
Fill bits		Check that value = 2 (message length = 1000 bit)		Passed
		Additional checks		
Length of sentence		Confirm that no sentence exceeded the length of 82 character (no warning from monitor program)		Passed
Checksum		Confirm that no sentence had a wrong checksum (no warning from monitor program)		Passed

7.7 19.7 High speed output interface performance

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Increase the VDL load to >90%. Record transmitted messages and check PI output of EUT on the port for "external display" and the "auxiliary display/pilot port".

Required results

Confirm that EUT outputs all received messages to the PI and the "auxiliary display/pilot port". Verify during VDL load >90 % that the sync timing, the T_x slots and the slot number in the CommState are correct.

2014-05-22	**Tester: Ba**	**Test details:** High speed output interface performance		
Test item		Check	Remark	Result
Apply 90% VDL channel load on channel A and B		Check that all received messages of both channels are output on the external display port	> 99.9 % on both channels	Passed
		Check that all received messages of both channels are output on the auxiliary display/ pilot port		Passed
		Check that the sync timing is correct		Passed
		Check that the correct Tx slots are used		Passed
		Check that the slot numbers in the CommState are correct		Passed

7.8 19.8 Output of undefined VDL messages

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Verify that AIS messages with undefined data contents according to Table 12 (Message type 28 or higher) are output by the PI. Repeat test for port "auxiliary display/pilot port".

Required results

Confirm that EUT outputs all undefined received messages to the PI.

2014-05-12	**Tester: Ba**	**Test details:** Output of undefined VDL messages	
Test item	Check	Remark	Result
Apply messages with undefined message ID (> 27) to the VDL	Check that the undefined messages are output on the external display port		Passed
	Check that the undefined messages are output on the auxiliary display/ pilot port		Passed

7.9 19.9 Test of high speed input

Method of measurement

Set up standard test environment. Apply simulated input data, in accordance with the sentence specifications of IEC 61162-1 and Table 15 of this standard to the EUT and record VDL output.

NOTE For the SSD sentence:
a) the source identifier "AI" means that the A, B, C, D values are related to the internal EPFS receiver;
b) any other source identifier means that the A, B, C, D values are related to the external EPFS.

Required results

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

Verify that configuration items which shall be protected according to 6.11.4 are accepted only if the input sentence is preceded by an SPW sentence with a valid password, when using the EPV configuration sentence.

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

All other sentences are tested in special test items.

2014-05-22	**Tester: Ba**	**Test details:** Evaluation of SSD sentence		
Test item		Check	Remark	Result
Apply an SSD sentence to an high speed input (PI). A SPW sentence with a valid password shall precede the SSD sentence.				
VDL transmission		Check that Message 5 is transmitted after change of data by SSD sentence	Message 5 is transmitted	Passed
Call sign		Check that the new call sign is transmitted in Message 5		Passed
Ship's name		Check that the new ship's name is transmitted in Message 5		Passed
Source identifier = "AI" (internal GNSS) A – Distance from bow B – Distance from stern C – Distance from port D – Distance from starboard		Check that the new dimensions are transmitted in Message 5		Passed
Source identifier not "AI" (external EPFS) A – Distance from bow B – Distance from stern C – Distance from port D – Distance from starboard		Check that the new dimensions are transmitted in Message 5		Passed
DTE indicator flag		Check if the DTE flag is entered in VDL message 5 if appropriate, depending on the presence of an MKD	DTE flag is always 1 <u>Retest 2014-08-20 Ba:</u> DTE flag = 0 if SSD with DTE = 0 is applied	Passed
Apply an SSD sentence without SPW sentence				
Password protecting		Check that the new values of call sign, ship's name and dimension/reference are not accepted	No response A NAK response to indicate the missing password would be nice	Passed
Apply an SSD sentence with preceding SPW sentence with invalid password				
Password protecting		Check that the new values of call sign, ship's name and dimension/reference are not accepted	No response A NAK response to indicate the incorrect password would be nice	Passed

2014-05-22	**Tester: Ba**	**Test details:** Evaluation of VSD sentence	
Test item	Check	Remark	Result
Apply an VSD sentence to an high speed input (PI).			
Navigational status	Check that the new Navigational status is transmitted in Message 1		Passed
Type of ship and cargo	Check that the new type is transmitted in Message 5		Passed
Maximum actual static draught	Check that the new draught is transmitted in Message 5		Passed
Destination	Check that the new destination is transmitted in Message 5	The character “?” is not accepted even if it is not a reserved character according to IEC 61162-1 8.1 The replacement “^3F” is accepted and transmits “?” in message 5	Passed
Estimated Time of Arrival (ETA)	Check that the new ETA is transmitted in Message 5		Passed
Regional application flag	Check if the regional application flag is entered in VDL message 1		Passed
Persons on board	Check if the persons on board are displayed on MKD Not required	Test 2014-10-15 Ba: Number of persons is displays as 0. VSD output indicated 26 Retest 2014-11-28 Ba: The number of persons is displayed correctly	Passed

2014-05-22	**Tester: Ba**	**Test details:** Evaluation of EPV sentence	
Test item	Check	Remark	Result
Apply EPV sentences to an high speed input (PI). A SPW sentence with a valid password shall precede the SSD sentence.			
Query for EPV	Check that an EPV sentence for all configuration data is output	There is no response I tried it without SPW, with user and admin password An EPV implementation without query response is useless because the external display equipment is not able to present the operator the settings. Retest 2014-08-20 Ba: No change, no response Retest 2014-09-18 Ba: • There is a EPV response. • 110 LR channel 2 is not output • 111 Admin Password is output but should not be output Retest 2014-10-29 Ba: • 110 LR channel 2 is output correctly • 112 User Password is output but should not Retest 2014-12-01 Ba: The user password is not output	Passed Passed Passed
101 Sensor 1 baud	Check that the baud rate of Sensor 1 is correctly set	Protection: Level 2 Retest 2014-09-18 Ba: The changed value is not stored permanently. After a restart the old value is used. Retest 2014-10-29 Ba: The value is permantently stored	Passed

102 Sensor 2 baud	Check that the baud rate of Sensor 2 is correctly set	Sensor 2 is not changed but Sensor 1 input is changed according to the value Retest 2014-09-18 Ba: Sensor 2 is changed Protection level 2 The changed value is not stored permanently. After a restart the old value is used Retest 2014-10-29 Ba: The value is permantently stored	Passed Passed
103 Sensor 3 baud	Check that the baud rate of Sensor 3 is correctly set	Sensor 3 is not changed but Sensor 1 input is changed according to the value Retest 2014-09-18 Ba: Sensor 3 is changed Protection level 2 The changed value is not stored permanently. After a restart the old value is used Retest 2014-10-29 Ba: The value is permantently stored	Passed Passed
104 Long-range baud	Check that the baud rate of the Long range port is correctly set.	The Long range port is not changed but Sensor 1 input is changed according to the value Retest 2014-09-18 Ba: According to EPV response the LR baud rate has been changed but the EUT continues working with the old baud rate. The new rate is not applied. The changed value is not stored permanently. After a restart the old value is used Retest 2014-10-29 Ba: The EUT uses the new baudrate. The value is permantently stored	Passed

105 DGNSS Baud	Check that the baud rate of DGNSS port (correction data) is correctly set	The DGNSS port is not changed but Sensor 1 input is changed according to the value Retest 2014-09-18 Ba: The value in the EPV response has been changed according to the setting. After a restart it is reset to the old value. So it seems the configuration value has not really been changed. The actual baudrate cannot be checked because the beacon input does not yet work Retest 2014-10-29 Ba: The new value is not used for the DGNSS input. The EUT continues using beacon data with the old baudrate. The value is permanently stored. After a restart the new value is used. This is generally acceptable but it is confusing for the users if different ports have a different behaviour. Retest 2014-12-01 Ba: The new value is immediately used for the DGNSS input	Passed Passed
106 MMSI	Check that the MMSI has been correctly set	Protection: Level 2	Passed
107 IMO number	Check that the IMO number has been correctly set	Protection: Level 2	Passed
108 Long-range interface configuration	Check that the MMSI has been set ot A or M according to the EPV sentence	Protection: Level 2	Passed

109 Long-range AIS broadcast channel 1	Check that Long-range broadcast channel 1 is correctly set	UTC 12:35 The long rang broadcast channel 1 is correctly stored (acc. to web interface) but not used. After a power cycle they are reset to the default channels Both receivers are set to AIS1 and AIS2 even if the area setting with different channels is still in use. After a power cycle the correct Rx channels are used again. <u>Retest 2014-09-18 Ba:</u> The EPV response shows the old channel. Both receivers are set to AIS1 and AIS2 <u>Retest 2014-10-29 Ba:</u> No change <u>Retest 2014-12-01 Ba:</u> The EUT changes for one frame the main channels to AIS1/AIS2 and performs then a rescheduling on the area channels. This is not correct, but we accept it because we expect that the LR broadcast channels will never be changed.	Passed
110 Long-range AIS broadcast channel 2	Check that Long-range broadcast channel 2 is correctly set	Same as 109 <u>2014-09-18 Ba:</u> Has to be tested when 109 and the EPV response is correct <u>Retest 2014-12-01 Ba:</u> See 109	Passed
111 Administrator password	Check that the Administrator password has been correctly set	<u>2014-10-30 Ba:</u> The Admin password has been changed, applied immediately and stored permanently	Passed

112 user password	Check that the User password has been correctly set	No response After trying to change the user password no further EPV settings are accepted. After power cycle it is ok again <u>Retest 2014-10-30 Ba:</u> The user password has been changed, applied immediately and stored permanently	Passed
113 AIS-SART test mode	Check that the AIS-SART test mode has been correctly set.	No response, the SART test mode is not changed. Tried with SPW level 1 and 2 <u>Retest 2014-09-18 Ba:</u> The EPV response shows that it is changed but it is not applied. SART Test messages are still output <u>Retest 2014-10-30 Ba:</u> According to the EPV response the new test mode is stored, is applied without restart and is permanently stored..	Passed
Apply an EPV sentence, 106 MMSI, without SPW sentence			
Password protecting	Check that the MMSI is not changed		Passed
Apply an EPV sentence, 106 MMSI, with preceding SPW sentence with invalid password			
Password protecting	Check that the MMSI is not changed		Passed

8 20 Long-range functionality tests

8.1 20.1 Long-range application by two-way interface

(See 8.2)

8.1.1 20.1.1 LR interrogation

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply a LR addressed interrogation message to the LR-interface port of EUT. Record LR output port and AIS high-speed output port Set EUT to

a) automatic response,

b) manual response via MKD,

c) manual response via PI.

Required results

Check that EUT displays LR interrogation messages and sends them to PI. Check that EUT outputs a LR position report message

a) automatically (and indicates action on display),

b) after manual confirmation via MKD,

c) after manual confirmation via PI.

2014-05-27	**Tester: Ba**	**Test details:** a) LR automatic response, all data		
Test item		Check	Remark	Result
Set EUT to automatic response. Apply an addressed request to the LR port of EUT requesting all possible information. File name: LRI_LRF_MMSI_all.sst				
Response		Check that a response is output on LR port		Passed

Display on MKD	Check that the request is displayed on MKD	Test 2014-10-16 Ba: With a popup window	Passed
	Check that reply status is displayed on MKD	The reply status is not displayed for automatic reply. Remark: It is displayed for manual reply Retest 2014-12-01 Ba: For each LR request/response there are two entries, on with To MMSI 211000001 and one with To MMSI 0. In manual mode both have an Ack mark, in automatic mode only the second one. There should be only one entry in the list, with Ack mark as soon as it has been acknowledged. Retest 2015-01-26 Ba: There is only one entry for each LR request. There are only two entries, one for MMSI addressed and one for area addressed. A new request overwrited the old one	Passed
PI output	Check that LR interrogation and response is output on PI		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 avail.)		Passed

Contents of LR1 response	Check output of LR1 sentence		Passed
	Check that sequence number = request = LRF		Passed
	Check MMSI of responder = own MMSI		Passed
	Check MMSI of requestor		Passed
	Check ship's name		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		Passed
	Check draught		Passed
	Check ship/cargo		Passed
	Check length of ship		Passed
	Check breadth of ship		Passed
	Check ship type		Passed
	Check persons		Passed

2014-05-27	**Tester: Ba**	**Test details:** a) LR automatic response, selected data		
Test item		Check	Remark	Result
Set EUT to automatic response. Apply an addressed request to the LR port of EUT requesting selected information. File name: LRI_LRF_MMSI_all.sst, modified by deleting not requested information				
Request A Name Call sign IMO number		Check that only LF and LR1 is transmitted	All sentences are output	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
		Check that the not requested fields are empty		Passed
Request A,E,F Name Call sign IMO number COG SOG		Check that LRF, LR1 and LR2 is transmitted	All sentences are output	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	All sentences are output	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	All sentences are output	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

2014-10-16	**Tester: Ba**	**Test details:** b) Manual Confirmation		
Test item		Check	Remark	Result
Set EUT to manual response. Apply an addressed request to the LR port of EUT requesting all possible information. File name: LRI_LRF_MMSI_all.sst				
Display on MKD		Check that the request for manual response is displayed on MKD		Passed
		Check that response is transmitted after manual confirmation on MKD		Passed

2014-05-27	**Tester: Ba**	**Test details:** c) Confirmation via PI		
Test item		Check	Remark	Result
Set EUT to external or manual confirmation as implemented. Apply an addressed request to the LR port of EUT requesting all possible information. File name: LRI_LRF_MMSI_all.sst				
Confirmation via PI		Check that the request for manual response is output on PI (copy of long range request input)		Passed
		Check that response is transmitted after external confirmation via PI using the LRF sentence	UTC 09:03 No response Retest 2014-09-18 Ba: There is a response	Passed

8.1.2 20.1.2 LR "all ships" interrogations

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply a LR "all ships" interrogation message to the LR-interface port of EUT defining a geographical area which contains own ships position; Record LR output port. Set EUT to

a) automatic response,

b) manual response.

Repeat check with own ship outside specified area.

Required results

Check that EUT outputs a LR position report message

a) automatically (and indicates action on display), *b) after manual confirmation.*

No response shall be output on the repeat check.

2014-05-27	**Tester: Ba**	**Test details:** a) Area addressing: Automatic response		
Test item		Check	Remark	Result
Set EUT to automatic response. Apply an area addressed request to the LR port of EUT requesting position and speed information.				
Own position in area File name: LRI_LRF_area_CEF.sst		Check that the request is automatically responded		Passed
		Check that the request and response status is displayed on MKD	Test 2014-10-16 Ba:	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	Test 2014-10-16 Ba:	Passed
		Check that the request is not output on PI		Passed

2014-05-27	**Tester: Ba**	**Test details:** b) Area addressing: Manual confirmation		
Test item		Check	Remark	Result
Set EUT to manual response. Apply an area addressed request to the LR port of EUT requesting position and speed information.				
Own position in area File name: LRI_LRF_area_CEF.sst		Check that the request is displayed on MKD	Test 2014-10-16 Ba:	Passed
		Check that response is transmitted on confirmation on MKD	Test 2014-10-16 Ba:	Passed
		Check that the request and response is output on PI	The request is output on the PI port There is no response on confirmation via PI port Retest 2014-09-18 Ba: There is a response	Passed Passed
Own position not in area File name: LRI_LRF_out_area_CEF.sst		Check that the request is not displayed on MKD	Test 2014-10-16 Ba:	Passed
		Check that the request is not output on PI		Passed

8.1.3 20.1.3 Consecutive LR “all ships” interrogations

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Set EUT to automatic mode. Apply 5 LR “all ships” interrogation messages to the LR-interface port of EUT defining a geographical area which contains own ship’s position;

Set the control flag in the LRI message to

a) 0 (reply on first interrogation only),

b) 1 (reply on all applicable interrogations).

Record LR output port.

Required results

Check that EUT outputs a LR position report message

a) on the first interrogation only,

b) on all interrogations.

2014-05-27	**Tester: Ba**	**Test details:** Area addressing: Automatic response	
Test item	Check	Remark	Result
Set EUT to automatic response. Apply some area addressed requests to the LR port of EUT requesting position and speed information. File name: LRI_LRF_area_CEF.sst			
a) Control flag = 0 (reply only on first request) Change MMSI to get the first response	Check that the 1. Request is automatically responded		Passed
	Check that the following interrogations are not responded		Passed
	Check that the following interrogations are not displayed on MKD	Test 2014-10-16 Ba:	Passed
	Check that the following interrogations are not output on PI		Passed
b) Control flag = 1 (reply on all requests)	Check that the 1. request is automatically responded		Passed
	Check that the following interrogations are responded		Passed

8.2 20.2 Long-range application by broadcast

(See 8.3)

8.2.1 20.2.1 Long-range broadcast

Method of measurement

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT. The designated long-range channels are defined in 8.3.

a) Do not apply Message 4 and Message 23.

b) Apply the Message 4 with the long range control bit set to 1 and 0. Place the EUT inside the RF footprint (Message 4 receiving area) of a base station.

c) Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the RF footprint area, but outside the base station coverage area.

d) Apply the Message 4 with the long range control bit set to 1 and 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area..

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

f) Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 minutes, remove transmissions of Message 23.

g) Apply the Message 4 with the long range control bit set to 0. Using the same MMSI as the Message 4, broadcast the Message 23 with station type 10 to define the base station coverage area. Place the EUT inside the base station coverage area. After 6 min. remove transmissions of Message 4.

Required results

Check that EUT transmits the appropriate messages, e.g. in addition to the normal transmission of Messages 1 and 5 with adequate reporting interval on AIS 1 and AIS2, confirm that:

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

b) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.

c) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the designated long-range channels] with 3 min reporting interval.

d) EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval when the Message 4 long-range control bit is set to 1. EUT stops transmitting Message 27 when the Message 4 long-range control bit is set to 0. Verify fields after station type in received Message 23 are ignored.

e) Irrespective of the Message 4 long range control bit status, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.

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

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

2014-05-16 — **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		Passed
	Check Tx channels C and D	There is no VDO output for the transmissions of message 27 <u>Retest 2014-08-19 Ba:</u> • There is a VDO output • There are no channels in the VDO sentence <u>Retest 2014-09-18 Ba:</u> There are channels C and D in the VDO sentence.	Passed Passed
	Check that the transmission is alternating between C and D		Passed
	Check reporting interval = 3 min		Passed
	Check that slots occupied by targets are not used for the transmission of message 27	Test 2015-03-26 Ba:	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 08:15	Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 08:31	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 09:05	Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 09:18	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 08:40	Passed
	Verify that the information of message 23 after station type is ignored	Has to be tested when 16.6.7.3 is correct <u>Retest 2014-09-19 Ba:</u> The other information of message 23 is ignored, the transmission schedule is not changed	Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 08:52	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 10:44 There is no VDM of message 23 <u>Retest 2014-09-19 Ba:</u> There is a VDM of message 23	Passed Passed
Apply message 4 with long range control bit set to 1	Check that message 27 is transmitted with 3 min interval	UTC 11:10 There is no VDM of message 23 <u>Retest 2014-09-19 Ba:</u> There is a VDM of message 23	Passed 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	Msg 23: UTC 09:43 – 09:48 Msg 4: UTC 09:43 – 10:15	Passed
Stop messages 23 after 6 minutes	Check that EUT starts transmission of Message 27 after the time-out of message 23 (4... 8 min)	UTC 10:25 Message 27 did not start again Manual power cycle activated messge 27 again. <u>Retest 2014-08-19 Ba:</u> UTC 11:41 – 11:46 Msg 23 Message 27 stops (ok) UTC 13:14 first message 27 So after about 90 min message 27 continues. That is much longer than the message 23 time-out <u>Retest 2014-09-19 Ba:</u> 5 min after last message 23 the EUT continues Tx of message 27	Passed

g) Apply message 23 with station type 10 (long range coverage area), EUT inside the coverage area			
Apply message 4 with long range control bit set to 0	Check that message 27 is not transmitted		Passed
Stop message 4 after 6 minutes	Check that EUT starts transmission of Message 27 later than 3 minutes after end of message 4	Message 4: UTC 12:08 – 12:16 Message 23: UTC 12:09 – 12:38 Message 27 stopped at 12:09 and did not start again until 13:07 (end of test) Retest 2014-09-19 Ba: Msg 27 start 4 minutes after last message 4	Passed

8.2.2 20.2.2 Multiple assignment operation

Method of measurement

Set up standard test environment, enable the EUT to transmit Message 27 and operate EUT in autonomous mode with a reporting interval of 10 s. Use base stations MMSI to transmit Message 4 and Message 23. Record the transmitted messages from the EUT.

a) *Transmit a Group Assignment command (Message 23) to the EUT (define geographic region so that the EUT is inside this region). Set the reporting interval to 2 s and the station type to 0 (all stations).*

b) *Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping their RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas not overlapping. Place the EUT inside the overlapped RF footprint area.*

c) *Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from multiple base stations with station type 10 to define the base station coverage areas partially overlapping the base station coverage areas. Place the EUT inside the overlapped base station coverage area.*

d) *Using different MMSIs, apply the Message 4 with long range control bit set to 1 and 0 from multiple base stations partially overlapping RF footprints. Broadcast the Message 23 from one base station with station type 10 to define the base station coverage areas. Do not broadcast Message 23 from other base stations. Place the EUT inside the RF footprint area of base station not broadcasting Message 23.*

