



Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency



Conformance test report of an
AIS Class B CS system

Equipment under test: **Weatherdock**

Type: **EasyTRX2**

Applying test standards: IEC 62287-1 Sections 10,12,13, Annex C.3

Test Report No.: BSH/46162/4320939/08/S3140

Applicant: Weatherdock AG
Am Weichselgarten 7
91058 Erlangen
Germany

Hamburg, 16 December 2009
Federal Maritime and
Hydrographic Agency

by order

Bartels
Test engineer

by order

Preuss
head of
laboratory

nach EN ISO/IEC 17025:2005
akkreditiertes Prüflaboratorium

Federal Maritime and Hydrographic Agency
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DAT-P-086/98

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See notes overleaf

General

Applicant: Weatherdock AG
Am Weichselgarten 7, 91058 Erlangen, Germany

Equipment under test:

Type: EasyTRX2
Manufacturer: Weatherdock AG
Am Weichselgarten 7, 91058 Erlangen, Germany
Place of test: BSH test laboratory Hamburg, Room 916
Start of test: 16 December 2008
End of test: 16 December 2009

Test standards¹:

IEC 62287-1, 2007

Maritime navigation and radiocommunication equipment and systems-
Automatic Identification Systems
Class B shipborne equipment of the Universal Automatic Identification System (AIS) using CSTMA techniques

IEC 61162-1 Ed. 3, 2007

Maritime navigation and radiocommunication equipment and systems – Digital interfaces
Part 1: Single talker and multiple listeners

Summary

Test No.	Reference	Section	Result (passed/ not passed / not applicable / not tested)
2	IEC 62287	10 Operational tests	Passed
3	IEC 62287	11 Physical tests	Not included
4	IEC 62287	12 Specific tests of link layer	Passed
5	IEC 62287	13 Specific tests of network layer	Passed
6	IEC 62287	C.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 62287-1 if not stated otherwise.

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1 General information

1.1 Equipment history

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

1.1.1 EUT system no 1

Transponder				
Type	EasyTRX2		Part No.:	A034
Delivery date	2008-12-08		Serial number	00003
HW Version:	Delivery date		Version no	V1.0.0
	Installation date	2008-12-08		
SW Version:	Delivery date	2008-12-15	Version no	V.1.0.1
	Installation date	2008-12-15		
SW Version:	Delivery date	2009-01-30	Version no	V.1.0.3
	Installation date	2009-02-09		
SW Version:	Delivery date	2009-02-13	Version no	V.1.0.4
	Installation date	2009-02-16		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	Marine GPS Antenna		Part No.:	RV-16/A029
Delivery date	2008-07-17		Serial number	255689
HW Version:	Delivery date	2008-07-17	Version no	---
	Installation date	2008-07-17		

1.1.2 EUT system no 2

Transponder				
Type	EasyTRX2		Part No.:	A038
Delivery date	2009-04-16		Serial number	00007
HW Version:	Delivery date	2009-04-16	Version no	
	Installation date	2009-04-16		
SW Version:	Delivery date	2009-04-16	Version no	V.1.0.5
	Installation date	2009-04-16		
SW Version:	Delivery date	2009-05-04	Version no	V.1.0.6
	Installation date	2009-05-04		
SW Version:	Delivery date	2009-05-27	Version no	1.0.8
	Installation date	2009-05-29		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	Marine GPS Antenna		Part No.:	RV-16/A029
Delivery date	2008-07-17		Serial number	255689
HW Version:	Delivery date	2008-07-17	Version no	---
	Installation date	2008-07-17		

1.2 Test environment

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

1.2.1 Test environment no 1

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

Room	BSH Room 916 (9 th 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	2008-12-08	2008-12-17	Bartels
1	2008-12-17	2008-12-19	Bartels
1	2009-02-09	2009-02-18	Bartels
1	2009-02-23	2009-02-27	Bartels
2	2009-04-16	2009-04-17	Bartels
2	2009-05-13	2009-05-14	Bartels
2	2009-06-02	2009-06-04	Bartels
2	2009-07-13	2009-07-13	Bartels
Documentation	2009-12-14	2009-12-16	Bartels

1.3 Composition

Display

☐ Internal ☐ Remote ☒ not available

DSC

☐ Dedicated DSC Rx ☒ Time sharing with TDMA Rx

RF Band ability

☐ Only upper band ☒ upper and lower band can be used

Channel management by msg 22

☒ Msg 22 implemented ☐ Only AIS 1 and AIS 2 can be used

Serial Interface

☒ Available ☐ Not available

Standard of serial interface:	
-------------------------------	--

If not available, a serial test interface is required

Sync signal for Carrier sense test

Required for testing

Parameters	
Polarity:	Positive edge
Level	0 / 5 Volt

1.4 Legend

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

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

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

REC	recommendation (in terms of IEC17025 “opinion”); an improvement or change is Recommended
Note	note or comment (in terms of IEC17025 “interpretation”) ; rationale for specific results or interpretation of requirements as appropriate

Template for additional test notes (copy if required):

Date	Result	Status

Issue of this template: 2007-09-10

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

1.4.1 General problems

Here are general problems found in the operation of the EUT, not specific to the actual test point.

General problems			
Date	Item	Remark	Result

2 4. General requirements

2.1 4.2 Manuals

The manuals shall include:

- the type of external connectors if applicable;
- the required information for correct siting of the antennas;
- the required information for compass safe distance.

It is checked that the required documentation items are available.

2009-12-16 Ba		Test details – General documentation	
Test item	Check	Remark	Result
Composition of customer documentation	Check the composition of customer documentation.	There is one manual	
Description of AIS	Check that an general function description of AIS as a new system is included. This is not required but recommended in the introduction phase of a new system.		Passed
Operating information	Check that an operating manual is included	Included in the manual	Passed
Technical information	Check that an technical manual is included	Included in the manual	Passed
Installation information	Check that an installation manual is included	Included in the manual	Passed
Language	Check that the documentation is written in English		Passed
Some details of installation information			
System overview	Check that an AIS system overview diagram is available		Passed
Mechanical dimensions	Check that mechanical dimension drawings of transponder are available	There is a hole mounting template in the draft manual. This has to be finalised	Passed
	Check that mechanical dimension drawings of GPS antenna are available		Passed
	Check that mechanical dimension drawings of VHF antenna are available	The VHF is antenna is not in the scope of delivery.	N/A

2009-12-16 Ba		Test details – Requirements of IEC 62287	
Test item	Check	Remark	Result
Type of external Connectors	Check that type of external connectors is included		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
Compass safety distance	Check that information about the compass safety distance is included	It is not yet included in the draft manual because the values were not yet available. The manufacture has confirmed that it will be included in the final version	Passed

2.2 4.3 Marking and identification

Each unit of the equipment shall be marked externally with the following information which, where practicable, shall be clearly visible when the equipment is installed in its recommended position:

- *identification of the manufacturer;*
- *equipment type number or model identification;*
- *serial number of the unit;*
- *power supply requirements; and*
- *compass safe distance.*

Alternatively, the marking may be presented on a display at equipment start-up.

The version of software shall be either marked or displayed on command on the equipment.

When the marking and the title and version of the software are presented only on the display, such information shall also be included in the equipment manual.

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2009-11-20 Ba		Test details – Marking and identification	
Test item	Check	Remark	Result
Type of marking and identification	Check if the equipment is marked	The equipment is marked with a type label	Passed
	Check if the marking and identification is shown on a display	There is no display	Passed
Marking items	Check that the Identification of the manufacturer is available	Weatherdock AG	Passed
	Check that the equipment type number or model identification is available	Art. #: A034	Passed
	Check that the serial number of the unit is available		Passed
	Check that power supply requirements information is available	12 to 25 V; 4W, -20% +30%	Passed
	Check that the compass safety distance is available		Passed
Software version	Check that the software version is displayed		Passed
	Note if the software version is displayed on the equipment or on the display	The software version is available on the serial interface for display equipment	Passed
	If displayed only on the display: check that the software version is also included in the manual		Passed

3 10 Operational tests

3.1 10.2 Modes of operating

(see 4.1.5)

3.1.1 10.2.1 Autonomous mode

(see 4.1.5.1)

3.1.1.1 10.2.1.1 Transmit Position reports

10.2.1.1.1 Method of measurement

Set up standard test environment. Record the VDL communication and check for messages transmitted by the EUT.

10.2.1.1.2 Required results

Confirm that the EUT transmits Messages 18 and 24 following the nominal schedule and alternates between channel A and channel B.

2008-12-09 Ba	Test details – Transmission of Position reports		
Test item	Check	Remark	Result
Set up standard test environment			
Msg 18	Check that message 18 is transmitted continuously		Passed
	Check the transmission schedule of msg 18	Is tested in detail in 10.6.2.1	Passed
	Check that msg 18 alternates between channel A and B		Passed
Msg 24	Check that message 24 is transmitted continuously		Passed
	Check that msg 24 part A and B are transmitted.		Passed
	Check the transmission schedule of msg 24		Passed
	Check that msg 24 alternates between channel A and B		Passed

3.1.1.2 10.2.1.2 Receive Class A position reports

10.2.1.2.1 Method of measurement

Set up standard test environment.

- a) Switch on test targets, then start operation of the EUT.
- b) Start operation of the EUT, then switch on test targets.
- c) Transmit test targets using same time periods on channel A and channel B.

Check the VDL communication, test output, and where provided, display or external interface of the EUT.

10.2.1.2.2 Required results

Confirm that EUT receives continuously under conditions 10.2.1.2.1 a), b) and c) and, where provided, outputs the received messages on the external interface or display.

2008-12-09 Ba		Test details a)– Receive Position reports, Target started first	
Test item	Check	Remark	Result
Switch on Test targets, then start operation of the EUT			
Check the following items on external interface and display			
Check for continuous receiving	On test output		N/A
	On external interface	If implemented	Passed
	On display	If implemented	N/A
Channels	Check that the position reports are received on channel A		Passed
	Check that the position reports are received on channel B		Passed

2008-12-09 Ba		Test details a)– Receive Position reports, EUT started first	
Test item	Check	Remark	Result
Switch on EUT, then start Test targets			
Check the following items on external interface and display			
Check for continuous receiving	On test output		N/A
	On external interface	If implemented	Passed
	On display	If implemented	N/A
Channels	Check that the position reports are received on channel A		Passed
	Check that the position reports are received on channel B		Passed

2008-12-10 Ba		Test details a)– Receive Position reports in same time periods	
Test item	Check	Remark	Result
Start 2 test targets using the same time slots on channel A and B Check the following items on external interface and display			
Check for continuous receiving	On test output		N/A
	On external interface	If implemented	Passed
	On display	If implemented	N/A
Channels	Check that the position reports of one target are received on channel A		Passed
	Check that the position reports of the other target are received on channel B		Passed
Remark:	This test result has been derived from the Rx performance test (3.1.1.5) because in this test the EUT is receiving in the same time slots on both channels.		

3.1.1.3 10.2.1.3 Receive Class B"CS" position reports

This test is only applicable if a display or display interface for the received messages is provided.

10.2.1.3.1 Method of measurement

Set up standard test environment. Simulate at least one additional Class B"CS" test target (bit stuffing shall not increase 4 bit)

Check the VDL communication, test output, and display or external interface of the EUT.

10.2.1.3.2 Required results

Confirm that EUT receives the Class B"CS" test target continuously and, where provided, outputs the received Messages 18 and 24 on the external interface.

2008-12-09 Ba		Test details a)– Receive Class B “CS” position reports	
Test item	Check	Remark	Result
Switch on Test targets, then start operation of the EUT Check the following items on external interface and display			
Check for continuous receiving of msg 18	On test output		N/A
	On external interface	If implemented	Passed
	On display	If implemented	N/A
Check for continuous receiving of msg 24	On test output		N/A
	On external interface	If implemented	Passed
	On display	If implemented	N/A
	Check that msg 24 A and B are received		Passed
Channels	Check that the position reports are received on channel A		Passed
	Check that the position reports are received on channel B		Passed

3.1.1.4 10.2.1.4 Receive in adjacent time periods

10.2.1.4.1 Method of measurement

Set up standard test environment. Simulate additional targets so that the first 4 of each 5 time periods are used. The reporting rate may be increased for the purpose of this test.

Check the VDL communication, test output, and where provided, display or external interface of the EUT.

10.2.1.4.2 Required results

Confirm that EUT continuously receives messages in the time periods adjacent to own transmission period with an acceptable loss of 5 %.

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2008-12-16 Ba		Test details - Receive in adjacent time periods	
Test item	Check	Remark	Result
Simulate targets in 4 of 5 time periods (80 % channel load, VDL tester set "test 80% 4-1") Check the following items on external interface			
Received targets	Check that the targets transmitting in the time periods before the EUT transmission slot are received		Passed
	Check that the targets transmitting in the time periods after the EUT transmission slot are received	Not all targets in the slot after the own transmission are received. <u>Retest 2009-02-10 Ba:</u> On channel A some targets after the own transmission are not received. On channel B all targets are received <u>Retest 2009-02-23 Ba:</u> No change, some targets on channel A are not received <u>Retest 2009-06-03 Ba:</u> Could not be retested because on channel A generally only about 85% are received <u>Retest 2009-07-13 Ba:</u> The messages in the slots after the EUTs transmission slot are received.	Passed
	Check that the Rx loss is < 5 %	The loss is in the range of 40% <u>Retest 2009-02-10 Ba:</u> The loss on channel A is about 30 ... 40 % <u>Retest 2009-02-23 Ba:</u> The loss on channel A is about 43 % <u>Retest 2009-07-13 Ba:</u> The messages in the slots after the EUTs transmission slot are received. <u>Retest 2009-07-13 Ba:</u> Less than 1% are not received. 1 message of 2x120 messages are not received.	Passed

3.1.1.5 10.2.1.5 Rx performance test

10.2.1.5.1 Method of measurement

Set up standard test environment. Simulate additional targets so that 9 of 10 time periods are used.

Check the VDL communication, test output, and where provided, display or external interface of the EUT.

10.2.1.5.2 Required results

Confirm that EUT continuously receives messages and, where provided, outputs the received messages on the external interface with a loss of not more than 5 %.

2008-12-09 Ba		Test details - Receive in adjacent time periods	
Test item	Check	Remark	Result
Simulate targets in 9 of 10 time periods (90 % channel load), record the test or external interface			
Rx probability	Check that at least 95 % of the target position reports are received	If the DSC sharing is disabled 100% of the transmitted messages are output on the PI port.	Passed
		If the DSC sharing is enabled on channel A which is not used for DSC sharing 100% of the Tx messages are received.	Passed
		If the DSC sharing is enabled on channel A which is used for DSC sharing only about 50 % of the Tx messages are received. It seems that not only for the dedicated DSC receiving times but also for about 50 % of the time the receiver is used for DSC receiving. <u>Retest 2008-12-19 Ba:</u> With DSC enabled ("Auto") there are 2 Gaps of 30s at the defined GPS receiving times (xx:50:30 ahd xx:06:30).	Passed

3.1.2 10.2.2 Assigned mode

(see 4.1.5.2)

3.1.2.1 10.2.2.1 Group assignment

10.2.2.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a group assignment command Message 23 to the EUT addressing stations by

- *region,*
- *station type and*
- *type of ship*

and commanding for

- *Tx/Rx mode,*
- *reporting rate,*
- *quiet time.*

Record transmitted messages.

10.2.2.1.2 Required results

Confirm that the EUT transmits position reports Message 18 according to the defined parameters and reverts to standard reporting rate after 4 min to 8 min.

Confirm that the operation of the EUT is not affected when not addressed.

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2008-12-17 Ba		Test details - Group assignment, addressed	
Test item	Check	Remark	Result
Test 1: Send a msg 23 with the following parameters: speed = 10 kn			
Region: inside Station type: 0 = all types Type of ship: 0 = all types Tx/ Rx mode = 0: Tx A and B Reporting interval: 8 = 5 s Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T1"	check that the reporting rate = 5 s	UTC 09:29	Passed
	Check that EUT reverts to standard reporting rate after 4...8 min	EUT reverts after 7 minutes to the standard reporting rate	Passed
Test 2: Send a msg 23 with the following parameters:			
Region: inside Station type: 2 = all class B Type of ship: 37 = pleasure craft Tx/ Rx mode = 0: Tx A and B Reporting interval: 9 = next shorter Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T2"	check that the reporting rate = 15 s	UTC 09:52 EUT stops transmission UTC 10:01 With parameter 8 it is ok, so the selection by station type 2 and type of ship = 37 works correctly <u>Retest 2009-02-16 Ba:</u> UTC 14:34 EUT still stopps transmission <u>Retest 2009-06-02 Ba:</u> Reporting rate = 15 s	Passed
	Check that EUT reverts to standard reporting rate after 4...8 min	EUT reverts after 6 minutes to the standard reporting rate	Passed
Test 3: Send a msg 23 with the following parameters:			
Region: inside Station type: 5 = all class B CS Type of ship: 37 = pleasure craft Tx/ Rx mode = 0: Tx A and B Reporting interval: 7 = 10 s Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T3"	check that the reporting rate = 10 s	UTC 10:11	Passed
After 2 minutes send the same msg 23 but Reporting interval: 10 = next longer interval Msg "B Msg 23 Test 10.2.2.1 T3", manually change reporting interval to 10	check that the reporting rate = 15 s	UTC 10:13	Passed
	Check that EUT reverts to standard reporting rate after 4...8 min	UTC 10:21 After 8 minutes	Passed
Test 4: Send a msg 23 with the following parameters:			
Region: inside Station type: 5 = all class B CS Type of ship: 37 = pleasure craft Tx/ Rx mode = 1: Tx A Reporting interval: 6 = 15 s Quiet time: 0 = no quiet time Msg "B Msg 23 Test 10.2.2.1 T4"	check that the reporting rate = 30 s	UTC 10:23	Passed

	Check that all transmissions are on channel A	Retests 2009-02-16 Ba: UTC 14:41 There is a TXT output 53 Tx Timeout for each suppressed transmission on channel B	Passed
After 3 minutes send the same msg 23 but Tx/ Rx mode = 2: Tx B Msg "B Msg 23 Test 10.2.2.1 T4", manually change Tx/Rx mode to 2	check that the reporting rate = 30 s	UTC 10:28, 10:31	Passed
	Check that all transmissions are on channel B	All transmissions are on channel A Retests 2009-02-16 Ba: UTC 14:44 - All messages are transmitted on channel B. - There is a TXT output 53 Tx Timeout for each suppressed transmission on channel B	Passed Passed
Test 5: Send a msg 23 with the following parameters:			
Region: inside Station type: 5 = all class B CS Type of ship: 37 = pleasure craft Tx/ Rx mode = 0: Tx A and B Reporting interval: 0 = auto. Quiet time: 8 = 8 min Msg "B Msg 23 Test 10.2.2.1 T5"	Check that EUT stops transmission for 8 min	UTC 10:42	Passed
	Check that the EUT reverts to 30 s reporting rate after 8 min.		Passed

2008-12-17 Ba		Test details - Group assignment, not addressed	
Test item	Check	Remark	Result
Send a msg 23 with the following parameters: speed = 10 kn, EUT ship type = 0 Tx/ Rx mode = 0: Tx A and B Reporting interval: 8 = 5 s Quiet time: 0 = no quiet time			
Test 6: Region: <u>outside</u> Station type: 0 = all types Type of ship: 0 = all types Msg "B Msg 23 Test 10.2.2.1 T6"	check that the reporting interval = 30 s	UTC 11:22	Passed
Test 7: Region: inside <u>Station type: 4 = AtoN</u> Type of ship: 0 = all types Msg "B Msg 23 Test 10.2.2.1 T7"	check that the reporting interval = 30 s	UTC 12:26	Passed
Test 8: Region: inside Station type: 0 = all types <u>Type of ship: 70 = cargo vessel</u> Msg "B Msg 23 Test 10.2.2.1 T8"	check that the reporting interval = 30 s	UTC 12:31	Passed

3.1.2.2 10.2.2.2 Base station reservations

10.2.2.2.1 Method of measurement

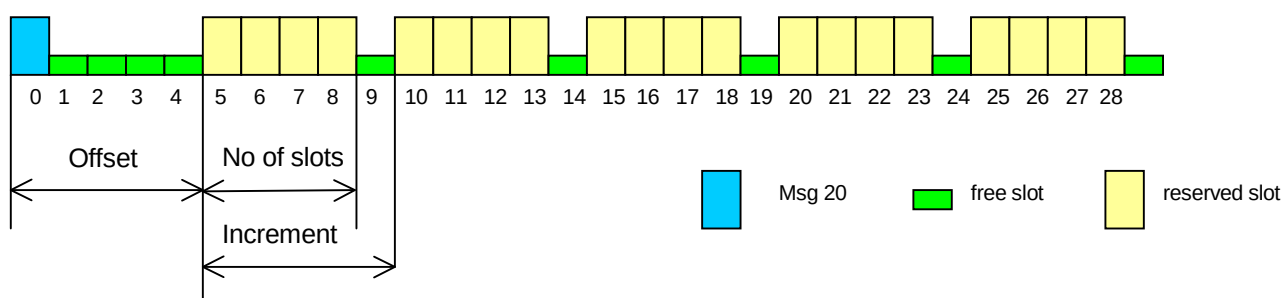
Set up standard test environment and operate EUT in autonomous mode. Transmit a reservation Message 20 to the EUT specifying reserved time periods.

Record transmitted messages.

10.2.2.2.2 Required results

Confirm that the EUT transmits position reports Message 18 without using reserved time periods.

2008-12-17 Ba		Test details - Base station reservations	
Test item	Check	Remark	Result
Test 1: Send a msg 20 with the following parameters: Msg: "B Msg 20 Test 10.2.2.2"			
Tx-slot: 0 offset number: 5 number of slots: 4 slot increment: 5 time-out = 7 Repetition of msg 20: 10 times	Check that only the time periods 0,1..4, 9, 14, 19 ... are used for transmissions	UTC 12:38 All time periods are used for transmissions <u>Retest 2009-02-17 Ba:</u> On channel A (channel with reservations) only the free slots are used	Passed
	Channels	The transmissions on channel B are stopped during the reservation time <u>Retest 2009-02-17 Ba:</u> The transmission on channel B continues	Passed
	check that after 18 minutes (Tx of msg 20 + time-out) all time periods are used for transmissions	Has to be tested when the first item is ok <u>Test 2009-02-17 Ba:</u> After time-out all slots are used again	Passed



3.1.3 10.2.3 Polled mode/interrogation response
(see 4.1.5.3)

3.1.3.1 10.2.3.1 Interrogation for Messages 18 and 24

10.2.3.1.1 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 (ITU-R M.1371 table13) for responses with Message 18, Message 24:

- a) *with transmission offset = 0,*
- b) *with transmission offset = defined value,*
- c) *with a Message 23 "quiet time" command transmitted before the interrogation.*

Record transmitted messages and frame structure.

10.2.3.1.2 Required results

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

2008-12-17 Ba		Test details - Interrogation for msg 18, 20	
Test item	Check	Remark	Result
a) Test 1: Send a msg 15 transmission offset = 0:			
Interrogation for msg 18 and 24 for destination 1, on channel A Msg: "B Msg15 Test 10.2.3.1 T1",	Check that msg 18 is responded		Passed
	Check that the response was within 30 s		Passed
	Check that the response is transmitted on the request channel	- The response is always on channel A - The VDO output indicates the correct channel (A on request on A and B on request on B) <u>Retest 2009-02-09 Ba:</u> UTC 14:20 - Not changed, the VDO output indicates the correct channel, but the responses are always received on channel A - Sometimes the own transmission of message 24 is received and output as VDM <u>Retest 2009-02-16 Ba:</u> UTC 14:20 - The response is transmitted on the correct channel. - The own Tx of message 24 is sometimes received and output as VDM <u>Retest 2009-06-02 Ba:</u> There are no VDM outputs of the own transmission of message 24.	Passed
	Check that msg 24 A is responded within 60 s		Passed
	Check that msg 24 B is responded within 90 s		Passed
b) Test 2: Send a msg 15 transmission offset = 10:			
Interrogation for 24 for destination 1, offset = 20, 30 and for msg 18, destination 2, offset = 10 Request on channel B Msg: "B Msg15 Test 10.2.3.1 T2",	Check that msg 18 is responded with the defined offset	Message 18 is repoded with an offset of about 200 slots. The same happens if the offset in msg 15 is 100 <u>Retest 2009-02-09 Ba:</u> The response is output in the correct slot	Passed

	Check that msg 24 A is responded with the defined offset	Msg 24 A is transmitted twice, 1 slot before the offset defined for part A and for part B <u>Retest 2009-02-09 Ba:</u> The response is output in the correct slot	Passed
	Check that msg 24 B is responded with the defined offset	Msg 24 B is transmitted twice, at the offset defined for part A and for part B <u>Retest 2009-02-09 Ba:</u> The response is output in the correct slot	Passed
	Check that the responses are transmitted on channel B	- The response is transmitted on channel A. - The VDO indicates channel B <u>Retest 2009-02-09 Ba:</u> UTC 14:28 Not changed, the VDO output indicates the correct channel, but the responses are always received on channel A <u>Retests 2009-02-16 Ba:</u> UTC 14:25 The response is transmitted on the correct channel.	Passed
c) Test 3: Send a msg 23 commanding quiet time for 8 min, (setting "B Msg23 Test 10.2.2.1 T5") Send a msg 15 with transmission offset = 10: (setting "B Msg15 Test 10.2.3.1 T2", same as Test 2)			
Interrogation for msg 18 for destination 2	Check that msg 18 and 24 are responded	Msg 18 and 24 are responded	Passed

3.1.3.2 10.2.3.2 Interrogation for Message 19

10.2.3.2.1 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 Table13) for responses with Message 19:

- a) with transmission offset = 0,*
- b) with transmission offset = defined value.*

Record transmitted messages and frame structure.

10.2.3.2.1 Required results

Check that

- a) the EUT does not respond,*
- b) the EUT transmits the appropriate interrogation response message as requested after defined transmission offset.*

Confirm that the EUT transmits the response on the same channel as that received and the data content is identical with that in Message 24.

2008-12-17 Ba		Test details - Interrogation for msg 19	
Test item	Check	Remark	Result
Test 1: Send a msg 15 transmission with interrogation for msg 19: (setting "B Msg 15 Test 10.2.3.2");			
Offset = 0, destination 1	Check that msg 19 is not responded		Passed
Offset = 15, destination 1 channel = B	Check that msg 19 is responded		Passed
	Check that msg 19 is responded with the defined offset	The response is transmitted 1 slot earlier as defined in msg 15. e.g: Offset = 10, Tx in slot 86, response in slot 95, should be in slot 96 <u>Retest 2009-02-09 Ba:</u> The response is output in the correct slot	Passed
	Check that the response is transmitted on channel B	- The response is transmitted on channel A. - The VDO indicates channel B <u>Retest 2009-02-09 Ba:</u> UTC 14:28 Not changed, the VDO output indicates the correct channel, but the responses are always received on channel A <u>Retests 2009-02-16 Ba:</u> UTC 14:30 The response is transmitted on the correct channel.	Passed

3.2 10.3 Messages extending one time period

(see 4.1.5)

10.3.1 Method of measurement

Check the documentation for a possibility to initiate transmission of messages longer than one time period.

10.3.2 Required results

It shall not be possible for the user to initiate the transmission of messages longer than one time period.

2009-12-11	Test details - Tx of msg with more than 1 slot		
Test item	Check	Remark	Result
Check documentation	Check that there is no way to initiate the transmission of message longer than 1 time period	The manufacturer documentation states that it is not possible to initiate any messages via the interface So it is not possible to initiate longer messages	Passed

3.3 10.4 Channel selection

(see 6.2)

3.3.1 10.4.1 Valid channels

10.4.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Switch the EUT to different channels within the operating band as specified in 6.2 by transmission of channel management message (Message 22) broadcast and addressed to EUT,

Record the VDL messages on the designated channels and check "band flag" and "Message 22 flag" in Message 18. (note that DSC command is covered in Annex C)

10.4.1.2 Required results

Confirm that the EUT switches to the required channel accordingly.

2008-12-17 Ba		Test details - Channel selection by msg 22	
Test item	Check	Remark	Result
Test 1: Send a msg 22 broadcast, EUT inside the area			
Channels 2060, 2062 (msg "B Msg 22 Test 10.4.1 a")	Check that EUT transmits on the assigned channels	- EUT does not transmit on the assigned channel - The EUT does not delete or overwrite an stored area setting if the area is overlapping <u>Retest 2009-02-09 Ba:</u> UTC 15:50 The EUT transmits on the assigned channels The EUT overwrote the overlapping area settings or the area settings with identical corners	Passed
	Check that EUT receives on the assigned channels	EUT does not receive on the assigned channel <u>Retest 2009-02-09 Ba:</u> The EUT receives on the assigned channels	Passed
	Check and note the band flag	Band flag = 1	Passed
	Check that the Msg 22 flag = 1		Passed
Send an addressed msg 22 to the EUT, channels 2084, 2086 (msg "B Msg 22 Test 10.4.1 b")	Check that EUT transmits on the assigned channels		Passed
	Check that EUT receives on the assigned channels		Passed

3.3.2 10.4.2 Invalid channels

10.4.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Check units capability on the "band flag" and "Message 22 flag" in Message 18. Switch the EUT to channels outside the operating band as specified in 6.2..

Record the VDL messages on the designated channels.

10.4.2.2 Required results

Confirm that the EUT does not switch to the respective channels and stops transmissions.

2008-12-17 Ba		Test details - Channel selection by msg 22	
Test item	Check	Remark	Result
Test 1: Send a msg 22 broadcast, EUT inside the area			
If the EUT is able to operate in the lower band: Channels 1084, 2084 (msg "B Msg 22 Test 10.4.1 a"), modify channels manually	Check that EUT transmits on the assigned channels		Passed
	Check that EUT receives on the assigned channels		Passed
	Check the band flag = 1		Passed
	Check that the Msg 22 flag = 1		Passed
If the EUT is not able to operate in the lower band: Channels 1084, 2084 (msg "B Msg 22 Test 10.4.1 a"), modify channels manually	Check that EUT stops transmission	EUT operates on the complete band	N/A
	Check that EUT receives on AIS 1 and AIS 2 (default)		N/A
	Check the band flag = 0		N/A
	Check that the Msg 22 flag = 1		N/A
Send a msg 22 broadcast with invalid channels (msg "B Msg 22 Test 10.4.1 a"), modify channels manually	Check that EUT stops transmission		Passed
	Check that EUT receives on AIS 1 and AIS 2 (default)		Passed

3.4 10.5 Internal GNSS receiver

(see 6.3)

Relevant tests according to IEC 61108-1 shall be performed with regard to

- position accuracy, static;
- position accuracy, dynamic;
- COG/SOG accuracy;
- position update;
- status indications (including RAIM, where fitted).

Note: The GNSS receiver test is not part of this test report. The GNSS receiver is tested in a separate test with a separate test report.

3.5 10.6 AIS information

(see 6.5)

3.5.1 10.6.1 Information content

(see 6.5.1)

3.5.1.1 10.6.1.1 Defaults

10.6.1.1.1 Method of measurement

Set up the standard test environment and reset the equipment to enable the manufacturers static data delivery defaults. Attempt to set the equipment to operate in autonomous mode.

10.6.1.1.2 Required results

Confirm that the default MMSI is set at 000000000 and that other static data defaults unambiguously identify that the equipment has been properly initialised. Confirm that the transmissions are inhibited and that an indication is given that transmissions are inhibited.

2008-12-18 Ba		Test details - Defaults	
Test item	Check	Remark	Result
Reset the EUT to the default settings			
Default settings	Check that the MMSI is 00000000		Passed
	Check that the other static data are set to default values	There is no VDO output of msg 14 but the static data can be queried by AIQ,SSD and AIQ,VSD	Passed
	Check that the EUT does not transmit		Passed
	Check that the transmission stop is indicated on the EUT	- The "Warning" LED is on. - The "Rx only" LED should also be on The designation of the LED should be made clearer	Passed

3.5.1.2 10.6.1.2 Required information

10.6.1.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply all static data to the EUT.

Record all messages on VDL and check the contents of position report Message 18 and static data report Messages 24 A and B.

10.6.1.2.2 Required results

Confirm that data transmitted by the EUT complies with static data and position sensor data.

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2008-12-18 Ba		Test details - Required information	
Test item	Check	Remark	Result
Apply all necessary data to the EUT			
Required information of msg 18	Check the MMSI		Passed
	Check the SOG		Passed
	Check the PA-flag		Passed
	Check the Longitude		Passed
	Check the Latitude		Passed
	Default position:	If the unit has no position available the lat and lon data in the VDO are 0. They should be 91° for lat and 181° for lon as defined in ITU-R M.1371 <u>Retest 2009-06-02 Ba:</u> If no position is available the position values in message 18 are the default values (91°N, 181°E).	Passed
	Check the COG		Passed
	Check the Heading	= default	Passed
	Check the Time stamp		Passed
	Check the class B unit flag		Passed
	Check the Display flag	Always 0, should follow the DTE flag in the SSD input sentence <u>Retest 2009-02-17 Ba:</u> The DTE flag follows the SSD input	Passed
	Check the DSC flag	Always 1 (DSC active), also when DSC is inactivated. <u>Retest 2009-02-17 Ba:</u> The DSC flag is in Auto mode only set to 1 during the short DSC receiving periods. See note) <u>Retest 2009-05-13 Ba:</u> See C.3.4 <u>Retest 2009-06-03 Ba:</u> The DSC flag is set correctly according to the DSC activation state	Passed
	Check the band flag	= 1	Passed
	Check the msg 22 flag	= 1	Passed
	Check the Mode flag	= 0 in autonomous mode, the value 1 has been checked in assigned mode test	Passed
	Check the RAIM flag	= 0 RAIM is not required for class B	Passed

Required information of msg 24A	Check the MMSI		Passed
	Check the Part number = 0		Passed
	Check the Name		Passed
Required information of msg 24B	Check the MMSI		Passed
	Check the Part number = 1		Passed
	Check the Type of ship and cargo		Passed
	Check the Vendor ID		Passed
	Check the Call Sign		Passed
	Check the Dimension of ship/ reference for position (A, B, C, D)		Passed

Note:

The purpose of the DSC flag is the indication to a base station that the channel management can generally be done by DSC calls (considering time sharing). The standard says: "Equipped with DSC function (dedicated or time-shared)".

So if the DSC function is enabled in time sharing mode the DSC flag shall be set to 1 all the time, not only during the actual receiving times during time sharing.

3.5.1.3 10.6.1.3 External sensor information

(see 6.3, 6.6.3)

This test is applicable if an **optional** interface for external sensors is provided.

10.6.1.3.1 Method of measurement

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

- a) Apply external position data with expected error <10m (from GBS sentence) and within 26 m of internal position.
- b) Simulate unavailable/invalid external sensor data and missing/incorrect checksum.
- c) Apply a non-WGS-84 or unspecified (no DTM) position input.
- d) Apply a low accuracy position input with expected error >10m or without RAIM information (no GBS).
- e) Apply position data with more than 26 m apart from internal position

Record all messages on VDL and check the contents of position report Message 18 for position and COG/SOG.

10.6.1.3.2 Required results

a) Confirm that data transmitted by the EUT complies with external sensor inputs.

b), c), d), e) Confirm that external data is not used.

Confirm that accuracy and RAIM flags are set accordingly; confirm that position and COG/SOG are of the same source.

2008-12-18 Ba Test details - Check for implementation			
Test item	Check	Remark	Result
Check the manufacturers documentation			
Implementation of optional function	Check if the input of external sensor data is implemented	• The input of external sensor data is implemented.	Passed
		• Only the RMC sentence is implemented	Passed

2008-12-18 Ba		Test details - External sensor input not implemented	
Test item	Check	Remark	Result
<u>This test is applicable only if external sensor input is not implemented</u> Apply Position sentences, GBS and DTM sentence to the EUT: - Valid position data, - Position within 26 m from internal GPS - GBS < 10 m - GBS = WGS 84			
Apply GLL sentence	Check that external position is not used	External sensor input is implemented, therefore this test is not applicable	N/A
	Check that external speed is not used		N/A
	Check that external heading is not used		N/A
Apply GGA sentence	Check that external position is not used		N/A
	Check that external speed is not used		N/A
Apply GNS sentence	Check that external position is not used		N/A
	Check that external speed is not used		N/A
Apply RMC sentence	Check that external position is not used		N/A
	Check that external speed is not used		N/A

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2009-02-17 Ba		Test details - External GNSS data	
Test item	Check	Remark	Result
This test is applicable only if external sensor input is implemented. Apply a GLL, GBS and DTM sentence to the EUT, if not other specified: - Valid GLL data, - Position within 26 m from internal GPS - GBS < 10 m - GBS = WGS 84			
Valid data as above	Check that external Lat is used	Test 2008-12-19 Ba: Sensor data were not used by the EUT. <u>Retest 2009-02-17 Ba:</u> The external Lat is used	Passed
	Check that external LON is used		Passed
	Check that external SOG is used		Passed
	Check that external COG is used		Passed
Set RMC status flag to invalid	Check that internal Lat is used		Passed
	Check that internal LON is used		Passed
	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed
Checksum incorrect	Check that internal Lat is used		Passed
	Check that internal LON is used		Passed
	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed
DTM not WGS 84	Check that internal Lat is used		Passed
	Check that internal LON is used		Passed
	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed
Remove DTM	Check that internal Lat is used		Passed
	Check that internal LON is used		Passed
	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed
Set GBS > 10 m	Check that internal Lat is used		Passed
	Check that internal LON is used		Passed
	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed

Remove GBS	Check that internal Lat is used	UTC 09:50 The external LAT is used <u>Retest 2009-06-02 Ba:</u> Internal LAT is used	Passed
	Check that internal LON is used	The external LON is used <u>Retest 2009-06-02 Ba:</u> Internal LON is used	Passed
	Check that internal SOG is used	The external SOG is used <u>Retest 2009-06-02 Ba:</u> Internal SOG is used	Passed
	Check that internal COG is used	The external COG is used <u>Retest 2009-06-02 Ba:</u> Internal COG is used	Passed
Set external position more than 26 m from the internal position	Check that internal Lat is used		Passed
	Check that internal LON is used		Passed
	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed

For the following test manufacturers documentation about supported sensor sentences is required.