Required results

Verify that:

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

b) *Irrespective of the Message 4 long-range control bit status of both base stations, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

c) *EUT transmits Message 27.*

d) *Irrespective of the Message 4 long range control bit status of both base stations, EUT transmits Message 27 alternating on the designated long-range channels with 3 min reporting interval.*

2014-05-19	**Tester: Ba**	**Test details:**		
Test item		Check	Remark	Result
Set up the standard test environment and operate EUT in autonomous mode. Enable the EUT to transmit Message 27, e.g. by configuring the long range broadcast channels, SOG = 10 kn, reporting interval = 10 s				
a) Transmit Message 23 EUT inside area, station type = 0, Reporting interval = 2 s		Check that Message 23 is received (VDM output)	Covered by tests 20.2.1 d) and f)	Passed
Reporting rate		Check that the reporting interval is changed to 2 s		Passed
Message 23 timeout		Verify that EUT reverts to normal operation mode after 4... 8 min		Passed
b) Apply message 4 and 23 with station type 10 (long range coverage area) from two different base station, the coverage area not overlapping EUT outside the coverage areas				
• Long range control bit of station 1 is set to 0 • Long range control bit of station 2 is set to 1		Check that message 27 is transmitted with 3 min interval	Covered by tests 20.2.1 c)	Passed
c) Apply message 4 and 23 with station type 10 (long range coverage area) from two different base station, the coverage areas are overlapping EUT inside the overlapping part of the coverage areas				
• Long range control bit of station 1 is set to 0 • Long range control bit of station 2 is set to 1		Check that message 27 is transmitted with 3 min interval	Message 27 is transmitted only on channel 4 or D. This may depend on the timing of the transmission of the messages 4 and 23 for both regions, but for the time when message 4 and 23 were transmitted message 27 was received on channel 4 only. After time-out of the messages it was received again on both channels. In a repetition of the test the EUT was transmitting on channel 3 or C only <u>Retest 2014-09-19 Ba:</u> Same result, Tx on C only when LR control bit was 1 <u>Retest 2014-10-30 Ba:</u> EUT continues Tx of message 27 on both channels	Passed

d) Apply message 4 and 23 with station type 10 (long range coverage area) from one base station and message 4 from a second base station EUT is outside the message 23 coverage area of base station 1			
• Long range control bit of station 1 is set to 0 • Long range control bit of station 2 is set to 1	Check that message 27 is transmitted with 3 min interval	Covered by 20.2.1 e)	Passed
• Long range control bit of station 1 is set to 1 • Long range control bit of station 2 is set to 0	Check that message 27 is transmitted with 3 min interval		Passed

9 Annex D DSC functionality

(normative)

9.1 D.1 DSC compatibility

The Class A AIS shall be capable to receive and process DSC channel management telecommands conforming to the provisions of Recommendations ITU-R M.493, ITU-R M.541, ITU-R M.825 (see M.1371/A3). In order to accomplish this performance, the AIS device shall contain a dedicated DSC receiver that is tuned permanently to channel 70. However, the AIS device shall not accept the channel management command sent by stations with invalid base station MMSI as defined in 6.12. For DSC channel management using geographical area calls, the end of sequence (EOS) character shall be EOS =127 (no response requested). However for compatibility, Class A AIS receivers shall respond to DSC channel management commands ending in "EOS = 127" and "EOS = 117 (RQ) even though they are not capable of transmitting DSC acknowledgements.

9.2 D.2 DSC receiver tests

NOTE For DSC receiver test signal refer to Clause 10 test signal 1.

The DSC receiver tests are not part of this test report but part of the Physical radio tests.

21.1 D.3 DSC functionality tests

Definition

The EUT shall correctly process the channel management command by DSC messages addressed to the stations in the designated geographical area or the stations individually designated.

Method of measurement

For the tests in this clause, set the EUT into autonomous mode using channels AIS 1 and AIS 2 with a reporting interval of 2 s. Standard AIS channel management by DSC calls consisting of format specifier 103 and message symbol number 104 with expansion symbols 09, 10, 12, 13 shall be applied to the EUT using a base station MMSI as follows:

a) Apply a geographical channel management call using symbol constructions: "103" "geographical coordinates" "103" "source MMSI" "104" "primary CH No" "secondary CH No" "NE of CH management area" "SW of CH management area". Apply the call with EOS = 117 and EOS = 127.

b) Move the EUT outside the channel management area.

c) Apply an individual channel management call using symbol constructions: "120" "EUT MMSI" "103" "source MMSI" "104" "primary CH No" "secondary CH No" "NE of CH management area" "SW of CH management area". Apply the call with EOS = 117 and EOS = 127.

d) Move the EUT outside the channel management area.

e) Apply incorrect MMSI, position outside addressed geographic area, different course, or ship's type.

f) Apply an extraneous call using symbol constructions: "120" "EUT MMSI" "103" "source MMSI" "104" "03" "01" "120". (Active alternative system with group number 1 and sequence number 120).

Transmit a DSC telecommand using a non-base station MMSI.

Required results

The following items shall be verified.

a) Verify that the EUT operates on the designated channels with the transition boundary of 5 NM.

b) Verify that the EUT reverts to the operation on AIS 1 and AIS 2 channels.

c) Verify that the EUT operates on the designated channels with the transition boundary of 5 NM.

d) Verify that the EUT reverts to the operation on AIS 1 and AIS 2 channels.

e) Verify that the EUT operation is not affected.

f) Verify that the EUT operation is not affected.

2014-12-01	**Tester: Ba**	**Test details:** Regional area designation		
Test item		Check	Remark	Result
a) Send a area addressed region setting call		Check that an ACA sentence is output at PI port	Test 2014-05-27 Ba: No ACA output Retest 2014-08-19 Ba: No ACA output Retest 2014-09-19 Ba: No change, no ACA output Retest 2014-10-13 Ba: No change, no response Retest 2014-12-01 Ba: There is an ACA output on the PI port	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	No ACA output Retest 2014-08-19 Ba: No ACA output Retest 2014-09-19 Ba: No change, no ACA output Retest 2014-10-13 Ba: No change, no response Retest 2014-12-01 Ba: ACA output	Passed
	Check that the region in use is modified according to the new settings.	Area is not modified Retest 2014-08-19 Ba: Area not stored Retest 2014-12-01 Ba: The modified channels are stored	
	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		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		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		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 See Note)		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 15:53	Passed
e) check of additional selection			
Send a <u>area addressed</u> 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 15:49 The new area is accepted <u>Retest 2015-01-27 Ba:</u> The new area is not stored	Passed

Note)
With the second digit = 0 (All ships of this type) it should be possible to address all ships of this type. If e.g. all tankers should be addressed independent of the type of dangerous cargo the value 80 can be used. In this case all ships with ship type „8x“ should store the area setting.

Annex A Test equipment

A.1 Test equipment summary

#	description	type	identification
1	VDL Analyser / Generator	AIS Test unit MKII	S/N AA08PN Bund BSH/2012, 7200002112 BSH PC10745 SW AISterm V1.0rev47 AISmain V1.47011120R
2	Target simulator software	Furuno Navintra	BSH PC 9169
3	Presentation Interface Monitor	BSH	BSH PC 8441 BSH PC 9457 SW NewMoni V3.1
4	GMDSS-AIS-Testbox (DSC)	Futronic I/S	200 30 405
5	16 Port Serial Device Server	Moxa DE-303	06698, BSH Nr. 6084
6	Connection box for Moxa serial server With 8 converters RS 232 to RS 422	----	----
7	Active retransmitting GPS antenna	RA - 48	4800199
8	Trimble GPS reference receiver	4000RS, Part number 21000-76	S/N 3428A06700
	Auxiliaries:		
9	True RMS Multimeter DMM 916	Tektronix	S/N 138531
10	2-Kanal-Digital-Oszilloskop	Le Croy Wavesurfer 422	LCRY 0301 J 15673
11	Unbalanced Standard Attenuator	Rhode & Schwarz DPR BN 18024/50	BUND KK 11201
12	2 fixed voltage power supply (24 V/10A)	SITOP	BUND 102452, 102453
13	1 fixed voltage power supply (12 V/4,5A)	Siemens	
14	2 adjustable power supplies (30 V/5 A)	PS 405 D	S/N 2737, 2768

Reserve equipment

#	description	type	identification
15	VDL Analyser / Generator	AIS equipment tester	S/N 218 Bund 102710/2002 Prüfgerät Nr. 1
16	VDL Analyser / Generator	AIS equipment tester	Prüfgerät Nr. 2

A.1.1 VDL Analyser / Generator

The VDL analyser/generator:

- receives the radio data telegrams transmitted by the AIS under test, slotwise evaluates their radio parameters (field strength, SNR, etc.) and provides a transparent display of the decoded radio data telegrams (VDL messages).
- transmits radio data telegrams which have been entered/edited via a control panel. The AIS under test receives these messages and either passes the received data to it's presentation interface and/or responds as appropriate.
- records all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- simulates AIS targets by transmitting position reports of virtual targets up to the maximum channel capacity of 100% channel load on both channels (4500 messages / minute). The data are provided via serial interface to the VDL analyser/ Generator.

A.1.2 Target simulator

The target simulator consists of a standard PC with a special AIS Target Simulator software.

For tests of AIS transponders the data of up to 75 moving targets defined in text file in plain language are transferred to the „TS" input of the VDL Analyser/ Generator as VDM sentences and transmitted on the VHF data link (VDL) . Thus the AIS VHF data link is loaded with simulated AIS targets in fixed slots or in slots selected by the VDL Analyser/ Generator.

A.1.3 Presentation Interface Monitor

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

- analyse the AIS high speed input / output
- analyse the AIS long range function
- generate DSC calls for the DSC test box and to display, log and evaluate the received DSC calls from EUT.

For that purpose it includes the functions:

- coding / decoding of NMEA 6-bit data fields
- online AIS message filtering
- online AIS message editing
- load and transmit predefined sequences
- online modification of transmitted sequences

A.1.4 Sensor Data Simulator

The Sensor Data Simulator provides simulated sensor data to the serial sensor data inputs of the EUT. The sensor data are provided in text files to the Sensor Data Simulator which modifies the sensor data sentences e.g. adding the actual UTC time, modify some time-varying data and by adding a checksum.

The Sensor Data Simulator is basically the same software as the Presentation Interface Monitor using a special part of the functionality of the software.

A.1.5 DSC Testbox

The DSC test box is a standard GMDSS-AIS Test box used for the survey of ship stations.

For the DSC testing of AIS equipment in includes a software extension that provides a remote control input/output facility
- to transmit DSC calls according to ITU 825-3 generated in an external PC on DSC channel 70 and
- to output received DSC calls from the EUT to the external PC.

A special PC software is used to generate the DSC calls and to display, log and evaluate received DSC calls. It communicates via the serial remote control interface to the DSC Testbox.

A.1.6 Serial Interface Server

The Serial Interface Server provides 16 serial lines which can be connected in a flexible way to the EUT and to equipment of the test environment like the DSC Testbox.

The Serial Interface Server is connected to the controlling PCs via Ethernet Network.
It includes:
- 8 serial lines according to RS-422 and IEC 61162-1/2
- 8 serial lines according to RS-232

A.1.7 Laboratory Network

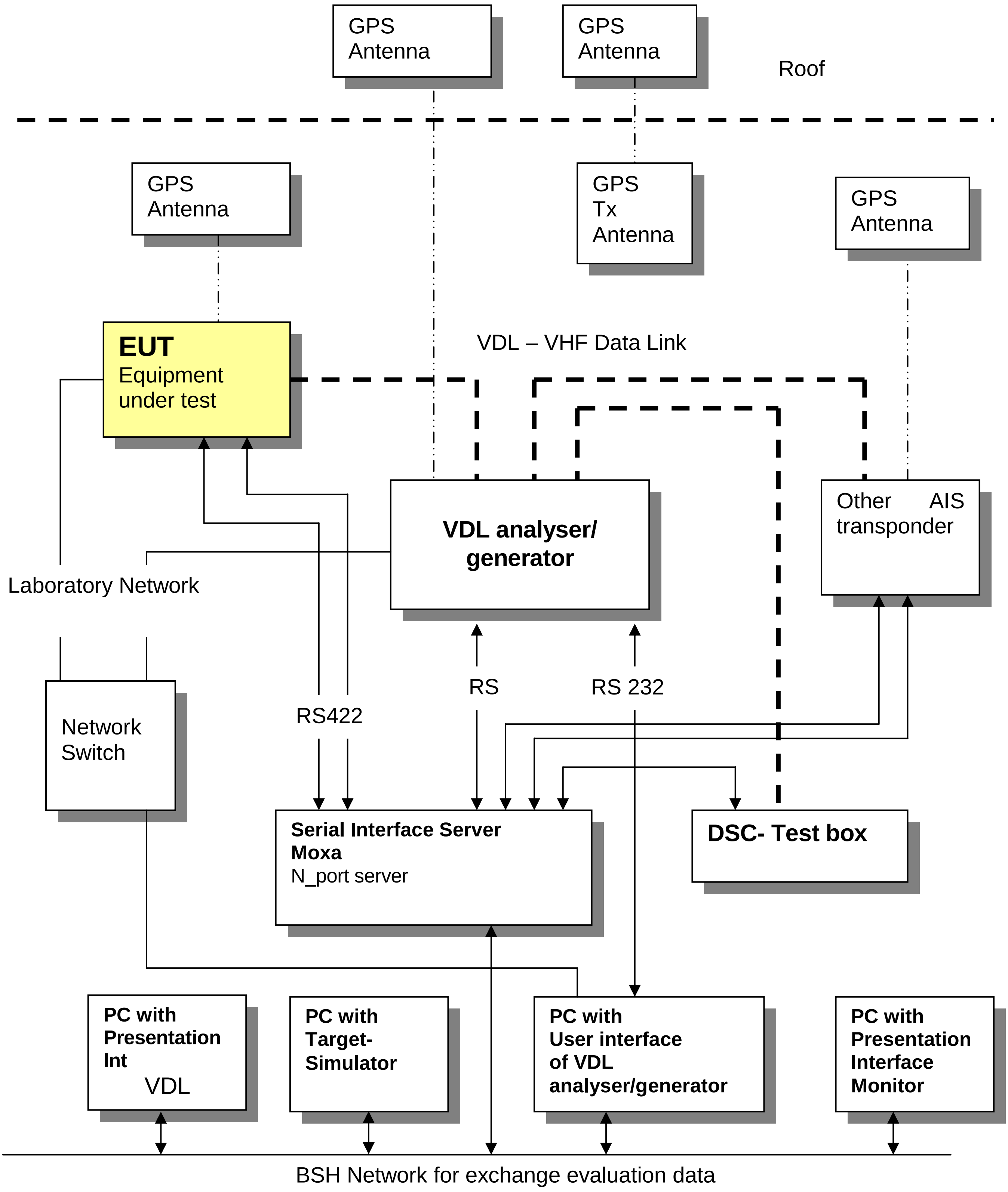
A special laboratory network connect controlling PCs with equipment of the test environment (VDL Generator/ analyser) and with EUT if equipped with an ethernet interface.

A.1.8 GPS Retransmitter

All AIS equipment includes a GPS receiver for the exact timing and for getting position and speed information.

To avoid the need to connect all AIS equipment to GPS antennas outside the laboratory a re-transmitting GPS antenna is installed in the lab. It amplifies and radiates a GPS signal in the laboratory which is received by active GPS antenna on the roof.

A.2 Test environment overview



Annex B Test sentences

B.1 IEC 61162 Test Sentences

Many of the test sentences are modified manually during the test according to the requirements of the actual test items.
Mainly the MMSI in all addressed sentences are adapted to the actual MMSI of the EUT or of the unit the EUT communicates with.
In addition the files containing these sentences contain also some control information used by the monitor program like:

<UTC>	is replaced by the actual UTC time at time of output
<WAIT EVENT>	waiting for user action before next output
<WAIT xxxx>	waiting xxx ms before next output

This control information is not shown in the following sentence examples because it is not sent to the EUT.

B.1.1 Sensor input

Sensor input sentences	
File name	Description
Sentences	
AIS01_gll_vtg_hdt_rot.sst	Standard sensor input sentences
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS01d_dtm_gll_vtg_hdt_rot.sst	Standard sensor input with DTM
Similar files with an additional DTM sentence are also available for the other position sentence sets and not listed explicitely	
$GPDTM,w84,,,,,,,P90 *$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A* *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS01g_gll_vtg_gbs_hdt_rot.sst	Standard sensor input with GBS sentence
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$GPGBS,141800.00,2.6,2.8,4.2,,,,* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS01x_gll_vtg_hdt_rot_180.sst	Standard sensor input at Longitude of 180°
$GPGLL,0001.00,N,17959.00,W,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS02_gga_vtg_hdt_rot.sst	Sensor Input set with GGA position

$GPGGA,092854,5330.1234,N,01001.2345,E,1,3,1.2,65.2,M,45.1,M,,* *$GPVTG,350.0,T,,M,10.0,N,,K,A *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS02d_dtm_gga_vtg_hdt_rot.sst	Sensor Input set with GGA position and DTM
$GPDTM,999,,,,,,,P90 *$GPGGA,092854,5330.1234,N,01001.2345,E,1,3,1.2,65.2,M,45.1,M,,* *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS03_gns_vtg_hdt_rot.sst	Sensor input set with GNS position
$GNGNS,122500.00,5330.1234,N,01001.2345,E,AA,5,1.2,35.5,41.1,,* *$GNVTG,350.0,T,,M,10.0,N,,K,A *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS04_rmc_hdt_rot.sst	Sensor input set with RMC position and speed
$GPRMC,122500.00,A,5330.1234,N,01001.2345,E,11.2,352.2,120202,2.0,E,A *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS06_gll_vtg_vbw_hdt_rot.sst	Sensor input set with speed by VBW and VTG
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A* *$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS07_osd.sst	Single OSD sentence
$INOSD,359.9,A,5.2,B,12.6,B,150.0,1.2,N	
AIS08_gll_vbw_hdt_rot.sst	Standard sensor input with VBW instead of VTG
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V* *$TIHDT,359.9,T* *$TIROT,0.0,A*	
AIS09_gll_osd.sst	Sensor input set with GLL and OSD
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$INOSD,359.9,A,5.2,B,12.6,B,150.0,1.2,N*	
AIS10_gll_vtg.sst	GPS receiver sentences (GLL and VTG)
$GPGLL,5330.1234,N,01001.2345,E,141800.00,A,A *$GPVTG,350.0,T,,M,10.0,N,,K,A*	
AIS11_vbw.sst	Log sentence VBW
$VDVBW,11.00,01.00,A,12.00,02.00,A,,V,,V	
AIS12_hdt_rot.sst	Gyro sentences (HDT and ROT)
$TIHDT,359.9,T *$TIROT,0.0,A*	

B.1.2 Settings (VSD, SSD)

Settings (VSD, SSD)	
File name	Description
Sentences	
AISSD_transpondertype.sst	Settings of static data, specific set for each transponder type
$AISSD,callsign,name,100,20,15,10,1,GP	
AIVSD_Hamburg.sst	Settings of voyage related data
$AIVSD,51,11.5,26,HAMBURG,131020,20,05,0,0	

B.1.3 Messages (ABM, BBM)

The addressed messages include a MMSI number which is changed according to the actual MMSI number of the EUT

Messages (ABM, BBM)	
File name	Description
Sentences	
AIABM_bin.sst	Standard addressed binary message
!AIABM,1,1,2,000001005,1,6,06P0test,0	
AIABM_safety.sst	Standard addressed safety related message
!AIABM,1,1,2,000001005,1,12,D5CD,0	
AIABM_4_bin.sst	Set of 4 addressed binary messages
!AIABM,1,1,3,000008001,1,6,06P0test,0 *!AIABM,1,1,0,000008001,2,6,06P0test,0* *!AIABM,1,1,1,000008001,1,6,06P0test,0* *!AIABM,1,1,2,000008001,2,6,06P0test,0*	
AIABM_4_safety.sst	Set of 4 addressed safety related messages
!AIABM,1,1,0,000001005,1,12,D5CD,0 *!AIABM,1,1,1,000001005,1,12,D5CD,0* *!AIABM,1,1,2,000001005,1,12,D5CD,0* *!AIABM,1,1,3,000001005,1,12,D5CD,0*	
AIBBM_bin.sst	Standard binary broadcast message
!AIBBM,1,1,6,1,8,06P0test,0	
AIBBM_safety.sst	Standard safety related broadcast message
!AIBBM,1,1,6,1,14,D5CD,0	