2008-12-18 Ba		Test details - External GNSS sentences	
Test item	Check	Remark	Result
This test is applicable only if external sensor input is implemented Apply other Position sentences, GBS and DTM sentence to the EUT, if not other specified: - Valid position data, - Position within 26 m from internal GPS - GBS < 10 m - GBS = WGS 84			
Apply GGA sentence	Check that external Lat is correct	Not implemented	N/A
	Check that external LON is correct		N/A
	Check that external SOG is correct		N/A
	Check that external COG is correct		N/A
Apply GNS sentence	Check that external Lat is correct	Not implemented	N/A
	Check that external LON is correct		N/A
	Check that external SOG is correct		N/A
	Check that external COG is correct		N/A
Apply RMC sentence	Check that external Lat is correct	Not implemented	N/A
	Check that external LON is correct		N/A
	Check that external SOG is correct		N/A
	Check that external COG is correct		N/A

3.5.2 10.6.2 Information update rates

(see 6.5.2)

3.5.2.1 10.6.2.1 Nominal reporting interval

10.6.2.1.1 Method of measurement

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

- a) Start with own SOG of 1 kn; record all messages on VDL for 10 min and evaluate reporting rate for position report of EUT by calculating average transmission offset over test period.
- b) Increase speed to 10 kn.
- c) Reduce speed to 1 kn.

Record all messages on VDL and check transmission offset between two consecutive transmissions.

10.6.2.1.2 Required results

- a) Reporting interval shall be 3 min (± 10 s).
- b) Confirm that the reporting interval of 30 s (± 5 s) has been established after the next transmission in the old schedule at the latest. The average reporting interval calculated over at least 25 transmissions shall be 30 s (± 2 s).
- c) Confirm that the reporting rate is reduced after 3 min (speed reduction).

2008-12-10 Ba		Test details - Autonomous reporting rate	
Test item	Check	Remark	Result
Apply SOG according to the test items and check the reporting rate			
a) SOG = 1 kn for 10 min	Check that the reporting rate = 3 min $\pm$ 10s		Passed
b) Change SOG to 10 kn for 15 min	Check that the reporting rate = 30 s $\pm$ 5s		Passed
	Check that the reporting rate is established after the next transmission of the old schedule		Passed
	Change of reporting rate		Passed
	Check that the average reporting rate of 25 Tx = 30 s $\pm$ 2s		Passed
c) SOG = 1 kn for 10 min	Check that the reporting rate = 3 min $\pm$ 10s		Passed
	Check that the reporting rate is reduced after 3 min	The reporting rate is immediately (after the next transmission of the previous reporting rate) reduced <u>Retest 2009-02-17 Ba:</u> The reporting rate is changed after 3 min	Passed

3.5.2.2 10.6.2.2 Assigned reporting interval

10.6.2.2.1 Method of measurement

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

- a) Transmit an assigned mode command Message 23 to the EUT with designated reporting intervals of 5 s to 3 min according to Table 17.
- b) Transmit an assigned mode command Message 23 to the EUT with designated reporting interval of 10 min.
- c) Transmit Messages 23 with a refresh rate of 1 min with designated reporting intervals of 6 min and 10 min.
- d) Transmit Messages 23 designated reporting interval field settings of 11-15
- e) Change course, speed. Record transmitted messages.

10.6.2.2.2 Required results

- a) Confirm that the EUT transmits position reports Message 18 according to the parameters defined by Message 23. The EUT shall revert to autonomous mode with nominal reporting interval after 4 min to 8 min.
- b) Confirm that the EUT reverts to autonomous mode with nominal reporting interval after 4 min to 8 min.
- c) Confirm that the EUT transmits position reports Message 18 according to the parameters defined by Message 23.
- d) Confirm that the EUT does not change its nominal behaviour.
- e) The reporting interval shall not be affected by course or speed.

Remark: Reporting rates 5, 10, 15 s are tested in 10.2.2.1

2009-02-17 Ba		Test details - Assigned reporting interval		
Test item		Check	Remark	Result
Test a: Send a msg 23 with the following parameters: speed = 1 kn				
Region: inside Reporting interval: 5 = 30 s Msg "B Msg 23 Test 10.6.2.2. Ta1"	Check that the reporting interval = 30 s	UTC 12:33	Passed	
	Check that EUT reverts to standard reporting rate after 4...8 min	After 5 minutes	Passed	
Test a: Send a msg 23 with the following parameters: speed = 10 kn				
Region: inside Reporting interval: 3 = 3 min Msg "B Msg 23 Test 10.6.2.2. Ta2"	check that the reporting interval = 3 min	UTC 12:54	Passed	
	Check that EUT reverts to standard reporting rate after 4...8 min	After 4 minutes	Passed	
Test b: Send a msg 23 with the following parameters:				
Reporting interval: 1 = 10 min Msg "B Msg 23 Test 10.6.2.2. Tb"	Check that EUT reverts to standard reporting rate after 4...8 min	UTC 13:02 EUT reverts after 4 min to 30 s reporting interval	Passed	

Test c1: Send a msg 23 with the following parameters and repeat it every minute for at least 15minutes			
Reporting interval: 2 = 6 min Msg "B Msg 23 Test 10.6.2.2. Tc1"	check that the reporting rate = 6 min	UTC 13:09	Passed
	Check that EUT reverts to standard reporting rate 4...8 min after last msg 23	5 min after last msg 23	Passed
Test c2: Send a msg 23 with the following parameters and repeat it every minute for at least 22 minutes			
Reporting interval: 1 = 10 min Msg "B Msg 23 Test 10.6.2.2. Tc2"	check that the reporting rate = 10 min	Utc 13:21	Passed
	Check that EUT reverts to standard reporting rate 4...8 min after last msg 23	5 min after last msg 23	Passed
Test d: Send a msg 23 with the following parameters:			
Reporting interval:11 Msg "B Msg 23 Test 10.6.2.2. Td1"	check that the reporting rate is not affected		Passed
Reporting interval:15 Msg "B Msg 23 Test 10.6.2.2. Td2"	check that the reporting rate is not affected		Passed
Test e: Send a msg 23 with the following parameters: Reporting rate: 4 = 1 min, Msg "B Msg 23 Test 10.6.2.2. Te"			
Speed = 1 kn	Check that the reporting rate is 1 min	UTC 12:43	Passed
Change speed to 15 kn	check that the reporting rate is not affected		Passed
Change heading with 20 deg/min	check that the reporting rate is not affected		Passed

3.5.2.3 10.6.2.3 Static data reporting interval

10.6.2.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Record the transmitted messages and check for static data (Message 24).

Repeat the test at an assigned reporting interval of 5 s.

10.6.2.3.2 Required results

Confirm that the EUT transmits submessages 24A and 24B every 6 min (24B following 24A within 1 min). Transmission shall alternate between channel A and channel B and be independent of the Message 18 reporting interval.

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2008-12-10 Ba		Test details - Static data reporting interval	
Test item	Check	Remark	Result
Speed = 1 kn			
Msg 18 reporting rate	check that the msg 18 reporting rate = 3 min		Passed
Msg 24 reporting rate	check that the reporting rate of msg 24 A and B is 6 min +/- 5s		Passed
	Check that the distance between msg 24 A and B is < 1 min		Passed
	Check that 24 A/B alternate between channel A and B		Passed
	Check that 24 part A and B are transmitted on the same channel	If there is a message 18 between part A and B then part A and B are transmitted on different channels <u>Retest 2009-02-23 Ba:</u> The parts A and B are transmitted on the same channel	Passed
	Check that the channel alternating is separate for message 18 and 24 (see 62287-1 §7.4.1)	The channel alternating of message 18 and 24 is not handled separately. <u>Retest 2009-02-23 Ba:</u> The alternation of the channels is handle separately for message 18 and 24	Passed
Speed = 10 kn			
Msg 18 reporting rate	check that the msg 18 reporting rate = 30 s		Passed
Msg 24 reporting rate	check that the reporting rate of msg 24 A and B is 6 min +/- 5s		Passed
	Check that the distance between msg 24 A and B is < 1 min		Passed
	Check that 24 A/B alternate between channel A and B		Passed
	Check that 24 part A and B are transmitted on the same channel	If there is a message 18 between part A and B then part A and B are transmitted on different channels <u>Retest 2009-02-17 Ba:</u> The parts A and B are transmitted on the same channel	Passed
	Check that the channel alternating is separate for message 18 and 24	The channel alternating of message 18 and 24 is not handled separately <u>Retest 2009-02-17 Ba:</u> The alternation of the channels is handle separately for message 18 and 24	Passed

Send a msg 23 with the reporting interval: 8 = 5s. Msg "B Msg 23 Test 10.2.2.1 T1"			
Msg 18 reporting rate	check that the msg 18 reporting rate = 5 s		Passed
Msg 24 reporting rate	check that the reporting rate of msg 24 A and B is 6 min		Passed
	Check that the distance between msg 24 A and B is < 1 min		Passed
	Check that 24 A/B alternate between channel A and B		Passed

3.6 10.7 Initialisation period

(see 6.5.3)

10.7.1 Method of measurement

Set up standard test environment with SOG>2 kn.

- a) Switch on the EUT from cold (off-time minimum 1 h) with EUT operating in autonomous mode.
- b) Switch off the EUT for a period of time between 15 min to 60 min and switch on again.
- c) Make the GNSS sensor unavailable for a period of time between 1 min to 5 min

Record transmitted messages.

10.7.2 Required results

Confirm that the EUT starts regular transmission of Message 18 including valid position:

- a) within 30 min after switch on;
- b) within 5 min;
- c) stops transmitting after the next transmission and resumes within 1 min after enabling the position source.

2009-02-17 Ba		Test details - Initialisation period	
Test item	Check	Remark	Result
Switch the On and Off according to the test items			
a) Switch the EUT on in the morning (> 1 h off)	Check that the EUT starts msg 18 within 30 min	Test 2009-06-04 Ba: The EUT starts transmission 1 min 15s after switching on	Passed
b) Switch the unit off for 15 ... 60 min and on again	Check that the EUT starts msg 18 within 5 min	EUT starts transmission after 4 min.	Passed
c) Disable GNSS for 1 ... 5 min	Check that the EUT stops transmission	Test 2009-06-02 Ba:	Passed
Enable GNSS again	Check that the EUT starts msg 18 within 30 s	Test 2009-06-02 Ba: UTC 09:15 EUT starts after about 15 s	Passed

3.7 10.8 Alarms and indications, fall-back arrangements

(see 6.6)

3.7.1 10.8.1 Built in integrity test

(see 6.6.1)

10.8.1.1 Method of measurement

Check manufacturer's documentation on built-in integrity test.

10.8.1.2 Required result

Verify that an indication is provided if a malfunction is detected.

2009-12-11 Ba		Test details - Built in integrity test	
Test item	Check	Remark	Result
Check manufacturer's documentation			
Malfunction detection	Check that the EUT indicates the detection of a malfunction	The documentation has been provided	Passed
	Note the kind of indication	Malfunction is indicated by LEDs	Passed

3.7.2 10.8.2 Transceiver protection

10.8.2.1 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 5 min each.

10.8.2.2 Required results

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

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2009-05-14 Ba			
Test details - Transceiver protection			
Test item	Check	Remark	Result
Open circuit of VHF antenna terminal for > 5 min	Check that the EUT generates an antenna VSWR exceeded alarm	There is an ALR output. The status is incorrect. It is set to "V" (not exceeded) but should be set to "A" (limit exceeded) <u>Retest 2009-06-04 Ba:</u> Same result, there is an ALR output but with the reversed status ("V"). UTC 09:20 <u>Retest 2009-07-06 Ba:</u> The status is now "A" Remark: Normally (Class A standard) the AIS has to output an ALR sentence with status "V" when the VSWR is below the limit again. This output is missing.	Passed
Continued: Re-fit the antenna	Check that EUT starts transmission within 2 min after refitting the antenna	UTC 09:30 The next scheduled message (at 5 s rate) is transmitted	Passed
Short circuit of VHF antenna terminal for > 5 min	Check that the EUT generates an antenna VSWR exceeded alarm	UTC 09:33 <u>Retest 2009-06-04 Ba:</u> The EUT generates an VSWR alarm	Passed
	Check that EUT starts transmission within 2 min after refitting the antenna	UTC 09:41 The next scheduled message (at 5 s rate) is transmitted	Passed

3.7.3 10.8.3 Transmitter shutdown procedure

(see 6.6.2)

10.8.3.1 Method of measurement

Check manufacturer's documentation on transmitter shutdown procedure.

10.8.3.2 Required result

Verify that a transmitter shutdown procedure independent of the operating software is provided.

2009-12-11 Ba		Test details - Transmitter shutdown procedure	
Test item	Check	Remark	Result
Check manufacturer's documentation			
Malfunction detection	Check that the transmitter shutdown procedure is described	The transmitter shutdown procedure is described by a drawing and functional description	Passed
	Check that the transmitter shutdown procedure is independent of the software		Passed

3.7.4 10.8.3.4 Position sensor fallback conditions

(see 6.6.3)

10.8.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Where an option for an external GNSS sensor is not provided, then the respective tests shall be omitted.

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

- a) *external DGNSS in use if implemented;*
- b) *internal DGNSS in use (corrected by Message 17) if implemented;*
- c) *internal DGNSS in use (corrected by a beacon) if implemented;*
- d) *external GNSS in use if implemented;*
- e) *internal GNSS in use ;*
- f) *no sensor position in use.*

Check the position accuracy and RAIM flag in the VDL Message 18 and, where provided, the ALR sentence.

10.8.4.2 Required result

Verify that the use of position source, position accuracy flag, RAIM flag and position information complies with Table 1

Verify that the position sensor status is maintained for the next scheduled report and changed after that.

2009-02-17 Ba		Test details - Position priority – Position sensor fallback with external sensor input	
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01_gll_vtg_hdt_near.sst Internal GPS: No RAIM, external: RAIM			
Changing downwards			
a) Set:	Check that external position is used		Passed
• Internal GNSS available	Check that position accuracy flag = 1		Passed
• External DGNSS	Check that the RAIM flag = 1		Passed
b) Change from a:	Check that internal position is used	If implemented	N/A
• Internal DGNSS available msg 17	Check that position accuracy flag = 1		N/A
• External GNSS	Check that RAIM flag = 1		N/A
	Check that sensor source is changed after the next scheduled position report		N/A
c) Change from a:	Check that internal position is used	If implemented	N/A
• Internal DGNSS available beacon input	Check that position accuracy flag = 1		N/A
• External GNSS	Check that RAIM flag = 1		N/A
	Check that sensor source is changed after the next scheduled position report		N/A
d) Change from b:	Check that external position is used		Passed
• Internal GNSS	Check that position accuracy flag = 0	PA = 1 because the GBS estimated error < 10 m	Passed
• External GNSS	Check that RAIM flag = 1		Passed
	Check that sensor source is changed after the next scheduled position report		Passed

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e) Change from d: • Internal GNSS • Remove external GNSS	Check that internal position is used	UTC 14:04	Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
	Check that there is an ALR output ID 025 (External EPFS lost)	There is an TXT output ID 50 GPS: no valid fix. This is not correct because the internal position fix is available. <u>Retest 2009-06-02 Ba:</u> There is no ALR output 025	Passed
	Check that sensor source is changed after the next scheduled position report	The next scheduled transmission is not transmitted (TXT 53 Tx TimeOut) . It seems after end of the external EPFS there is no position fix for about 1 minute. Therefore 1 transmission is refused (no position) The EUT should switch without a gap from external to internal EPFS <u>Retest 2009-06-02 Ba:</u> The transmission continues. After about 40 s the EUT switches the position source over to the internal GNSS	Passed
f) Change from e: • Inhibit internal GNSS • No external GNSS	Check that there is an ALR output ID 026 (no sensor position in use) - optional	There is only a TXT output ID 50 GPS: no valid fix. We recommend to use the ALR ID 26 according to the Class A standard	Passed
	Check that EUT stops transmission of position report after the next scheduled position report		Passed
Changing upwards			
e) Change from f: • Internal GNSS • No external GNSS	Check that the EUT starts transmission		Passed
	Check that internal position is used		Passed
	Check that position accuracy flag = 0		Passed
	Check that RAIM flag = 0		Passed
	Check that the ALR output ID 025 (External EPFS lost) is updated - optional	Not applicable because there is no ALR ID 025 output	N/A
d) Change from e: • Internal GNSS • External GNSS	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that RAIM flag = 1		Passed
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	Check if there is an indication of the source change - optional	No indication	Passed
c) Change from d: • Internal DGNSS available beacon input • External GNSS	Check that internal position is used	If implemented	N/A
	Check that position accuracy flag = 1		N/A
	Check that RAIM flag = 1		N/A
	Check if there is an indication of the source change - optional		N/A
b) Change from d: • Internal DGNSS available msg 17 • External GNSS	Check that internal position is used	If implemented	N/A
	Check that position accuracy flag = 1		N/A
	Check that RAIM flag = 1		N/A
	Check if there is an indication of the source change - optional		N/A
a) change from b: • DGNSS available • External DGNSS	Check that external position is used		Passed
	Check that position accuracy flag = 1		Passed
	Check that the RAIM flag = 1		Passed
	Check if there is an indication of the source change - optional	No indication	Passed

3.7.5 10.8.5 Speed sensors

(see 6.6.4)

10.8.5.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Where an option for an external GNSS sensor is not provided, this test shall be omitted.

Apply valid external DGNSS position and speed data.

Make external DGNSS position invalid (for example. by wrong checksum, "valid/invalid" flag) .

10.8.5.1 Required result

Check that the external data for SOG/COG is transmitted in Message 18.

Check that the internal data for SOG/COG is transmitted in Message 18.

2009-02-17 Ba		Test details - Speed sensors	
Test item	Check	Remark	Result
Connect sensor inputs and correction data according to the test items. Sensor input file name: AIS01_gll_vtg_hdt_near.sst Internal GPS: No RAIM, external: RAIM active.			
Set: • Internal GNSS available • External DGNSS	Check that external SOG is used		Passed
	Check that external COG is used		Passed
Change to: • Internal GNSS available • External DGNSS invalid	Check that internal SOG is used		Passed
	Check that internal COG is used		Passed

3.8 10.9 User interface

(see 6.7)

3.8.1 10.9.1 Display

(see 6.7.1)

10.9.1.1 Method of measurement

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

- Check status indications for power, Tx timeout, Error.
- Apply Message 23 "quiet time" of >7 min.
- Simulate VDL load in order to make it impossible for the EUT to find free candidate periods.

10.9.1.2 Required results

- Indicators shall be available and working correctly according to manufacturer's documentation.
- Check that the Tx timeout indication is activated.
- Check that the Tx timeout indication is activated.

2008-12-18 Ba	Test details - Display		
Test item	Check	Remark	Result
Operate EUT in autonomous mode			
a) Check for indicators	Check that a power indicator is available	There is no power indicator but an "All ok" which is on if the "Error" and "Warning" LED are not on	Passed
	Check that the power indicator is on	The "All ok" LED is on when there is no Error or Warning (the "Error" and "Warning" LED are not on)	Passed
	Check that a TX timeout indicator is available	The LED with the name "Warning" has the function of the Tx-Timeout indicator: The LED name is very confusing and does not really indicate the meaning of the LED. Therefore we recommend to name it "No transmission" or similar	Passed
	Check that an error indicator is available.	"Error"	Passed
b) Apply msg 23 for quiet time > 7 min Msg "B Msg 23 Test 10.2.2.1 T5"	Check that the Tx indicator is on	The "Warning" LED is on	Passed
c) Simulate high channel load to disable transmission	Check that the Tx indicator is on	The "Warning" LED is on	Passed
Disable position	Check that the Tx indicator is on	The "Warning" LED is on	Passed

3.8.2 10.9.2 Message display

This test is only applicable if a message display is provided.

10.9.2.1 Method of measurement

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

Transmit a Message 14.

10.9.2.2 Required results

Verify that the EUT displays the message.

2008-12-18 Ba	Test details - Message display		
Test item	Check	Remark	Result
Only applicable if a message display is provided			
Send a msg 14 from another station	Check that the msg 14 is correctly displayed	No message display	N/A

3.8.3 10.9.3 Static data input

(see 6.7.2)

10.9.3.1 Method of measurement

Verify that static data can be input to the unit according to the manufacturer's documentation. Set up standard test environment and operate EUT in autonomous mode.

10.9.3.2 Required results

Check that static data are transmitted correctly by the EUT and that the MMSI cannot be altered by the user.

2008-12-18 Ba		Test details - Static data input	
Test item	Check	Remark	Result
Input static data according to manufacturers documentation, as far as not yet set by the manufacturer			
Check the static data transmitted in msg 18 and 24	Check the User ID (MMSI)		Passed
	Check the Name		Passed
	Check the Type of ship and cargo		Passed
	Check the Vendor ID		Passed
	Check the call sign		Passed
	Check the dimension of ship/reference for position		Passed
Input protection	Check that the MMSI cannot be altered by the user		Passed
	Check that the Vendor ID cannot be changed by the user		Passed

3.8.4 10.9.4 External interfaces

(see 6.7.3)

3.8.4.1 10.9.4.1 Display interface

This test only applies if a display interface is provided.

10.9.4.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply a safety related broadcast Message 14 through the VDL to the EUT.

Check the output on the display interface.

10.9.4.1.2 Required results

The interface shall be compliant with IEC 61162 series protocol and the manufacturer's documentation of interface hardware.

2008-12-18 Ba		Test details - Display interface	
Test item	Check	Remark	Result
Only applicable if a display interface is provided			
Send a msg 14 from another station	Check that the msg 14 is correctly output on the display interface		Passed
	Check that the format is according to IEC 61162		Passed

4 11 Physical tests

Physical test are not part of this test document.

The physical tests are covered by the notification according to R&TTE

5 12 Specific tests of Link Layer

(see 7.3)

5.1 12.1 TDMA synchronisation

5.1.1 12.1.1 Synchronisation test sync mode 1

12.1.1.1 Definition

Synchronisation jitter (transmission timing error) is the time between nominal start of the transmission time period as determined by a UTC synchronisation source ($T_{o\ ref}$) and T_o of the EUT ($T_{o\ EUT}$).

12.1.1.2 Method of measurement

Set up standard test environment and set the EUT to assigned mode for a reporting rate of 5 s. Enable test conditions for the following:

- a) station transmitting Message 1 or 2, 3, 4, 18, 19 not subject to a CS-delay, with repeat indicator = 0, with no propagation delay and with position available is received by the EUT;*
- b) no sync source (switched off);*
- c) with the internal clock of the EUT out of sync (sync jitter > 1000 μ s), transmit messages not to be used as sync source (see 7.3.1.1) to the EUT;*
- d) repeat test a) using a sync source transmitting Message 4; simulate the position of the station providing the sync source (for example a base station 60 NM = 416 μ s away from EUT position) in order to simulate a propagation delay;*
- e) Repeat test d) with an additional source transmitting Message 1 or 2, 3, 4, 18 not subject to a CS-delay, with repeat indicator = 0, with no propagation delay and with position available is received by the EUT.*

Record VDL messages and measure the time between $T_{o\ ref}$ of the synchronisation source and the initiation of the "transmitter on" function T_A and calculate back to $T_{o\ EUT}$ (a sync output may be used for the purpose of this test). Alternative methods, for example by evaluating the start flag are allowed.

12.1.1.3 Required results

- a) The EUT shall synchronise on the received source and the synchronisation jitter shall not exceed $\pm 312\ \mu$ s (sync mode 1).*
- b) The synchronisation jitter shall not exceed $\pm 312\ \mu$ s during a 30 s period from the time a proper sync source was last received.*
- c) The EUT shall not synchronise on these received messages.*
- d) The synchronisation jitter of the EUT shall be within $-416\ \mu$ s $\pm 312\ \mu$ s .*
- e) The synchronisation jitter of the EUT shall be $-208\ \mu$ s $\pm 312\ \mu$ s within 60 s.*

2008-12-19 Ba		Test details - Synchronisation test sync mode 1	
Test item	Check	Remark	Result
Setup an assigned reporting rate of 5 s The correct timing is $T_{classA} + 1568 \mu s$			
a) Transmit an appropriate position report as sync source Msg "B Msg 23 Test 10.2.2.1 T1"	Check that the EUT does synchronise to the sync source		Passed
	Check that the sync jitter does not exceed $\pm 312 \mu s$ from the sync source		Passed
	Check that the sync mode value in the comm state is 3		Passed
b) Remove sync source	Check that the sync jitter does not exceed $\pm 312 \mu s$ for the next 30 s after last received sync msg		Passed
	Check that the sync mode value in the comm state is 3		Passed
c) Restart the EUT to get it out of sync ($>1000 \mu s$) Transmit a position report with repeat indicator not 0. Msg "B Msg 1 Test 12.1.1 c"	Check that EUT does not synchronise to the msg		Passed
d) Transmit msg 4, range to EUT = 60 NM Msg "B Msg 4 Test 12.1.1 d"	Check that the sync jitter of the EUT is within $-416 \mu s \pm 312 \mu s$ from the msg 4		Passed
e) Transmit msg 4, range to EUT = 60 NM, and msg 1/3, range = 0 Msg "B Msg 1 Test 12.1.1 d"	Check that the sync jitter of the EUT is within $-208 \mu s \pm 312 \mu s$ from the msg 1, after 60 s		Passed

5.1.2 12.1.2 Synchronisation test sync mode 2

12.1.2.1 Method of measurement

Set up standard test environment and enable test conditions for the following:

- a) operate EUT in sync mode 2 for more than 5 min.
- b) Switch on sync source immediately after scheduled transmission of EUT. Sync source shall be a station transmitting Message 1 or 2,3,4,18,19 not subject to a CS-delay, with repeat indicator = 0 and with position available with a reporting rate of 10 s.

Record VDL messages and measure the time between T_{o_ref} of the synchronisation source and the initiation of the "transmitter on" function T_A and calculate back to T_{o_EUT} (a sync output may be used for the purpose of this test). Alternative methods, for example by evaluating the start flag are allowed.

12.1.2.2 Required results

Verify that the EUT synchronises its next scheduled transmission on the sync source. The synchronisation jitter shall not exceed $\pm 312 \mu s$.

2008-12-19 Ba		Test details - Synchronisation test sync mode 1	
Test item	Check	Remark	Result
Operate in autonomous mode The correct timing is $T_{classA} + 1568 \mu s$			
a) Operate in sync mode 2 for more than 5 min	Check that the EUT is not synchronised		Passed
b) After scheduled transmission start appropriate sync source	Check that the sync jitter of the next transmission does not exceed $\pm 312 \mu s$ from the sync source		Passed

5.1.3 12.1.3 Synchronisation test with UTC

This test is only relevant if optional synchronisation sources providing UTC are implemented.

12.1.3.1 Method of measurement

Set up standard test environment and enable test conditions in a way that EUT operates in UTC synchronised mode.

12.1.3.2 Required results

The synchronisation jitter shall not exceed $\pm 312 \mu s$.

2008-12-19 Ba		Test details - Synchronisation test sync mode 1	
Test item	Check	Remark	Result
Connect the optional synchronisation source The correct timing is $T_{classA} + 20 \text{ bit}$ (2083 μs)			
Optional synchronisation	Check that the sync does not exceed $\pm 312 \mu s$ from the correct UTC timing	If implemented Not implemented	N/A

5.2 12.2 Carrier-Sense tests

5.2.1 12.2.1 Threshold level

12.2.1.1 Definition

Carrier-Sense threshold is the signal level below that which a time period shall be regarded as unused and a transmission may take place.

12.2.1.2 Method of measurement

The test configuration is described here in its most basic form, using three signal sources with RF (PIN) switches selecting when each signal is applied to the EUT. Other equipment configurations may be used if they fulfil the same requirements (for example a single RF source fed via a switched attenuator, which is controlled by a timing circuit).

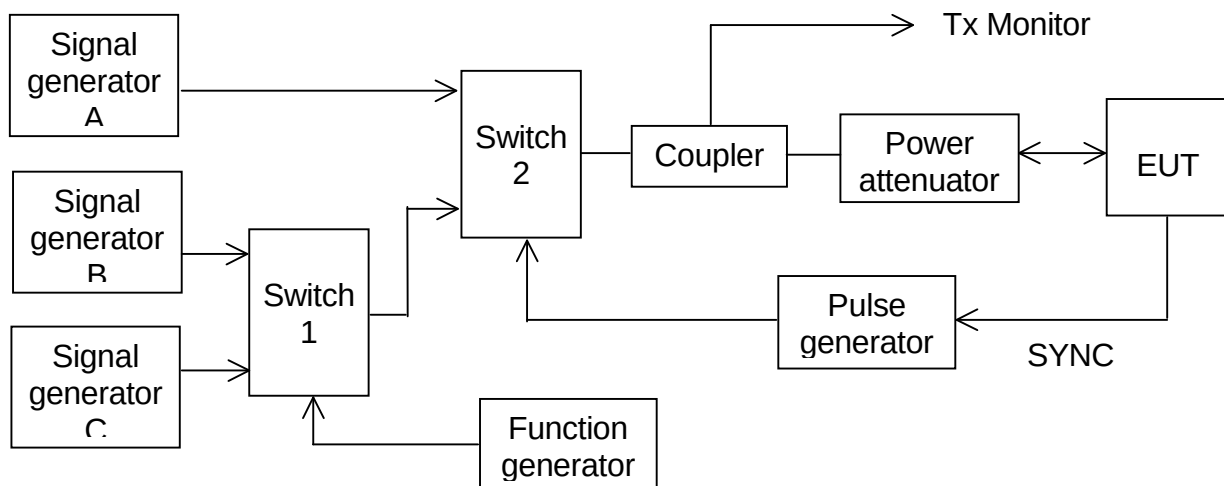


Figure 1 – Configuration for Carrier-Sense threshold test

- a) Signal C is a carrier modulated with a 400 Hz FM signal with a deviation of 3 kHz equivalent to – 60 dBm at the EUT. The switches connect this signal to the EUT most of the time to mimic 100 % channel loading with strong traffic.
- b) Signal B is a carrier modulated with a 400 Hz FM signal with a deviation of 3 kHz equivalent to – 87 dBm at the EUT. Switch 1 replaces signal C with signal B for 26,67 ms. The function generator makes this happen once every 2 s. This imitates one vacant time period in a 99 % loaded channel. The level of Signal B can be manually switched between –87 dBm and OFF to mimic high and low background levels (resulting in a threshold level of –77 dBm and –107 dBm).
- c) Signal A is a carrier modulated with a 400 Hz FM signal with a deviation of 3 kHz equivalent to – 104 dBm at the EUT. When the EUT attempts a transmission, switch 2 replaces the 'background traffic' with signal A to imitate an incoming message intended to inhibit the transmission attempt. The level of signal A can be manually set to –74 dBm, –104 dBm and OFF (defined as less than –117 dBm).

- d) *All three signal generators are tuned to the same frequency. The test shall be carried out on the lowest frequency declared by the manufacturer and AIS 2 (162,025 MHz).*
- e) *For the purposes of this test, the EUT will be equipped with a test signal (SYNC) indicating the start of each time period that it intends to transmit into. This is used to trigger the pulse generator which after a delay of 0,8 ms (8 bits) generates a 23,3 ms (224 bits) pulse for switch 2.*
- f) *With the signal levels set to the levels shown in the first row of the following table, the EUT shall be observed making routine scheduled position reports. Levels shall then be adjusted as per subsequent steps and the EUT monitored for 10 min (or at least 20 reporting attempts) to confirm if transmission has ceased.*

12.2.1.3 Required results

Table 24 – Required threshold test results

Step	Description	Signal A (dBm)	Signal B (dBm)	EUT transmission
1	Time period free	OFF	OFF	Yes
2	Time period used	–104	OFF	Ceased
3	Recovery	OFF	OFF	Yes
4	Raised background	OFF	–87	Yes
5	Time period used	–74	–87	Ceased
6	Recovery	OFF	–87	Yes

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2008-12-18		Test details - Threshold level	
Test item	Check	Remark	Result
Run the test automatically with all steps, using the automatic test adapter. Record the transmissions of the EUT and the step information output of the test adapter			
Step 1	Check that the EUT has transmitted		Passed
Step 2	Check that the EUT has not transmitted	The result is not yet really reproducible. In 2 complete test (Test 4 and 5) most of the messages were transmitted, in a repetition of test steps 1 to 3 (Test 6) with modified, shorter cables there were no transmission. In a repetition with the short cables there were 4 of 20 transmission. Finally it has to be verified in a complete test run <u>Retest 2009-02-27 Ba:</u> All messages transmitted, Tested with level of signal A = -101 dBm (diagram) and with signal A = -104 dBm (as defined in the standard). Same result for both levels <u>Retest 2009-04-16 Ba:</u> The EUT has not transmitted	Passed
Step 3	Check that the EUT has transmitted		Passed
Step 4	Check that the EUT has transmitted		Passed
Step 5	Check that the EUT has not transmitted		Passed
Step 6	Check that the EUT has transmitted		Passed

5.2.2 12.2.2 Carrier sense timing

12.2.2.1 Definition

This test is to verify that signals that are received before the CS detection window starts are not used for the detection of used time periods.

12.2.2.2 Method of measurement

Use the test configuration and signals of test 12.2.1.

Signal B is switched off, signal A can be manually set to -74 dBm, -104 dBm and OFF.

The SYNC signal of the EUT indicating the start of each time period that it intends to transmit into is used to trigger the pulse generator to generate a 0,7 ms (7 bits) pulse for switch 2 starting at the SYNC signal (this pulse ends 1 bit before start of the CS detection window of the EUT)

f) Levels shall be adjusted as per the steps given in Table 25 and the EUT monitored for 10 min (or at least 20 reporting attempts) to confirm if EUT transmits.

12.2.2.3 Required results

Table 25 Required carrier sense timing results

Step	Description	Signal A (dBm)	Signal B (dBm)	EUT transmission
1	Time period free	OFF	OFF	Yes
2	Time period free	-104	OFF	Yes
3	Time period free	-74	OFF	Yes

2008-12-19		Test details - Carrier sense timing		
Test item	Check	Remark	Result	
Run the test automatically with all steps, using the automatic test adapter.		Record the transmissions of the EUT and the step information output of the test adapter		
Step 1	Check that the EUT has transmitted		Passed	
Step 2	Check that the EUT has transmitted		Passed	
Step 3	Check that the EUT has transmitted	No message transmitted Retest 2009-02-27 Ba: No message transmitted Retest 2009-04-17 Ba: All messages are transmitted	Passed	

5.3 12.3 VDL state/reservations

12.3.1 Method of measurement

Set up standard test environment and operate EUT with assigned reporting interval of 10 s. Record transmitted scheduled position reports Message 18 and check time periods used for transmission.

- a) Transmit a Message 20 to the EUT reserving a block of time periods including timeout.
- b) Transmit a Message 20 to the EUT reserving a block of time periods without timeout.

12.3.2 Required results

- a) Verify that the reserved block is not used and used again after the timeout specified in Message 20.
- b) Verify that the reserved block is not used and used again after a timeout of 3 min.