AIBBM_5_bin.sst	Set of 5 binary broadcast messages
!AIBBM,1,1,7,0,8,06P0test1,0 *!AIBBM,1,1,8,0,8,06P0test2,0* *!AIBBM,1,1,9,0,8,06P0test3,0* *!AIBBM,1,1,0,0,8,06P0test4,0* *!AIBBM,1,1,1,0,8,06P0test5,0*	
AIBBM_5_safety.sst	Set of 5 safety related broadcast messages
!AIBBM,1,1,6,0,14,D5CDi,0 *!AIBBM,1,1,7,0,14,D5CDj,0* *!AIBBM,1,1,8,0,14,D5CDk,0* *!AIBBM,1,1,9,0,14,D5CDl,0* *!AIBBM,1,1,0,0,14,D5CDm,0*	
AIBBM_bin_stuffing.sst	Special message for bit stuffing test
!AIBBM,1,1,6,1,8,06Qv>khvOP,4	
AIBBM_multi_bin.sst	Long 5 slot binary broadcast message
!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 *!AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,4,6,2,8,012345678901234567890123456789012345678901,4*	
AIBBM_multi_safety.sst	Long 5 slot safety related broadcast message
!AIBBM,4,1,6,2,14,0123456789012345678901234567890123456789,0 *!AIBBM,4,2,6,2,14,0123456789012345678901234567890123456789,0* *!AIBBM,4,3,6,2,14,0123456789012345678901234567890123456789,0* *!AIBBM,4,4,6,2,14,0123456789012345678901234567890123456789,0*	
AIBBM_multi_bin_1.sst	Longer than 5 slots binary broadcast message, all bits 1
!AIBBM,4,1,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0 *!AIBBM,4,2,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0* *!AIBBM,4,3,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0* *!AIBBM,4,4,1,1,8,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww,0*	
AIBBM_ABM_17_5.sst	Set of 2 long messages 8 and 12 for message priority test
!AIBBM,4,1,6,2,8,06P0456789012345678901234567890123456789,0 *!AIBBM,4,2,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,3,6,2,8,0123456789012345678901234567890123456789,0* *!AIBBM,4,4,6,2,8,0123456789012345678901234567890123456789,0* *!AIABM,4,1,2,000001005,1,12,0123456789012345678901234567890123456789,0* *!AIABM,4,2,2,000001005,1,12,0123456789012345678901234567890123456789,0* *!AIABM,4,3,2,000001005,1,12,0123456789012345678901234567890123456789,0* *!AIABM,4,4,2,000001005,1,12,0123456789012345678901234567890123456789,0*	

AIBBM_25.sst	25 broadcast message to check 20 slots per frame rule
!AIBBM,1,1,6,1,8,06P0test1,0 *!AIBBM,1,1,6,1,14,D5CD1,0* *!AIBBM,1,1,7,1,8,06P0test2,0* *!AIBBM,1,1,7,1,14,D5CD2,0* *!AIBBM,1,1,8,1,8,06P0test3,0* *!AIBBM,1,1,8,1,14,D5CD3,0* *!AIBBM,1,1,9,1,8,06P0test4,0* *!AIBBM,1,1,9,1,14,D5CD4,0* *!AIBBM,1,1,0,1,8,06P0test5,0* *!AIBBM,1,1,0,1,14,D5CD5,0* *!AIBBM,1,1,1,1,8,06P0test6,0* *!AIBBM,1,1,1,1,14,D5CD6,0* *!AIBBM,1,1,2,1,8,06P0test7,0* *!AIBBM,1,1,2,1,14,D5CD7,0* *!AIBBM,1,1,3,1,8,06P0test8,0* *!AIBBM,1,1,3,1,14,D5CD8,0* *!AIBBM,1,1,4,1,8,06P0test9,0* *!AIBBM,1,1,4,1,14,D5CD9,0* *!AIBBM,1,1,5,1,8,06P0test10,0* *!AIBBM,1,1,5,1,14,D5CD10,0* *!AIBBM,1,1,6,1,8,06P0test11,0* *!AIBBM,1,1,6,1,14,D5CD11,0* *!AIBBM,1,1,7,1,8,06P0test12,0* *!AIBBM,1,1,7,1,14,D5CD12,0* *!AIBBM,1,1,7,1,8,06P0test13,0*	
AIAIR_5.sst	Simple interrogation for Message 5
$AIAIR,000001005,5,,,,,,	
AIAIR_35_5.sst	Interrogation of Message 3 and 5 from ID1 and Message 5 from ID2
$AIAIR,000005002,3,,5,,000007001,5,,	
AIS_DSI.sst	Test that EUT ignores command to send a DSC message
$AIDSI,1,1,2210393930,,,,03,,11,,	

B.1.4 Regional operational settings (ACA)

Regional operational settings (ACA)	
File name	Description
Sentences	
AIACA_Region_in_ch86.SST	Region around standard position with test channels
$ECACA,2,5400.0,N,01030.0,E,5300.0,N,00930.0,E,4,2086,0,1086,0,0,1,,,	
AIACA_Region_out_ch74_76.SST	Region not including standard position with channels 74 and 76
$ECACA,2,5500.0,N,00900.0,E,5400.0,N,00800.0,E,4,0074,0,0076,0,0,1,,,	
AIACA_Region_17_3_SW.SST	2 adjacent regions in SW quadrant, for test 17.3
$ECACA,2,3000.00,S,01200.00,W,3100.00,S,01300.00,E,1,2081,0,1081,0,0,1,,,* *$ECACA,2,3000.00,S,01100.00,W,3100.00,S,01200.00,E,1,2082,0,1082,0,0,1,,,	
AIACA_8_Regions_17_7_1.SST	8 different regions to fill quickly the complete list, for test 17.7.1
$ECACA,,5400.00,N,01030.00,E,5300.00,N,00930.00,E,2,72,0,74,0,0,1,,,* *$ECACA,,5200.00,N,00700.00,E,5100.00,N,00600.00,E,2,2060,0,1060,0,0,1,,, *$ECACA,,5200.00,N,00900.00,E,5100.00,N,00800.00,E,2,2061,0,1061,0,0,1,,,* *$ECACA,,5200.00,N,01100.00,E,5100.00,N,01000.00,E,2,2062,0,1062,0,0,1,,,* *$ECACA,,5200.00,N,01300.00,E,5100.00,N,01200.00,E,2,2063,0,1063,0,0,1,,,* *$ECACA,,5200.00,N,01500.00,E,5100.00,N,01400.00,E,2,2064,0,1064,0,0,1,,,* *$ECACA,,5100.00,N,00800.00,E,5000.00,N,00700.00,E,2,2065,0,1065,0,0,1,,,* *$ECACA,,5100.00,N,01000.00,E,5000.00,N,00900.00,E,2,2066,0,1066,0,0,1,,,*	
AIACA_Region_17_7_2_c.SST	Region for test 17.7.2 c)
$ECACA,2,5430.00,N,01200.00,E,5300.00,N,01100.00,E,4,2083,0,1083,0,0,1,,,	
AIACA_Region_17_7_2_f.SST	Region for test 17.7.2 f)
$ECACA,2,5300.00,N,01320.00,E,5200.00,N,01200.00,E,4,2081,0,1081,0,0,1,,,	
AIACA_Region_17_7_4.SST	4 adjacent regions for test 17.7.2 f)
$ECACA,2,5800.00,N,00800.00,E,5700.00,N,00700.00,E,4,2081,0,1081,0,0,1,,,* *$ECACA,2,5800.00,N,00900.00,E,5700.00,N,00800.00,E,4,2082,0,1082,0,0,1,,, *$ECACA,2,5700.00,N,00800.00,E,5600.00,N,00700.00,E,4,2083,0,1083,0,0,1,,,* *$ECACA,2,5700.00,N,00900.00,E,5600.00,N,00800.00,E,4,2084,0,1084,0,0,1,,,*	
AIACA_Region_lon180.SST	Special region at longitude = 180°
$ECACA,2,0100.00,N,17900.00,W,0100.00,S,17900.00,E,2,0074,0,0076,0,0,1,,,	
AIACA_Set_channel.SST	Set channel command, without area coordinates
$ECACA,,N,,W,,N,,W,2,2074,0,2076,0,0,1,,,,	
Request_ACA.SST	Request of ACA sentences from EUT
$ECAIQ,ACA	

B.1.5 Long range requests

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

Long Range (LRI, LRF)	
File name	Description
Sentences	
LRI_LRF_MMSI_all.sst	Request of all data addressed by MMSI
$LRLRI,5,0,211003000,000002002,,,,,,,,* *$LRLRF,5,211003000,VTS,ABCEFIOPUW,	
LRI_LRF_area_CEF.sst	Request of some data addressed by area
$LRLRI,6,1,211003000,,6000.0,N,2000.0,E,4000.0,N,0500.0,E *$LRLRF,6,211003000,VTS,CEF,*	
LRI_LRF_out_area_CEF.sst	Request of some data addressed by area, standard position not in area
$LRLRI,6,1,211003000,,6000.0,N,1500.0,E,5500.0,N,0800.0,E *$LRLRF,6,211003000,VTS,CEF,*	
LRI_LRF_area_at_180_CEF.sst	Request of some data addressed by area, area around longitude of 180° and latitude of 0°
$LRLRI,6,1,211003000,,0500.0,N,17500.0,W,0500.0,S,17500.0,E *$LRLRF,6,211003000,VTS,CEF,*	
LRF_ack_all.sst	For external confirmation of request
$LRLRF,5,211003000,VTS,ABCEFIOPUW,	

B.2 DSC sentences

The sentences are listed as they are applied to the DSC Testbox for transmission of DSC test calls. There is a special format used based on an earlier definition of NMEA private sentences.

The frame for transmitting a DSC call is:
$PDEBT,CCDSC,T,00014600<call content>FF

The <call content> has to be entered in Hex code, 2 hex numbers for each 7 bit DSC symbol, without spaces, beginning with the format specifier which included only ones.
The DSC coding and addition of redundancy (3 bit symbol redundancy and symbol repetition) are done by the test box. The content description of the calls is available on request.

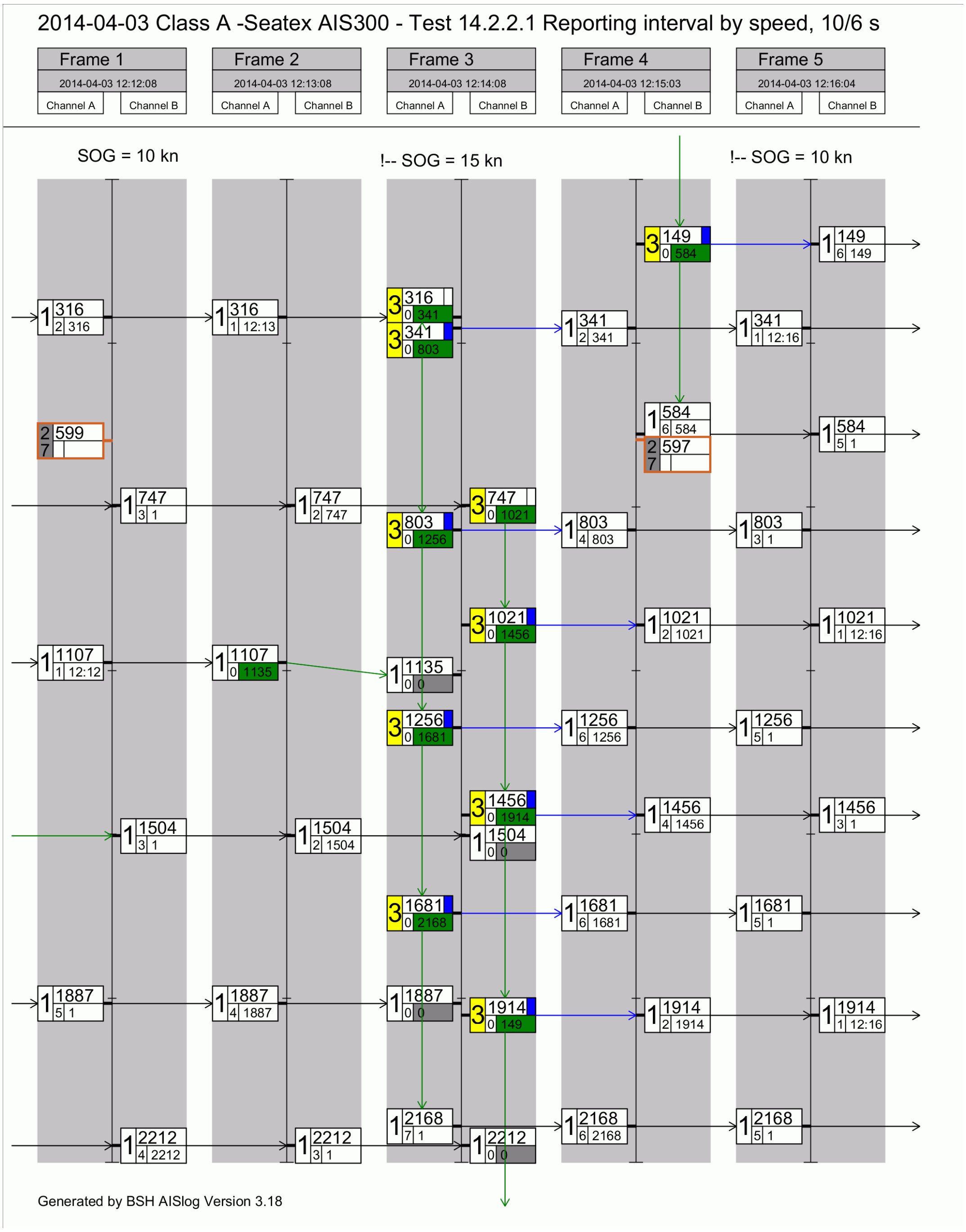
The DSC sentences include MMSI number which is changed according to the actual MMSI number the EUT.

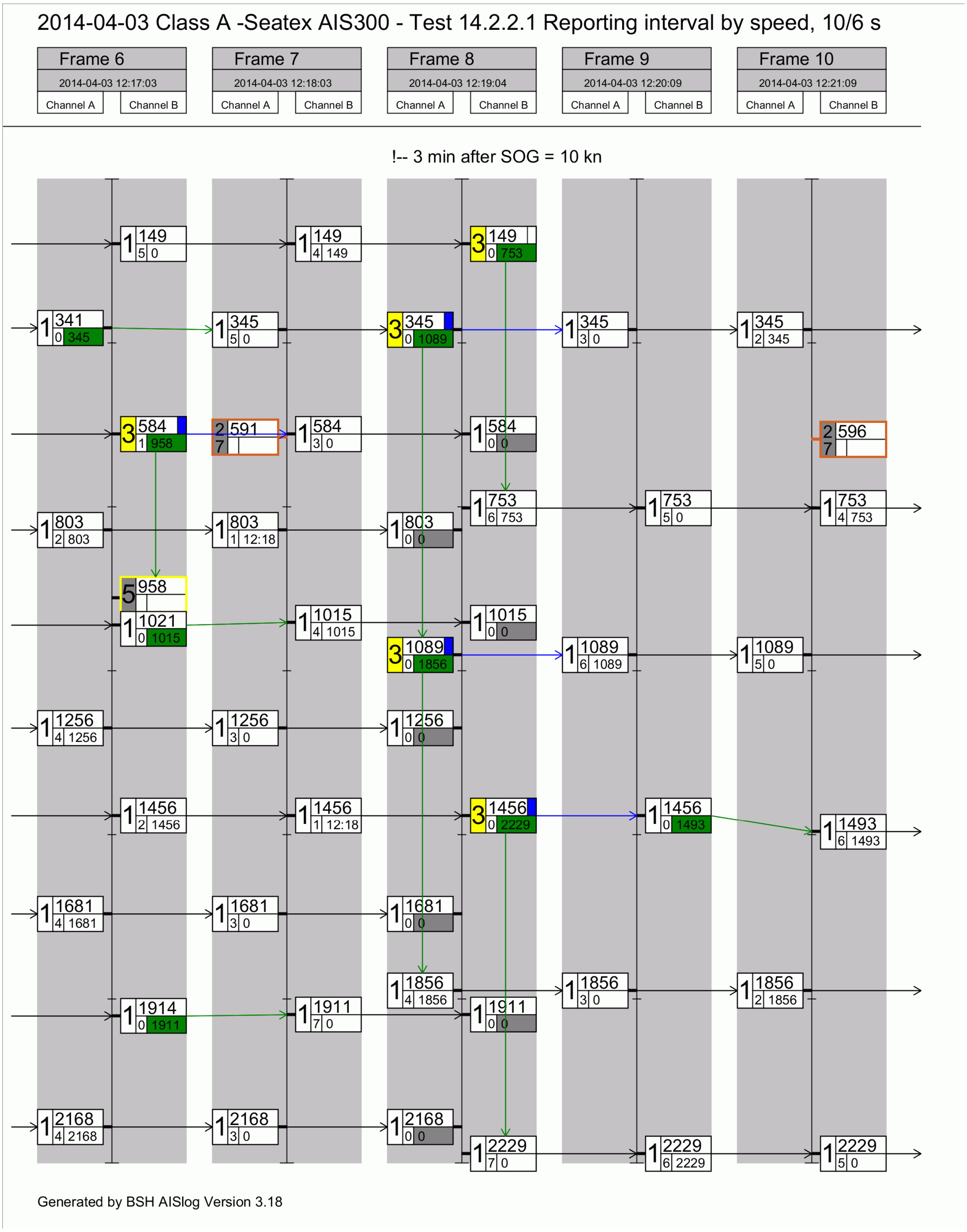
DSC Sentences	
File name	Description
Sentences	
sel_set_region.sst	Selective regional setting by DSC, standard pos. outside, channel 61
$PDEBT,CCDSC,T,0001460078000001005067150A27271E68090A3D00680A143D00680C053C00011400680D053200010A0075FF	
sel_set_region_in.sst	Selective regional setting, standard position inside, channel 72, 73, 12.5 kHz
$PDEBT,CCDSC,T,0001460078000001005067150A27271E680900480A680A00490A680C052800010300680D051E00005D0075FF	
sel_set_ais_channel_ch65.sst	Setting AIS channel to 65
$PDEBT,CCDSC,T,0001460078000001005067150A27271E68090A4100680A14410075FF	
area_set_region_20_2.sst	Area addressed regional setting for test 20.2
$PDEBT,CCDSC,T,00014600670F3200000E00005A005A0067150A27271E6809145200680A0A5200680C0F1E00011E00680D0F140001280075FF *$PDEBT,CCDSC,T,00014600670F3200000E00005A005A0067150A27271E6809145100680A0A5100680C0F1400011E00680D0F0A0001280075FF*	
Sequence_20_1sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF *$PDEBT,CCDSC,T,000146006606000050A0A64150A27271E646E5A00487E7E7E7FFF* *$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF* *$PDEBT,CCDSC,T,0001460078000001010067150A27271E646E5A00487E7E7E75FF* *$PDEBT,CCDSC,T,0001460078000001010067150A27271E676F75FF*	

Annex C Test Diagrams

C.1 Test 14.2.2 Reporting intervals

C.1.1 Reporting interval by speed change, 10 s – 6 s




2014-04-03 Class A -Seatex AIS300 - Test 14.2.2.1 Reporting interval by speed, 10/6 s
Frame 6
2014-04-03 12:17:03
Frame 7
2014-04-03 12:18:03
Frame 8
2014-04-03 12:19:04
Frame 9
2014-04-03 12:20:09
Frame 10
2014-04-03 12:21:09
Channel A
Channel B
!-- 3 min after SOG = 10 kn
Generated by BSH AISlog Version 3.18