2008-12-19 Ba		Test details – VDL state/ reservations	
Test item	Check	Remark	Result
Send a message 20 from VDL Generator with slot offset and increment for slot reservation according to the description below. Set time-out according to the test item. Set assigned reporting interval of 10 s.			
a) Timeout = 6 Msg "B Msg 20 Test 12.3 a" Msg "B Msg 23 Test 12.3"	Check that the reserved slots are not used by the EUT within the time-out	During the test – about 2 min after message 20 – the EUT stopped operation. The green LED remained on but there was no PI output and no Tx. After power cycle the EUT worked normal. <u>Retest 2009-02-23 Ba</u> EUT does not stop operation. The reserved slots are not used	Passed
	Check that after end of reservation all slots are used again.		Passed
b) Timeout = 0 (not available) Msg "B Msg 20 Test 12.3 b" Msg "B Msg 23 Test 12.3"	Check that the reserved slots are not used by the EUT within 3 min	<u>Test 2009-02-23 Ba</u>	Passed
	Check that after end of reservation all slots are used again.	3 min after the last msg 20 all slots are used	Passed

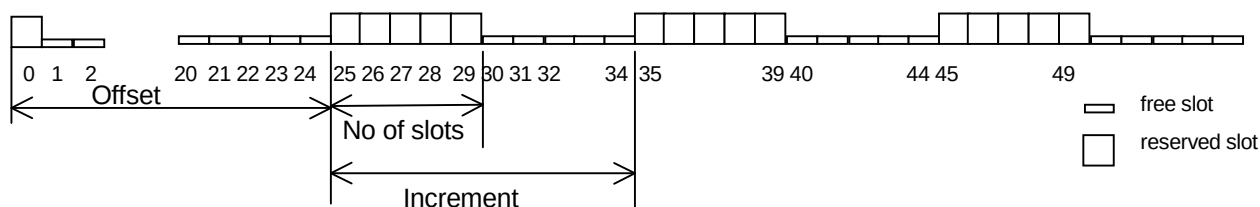
Test scenario: Msg 20 transmission by test system.

Msg 20 reserves slots which should not be used by mobile stations.

Msg 20 parameters:

- Msg 20 is transmitted in slot 0 in each frame
- Offset number 1: 25
- Number of slots: 5
- Time out 1: 6 / 0 depending on test item
- Increment: 10

FATDMA reservation



5.4 12.4 Data encoding (bit stuffing)

12.4.1 Method of measurement

Set up standard test environment.

Set ships name to a value that requires bit-stuffing for example "wwwwww" and check the VDL (note that this might require that the manufacturer provides means to input this data).

12.4.2 Required results

Confirm that transmitted VDL Message 24 conforms to data input.

2008-12-19 Ba		Test details - Data encoding (bit stuffing)	
Test item	Check	Remark	Result
Set ships name to a value requiring bit stuffing (Name: "????????????????")			
Msg 24 content	Check that the ships name in msg 24 on VDL is correct	It seems that the message 24 A with this name (all bits of the name = 1) cannot be handled by the EUT. At transmission of this message the EUT stops operation. After restart the EUT again stops operation at the first transmission of the message and deletes the area settings <u>Retest 2009-02-23 Ba:</u> Msg 24 is correct	Passed

5.5 12.5 Frame check sequence

12.5.1 Method of measurement

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

- a) Check test output; if a display interface is provided, check this.
- b) Repeat test 12.1.1 and check that a station transmitting messages with wrong CRC are not used for synchronisation.

12.5.2 Required results

Confirm that messages with invalid CRC are not accepted by the EUT in cases a) and b).

2008-12-19 Ba		Test details - Frame check sequence	
Test item	Check	Remark	Result
Transmit position report message from VDL generator			
Set CRC bit sequence to ok Msg "B Msg 1"	Check that position report is received from EUT (VDO output)		Passed
a) Set CRC bit sequence to false	Check that position report is not received from EUT (VDO output)		Passed
	Check that the target is not displayed on the display	If implemented	N/A
b) Transmit position report with wrong CRC	Check that the EUT does not synchronise to the incorrect message		Passed

5.6 12.6 Slot allocation (channel access protocol)

5.6.1 12.6.1 Autonomous mode allocation

12.6.1.1 Method of measurement

Set up standard test environment and operate EUT with assigned reporting interval of 10 s. Record transmitted scheduled position reports Message 18 and check time periods used for transmission. Check the Communication State of transmitted messages.

Repeat the test with additional simulated channel load of 80 % (4 time periods used, 1 time period unused).

12.6.1.2 Required results

The time periods used for transmission shall in both tests

- not exceed the transmission interval TI;
- not always use the same time period;
- not always use the first unused time period.

Check that the Communication state of Message 18 is the default value as defined in 7.3.3.5.

2008-12-16 Ba		Test details - Autonomous mode allocation	
Test item	Check	Remark	Result
Set assigned reporting rate of 10 s (Msg "B Msg 23 Test 12.3")			
Record the transmission slots for at least 30 min and evaluate the used slots			
Test 1: No channel load	Check that the slots do not exceed the TI		Passed
	Check that the EUT does not always use the same time period	In test 6 the EUT nearly always uses the same time period In test 7 it is ok. <u>Retest 2009-02-23 Ba:</u> EUT does not always use the same slots	Passed
	Check that the EUT not always uses the first unused time period		Passed
Test 2: 80% channel load	Check that the slots do not exceed the TI		Passed
	Check that the EUT does not always use the same time period		Passed
	Check that the EUT does not always use the first unused time period		Passed
	Check that the EUT does not use slots used by the received targets		Passed
	Tx channel	During the load condition nearly all messages are transmitted on channel A. The VDO correctly indicates channel A and B. <u>Retest 2009-02-23 Ba:</u> The Tx channels are correct, Tx alternating on A and B	Passed
Communication state	Check that the com state of msg 18 is always as defined in 7.3.3.5		Passed

5.6.2 12.6.2 DSC listening periods

12.6.2.1 Method of measurement

This test is applicable only if DSC functionality is implemented.

Set up standard test environment and operate EUT with assigned reporting interval of 10 s. Enable DSC functionality. Record transmitted scheduled position reports Message 18 and check time periods used for transmission.

12.6.2.2 Required results

During the DSC monitoring times, scheduled transmissions of Message 18 shall continue.

2009-02-23 Ba		Test details - DSC listening periods	
Test item	Check	Remark	Result
Set assigned reporting rate of 10 s Enable DSC functionality			
Tx of msg 18	Check that the scheduled Tx of msg 18 continues	Based on the recording of 12.6.1	Passed

5.7 12.7 Assigned operation

5.7.1 12.7.1 Assignment priority

12.7.1.2 Method of measurement

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

- a) Transmit a Message 22 defining a region with the EUT inside that region. Transmit a Message 22 to the EUT individually addressed and specifying Tx/Rx mode 2.
- b) Repeat the test, clear the region defined by Message 22 under a) ³. Transmit Message 22 to the EUT with regional settings specifying Tx/Rx mode 2.

Record transmitted messages.

12.7.1.2 Required results

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

³ This can be carried out using the method used in 13.3.1 b) step 2 or by assigning a new simulated position to the EUT.

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2009-02-23 Ba		Test details - Autonomous mode allocation	
Test item	Check	Remark	Result
Send a msg 23 with Tx/Rx mode = 1 Msg "B Msg 23 Test 10.2.2.1 T4"	Check that the EUT uses Tx/Rx mode 1	UTC 13:14	Passed
a) Send a msg 22 defining a region with EUT inside (Tx/Rx mode = 2) Msg "B Msg 22 Test 12.7.1 a1"	Check that the EUT uses Tx/Rx mode 1 as defined by msg 23 (Tx on channel A)	UTC 13:16 EUT uses Tx/Rx mode 2 <u>Retest 2009-06-02 Ba:</u> EUT continues Tx/Rx mode 1	Passed
Send an addressed msg 22 to EUT with Tx/Rx mode = 2 Msg "B Msg 22 Test 12.7.1 a2"	Check that the EUT uses Tx/Rx mode 2 as defined by msg 22 (Tx on channel B)	UTC 14:33 <u>Retest 2009-06-02 Ba:</u> After time-out of msg 23 EUT uses Tx/Rx mode 2	Passed
Clear the region defined in test a)			
b) Send a msg 22 defining a *region with EUT inside, Tx/Rx mode = 2 Msg "B Msg 22 Test 12.7.1 b1"	Check that the EUT uses Tx/Rx mode 2 (Tx on channel B)		Passed
Send one msg 23 to the EUT with Tx/Rx mode = 1 Msg "B Msg 23 Test 10.2.2.1 T4"	Check that the EUT uses Tx/Rx mode 1 as defined by msg 23 (Tx on channel A)	UTC 14:14	Passed
	Check that the EUT reverts to Tx/Rx mode 2 after 4...8 min	EUT reverts to Tx/Rx mode 2 after 6 min	Passed

5.7.2 12.7.2 Entering rate assignment

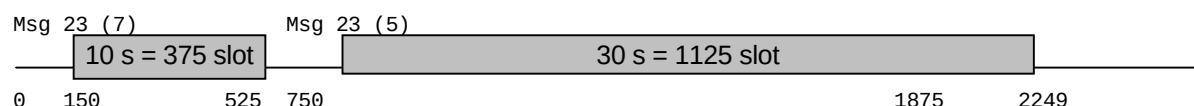
12.7.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 10 s assigned, monitor the VDL, reset by assigning 30 s rate; repeat 10 times.

12.7.2.2 Required result

Verify that the first transmission after receiving the Message 23 is within a time randomly selected between the time the Message 23 has been received and the assigned interval.

2009-02-23 Ba		Test details - Entering rate assignment	
Test item	Check	Remark	Result
Send 10 times: Msg 23 with 10 s reporting interval (Msg "B Msg 23 Test 12.7.2 10s") After 20 s: Msg 23 with 30 s reporting interval. (Msg "B Msg 23 Test 12.7.2 30s") Repeat after 45 s			
10 s reporting interval	Check that the first Tx is randomly selected in 0 ...10 s after msg 23		Passed
30 s reporting interval	Check that the first Tx is randomly selected in 0 ...30 s after msg 23		Passed



5.7.3 12.7.3 Reverting from rate assignment

12.7.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Transmit a Group Assignment command (Message 23) to the EUT with a reporting interval of 10 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.

12.7.3.2 Required result

T_{rev} shall be randomly distributed between 240 s and 480 s.

2009-02-24 Ba		Test details - Reverting from rate assignment	
Test item	Check	Remark	Result
Send 10 times: Msg 23 with 10 s reporting interval, Msg "B Msg 23 Test 10.2.2.1 T3" Wait until time-out + 1 min.			
Measure time T_{rev}	Check that T_{rev} is randomly distributed between 4 and 8 min		Passed

5.7.4 12.7.4 Reverting from quiet mode

12.7.4.1 Method of measurement

Set up standard test environment and operate EUT with a reporting interval of 10 s assigned. Transmit a Group Assignment command (Message 23) to the EUT with quiet time = 1 min.

12.7.4.2 Required results

Verify that the first transmission after the quiet period is within the schedule that was in place before the quiet period.

2009-02-24 Ba		Test details - Reverting from mode	
Test item	Check	Remark	Result
Send Msg 23 with 10 s reporting interval Msg "B Msg 23 Test 10.2.2.1 T3"			
Reporting rate	Check reporting interval = 10 s	UTC 10:28	Passed
Send msg 23 with quiet time = 1 min	Check that EUT does not transmit during quiet time		Passed
	Check that the transmissions after end of quiet time matches the previous schedule.		Passed

5.7.5 12.7.5 Retry of interrogation response

12.7.5.1 Method of measurement

Set up standard test environment. Interrogate the EUT by Message 15 for a response with Message 18.

- a) Simulate full VDL load for the following 30 s.
- b) Simulate full VDL load for the following 60 s

12.7.5.2 Required result

- a) Verify that a response is transmitted between 30 s and 60 s after the transmission of Message 15.
- b) Verify that no response is transmitted.

2009-02-24 Ba		Test details - Retry of interrogation response	
Test item	Check	Remark	Result
Send an interrogation for msg 18			
Apply full channel load for 30s Target simulation: "50_slotsVer2"	Check that a response is transmitted within 30 ... 60 s after msg 15	UTC 10:28	Passed
Send an interrogation for msg 18			
Apply full channel load for 60s Target simulation: "50_slotsVer2"	Check that no response is transmitted (because retry is inhibited)	UTC 11:33	Passed

5.8 12.8 Message formats

5.8.1 12.8.1 Received messages

12.8.1.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Apply messages according to Table 11 to the VDL. Record messages output by the PI of EUT where provided.

12.8.1.2 Required results

Confirm that EUT responds as appropriate. Check that EUT outputs the corresponding sentences with correct field contents and format via the PI where provided.

Verify that the EUT does not process addressed messages.

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13.06.06 Ba		Test details - Received messages	
Test item	Check	Remark	Result
Send all message to the EUT and check PI output			
Msg 1,2,3 Position report	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 4 base station report	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 5 Static and voyage related data	Check that message is output	Optional	Passed
	Check format and content		Passed
	Fill bits: ,2		
Msg 6 Addressed binary message	Check that message is not output		Passed
Msg 7 Binary acknowledgement	Check that message is not output		Passed
Msg 8 Binary broadcast message	Check that message is output	Optional	Passed
	Check format and content		Passed
	Fill bits: ,4		
Msg 9 SAR Aircraft position report	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 10 UTC and date inquiry	Check that message is not output		Passed
Msg 11 UTC/Date response	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 12 Safety related addressed message, addressed to EUT	Check that message is output	Optional No output	Passed
	Check format and content		N/A
Msg 13 Safety related acknowledge	Check that message is not output		Passed
Msg 14 Safety related broadcast message	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 15 Interrogation	Check that message is output	required	Passed
	Check format and content		Passed
	Fill bits: 2		
Msg 16 Assigned mode command	Check that message is not output		Passed
Msg 17 DGNSS broadcast binary message	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 18 Class B equipment position report	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 19 Extended Class B equipment position report	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 20 Data link management message	Check that message is output	Required	Passed
	Check format and content		Passed
Msg 21 Aids to navigation report	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 22 Channel management message	Check that message is output	Required	Passed
	Check format and content		Passed

Msg 23 Group assignment	Check that message is output	Required	Passed
	Check format and content		Passed
Msg 24 Class B "CS" static data, Part A	Check that message is output	Optional	Passed
	Check format and content		Passed
Msg 24 Class B "CS" static data, Part B	Check that message is output	Optional	Passed
	Check format and content		Passed

5.8.2 12.8.2 Transmitted messages

12.8.2.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Initiate the transmission of messages relevant for a Class B mobile station according to Table 11 by the EUT. Record transmitted messages.

12.8.2.2 Required results

Confirm that only messages as allowed by Table 11 are transmitted by the EUT.

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2009-02-24 Ba		Test details - Transmitted messages	
Test item	Check	Remark	Result
Initiate transmission of the messages according to table 11 by interrogation with msg 15			
Msg 1,2,3 Position report	Check that message is not transmitted		Passed
Msg 4 base station report	Check that message is not transmitted		Passed
Msg 5 Static and voyage related data	Check that message is not transmitted		Passed
Msg 6 Addressed binary message	Check that message is not transmitted		Passed
Msg 7 Binary acknowledgement	Check that message is not transmitted		Passed
Msg 8 Binary broadcast message	Check that message is not transmitted		Passed
Msg 9 SAR Aircraft position report	Check that message is not transmitted		Passed
Msg 10 UTC and date inquiry	Check that message is not transmitted		Passed
Msg 11 UTC/Date response	Check that message is not transmitted		Passed
Msg 12 Safety related addressed message, addressed to EUT	Check that message is not transmitted		Passed
Msg 12 Safety related addressed message, not addressed to EUT	Check that message is not transmitted		Passed
Msg 13 Safety related acknowledge	Check that message is transmitted when msg 12 is processed (Response on msg 12)	Optional	Passed
Msg 14 Safety related broadcast message	Check that message is not transmitted (Manually initiated)	Optional	Passed
Msg 15 Interrogation	Check that message is not transmitted		Passed
Msg 16 Assigned mode command	Check that message is not transmitted		Passed
Msg 17 DGNSS broadcast binary message	Check that message is not transmitted		Passed
Msg 18 Class B equipment position report	Check that message is transmitted (Interrogation and automatically)		Passed
Msg 19 Extended Class B equipment position report	Check that message is transmitted (Interrogation with offset)		Passed
Msg 20 Data link management message	Check that message is not transmitted		Passed
Msg 21 Aids to navigation report	Check that message is not transmitted		Passed
Msg 22 Channel management message	Check that message is not transmitted		Passed
Msg 23 Group assignment	Check that message is not transmitted		Passed
Msg 24 Class B "CS" static data, Part A	Check that message is transmitted (Interrogation and automatically)		Passed
Msg 24 Class B "CS" static data, Part B	Check that message is transmitted (Interrogation and automatically)		Passed

5.8.3 12.8.3 Use of safety related Message 14

This test is only applicable if Message 14 is implemented.

12.8.3.1 Method of measurement

Check manufacturer's documentation.

- a) Initiate transmission of Message 14 as specified by the manufacturer.
- b) Repeat initiation twice a minute

12.8.3.2 Required results

- a) Verify that the data content of Message 14 is predefined and the transmission cannot exceed one time period (see Table 12).
- b) Verify that the EUT only accepts the initiation of a Message 14 once a minute without automatic repetition.

2009-02-25 Ba		Test details - Use of safety related message 14	
Test item	Check	Remark	Result
Check manufacturers documentation			
a) Send msg 14	Check that the content of msg 14 is predefined	Text: "Mayday" The text "Mayday" should be avoided. See COMSAR 13/WP.3, Annex 5 Retest 2009-06-02 Ba: The text of message 14 has been changed to "PAN PAN PAN"	Passed
	Check that msg 14 cannot exceed one time period	Is predefined	Passed
	Check content of msg 14 on VDL		Passed
b) Repeat initiation of msg 14 twice a minute	Check that msg 14 is transmitted only once		Passed
	Automatical repetition	If the input lines are kept connected (switch closed) the EUT automatically repeats the text message once per minute. This is not allowed. Each transmission has to be initiated manually Retest 2009-06-02 Ba: Message 14 is transmitted only once, also when the switch is kept closed	Passed

6 13 Specific tests of network layer

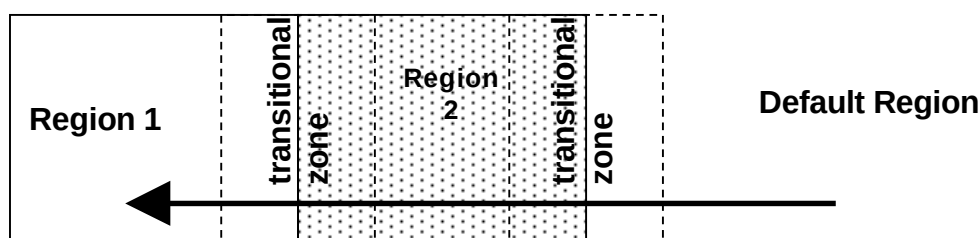
(see 7.4)

6.1 13.1 Regional area designation by VDL message

13.1.1 Method of measurement

Set up standard test environment. 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 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. This can be accomplished by either using a dedicated test input for simulated position information or a GNSS simulator.