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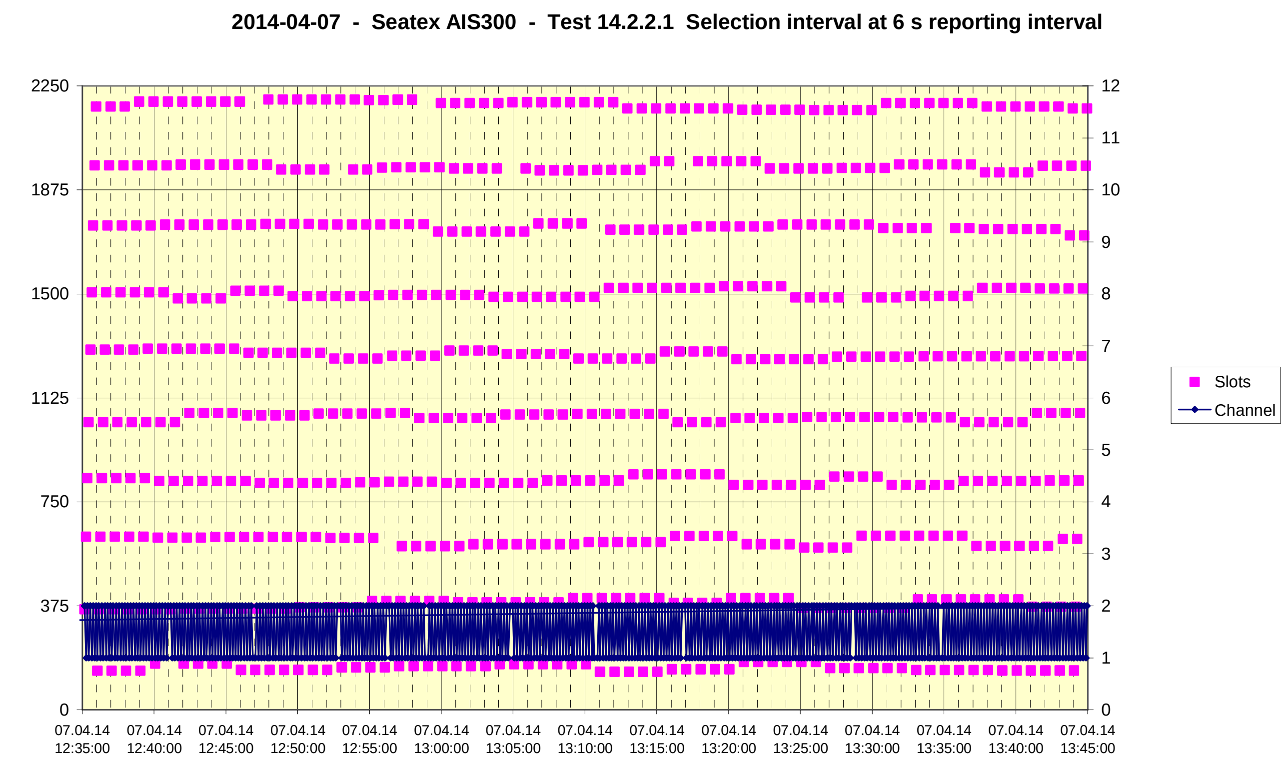
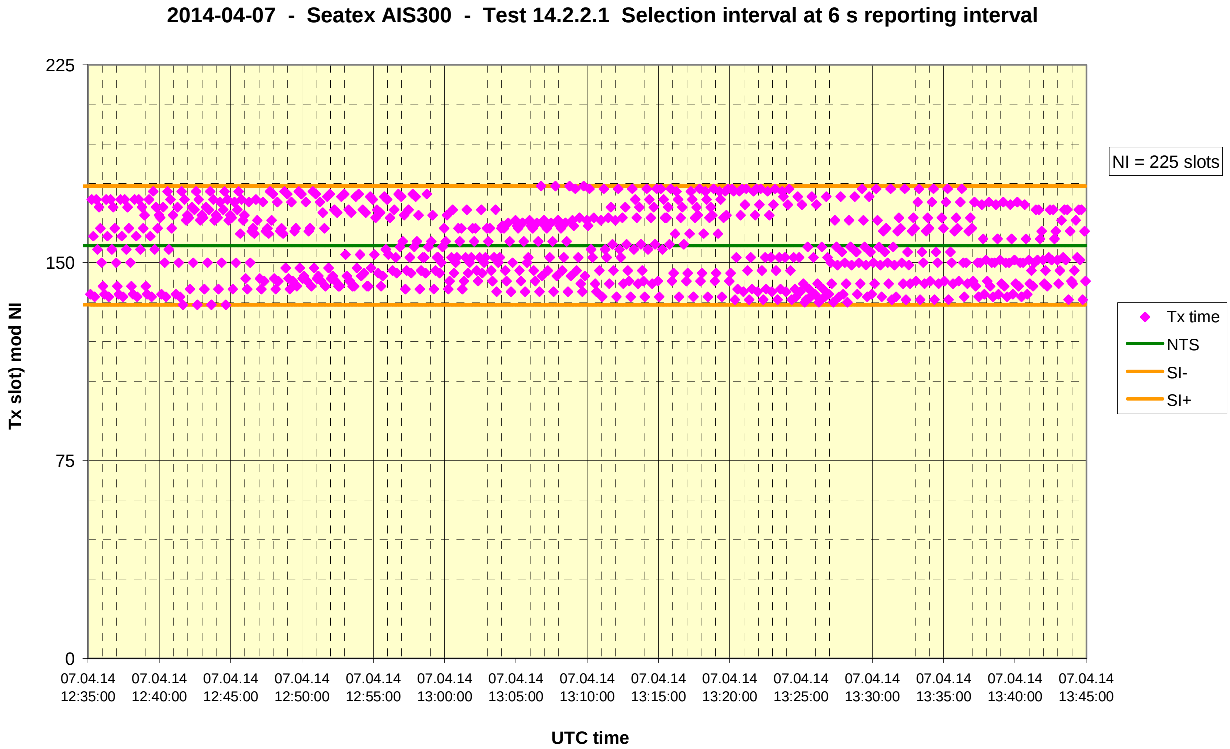
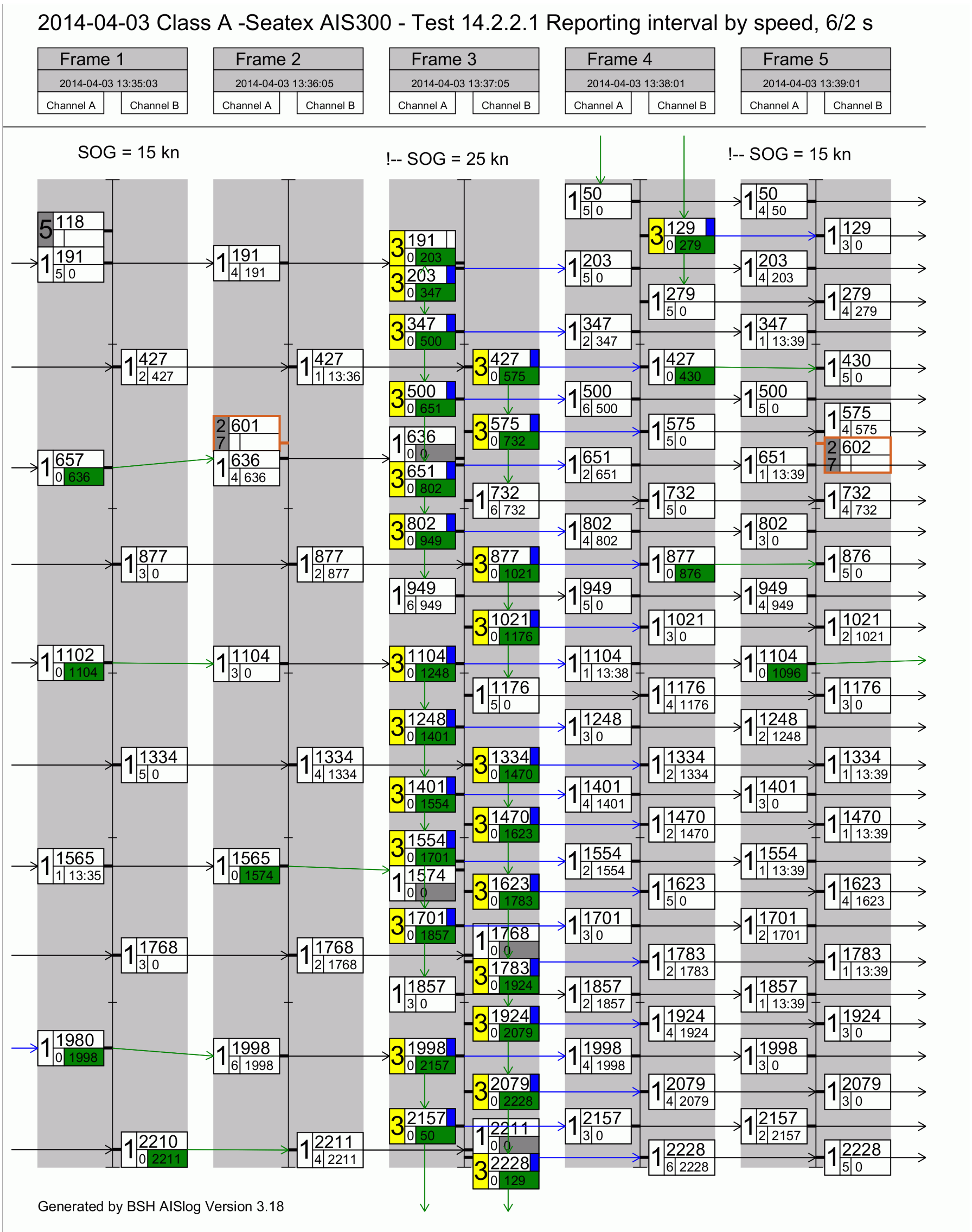
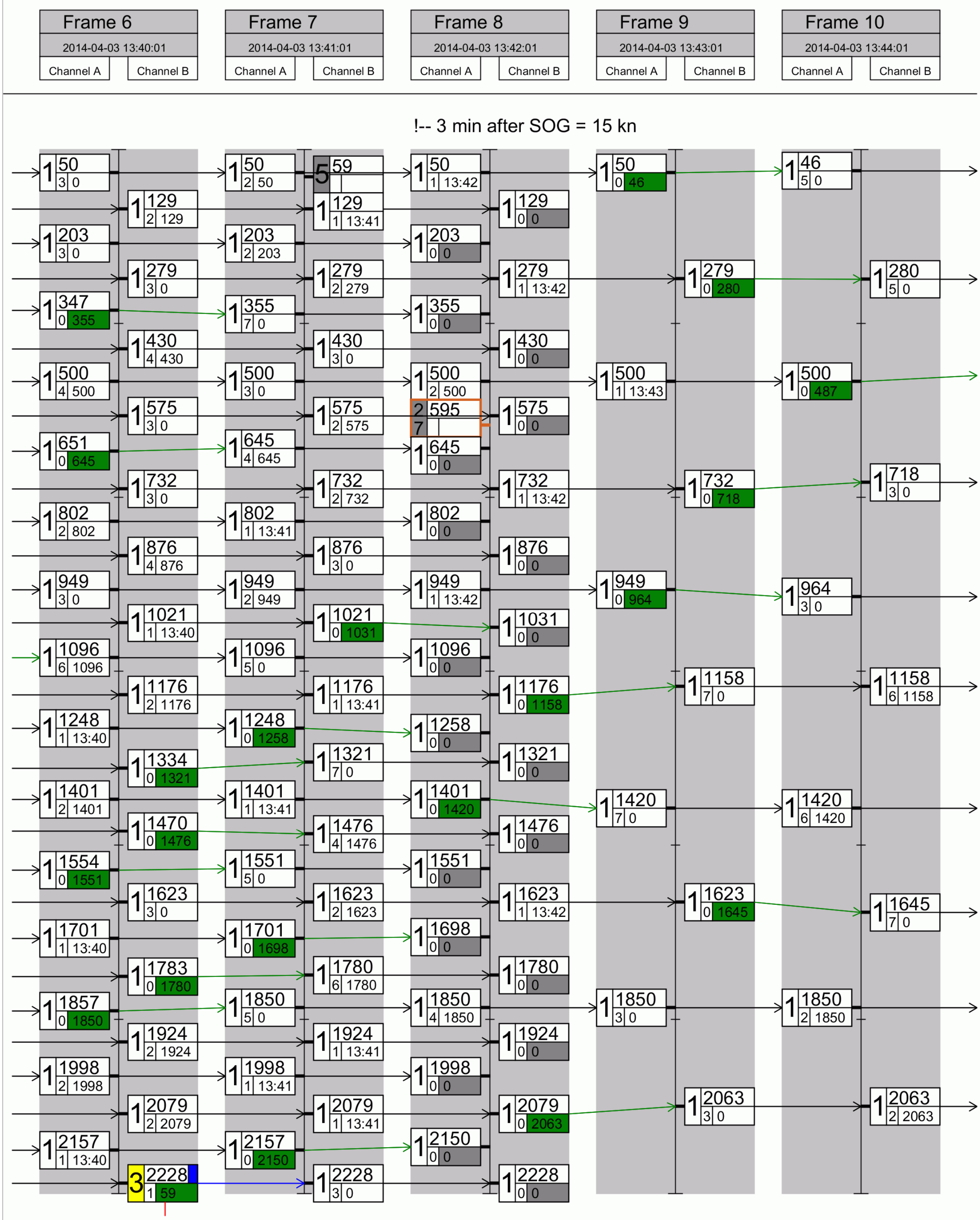




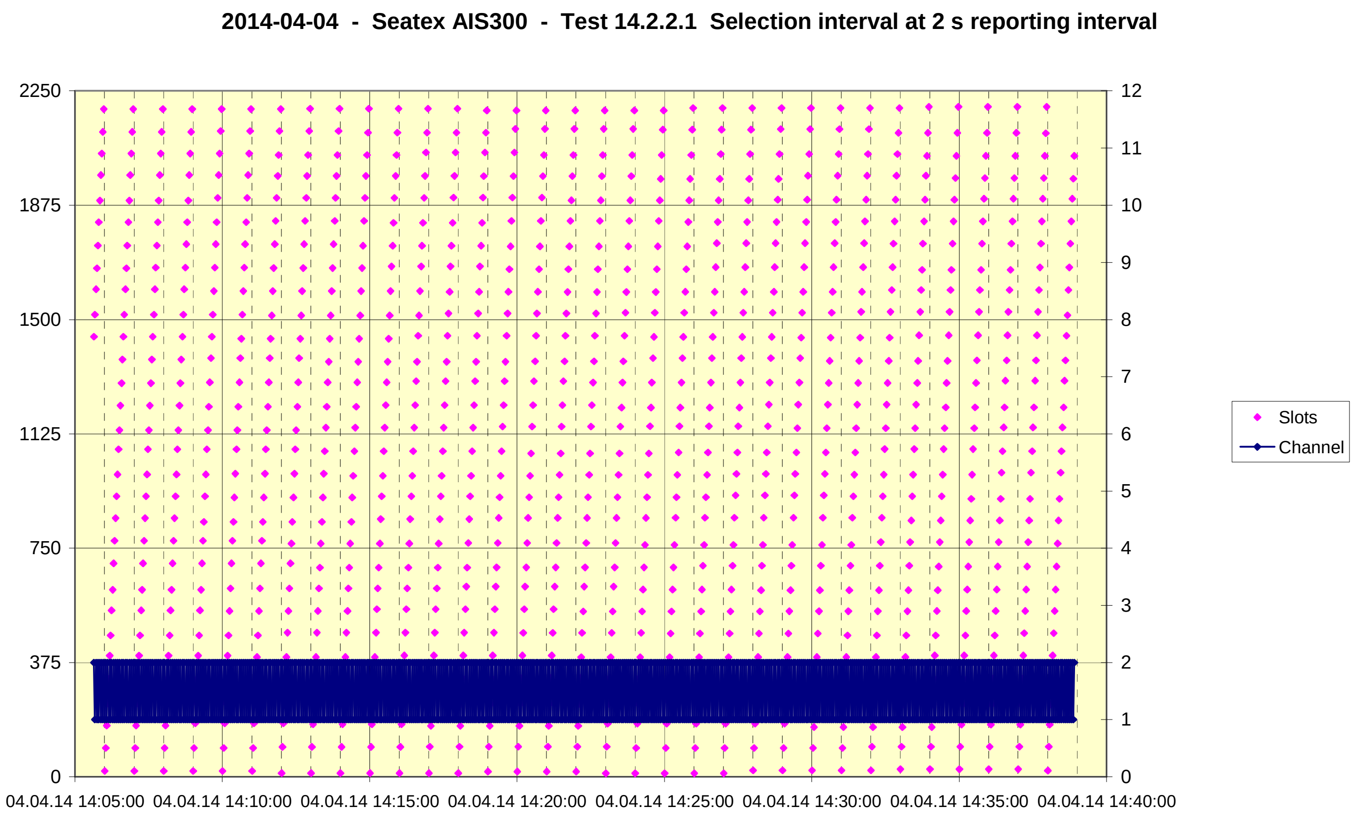
C.1.2 Reporting interval by speed change, 6 s - 2 s

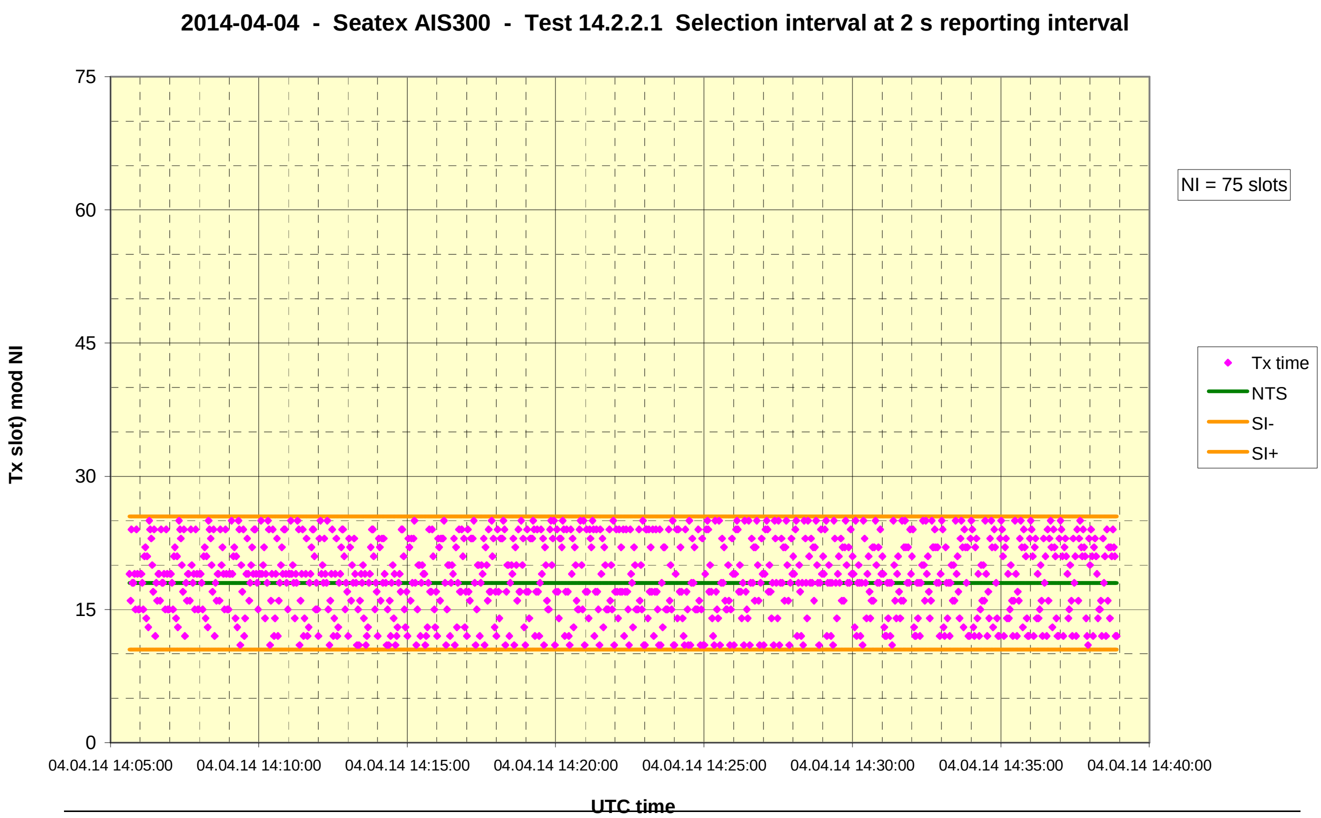


2014-04-03 Class A -Seatex AIS300 - Test 14.2.2.1 Reporting interval by speed, 6/2 s

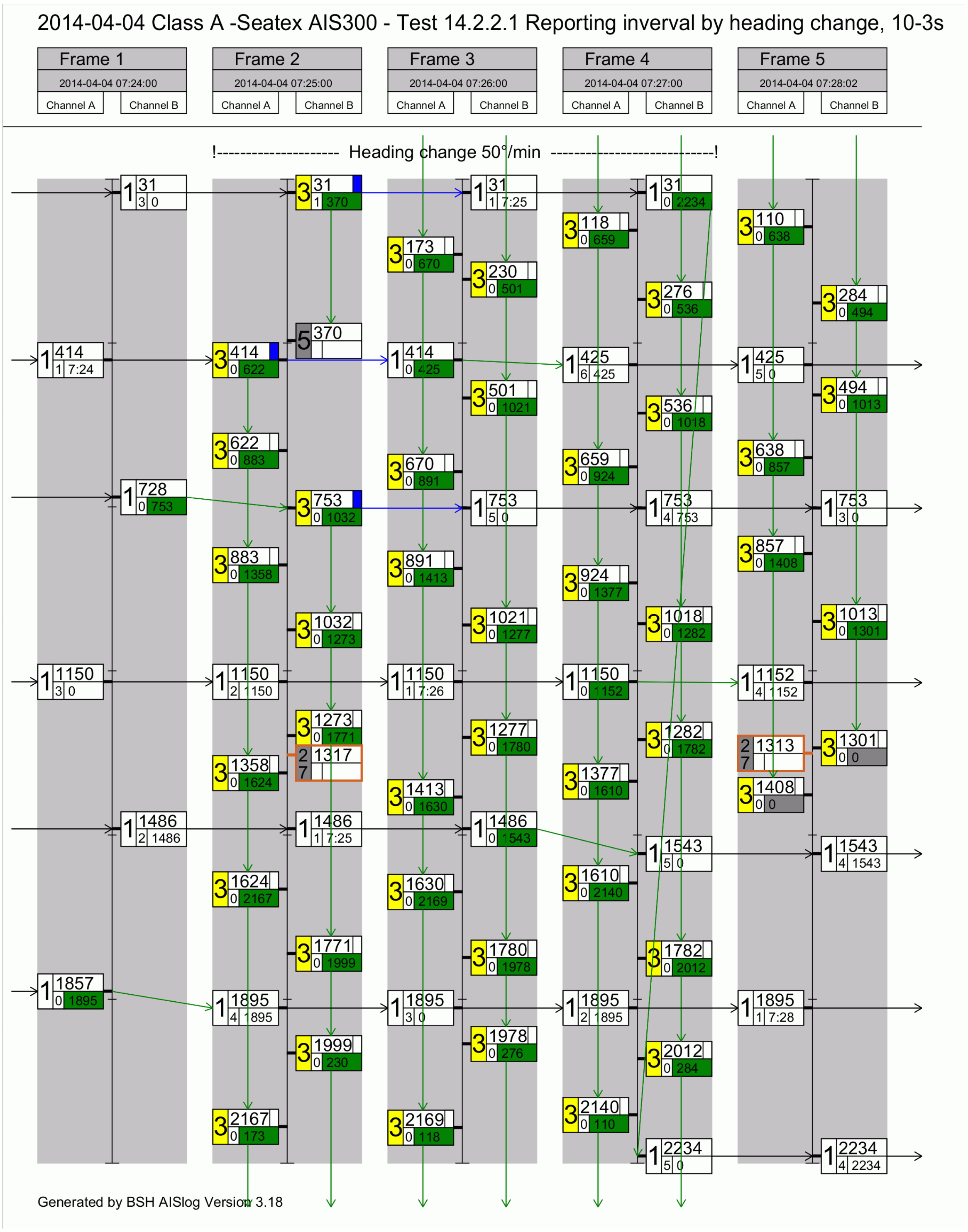


Generated by BSH AISlog Version 3.18

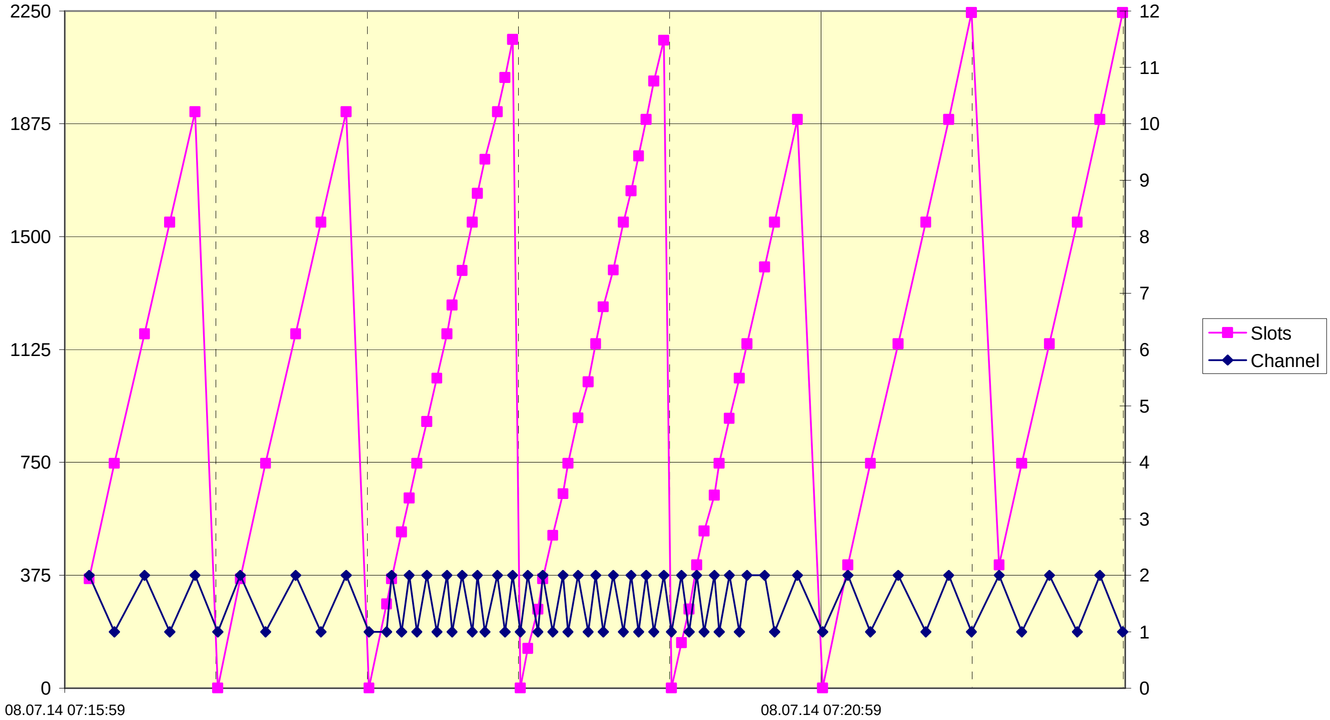

2014-04-04 - Seatex AIS300 - Test 14.2.2.1 Selection interval at 2 s reporting interval
2250
1875
1500
1125
750
375
0
12
11
10
9
8
7
6
5
4
3
2
1
0
Slots
Channel
04.04.14 14:05:00
04.04.14 14:10:00
04.04.14 14:15:00
04.04.14 14:20:00
04.04.14 14:25:00
04.04.14 14:30:00
04.04.14 14:35:00
04.04.14 14:40:00


2014-04-04 - Seatex AIS300 - Test 14.2.2.1 Selection interval at 2 s reporting interval
Tx slot) mod NI
75
60
45
30
15
0
NI = 75 slots
Tx time
NTS
SI-
SI+
04.04.14 14:05:00
04.04.14 14:10:00
04.04.14 14:15:00
04.04.14 14:20:00
04.04.14 14:25:00
04.04.14 14:30:00
04.04.14 14:35:00
04.04.14 14:40:00
UTC time

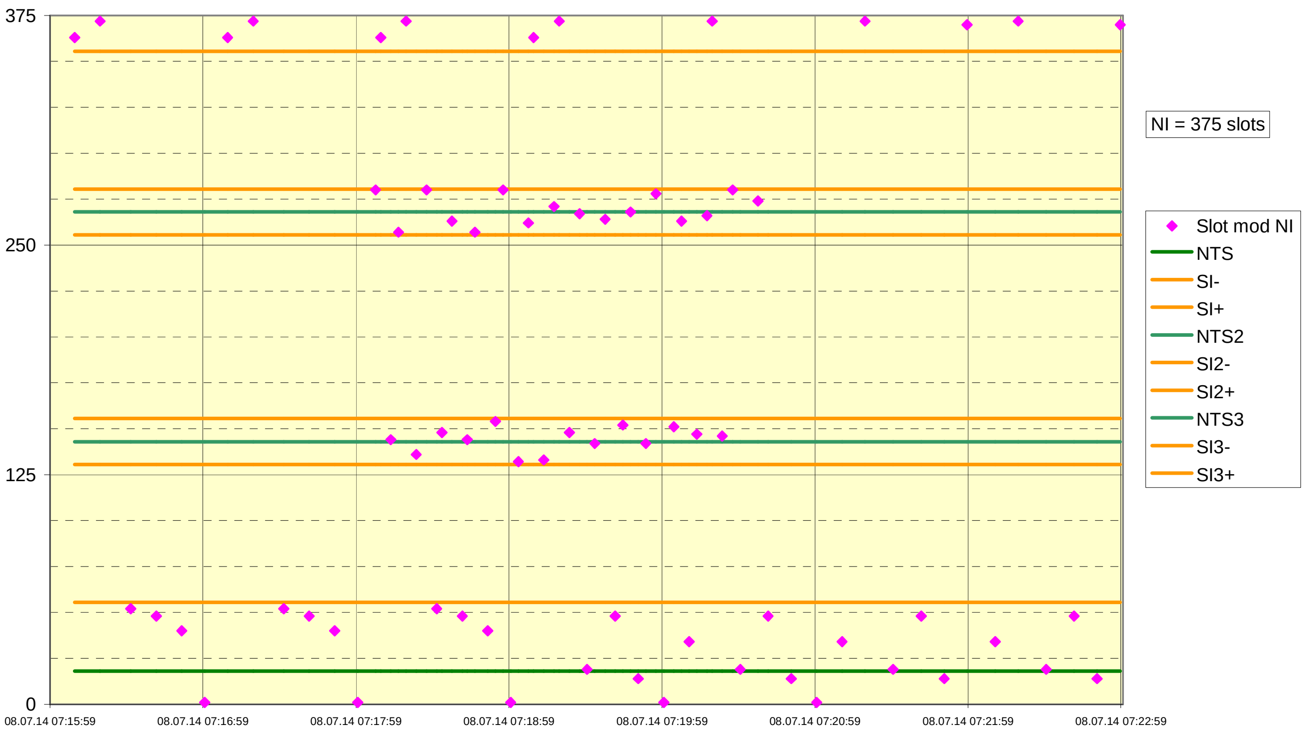
C.1.3 Reporting interval by heading change, 10 s



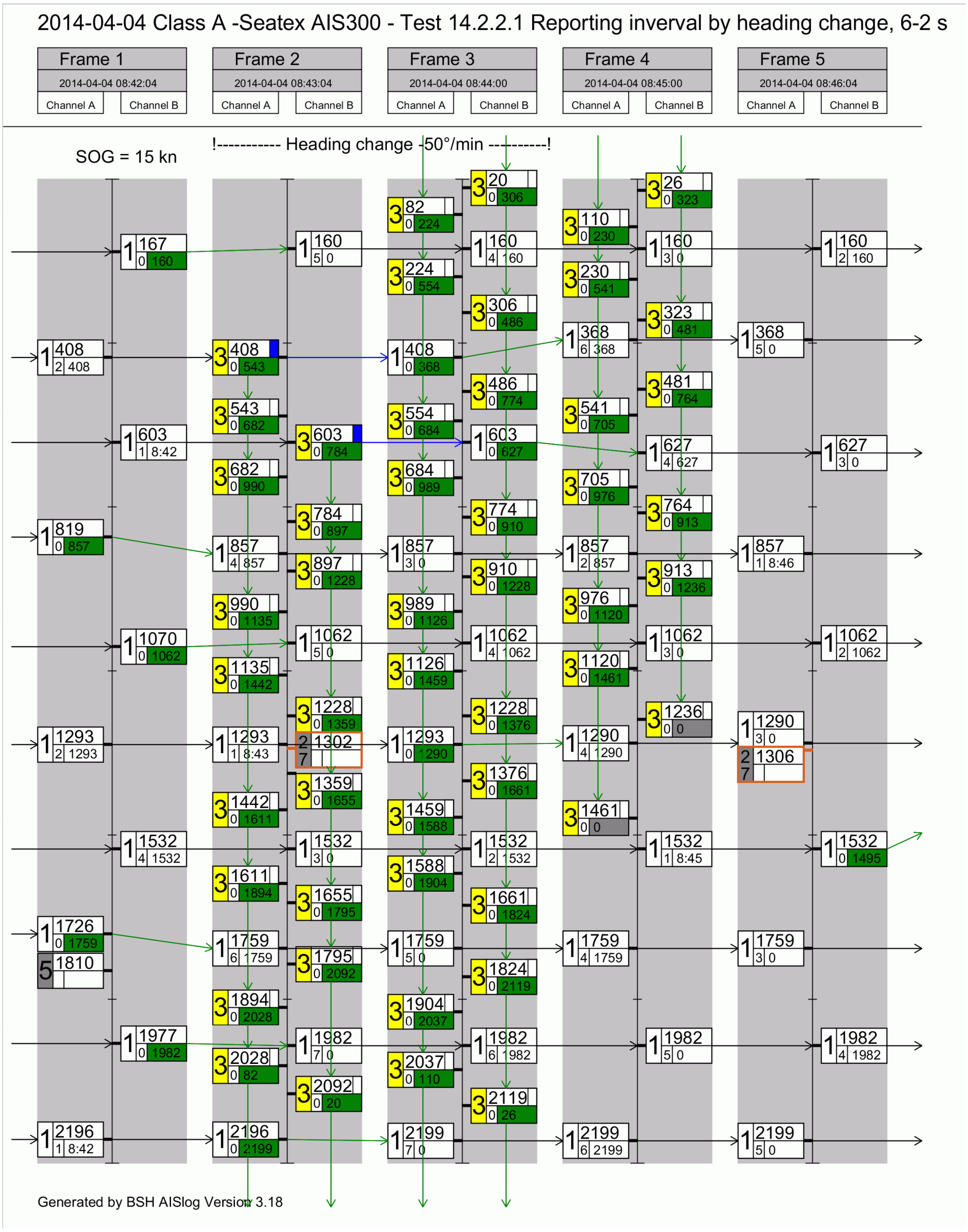
2014-07-08 - Seatex AIS300 - Test 14.2.2.1 Reporting interval by heading change, basic interval = 10s



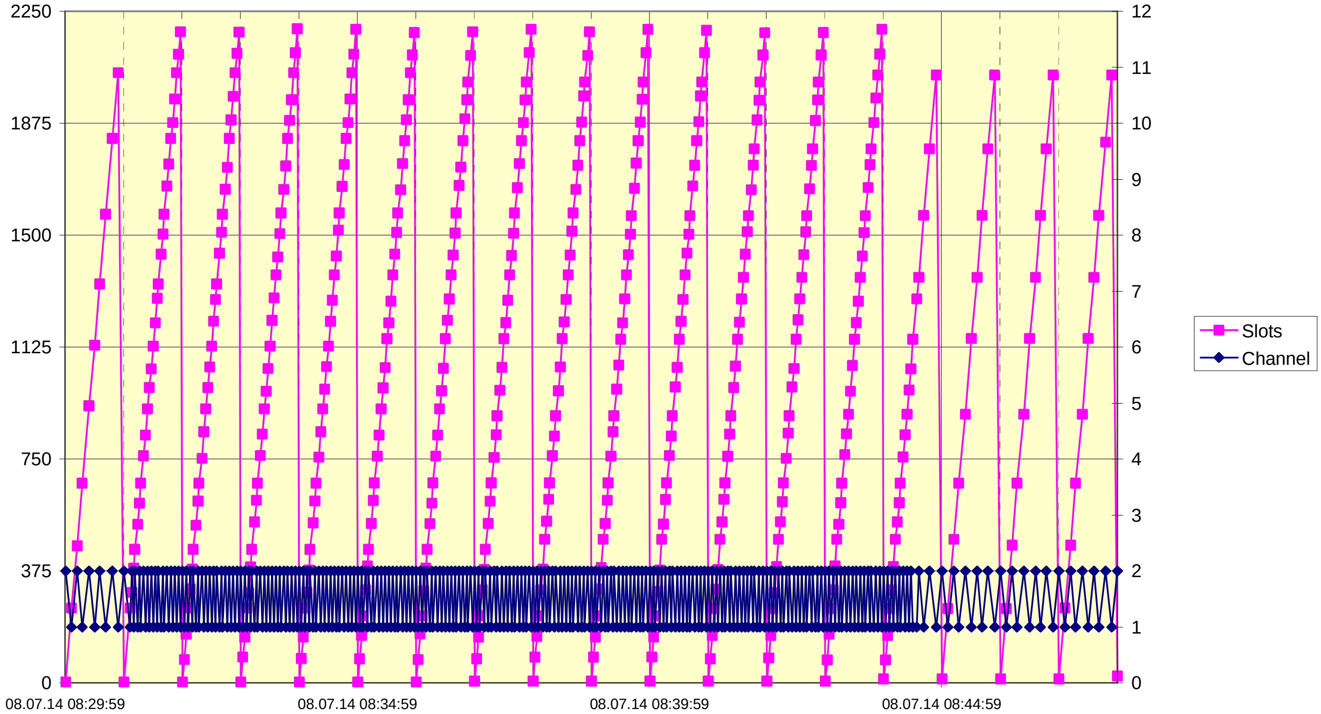
2014-07-08 - Seatex AIS300 - Test 14.2.2.1 Reporting interval by heading change, basic interval = 10s



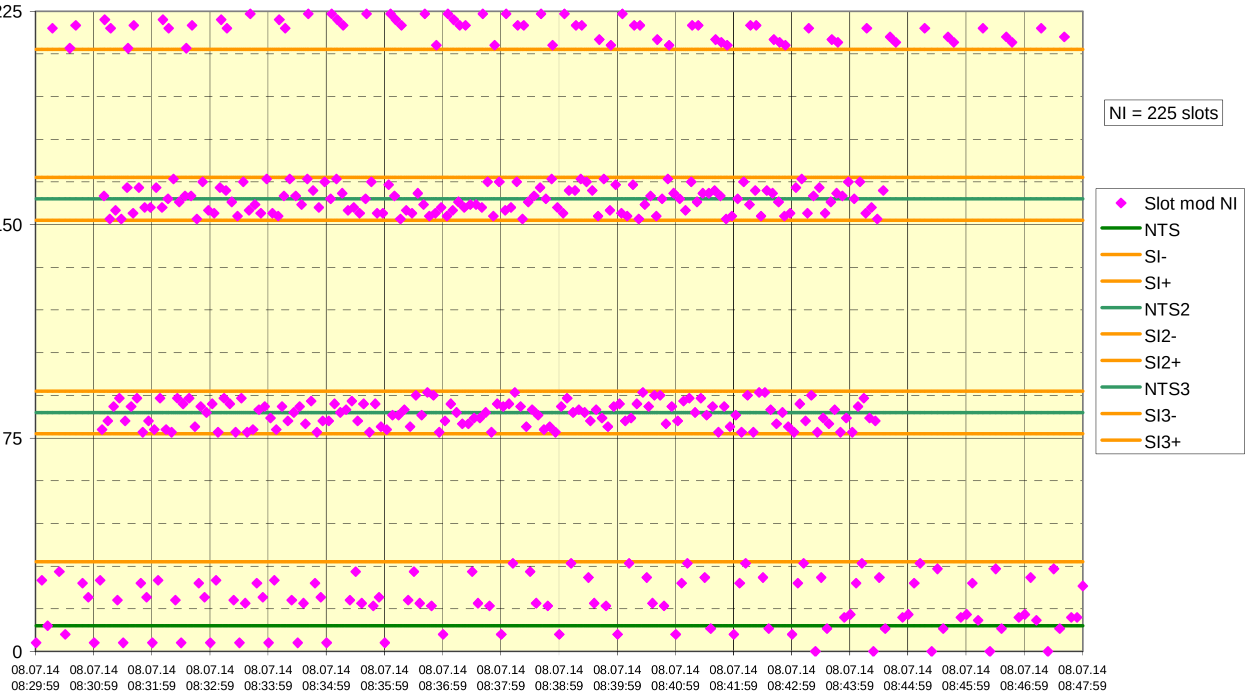
C.1.4 Reporting interval by heading change, 6 s



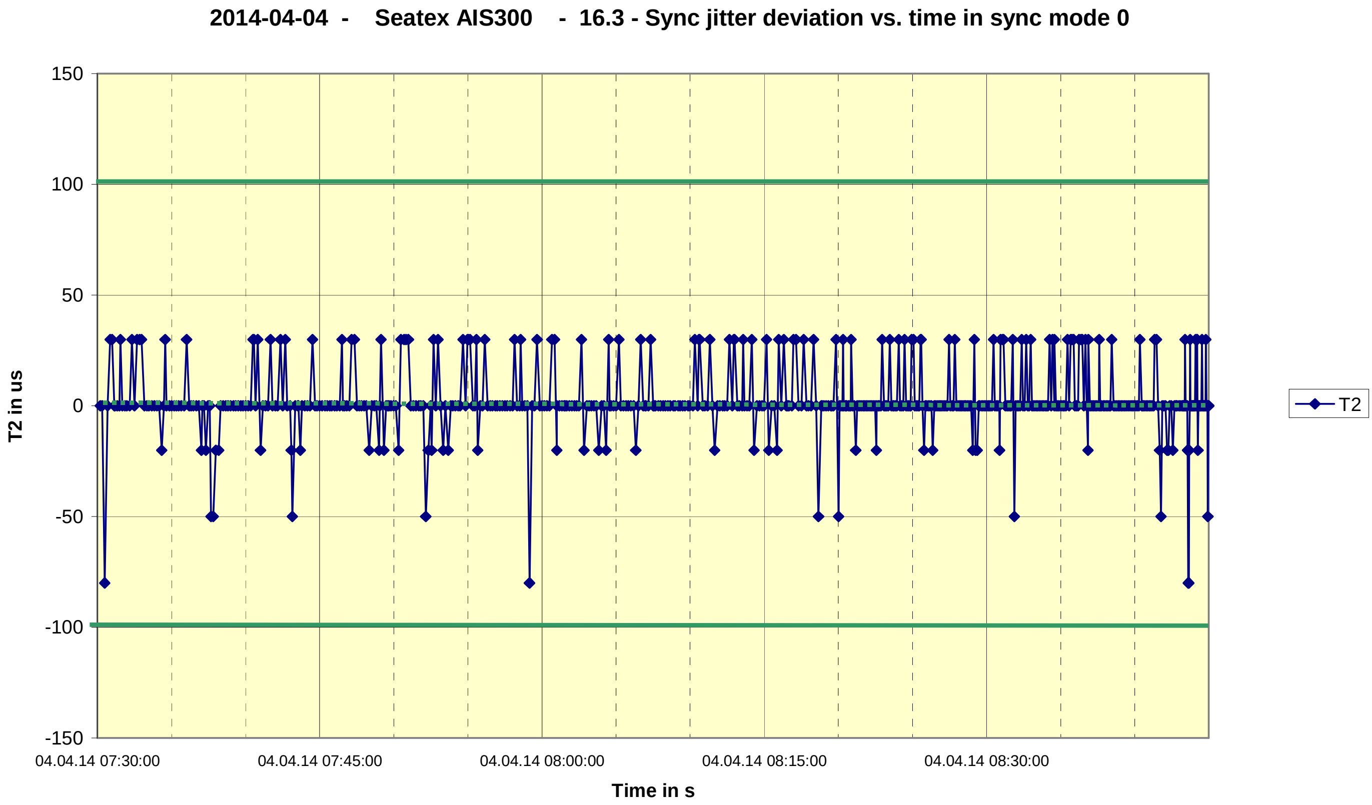
2014-07-08 - Seatex AIS300 - Test 14.2.2.1 Reporting interval by heading change, basic interval = 6s