	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 2 – Regional area scenario

13.1.2 Required results

Check that the EUT transmits and receives on the primary channels assigned for each region alternating channels and doubling reporting rate when passing through the transitional zones (see Table 26). EUT shall revert to default autonomous operation on the regional channels after leaving the transitional zones.

Table 26 – Required channels in use

	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

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2009-02-25 Ba		Test details part 1 – Channel management by VDL msg 22	
Test item	Check	Remark	Result
Set-up EUT in autonomous mode transmitting on channel AIS 1/AIS 2, send 2 Msg 22 by VDL generator, defining 2 adjacent areas with channels A1, B1 and A2, B2. Use external sensor input to simulate a voyage through both areas. Set transitional zone to 4nm. Set the position outside the areas. "TZ" is used for "transitional zone"			
Set the positions near the limits of the transitional zones to check the dimensions			
Msg: "B Msg 22 Test 13.1 Area1" and " B Msg 22 Test 13.1 Area2"			
<u>Area 1:</u> In high sea area	Check that channels AIS 1 and AIS 2 are in use	Are for test purposes set to 2084 and 2086	Passed
<u>Area 2:</u> Move position into outer TZ of region 2	Check the limit of the TZ (5 NM = 8.8 minutes)	UTC 14.32	Passed
	Check that channel AIS 1 and A2 are used	EUT transmits only on channel A, For the transmissions on channel B there is a TXT output 53 "Tx TimeOut". <u>Retest 2009-06-02 Ba:</u> AIS1 and A2 are used for transmission. There is no TXT output.	Passed
	Check that reporting rate is doubled	On channel A the reporting rate is doubled	Passed
Crossing the area border	Check the border of area	UTC 14:36	Passed
	Check that channel AIS 1 and A2 are used	EUT transmits only on channel B, For the transmissions on channel A there is a TXT output 53 "Tx TimeOut". <u>Retest 2009-06-02 Ba:</u> A2 and AIS1 are used for transmission. There is no TXT output.	Passed
<u>Area 3:</u> Move position into region 2 (out of TZ)	Check the limit of the TZ (4 NM = 7 minutes)	UTC 14:40	Passed
	Check that channel A2 and B2 are used	No Tx There is a TXT output 53 "Tx TimeOut" for each scheduled message Rx on A and B is ok <u>Retest 2009-06-02 Ba:</u> A2 and B2 are used for transmission. There is no TXT output.	Passed
	Check that reporting rate is changed back to normal reporting rate		Passed

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<u>Area 4:</u> Move position into TZ between region 1 and 2, inside area 2	Check that channels A2 and A1 are used	No Tx <u>Retest 2009-06-02 Ba:</u> A2 and A1 are used for transmission. There is no TXT output.	Passed
	Check that reporting rate is doubled	The output rate of the TXT 053 is 30 s. Therefore it seems the reporting rate is not doubled <u>Retest 2009-06-02 Ba:</u> The reporting rate is doubled	Passed
crossing the area border	Check the border of area		Passed
<u>Area 5:</u> Move position into region 1 (out of TZ)	Check that channels A1 and B1 are used	- No Tx, - For Rx the channels A1 and B1 are used <u>Retest 2009-06-02 Ba:</u> - A1 and B1 are used for transmission. There is no TXT output.	Passed
	Check the limit of the TZ (4 NM = 7 minutes)		Passed
	Check that reporting rate is changed back to normal reporting rate		Passed
<u>Item 6:</u> Move position into TZ of region 1 to high sea	Check that channels A1 and AIS 1 are used	No Tx on channel A1 <u>Retest 2009-06-02 Ba:</u> A1 and AIS1 are used for transmission. There is no TXT output.	Passed
	Check that reporting rate is doubled		Passed
<u>Area 7:</u> 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

6.2 13.2 Regional area designation by serial message or manually

13.2.1 Method of measurement

Check documentation.

13.1.2 Required result

Verify that the user cannot allocate channels (directly or by ACA sentence).

2009-02-26 Ba		Test details - Regional area designation	
Test item	Check	Remark	Result
Check documentation			
Serial message or manual input	Check that the user cannot enter area settings	ACA input is not accepted	Passed
	Check that the user cannot change the channels on another way	There is no MKD to enter areas.	Passed

6.3 13.3 Management of received regional operating settings

6.3.1 13.3.1 Replacement or erasure of dated or remote regional operating settings

13.3.1.1 Method of measurement

Set up standard test environment. Send a valid regional operating setting to the EUT by Message 22 with the regional operating area including the own position of the EUT. Consecutively send a total of seven valid regional operating settings to EUT, using Message 22, with regional operating areas not overlapping to the first and to each other. Perform the following in the order shown:

- a) send a ninth Message 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas;
- b) Step 1: set own position of EUT into any of the regional operating areas defined by the second to the ninth Message 22 sent to the EUT previously;

Step 2: send a tenth Message 22 to the EUT, with a regional operating area which partly overlaps the regional operating area to which the EUT was set by step 1 but which does not include the own position of the EUT;
- c) Step 1: move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands;

Step 2: consecutively set own position of EUT to within all regions defined by the previous Message 22.

This test can be accomplished by either using the test input for simulated position information or a GNSS simulator (see also Annex D).

13.3.2 Required results

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

- a) The EUT shall return to the default operating settings.
- b) Step 1: check that the EUT changes its operating settings to those of that region which includes own position of the EUT.

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

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NOTE Since the regional operating settings to which the EUT was set in Step 1 are erased due to Step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT returns to default.

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

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

2009-02-26 Ba		Test details – Test of replacement or erasure of dated or remote regional operating settings		
Test item		Check	Remark	Result
Send by msg 22 1 area including own position 7 areas not overlapping, not including own position Msg: “B Msg 22 Test 13.3.1 Area1... Area8”				
Check active area		Check that EUT uses the channels of area 1		Passed
a) Send a 9. msg 22 to the EUT not overlapping the previous areas Msg: “B Msg 22 Test 13.3.1 Area9”		Check that the EUT returns to the default operating settings (the area is deleted)		Passed
b) step 1: Set own position to any of the 7 areas	Check channels of area 2	Ch. 2060, 2061		Passed
	Check channels of area 3	Ch. 2001, 2002 - Rx ok - Does not transmit <u>Retest 2009-06-02 Ba:</u> Tx ok.	Passed	Passed
	Check channels of area 4	Ch. 2062, 2063		Passed
	Check channels of area 5	Ch. 2003, 2004 - Rx ok - Does not transmit <u>Retest 2009-06-02 Ba:</u> Tx ok.	Passed	Passed
	Check channels of area 6			Passed
	Check channels of area 7	Ch. 2019, 2020 - Rx ok - Does not transmit <u>Retest 2009-06-02 Ba:</u> Tx ok.	Passed	Passed
	Check channels of area 8			Passed
	Check channels of area 9	Ch. 2019, 2020 - Rx ok - Does not transmit <u>Retest 2009-06-02 Ba:</u> Tx ok.	Passed	Passed
	b) step 2: Send an area 10, overlapping the area of step 1 not including own position Msg: “B Msg 22 Test 13.3.1 Area10”	Check that the EUT returns to the default operating settings (the area is deleted)		

c) Step 1: Erasure by distance: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands	Check that the EUT operates with the default settings		Passed
Step 2: Check of erasure: Set own position of EUT to within all regions defined by the previous telecommands. b) step 1: Set own position to any of the 7 areas	Check area 2 = default		Passed
	Check area 3 = default		Passed
	Check area 4 = default		Passed
	Check area 5 = default		Passed
	Check area 6 = default		Passed
	Check area 7 = default		Passed
	Check area 8 = default		Passed
	Check area 10 = default		Passed
Overlapping areas	There seems to be a problem with the complete deletion of overlapping areas. See log file <u>2009-06-02 Ba:</u> After power cycle sometimes old overlapping areas are output again on ACA request. <u>Retest 2009-07-06 Ba:</u> The problem could not be found after several retests		Passed
Permanent memory	<u>2009-05-14 Ba:</u> It seems that sometimes all areas are deleted after switching off and on the unit. In most cases they are stored over power cycle <u>2009-06-02 Ba:</u> Areas are still sometimes deleted after power cycle <u>Retest 2009-07-06 Ba:</u> The problem could not be found after several retests		Passed

6.3.2 13.3.2 Channel management by addressed Message 22

13.3.2.1 Method of measurement

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

- send Message 22 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;
- send an addressed Message 22 to the EUT with different regional operating settings than the previous command;
- move the EUT out of the regional operating area defined by the previous addressed command into an area without regional operating settings.

13.3.2.2 Required results

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

2009-02-26 Ba		Test details – Test of addressed message 22	
Test item	Check	Remark	Result
All areas are erased by the previous test			
a) Send msg 22 with a new area, position inside Msg: "B Msg 22 Test 10.4.1"	Check, that the EUT uses the regional operating settings		Passed
b) Send an addressed msg 22 to the EUT with different regional operating settings Msg: "B Msg 22 Test 13.3.2 b"	Check, that the EUT uses the settings of the new message	UTC 10:36	Passed
c) Move the position out of the area	Check, that the EUT uses the default channels		Passed
Broadcast after addressed msg 22	Check that 10 min after the addressed msg 22 an msg 22 broadcast is accepted	UTC 13:12 More than 2 hours after an addressed msg 22 a broadcast is not accepted <u>Retest 2009-06-03 Ba:</u> After about 40 min the broadcast message 22 is not accepted UTC 09:20 <u>Retest 2009-07-06 Ba:</u> A broadcast message 22 is accepted after more than 12 min.	Passed

6.3.3 13.3.3 Invalid regional operating areas

This test is to check the rejection of invalid regional operating areas (three regional operating areas with same corner).

13.3.3.1 Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

- a) *send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by Message 22. 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.*

13.3.3.2 Required test results

- c) *Check, that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting.*
- d) *Check, that the EUT consecutively uses the regional operating settings of the first two received regional operating areas.*

2009-02-26 Ba	Test details – Test for invalid regional operating areas		
Test item	Check	Remark	Result
a) Send three different valid regional with adjacent corners by msg 22, Position inside 3 rd area. Msg: "B Msg 22 Test 13.3.1 Area6" Msg: "B Msg 22 Test 13.3.1 Area7" Msg: "B Msg 22 Test 13.3.3"	Check, that the default channels are used	UTC 10:42, 12:56	Passed
b) Move own position to the first area	Check, that the EUT uses the operational settings of the first area		Passed
Move own position to the second area	Check, that the EUT uses the operational settings of the second area		Passed

6.3.4 13.3.4 Continuation of autonomous mode reporting rate

13.3.4.1 Method of test

When in the presence of an assigned mode command and in a transition zone, check that the EUT continues to report at the autonomous mode reporting interval.

13.3.4.2 Required result

Ensure that the autonomous reporting interval is maintained.

13.06.06 Ba	Test details – Continuation of autonomous mode reporting rate		
Test item	Check	Remark	Result
Set the EUT into a transitional zone Send an assignment command using msg 23 to the EUT with a different reporting interval Area setting msg Msg: “B Msg 22 Test 10.4.1” Reporting interval: Msg: “B Msg 23 Test 10.2.2.1 T1”			
Assignment command in a transitional zone	Check that an rate assignment command is ignored in a transitional zone	UTC 14:05	Passed

6.3.5 13.3.5 Other conditions

The fulfilment of all other conditions of 7.4.2 shall be self-certified by the manufacturer.

Date	Result	Status
2009-12-16 Ba	There are no other conditions which need to be self-certified by the manufacturer	Passed

7 C.3 DSC functionality tests

7.1 C.3.1 General

For the tests in this clause (see also IEC 61993-1), set the EUT into assigned mode using channels AIS 1 and AIS 2 with a reporting interval of 10 s.

Check with a sequence of valid calls consisting of a DSC channel management test signal number 1, a geographic call from ITU-R M.493, a test signal number 1, an individual call from ITU-R M.493 and a test signal number 1 that the EUT's AIS operation is not affected by the interleaved calls.

2009-05-13 Ba		Test details– Sequence of 5 calls	
Test item	Check	Remark	Result
Activate DSC function Set reporting interval to 10 s and record VDL			
Start DSC transmission of test sentence File: sequence_C3_1.sst" Delay between the calls is 5 s	Check that the schedule of the AIS position reports is not affected by the transmission of the DSC calls		Passed

7.2 C.3.2 Regional area designation

Perform the following tests using the DSC channel management test signal number 1.

Send to the EUT a standard test signal number 1 but with symbol numbers appropriate to the geographical regions and channels specified in the test. Note the transition boundary is 5 NM in this test.

2008-12-19 Ba		Test details - Regional area designation	
Test item	Check	Remark	Result
Activate DSC function			
Start DSC transmission of test sentence File: area_set_region_2084_2086.sst"	Check that the area setting of the DSC command is correctly stored	The DSC calls are not received There is no test output on the PI <u>Retest 2009-02-27 Ba:</u> The test output shows that the DSC call is correctly received but the area is not stored (no ACA output) <u>Retest 2009-05-13 Ba:</u> The area setting of the DSC command is correctly stored	Passed
	Check that the transitional zone size is 5 NM	<u>Retest 2009-05-13 Ba:</u> The transitional zone size in the ACA output is set to 0 <u>Retest 2009-06-03 Ba:</u> The transitional zone size in the ACA output is set to 1	Passed
Tx TimeOut	During the DSC test the EUT stopped transmission. For each scheduled transmission there was a "Tx TimeOut" sentence. After manual restart Tx was ok. <u>Retest 2009-05-13 Ba:</u> Same problem occurred again (UTC 09:20) <u>Retest 2009-06-03 Ba:</u>		
	During the DSC tests no problem with transmission was found		Passed

7.3 C.3.3 Scheduling

Check that the EUT's AIS reporting is not affected during the DSC monitoring times.

Send a valid geographical call to the EUT. Check that a response is not transmitted.

2009-02-27 Ba		Test details (b) – Sequence of 5 calls	
Test item	Check	Remark	Result
Set reporting interval to 10 s and record VDL Msg: B Msg 23 Test 10.2.2.1 T3			
DSC monitoring times	Check that the AIS reporting is not affected during the DSC monitoring times		Passed
File: area_set_region_2084_2086.sst"	Check that not response is transmitted		Passed

7.4 C.3.4 DSC flag in Message 18

Check that the DSC flag is set properly when DSC functionality is available.

2009-02-27 Ba		Test details – DSC flag	
Test item	Check	Remark	Result
Record VDL			
DSC activated	Check that the DSC flag is set	The DSC flag is in Auto mode only set to 1 during the short DSC receiving periods. <u>Retest 2009-05-13 Ba:</u> The DSC flag always set to 1 <u>Retest 2009-06-03 Ba:</u> The DSC flag is set to 1	Passed
DSC inactivated	Check that the DSC flag is not set	<u>Retest 2009-05-13 Ba:</u> The DSC flag is set to 1 <u>Retest 2009-06-03 Ba:</u> The DSC flag is set to 0	Passed

Note:

The standard is not very clear regarding the DSC flag. It only says: "(not) equipped with DSC function."

I think the main purpose of the DSC flag is to indicate mainly to the base station if it can be controlled by DSC channel management. Therefore I think if the DSC function is disabled by configuration for the other stations it is identical to "not equipped with DSC function", and the DSC flag should not be set.

7.5 C.3.5 DSC monitoring time plan

Check that DSC commands are received during DSC monitoring times and, if time-sharing is used, are not received outside those times.

2009-02-27 Ba		Test details (b) – DSC monitoring time plan	
Test item	Check	Remark	Result
Delete all area settings			
Send a DSC area setting outside the monitoring time	If time-sharing is used: Check that the channels are not changed	Time-sharing is used	Passed
	If time-sharing is not used: Check that the channels are changed according to the area setting		N/A
Send a DSC area setting inside the monitoring time	Check that the channels are changed according to the area setting		Passed

7.6 C.3.6 Replacement or erasure of dated or remote regional operating settings

Method of measurement

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

- a) send a ninth Message 22 to the EUT with valid regional operating areas not overlapping with the previous eight regional operating areas;
- b) Step 1: set own position of EUT into any of the regional operating areas defined by the second to the ninth telecommands sent to the EUT previously;

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

- c) Step 1: move own position of EUT to a distance of more than 500 NM from all regions defined by previous commands;

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

Required results

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

- a) The EUT shall return to the default operating settings.
- b) Step 1: check that the EUT changes its operating settings to those of that region which includes own position of the EUT.

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

NOTE Since the regional operating settings to which the EUT was set in Step 1 are erased due to Step 2, and since there is no other regional operating setting due to their non-overlapping definition, the EUT returns to default.

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

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

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2009-05-13 Ba		Test details – Test of replacement or erasure of dated or remote regional operating settings	
Test item	Check	Remark	Result
Send by DSC and msg 22 1 area including own position by MSG 22 (Msg: B Msg 22 Test 13.3.1 Area 1...4) 7 areas not overlapping, not including own position, first 3 by msg 22, last 4 by DSC			
Check active area	Check that EUT uses the channels of area 1		Passed
a) Send a 9. msg 22 to the EUT not overlapping the previous areas	Check that the EUT returns to the default operating settings (the area is deleted)		Passed
b) step 1: Set own position to any of the 7 areas	Check channels of area 2		Passed
	Check channels of area 3		Passed
	Check channels of area 4		Passed
	Check channels of area 5		Passed
	Check channels of area 6		Passed
	Check channels of area 7		Passed
	Check channels of area 8		Passed
	Check channels of area 9		Passed
b) step 2: Send an area 10 by DSC, overlapping the area 2 of step 1 not including own position	Check that the EUT returns to the default operating settings (the area is deleted)		Passed
c) Step 1: Erasure by distance: Move own position of EUT to a distance of more than 500 miles from all regions defined by previous commands	Check that the EUT operates with the default settings		Passed
Step 2: Check of erasure: Set own position of EUT to within all regions defined by the previous telecommands. b) step 1: Set own position to any of the 7 areas	Check area 2 = default		Passed
	Check area 3 = default		Passed
	Check area 4 = default		Passed
	Check area 5 = default		Passed
	Check area 6 = default		Passed
	Check area 7 = default		Passed
	Check area 8 = default		Passed
	Check area 10 = default		Passed

7.7 C.3.7 Test of addressed telecommand

Method of measurement

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

- a) send 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 DSC telecommand to the EUT with different regional operating settings than the previous command;
- c) Move the EUT out of the regional operating area defined by the previous addressed telecommand into an area without regional operating settings.

Required results

- a) Check, that the EUT uses the regional operating settings commanded to it in a).
- b) Check, that the EUT uses the regional operating settings commanded to it in b).
- c) Check, that the EUT reverts to default.

2009-02-27 Ba		Test details – Test of addressed telecommand	
Test item	Check	Remark	Result
All areas are erased by the previous test			
a) Send a DSC call with a new area, position inside	Check, that the EUT uses the regional operating settings	DSC call is received but area is not stored <u>Retest 2009-05-13 Ba:</u> The area is stored <u>Retest 2009-06-03 Ba:</u> The area settings are stored:	Passed
b) Send an addressed DSC call to the EUT with different regional operating settings	Check, that the EUT uses the settings of the new message	DSC call is received but area settings (new channels) are not changed according to the addressed DSC call Tested with an area defined by message 22 <u>Retest 2009-05-13 Ba:</u> The settings are changed according to the DSC call	Passed
c) Move the position out of the area	Check, that the EUT uses the default channels		Passed

d) Set the position outside the addressed area	Check that the area settings are not stored	<u>Retest 2009-05-13 Ba:</u> The area settings are stored Position: 52°30N, 10°00E Addressed area: Corner point: 55°N, 9°30E, size = 60/60 minutes UTC 11:27 <u>Retest 2009-06-03 Ba:</u> The area settings are not stored: Addressed area: Corner point: 55°N, 9°0E, size = 60/60 minutes Positions: 1° outside in all 4 directions	Passed
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7.8 C.3.8 Invalid regional operating areas

Test for invalid regional operating areas (three regional operating areas with same corner).

Method of measurement

Set up standard test environment and operate EUT in autonomous mode. Perform the following tests in the following order after completion of all other tests related to change of regional operating settings:

- a) send three different valid regional operating settings with adjacent regional operating areas, their corners within eight miles of each other, to the EUT by 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.*

This test can be accomplished by either using a dedicated test input for simulated position information or a GNSS simulator.

Required test results

- a) Check, that the EUT uses the operating settings that were in use prior to receiving the third regional operating setting.*
- b) Check, that the EUT consecutively uses the regional operating settings of the first two received regional operating areas.*

10.07.06 Ba Test details – Test for invalid regional operating areas			
Test item	Check	Remark	Result
a) Send three different valid regional with adjacent corners by DSC area call, Position inside 3 rd area.	Check, that the default channels are used	Check by evaluation of ACA output on request	Passed
b) Move own position to the first area	Check, that the EUT uses the operational settings of the first area	Check by evaluation of ACA output on request	Passed
Move own position to the second area	Check, that the EUT uses the operational settings of the second area	Check by evaluation of ACA output on request	Passed

Annex A Test equipment

A.1 Test equipment summary

#	description	type	identification
1	VDL analyser / Generator	Attingimus UAIS Test unit	S/N 001 BSH PC5593 SW AISterm V1.0rev47 AISmain V1.47011120R
2	Target simulator	Simutech	BSH PC3007 SW BSHSIM7T
3	Presentation Interface Monitor	BSH	BSH PC 3481 BSH PC 5508 SW NewMoni V2.1
4	DSC Test box	DEBEG 3817 DEBEG 6348	S/N 475533
5	Carrier Sense test attenuator	Build at BSH	
6	RF Signal generator	Agilent E4430 B	Bund 106551/2005
7	Spectrum analyser	Agilent E4440 A	Bund 7200000003
	Auxiliaries:		
5	Digital Multimeter	Voltcraft	S/N 1010365036
6	Oscilloscope	Le Croy Wavesurver 422	BSH 106106/2005
7	5 Converters RS 422 to RS 232		
8	1 fixed voltage power supply (24 V/10A)		
9	3 adjustable power supplies (30 V/5 A)		
10	active retransmitting GPS antenna		

for a description of pos. 1-5 see below

A.1.1 VDL analyser / generator

The VDL analyser/generator:

- receives the radio data telegrams transmitted by the AIS under test, slotwise evaluates their radio parameters (field strength, SNR, etc.) and provides a transparent display of the decoded radio data telegrams (VDL messages).
- transmits radio data telegrams which have been entered/edited via a control panel. The AIS under test receives these messages and either passes the received data to its presentation interface and/or responds as appropriate.
- records all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- simulates AIS targets by transmitting position reports of virtual targets up to the maximum channel capacity.

A.1.2 Target simulator

The target simulator consists of a standard PC with

- special Radar and Target Simulator software

- extension boards for generation of Radar signals and RS422 serial output signals

Connection of AIS Test system

For tests of AIS transponders the data of 60 moving targets defined in the Radar Simulator are transferred to the VDL Generator and transmitted on VHF. Thus the AIS VHF data link is loaded with simulated AIS targets.

Connection of display systems

Radar systems as well as ECDIS systems will have the ability to receive, process and display AIS information in the near future. In order to test this feature the data of moving targets defined in the Radar Simulator are transferred to the RADAR (together with video, sensor data etc. as known).

Connection of AIS under Test

The AIS under test can be connected to the own ship sensor outputs in order to provide full control over own ships dynamic data (for tests of reporting rates, channel management...).

A.1.3 Presentation Interface Monitor

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

- simulate Sensor inputs
- analyse the AIS high speed input / output
- analyse the AIS long range function
- generate DSC calls for the DSC test box and to display, log and evaluate the received DSC calls from EUT.

For that purpose it includes the functions:

- coding / decoding of NMEA 6-bit data fields
- online AIS message filtering
- online AIS message editing
- load and transmit predefined sequences
- online modification of transmitted sequences

A.1.4 DSC Test box

The DSC test box includes:

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

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

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

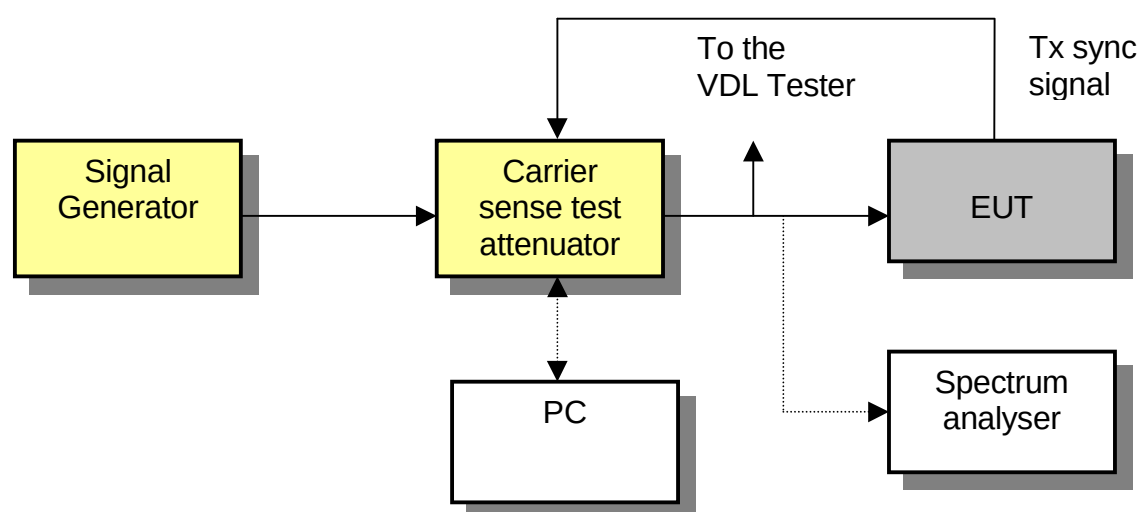
The Presentation Interface Monitor is used to generate the DSC calls and to display, log and evaluate the received DSC calls.

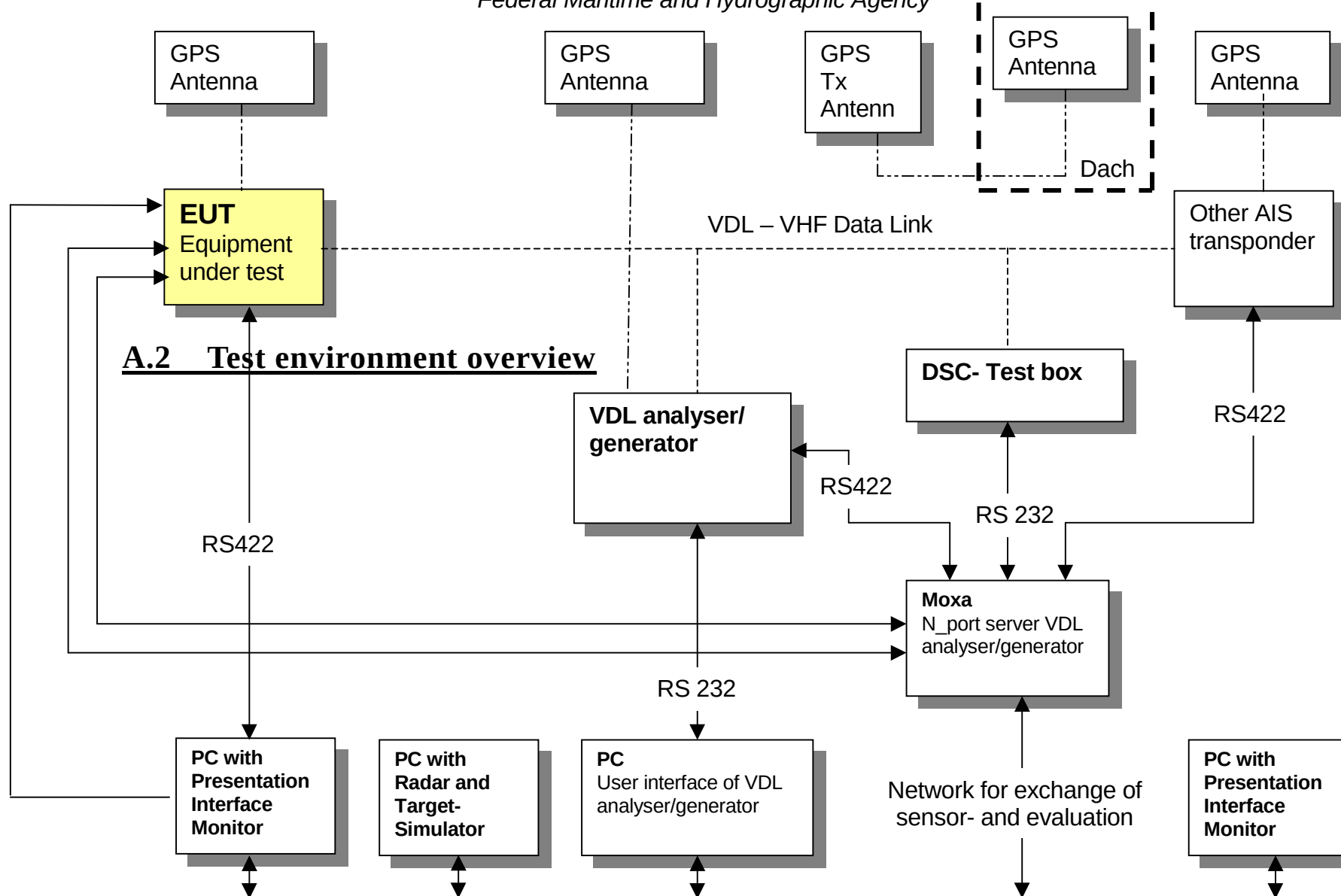
A.1.5 Carrier sense test attenuator

The Carrier sense test attenuator is an microprocessor controlled RF attenuator which is used to provide together with a RF signal generator the necessary RF signals of different levels for the Carrier sense tests in § 12.2. It has been specially developed by BSH for the Class B CS test.

The signal levels are checked with a spectrum analyser.

The microcontroller defines the actual attenuation with the exact timing as required by the standard. The timing is triggered by the Tx sync signal which is provided by the EUT at the beginning of the slots intended for transmission attempt.





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	

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.

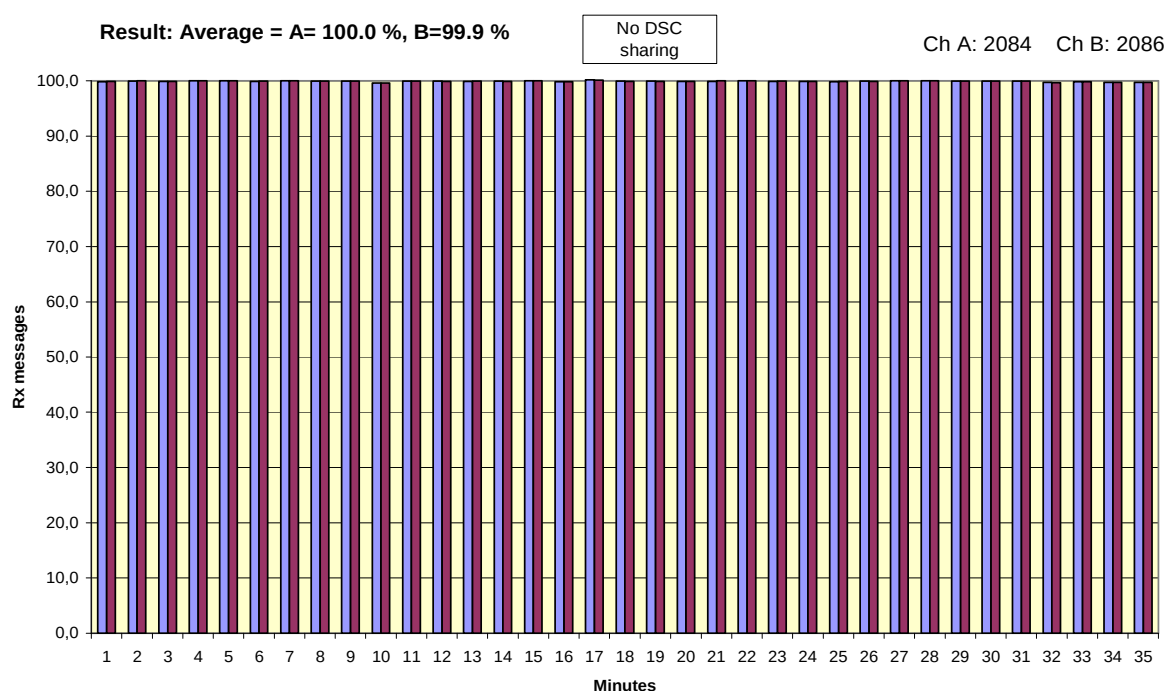
The DSC sentences include MMSI number which is changed according to the actual MMSI number the EUT

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	
sel_check_channel.sst	Test of channel use in 20.4
\$PDEBT, CCDSC, T, 0001460078000001010067150A27271E654875FF	
\$PDEBT, CCDSC, T, 000146006705280000091E003C003C0067150A27271E676F75FF	
area_set_region.sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
\$PDEBT, CCDSC, T, 000146006705280000091E003C003C0067150A27271E68090A3C00680A143C00680C051400005A00680D050A0000500075FF	
area_set_region_20_2.sst	Area addressed regional setting for test 20.2
\$PDEBT, CCDSC, T, 00014600670F3200000E00005A005A0067150A27271E6809145200680A0A5200680C0F1E00011E00680D0F140001280075FF	
\$PDEBT, CCDSC, T, 00014600670F3200000E00005A005A0067150A27271E6809145100680A0A5100680C0F1400011E00680D0F0A0001280075FF	
Sequence_20_1sst	Area addressed regional setting, standard position inside address, but not inside area, Ch 60
\$PDEBT, CCDSC, T, 0001460078000001010067150A27271E676F75FF	
\$PDEBT, CCDSC, T, 00014600660600050A0A64150A27271E646E5A00487E7E75FF	
\$PDEBT, CCDSC, T, 0001460078000001010067150A27271E676F75FF	
\$PDEBT, CCDSC, T, 0001460078000001010067150A27271E646E5A00487E7E75FF	
\$PDEBT, CCDSC, T, 0001460078000001010067150A27271E676F75FF	
Test_sequence_20_3.sst	Sequence of an area addressed call and continues transmission of other call for test of free channel check
\$PDEBT, CCDSC, T, 000146006705320000091E003C003C0067150A27271E676F75FF	
\$PDEBT, CCDSC, T, 0008460078000000010167150A27271E676F75FF	