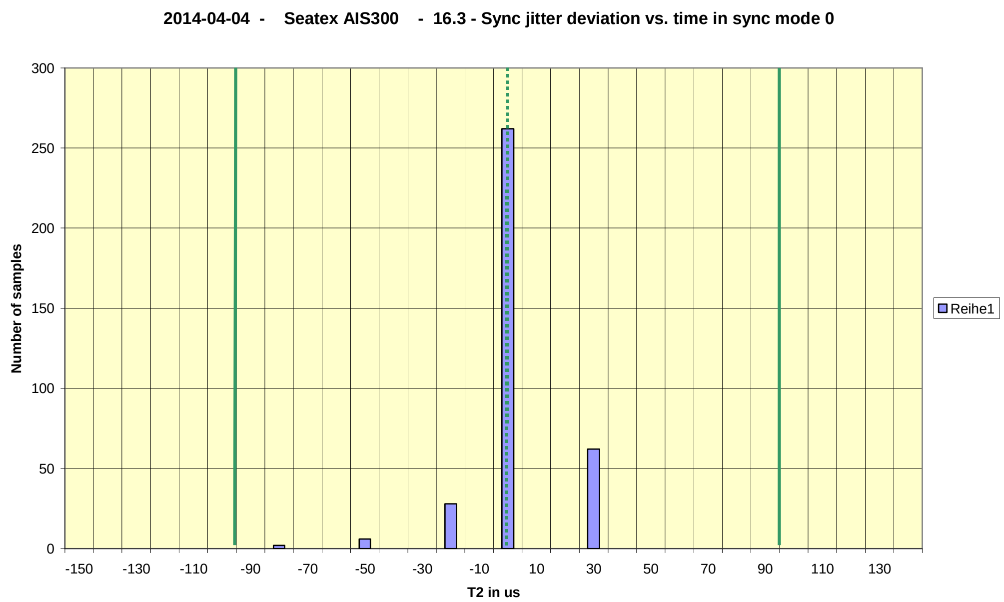


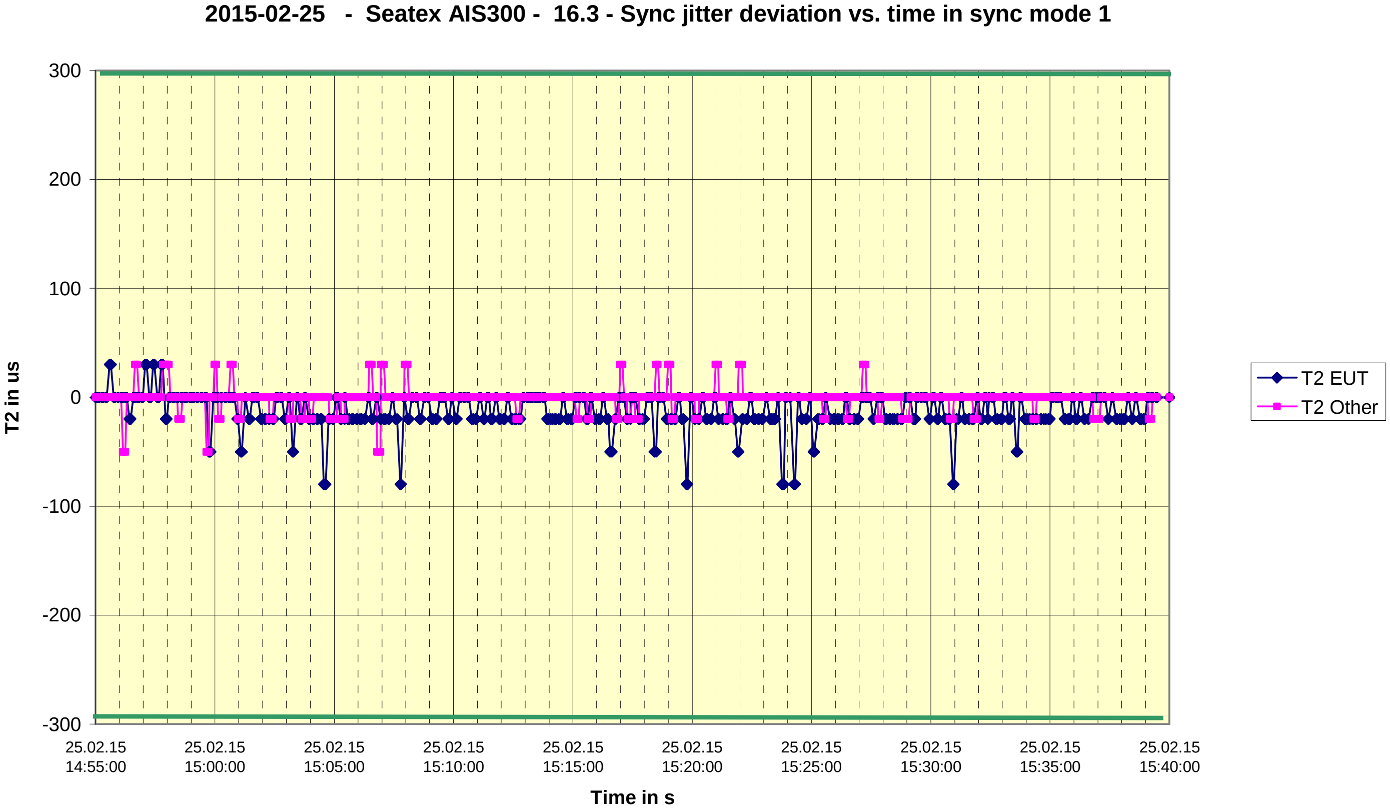
2014-07-08 - Seatex AIS300 - Test 14.2.2.1 Reporting interval by heading change, basic interval = 6s

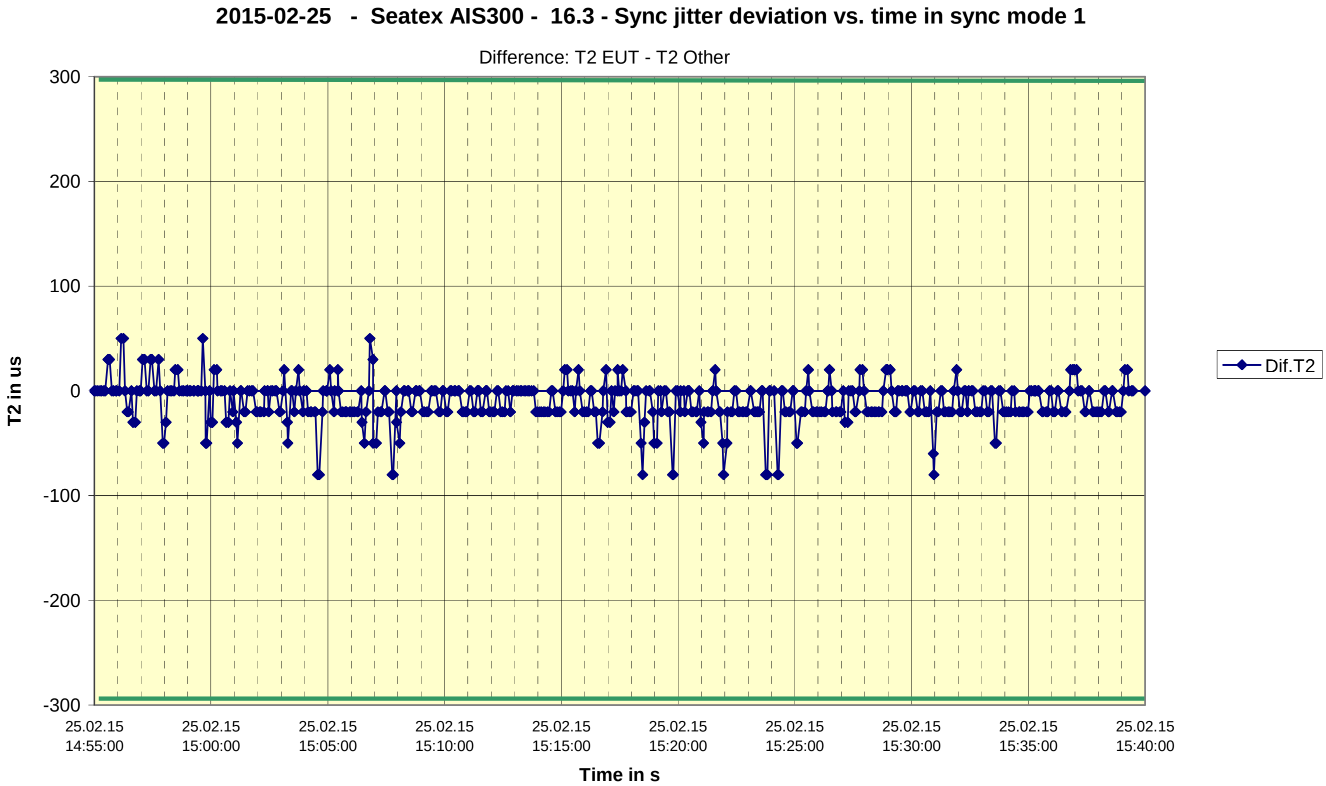


C.1.5 Test 16.3 Synchronisation jitter



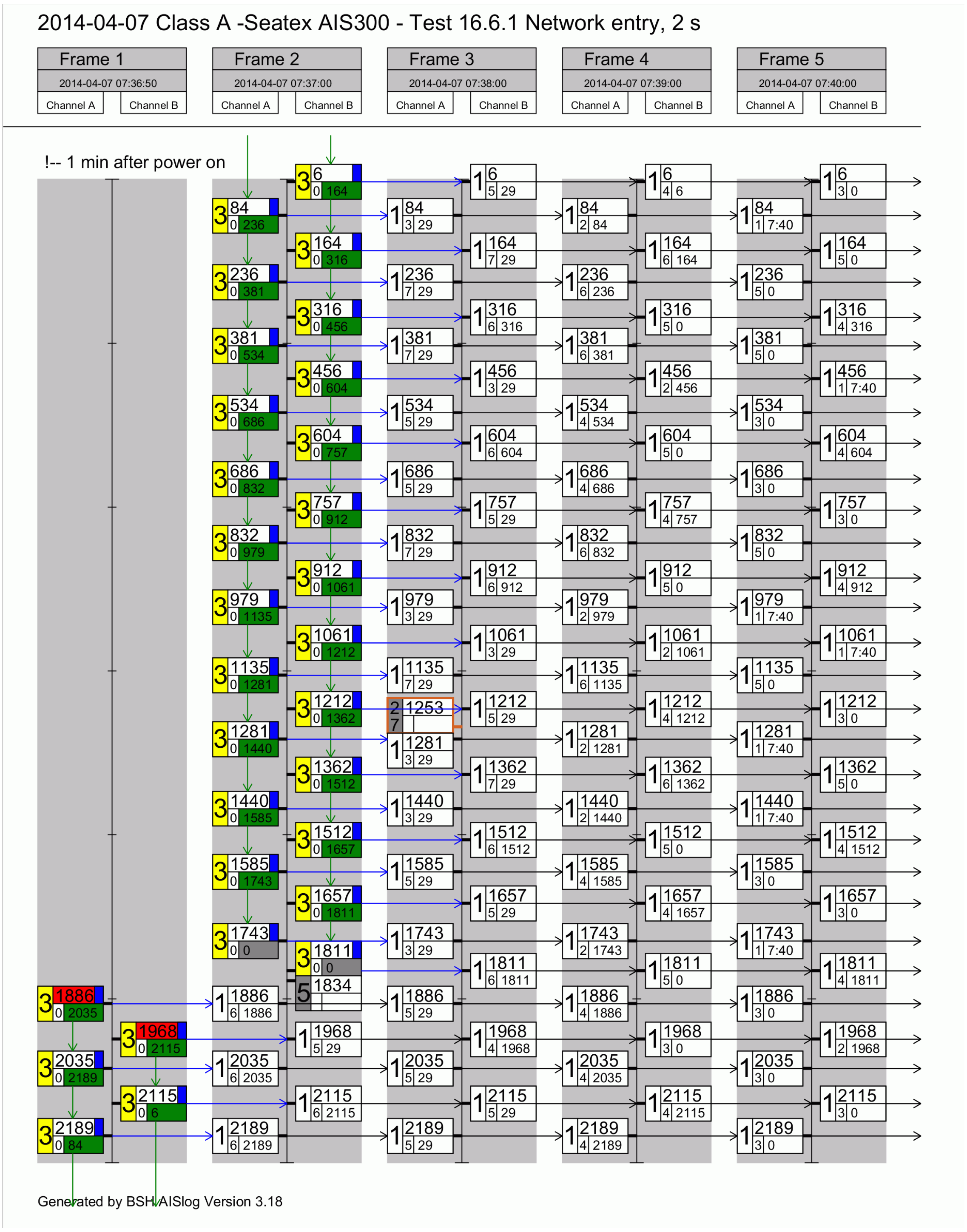


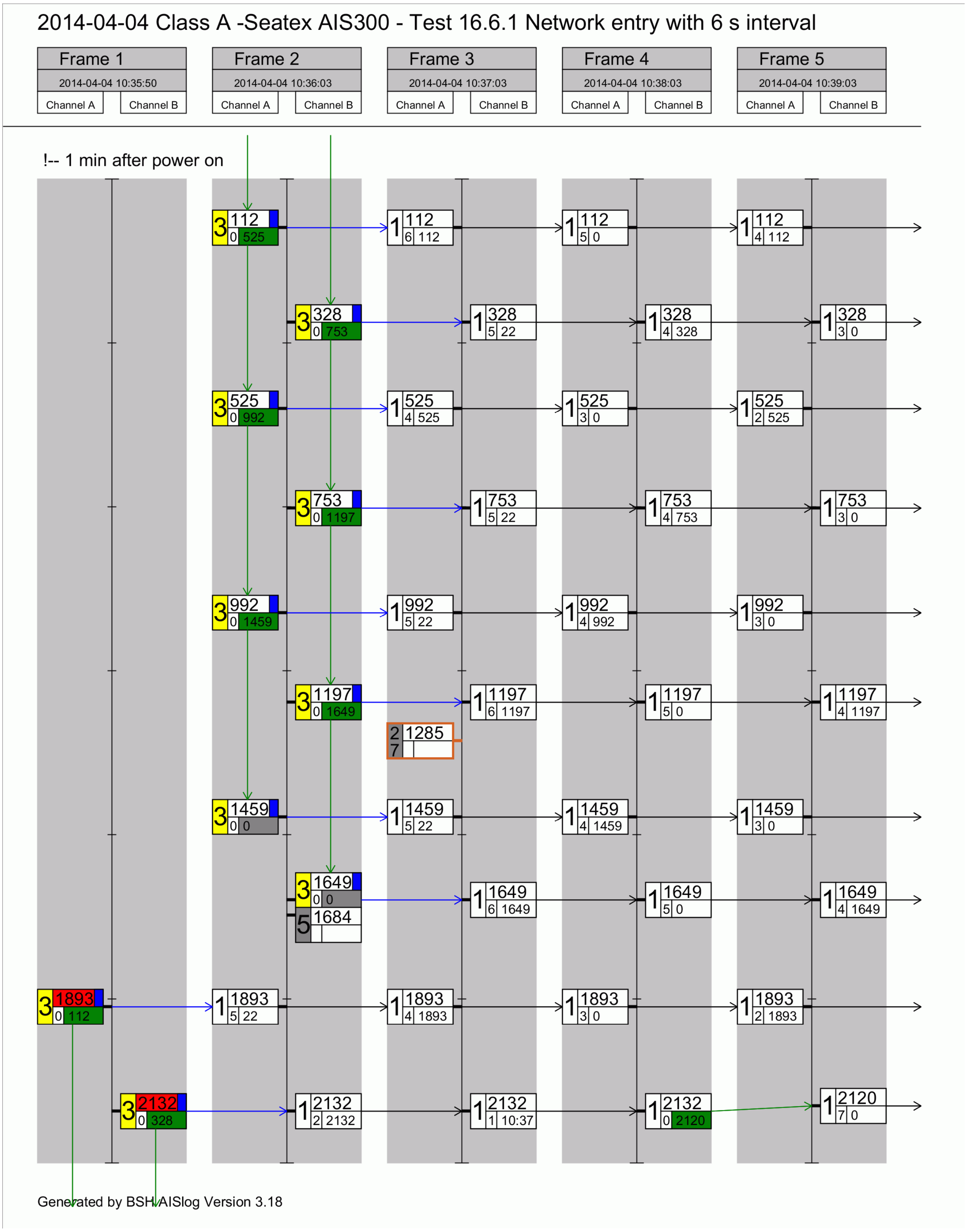

2015-02-25 - Seatex AIS300 - 16.3 - Sync jitter deviation vs. time in sync mode 1
300
200
100
0
-100
-200
-300
T2 in us
25.02.15 14:55:00
25.02.15 15:00:00
25.02.15 15:05:00
25.02.15 15:10:00
25.02.15 15:15:00
25.02.15 15:20:00
25.02.15 15:25:00
25.02.15 15:30:00
25.02.15 15:35:00
25.02.15 15:40:00
Time in s
T2 EUT
T2 Other

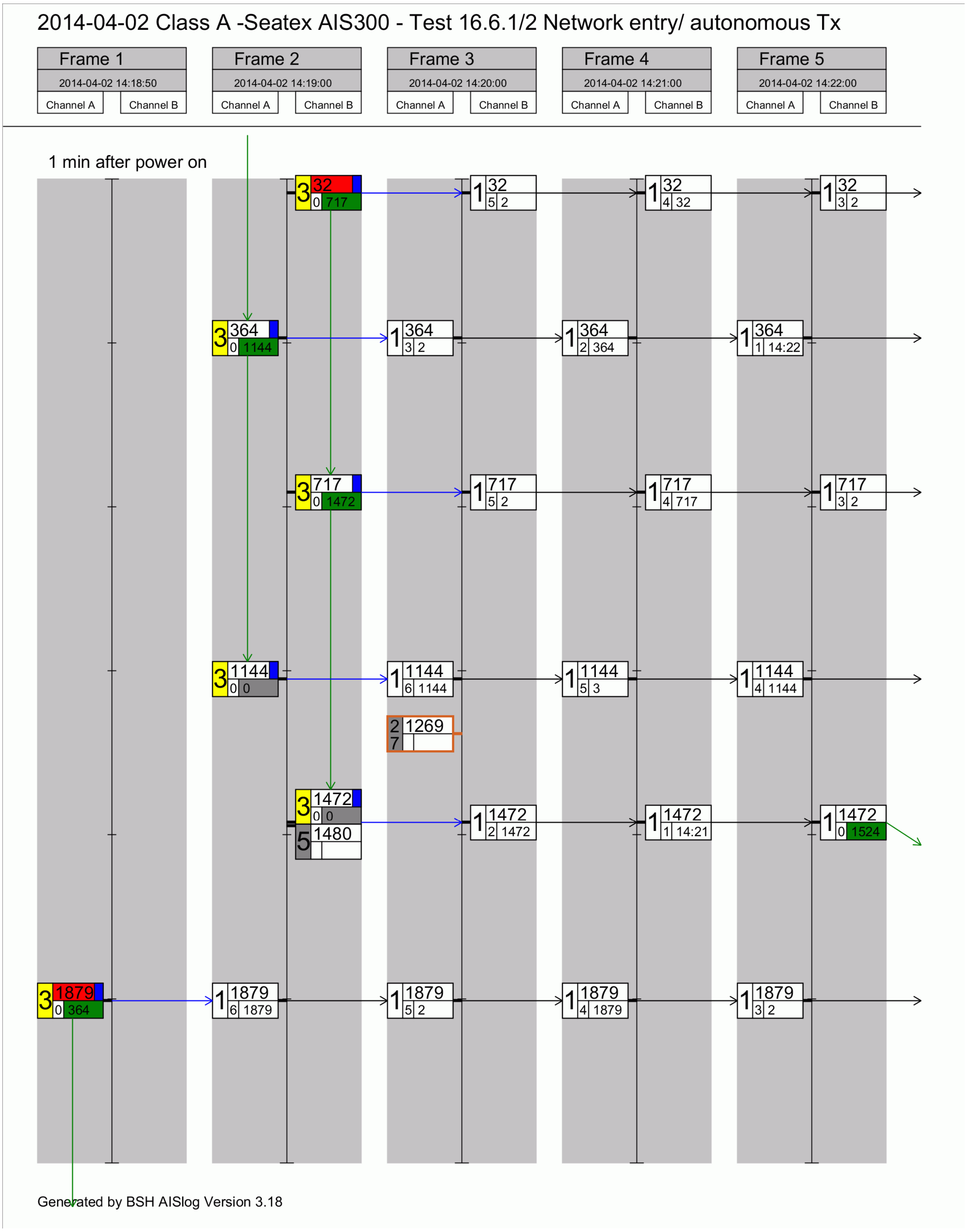

2015-02-25 - Seatex AIS300 - 16.3 - Sync jitter deviation vs. time in sync mode 1
Difference: T2 EUT - T2 Other
300
200
100
0
-100
-200
-300
T2 in us
25.02.15 14:55:00
25.02.15 15:00:00
25.02.15 15:05:00
25.02.15 15:10:00
25.02.15 15:15:00
25.02.15 15:20:00
25.02.15 15:25:00
25.02.15 15:30:00
25.02.15 15:35:00
25.02.15 15:40:00
Time in s
Dif.T2

C.2 Test 16.6 Slot allocation

C.2.1 Test 16.6.1 Network entry

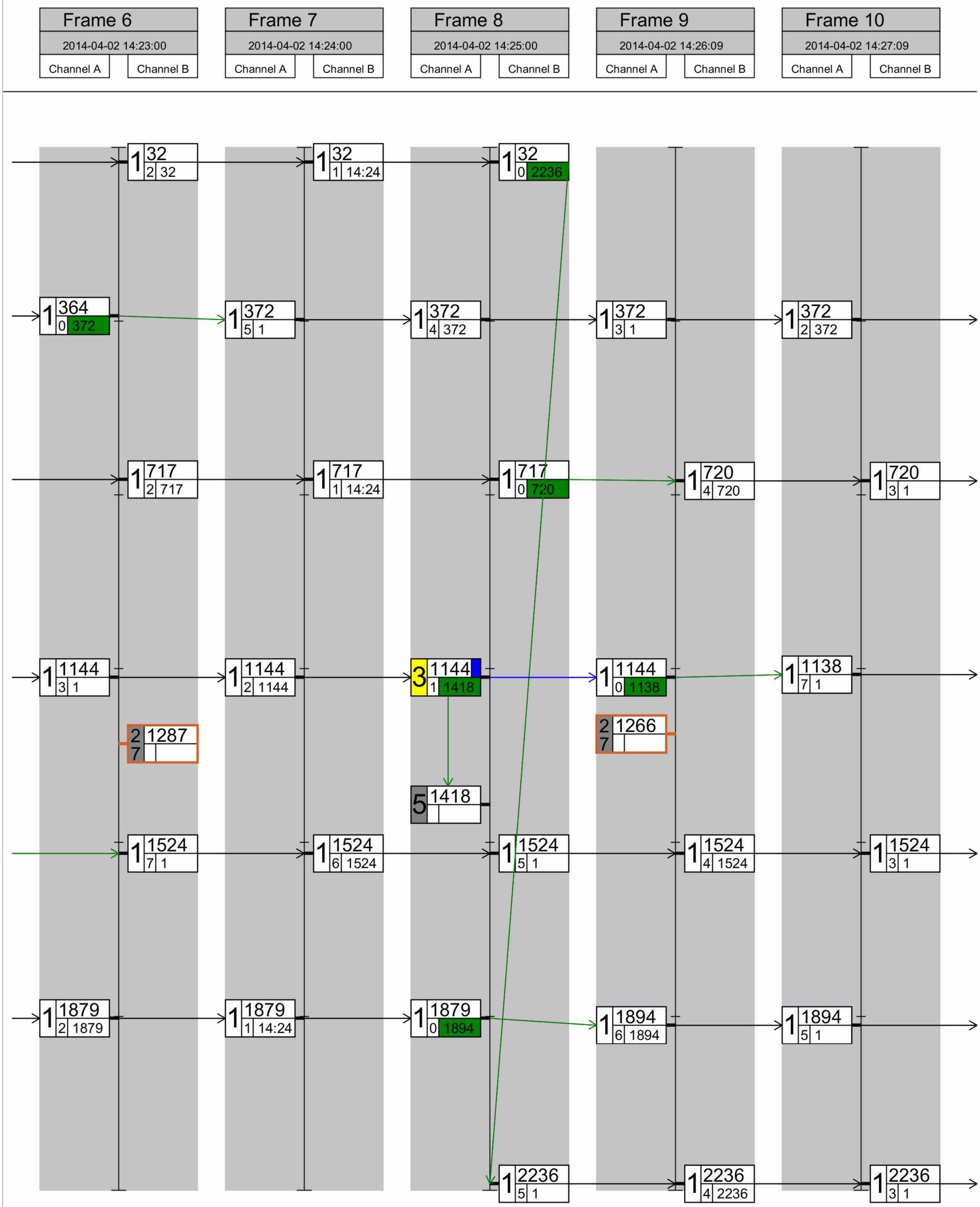



2014-04-04 Class A -Seatex AIS300 - Test 16.6.1 Network entry with 6 s interval
Frame 1
2014-04-04 10:35:50
Frame 2
2014-04-04 10:36:03
Frame 3
2014-04-04 10:37:03
Frame 4
2014-04-04 10:38:03
Frame 5
2014-04-04 10:39:03
Channel A
Channel B
!-- 1 min after power on
Generated by BSH AISlog Version 3.18


2014-04-02 Class A -Seatex AIS300 - Test 16.6.1/2 Network entry/ autonomous Tx
Frame 1
2014-04-02 14:18:50
Frame 2
2014-04-02 14:19:00
Frame 3
2014-04-02 14:20:00
Frame 4
2014-04-02 14:21:00
Frame 5
2014-04-02 14:22:00
Channel A
Channel B
1 min after power on
Generated by BSH AISlog Version 3.18

C.2.2 Test 16.6.2 Autonomous scheduled tx (SOTDMA)

2014-04-02 Class A -Seatex AIS300 - Test 16.6.1/2 Network entry/ autonomous Tx



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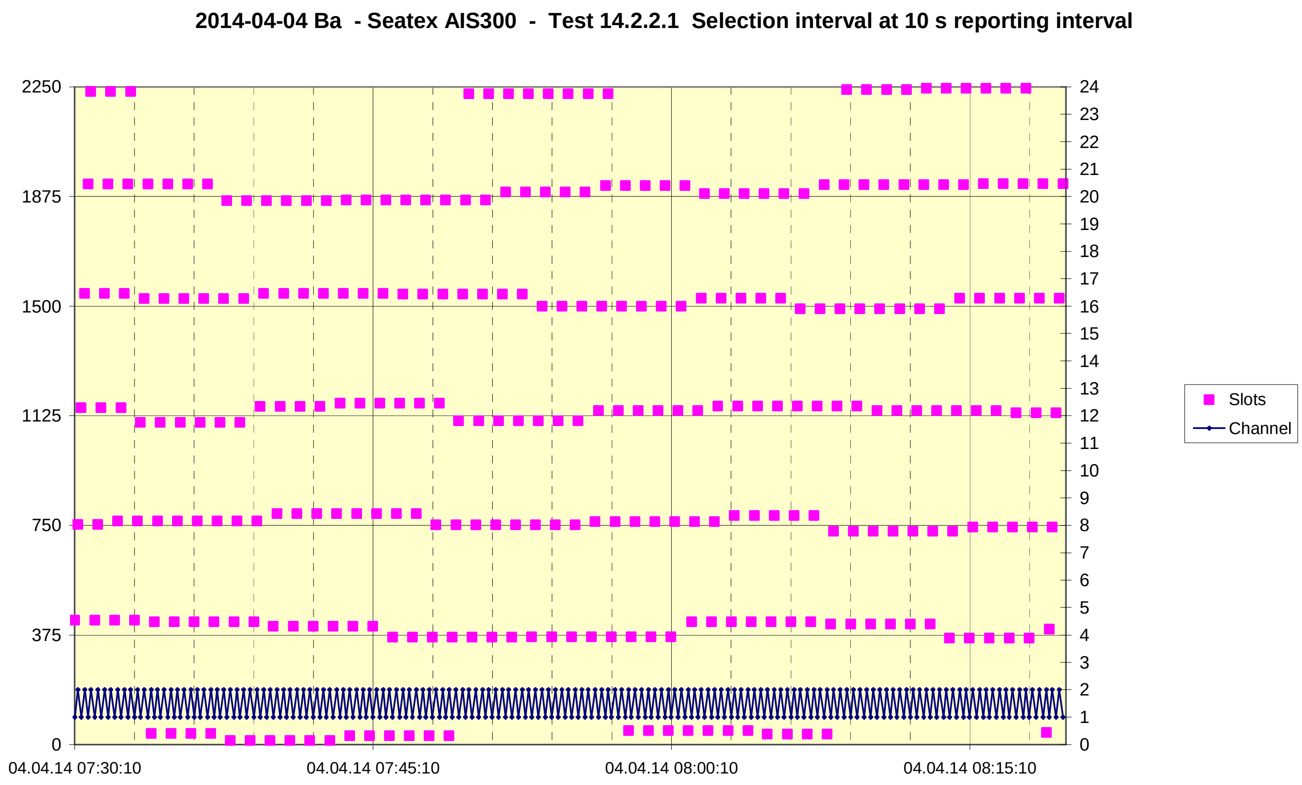
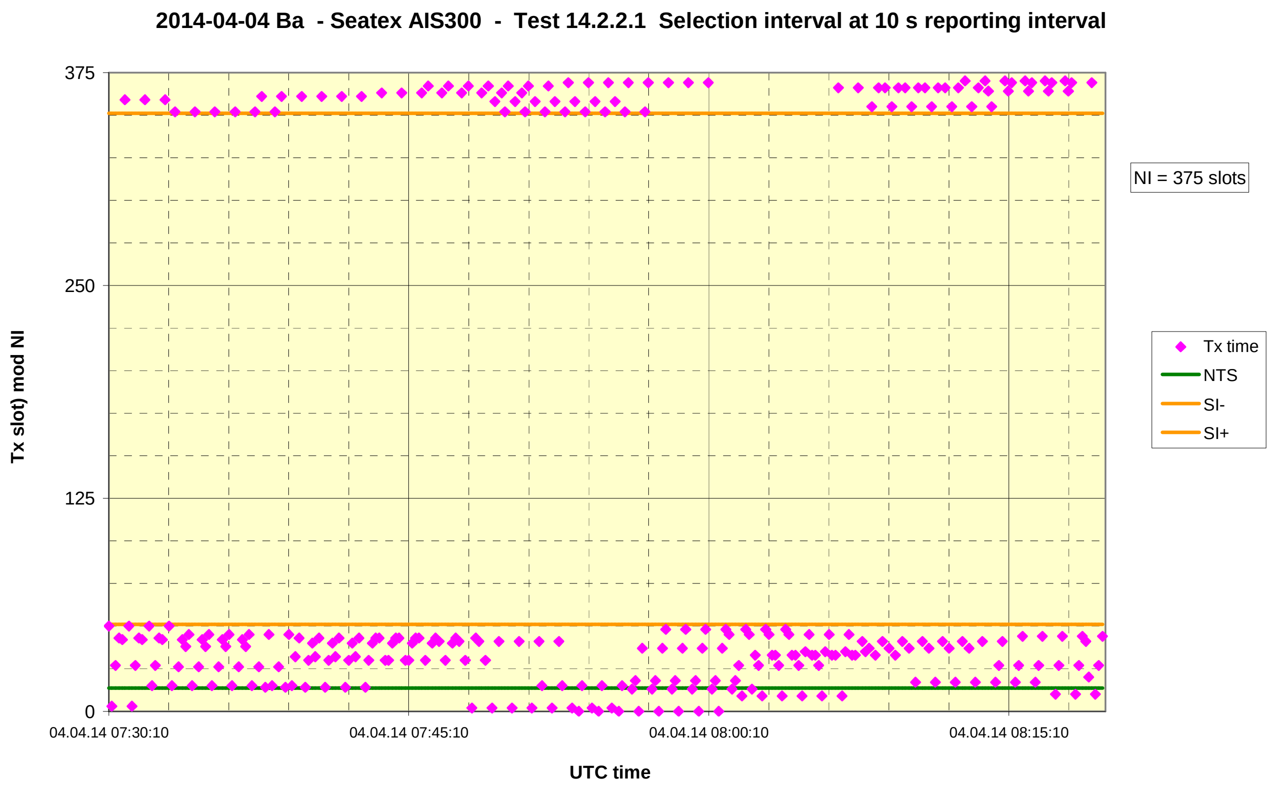
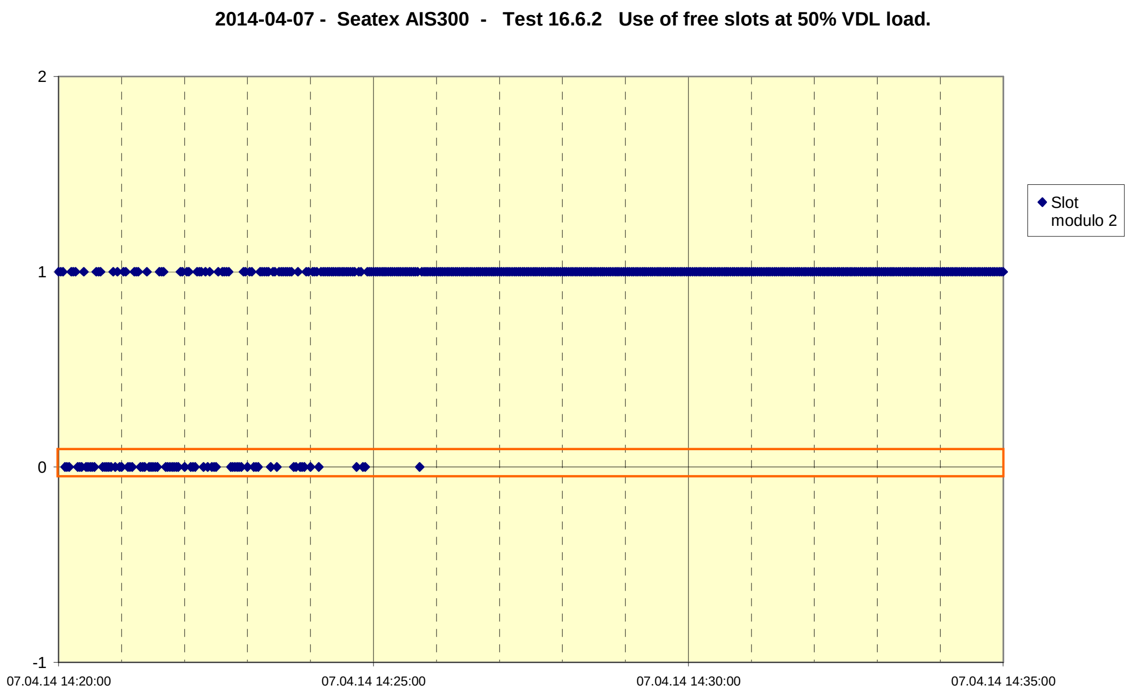
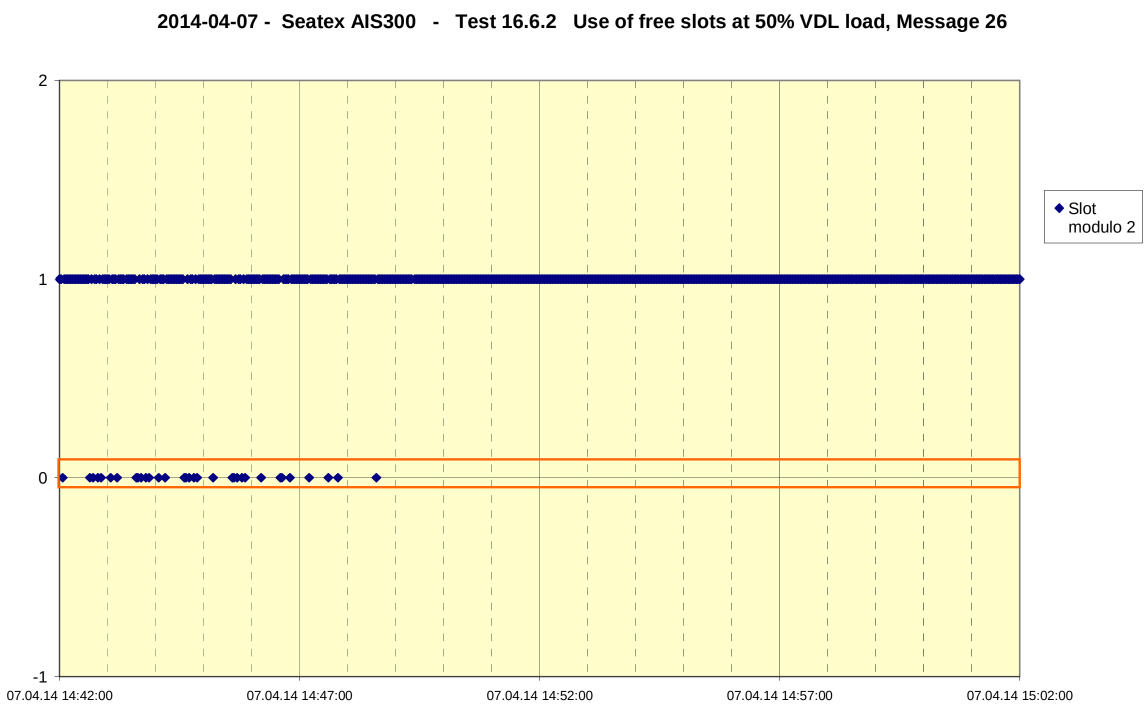

2014-04-04 Ba - Seatex AIS300 - Test 14.2.2.1 Selection interval at 10 s reporting interval
2250
1875
1500
1125
750
375
0
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
04.04.14 07:30:10
04.04.14 07:45:10
04.04.14 08:00:10
04.04.14 08:15:10
Slots
Channel


2014-04-04 Ba - Seatex AIS300 - Test 14.2.2.1 Selection interval at 10 s reporting interval
375
250
125
0
Tx slot) mod NI
04.04.14 07:30:10
04.04.14 07:45:10
04.04.14 08:00:10
04.04.14 08:15:10
UTC time
NI = 375 slots
Tx time
NTS
SI-
SI+

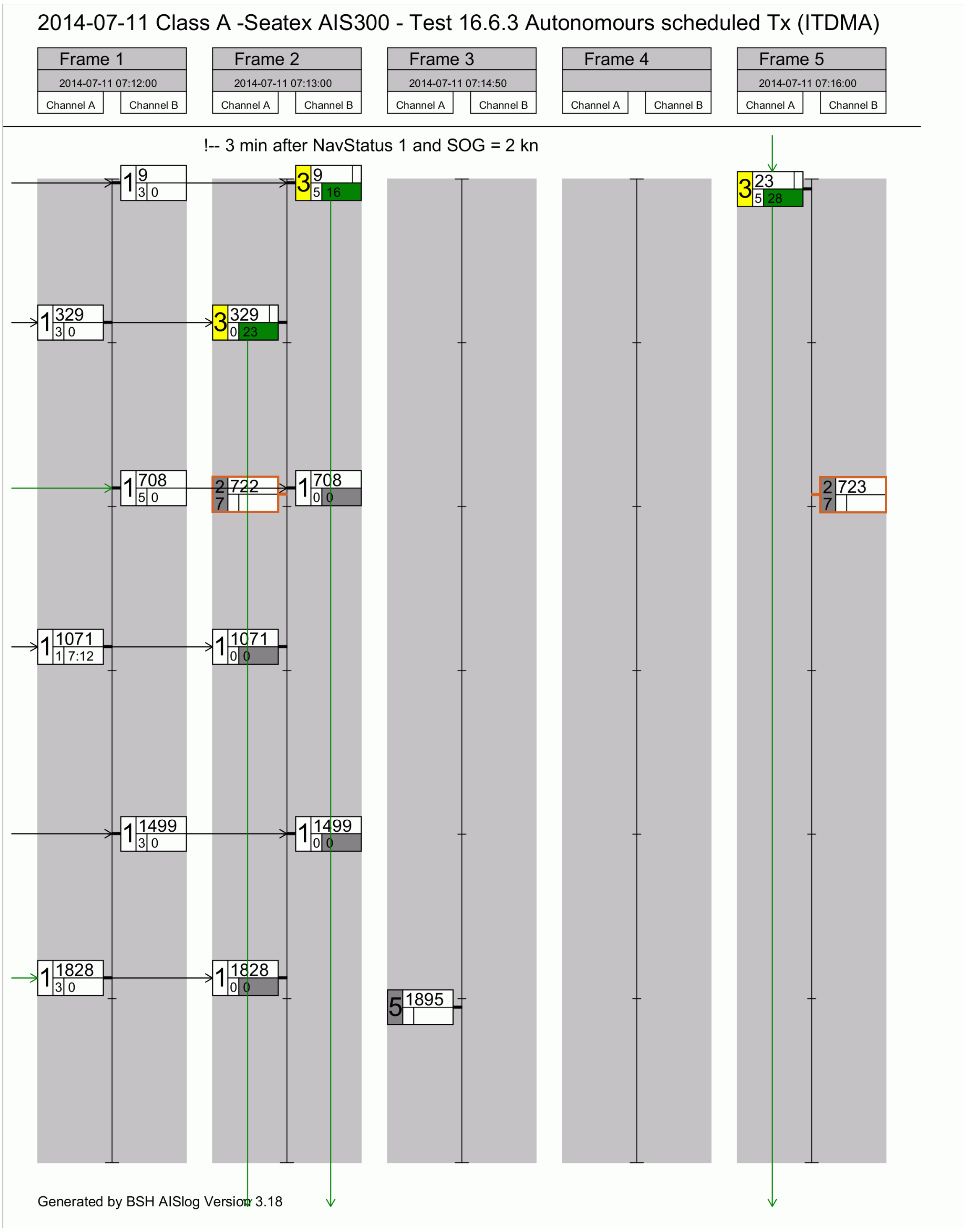
C.2.3 Test 16.6.2 Autonomous scheduled tx at 50% VDL load

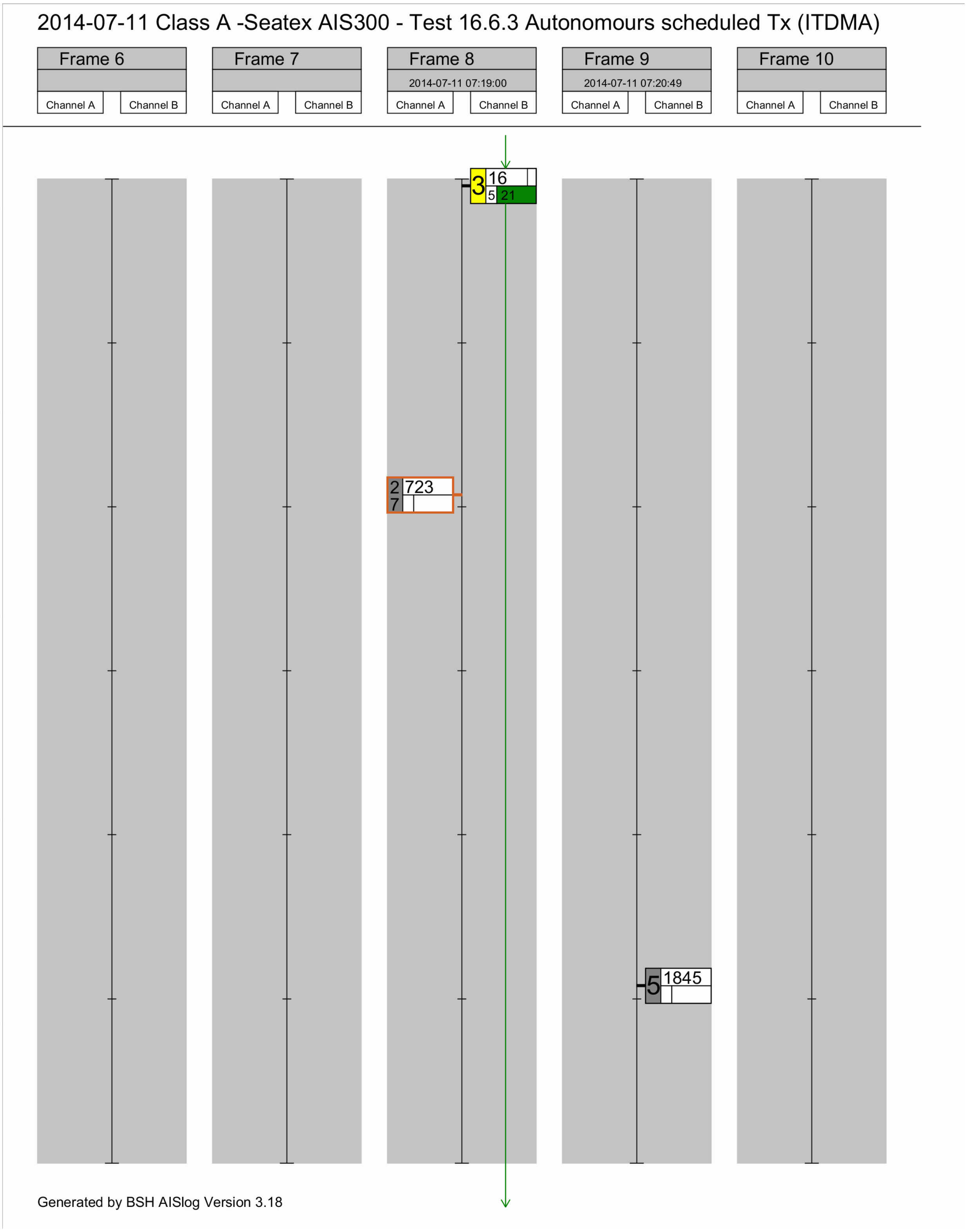
The even slots (slot no. Modulo 2 = 0) are occupied, the odd slots (slot no. Modulo 2 = 1) are free.





C.2.4 Test 16.6.3 Autonomous scheduled tx (ITDMA)




2014-07-11 Class A -Seatex AIS300 - Test 16.6.3 Autonomours scheduled Tx (ITDMA)
Frame 6
Frame 7
Frame 8
2014-07-11 07:19:00
Frame 9
2014-07-11 07:20:49
Frame 10
Channel A
Channel B
3
16
5
21
2
723
7
5
1845
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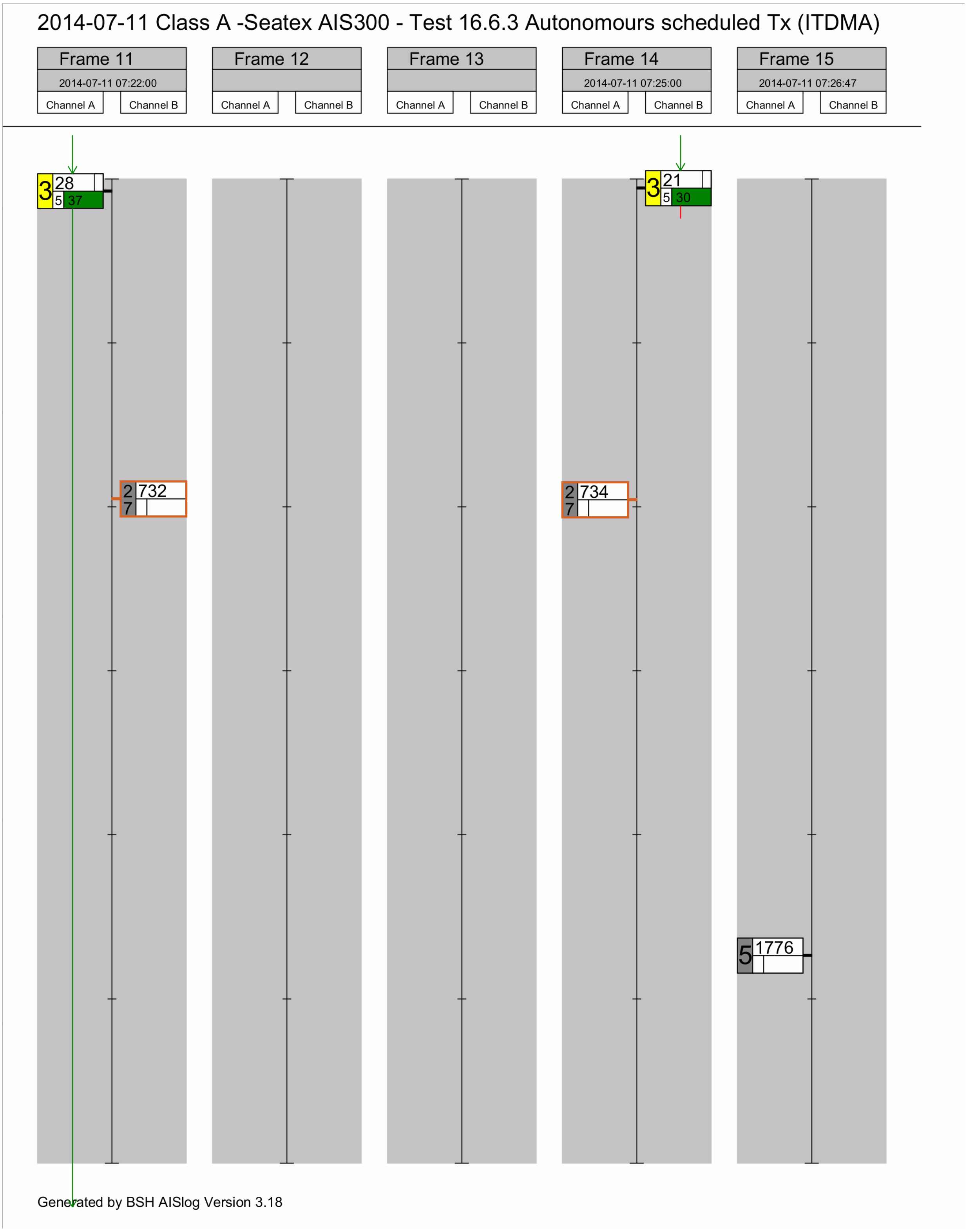
2014-07-11 Class A -Seatex AIS300 - Test 16.6.3 Autonomours scheduled Tx (ITDMA)
Frame 11
2014-07-11 07:22:00
Channel A
Channel B
Frame 12
Channel A
Channel B
Frame 13
Channel A
Channel B
Frame 14
2014-07-11 07:25:00
Channel A
Channel B
Frame 15
2014-07-11 07:26:47
Channel A
Channel B
3 28 5 37
2 732 7
3 21 5 30
2 734 7
5 1776
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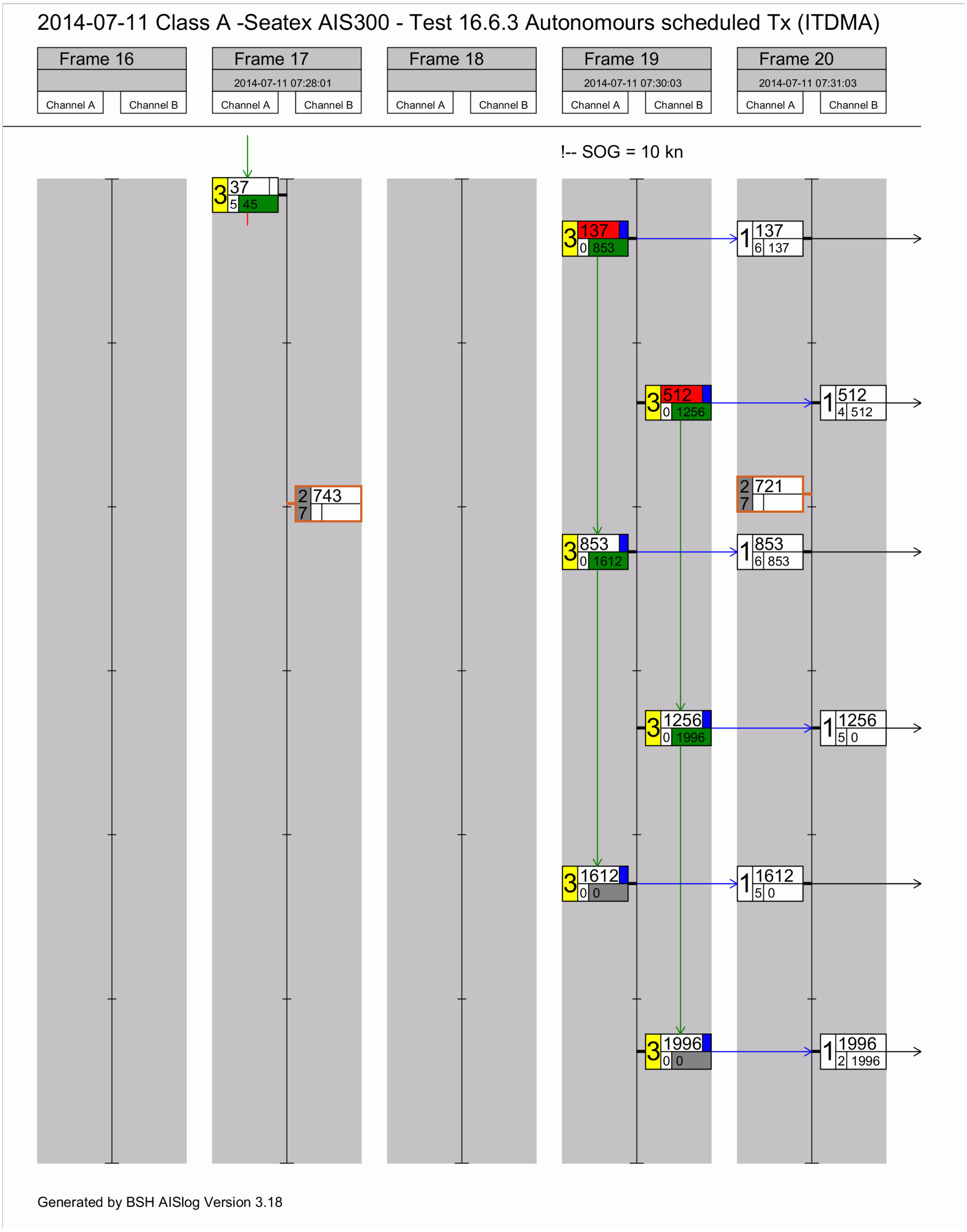
2014-07-11 Class A -Seatex AIS300 - Test 16.6.3 Autonomours scheduled Tx (ITDMA)
Frame 16
Frame 17
2014-07-11 07:28:01
Frame 18
Frame 19
2014-07-11 07:30:03
Frame 20
2014-07-11 07:31:03
Channel A
Channel B
!-- SOG = 10 kn
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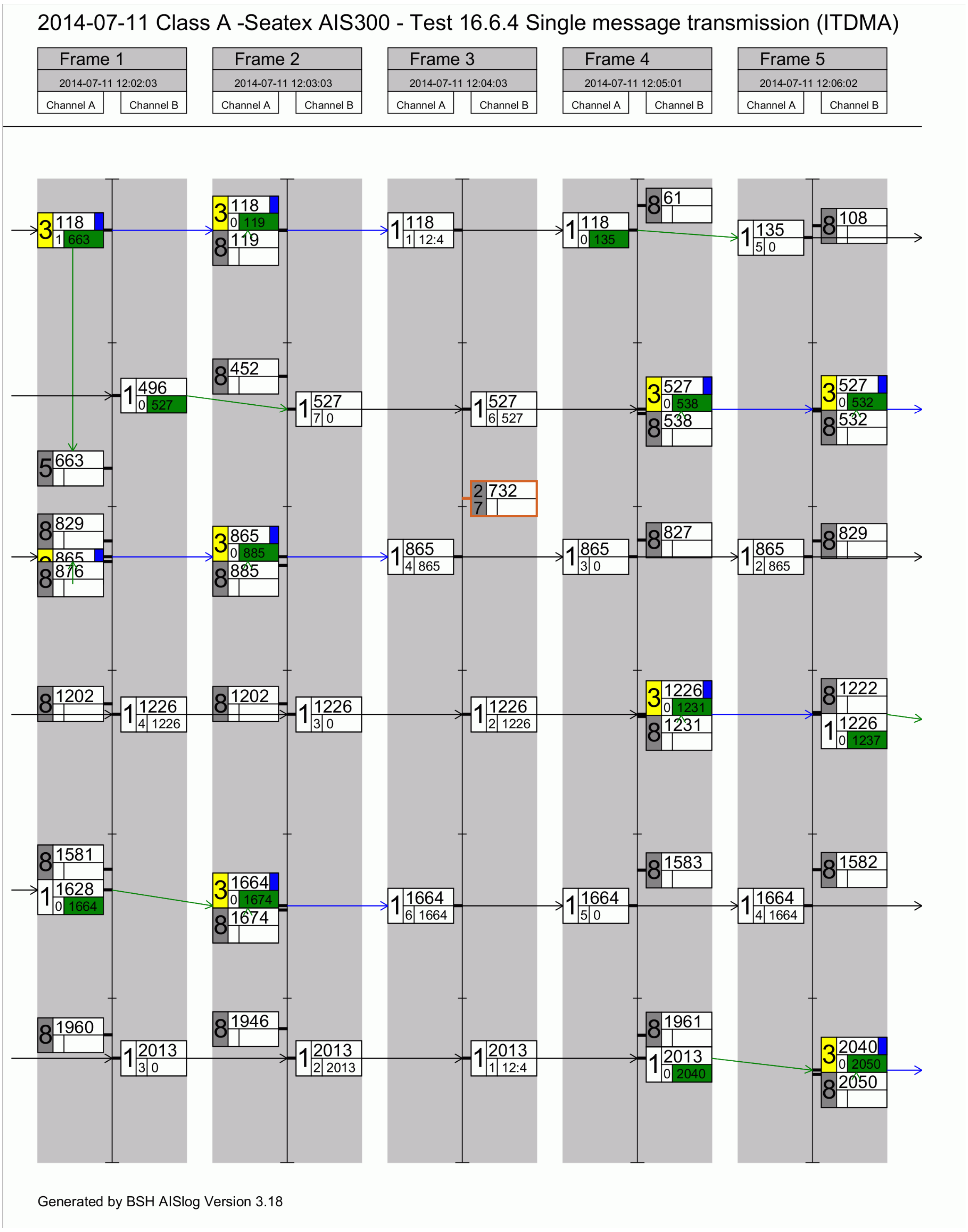
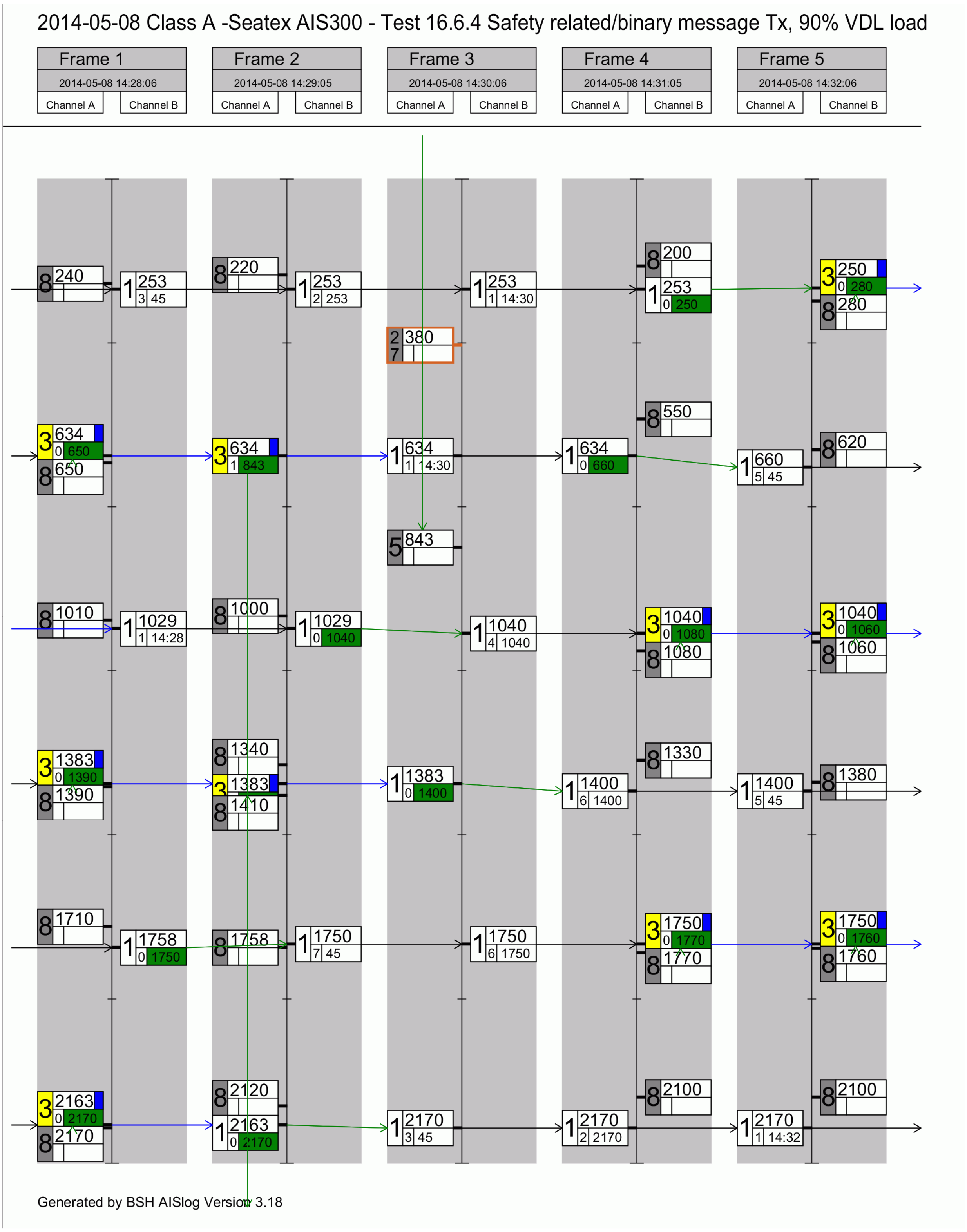
C.2.5 Test 16.6.4 Single message transmission (ITDMA)




2014-05-08 Class A -Seatex AIS300 - Test 16.6.4 Safety related/binary message Tx, 90% VDL load
Frame 1
2014-05-08 14:28:06
Frame 2
2014-05-08 14:29:05
Frame 3
2014-05-08 14:30:06
Frame 4
2014-05-08 14:31:05
Frame 5
2014-05-08 14:32:06
Channel A
Channel B
Generated by BSH AISlog Version 3.18