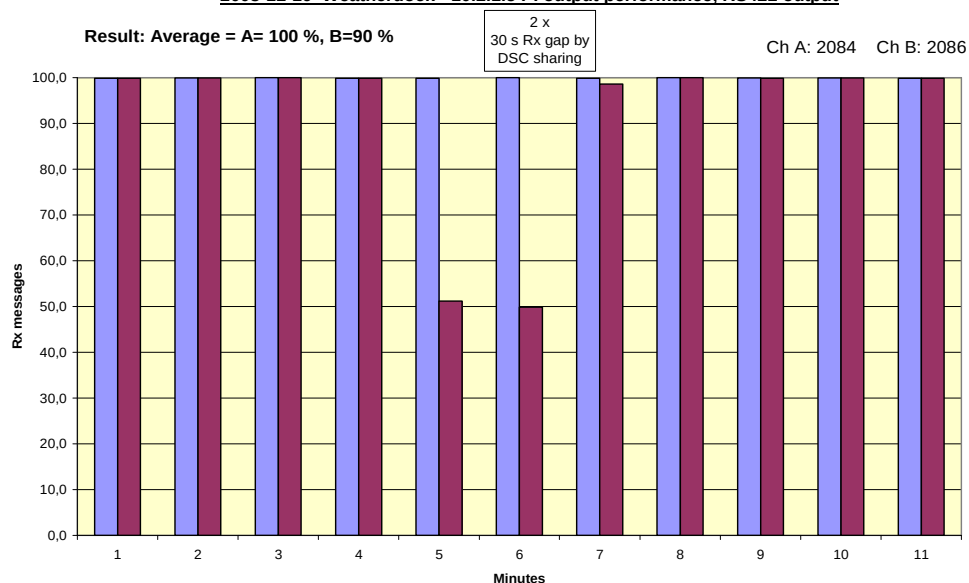
Annex C Test diagrams

C.1 10.2.1.5 Rx performance test

2008-12-09 Weatherdock - 10.2.1.5 PI output performance, RS422 output

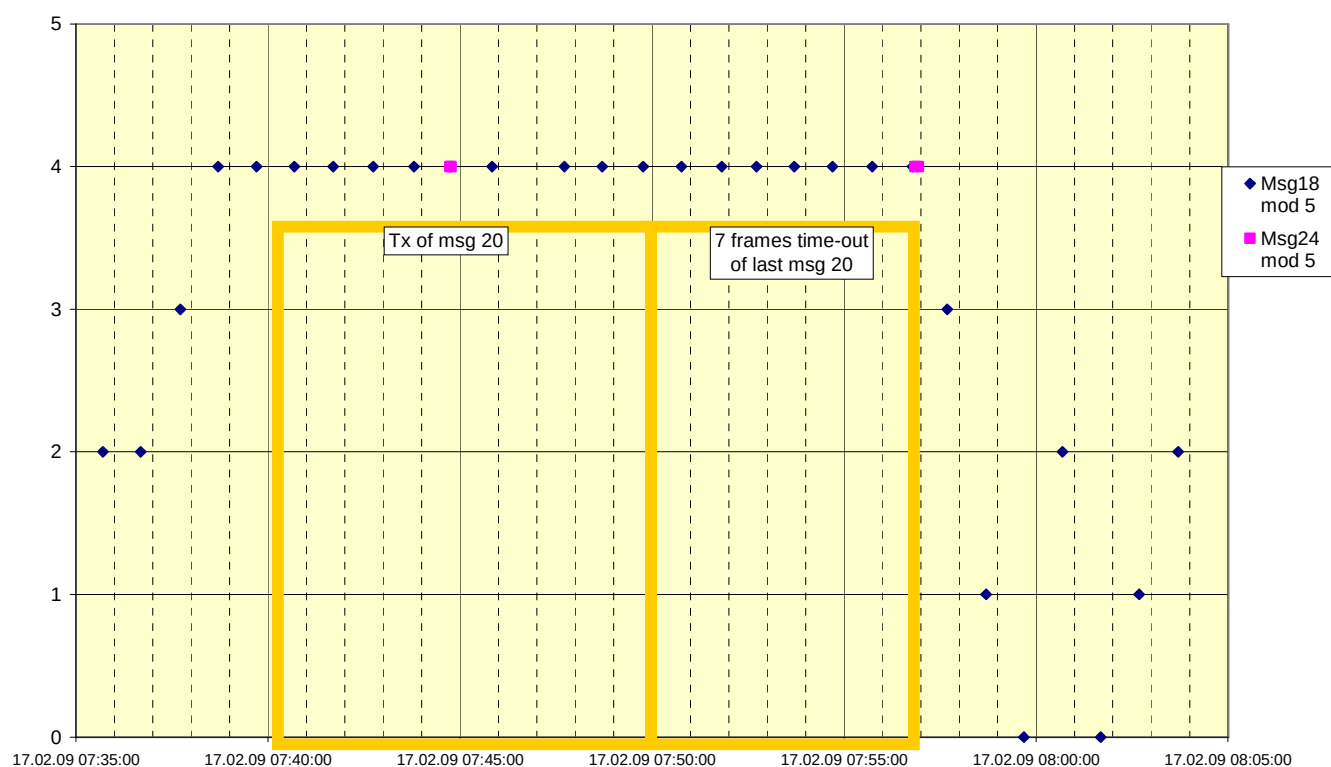


2008-12-19 Weatherdock - 10.2.1.5 PI output performance, RS422 output



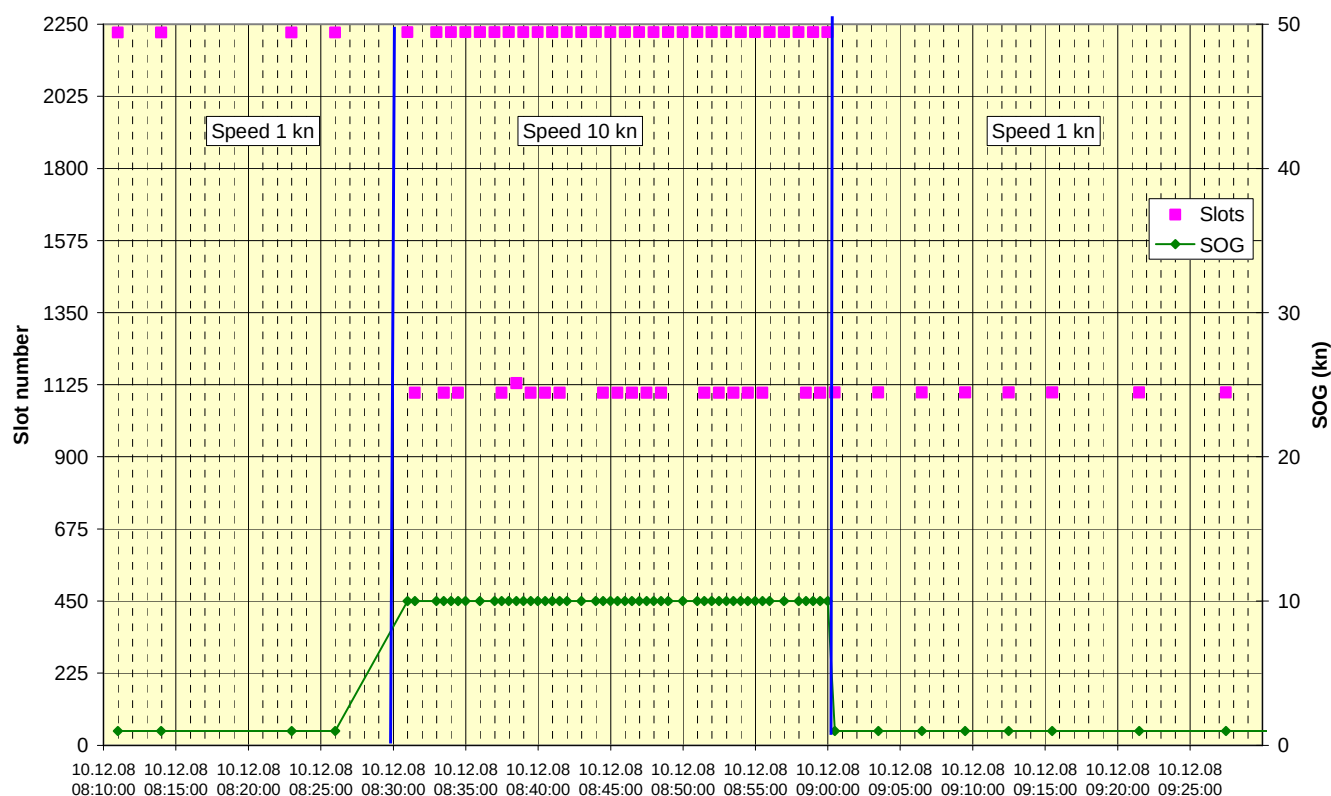
C.2 10.2.2.2 VDL state/reservations

2009-02-17 - Weatherdock EasyTRX2 - 10.2.2.2 Base station reservation



C.3 10.6.2.1 Nominal reporting interval

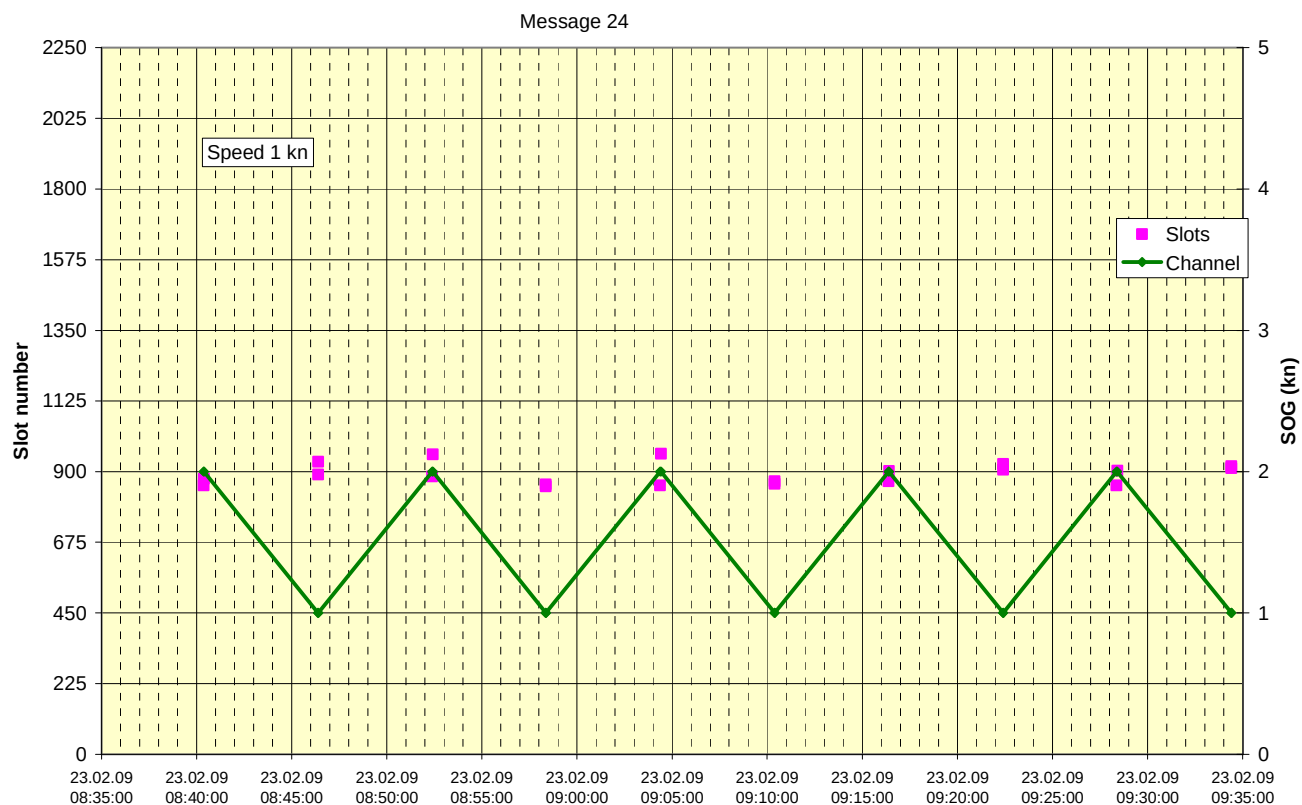
2007-12-10 Ba - Weatherdock EasyTRX2 - 10.6.2.1 Nominal reporting interval



Time	Interval (min)	SOG (kn)
08:10:00	180	1
08:15:00	180	1
08:20:00	180	1
08:25:00	180	1
08:28:00	30	10
08:30:00	30	10
08:35:00	30	10
08:40:00	30	10
08:45:00	30	10
08:50:00	30	10
08:55:00	30	10
09:00:00	30	10
09:01:00	180	1
09:05:00	180	1
09:10:00	180	1
09:15:00	180	1
09:20:00	180	1
09:25:00	180	1

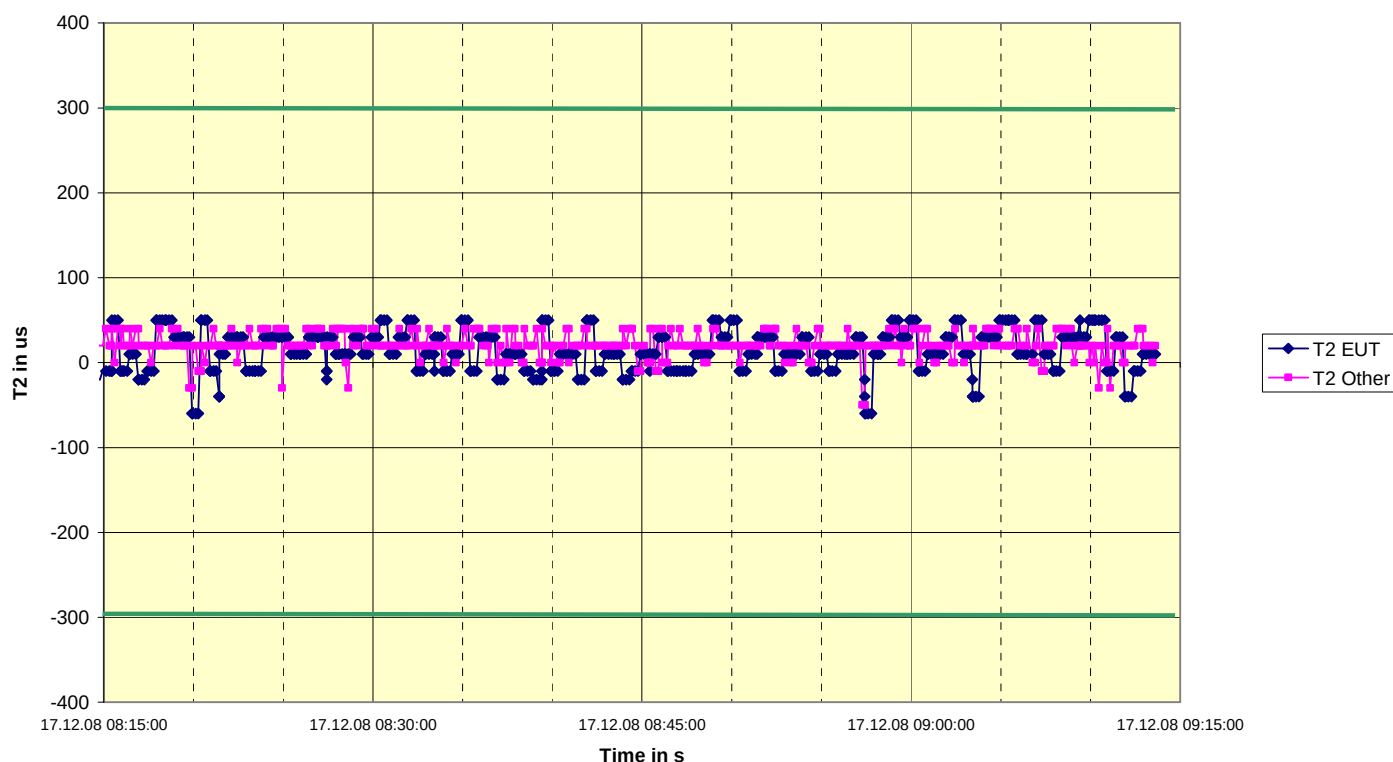
C.4 10.6.2.3 Static data reporting interval

2009-02-23 Ba - Weatherdock EasyTRX2 - 10.6.2.3 Static data reporting rates

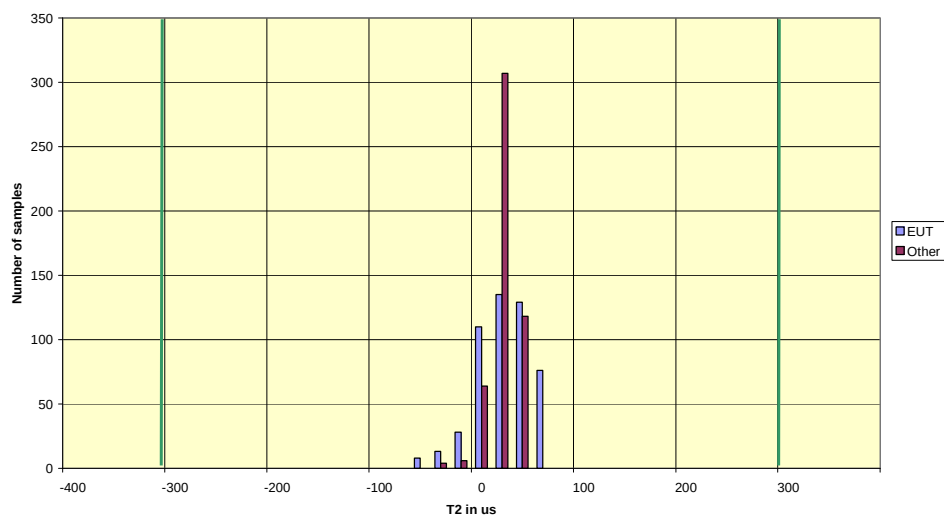


C.5 12.1.1 Synchronisation test sync mode 1

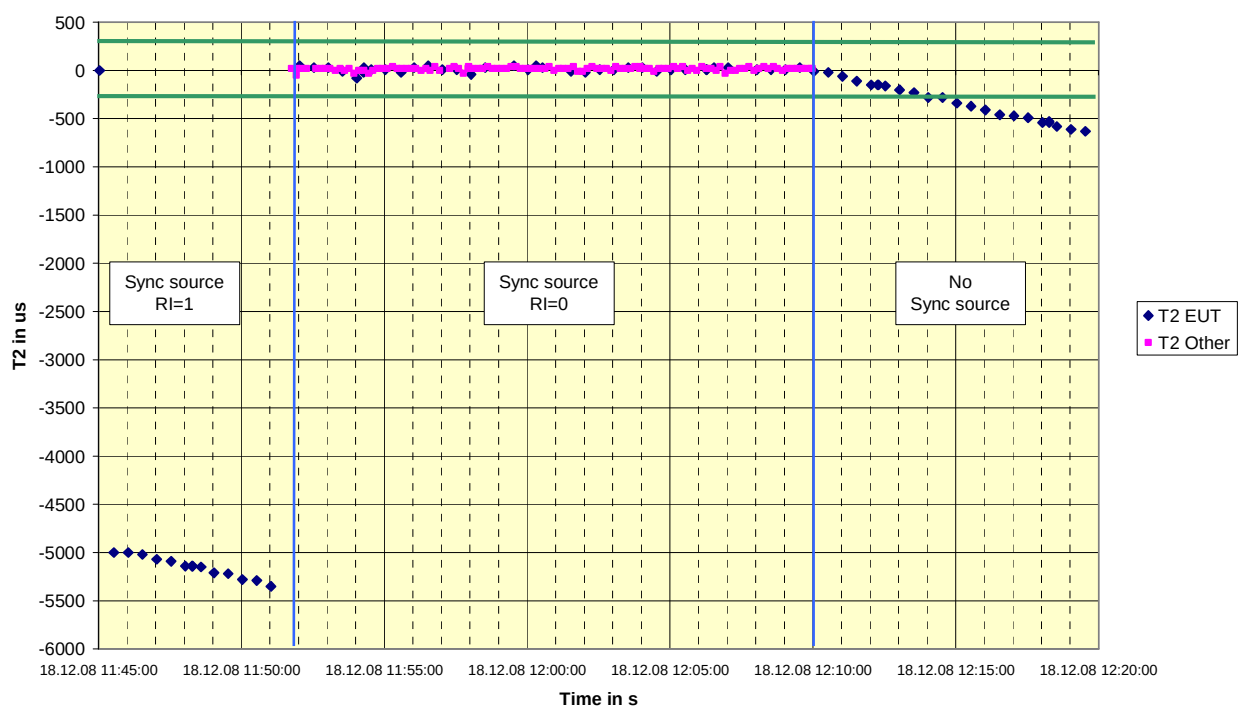
2008-12-17 Weatherdock EasyTrx2 - 12.1.1a Synchronisation test sync mode 1



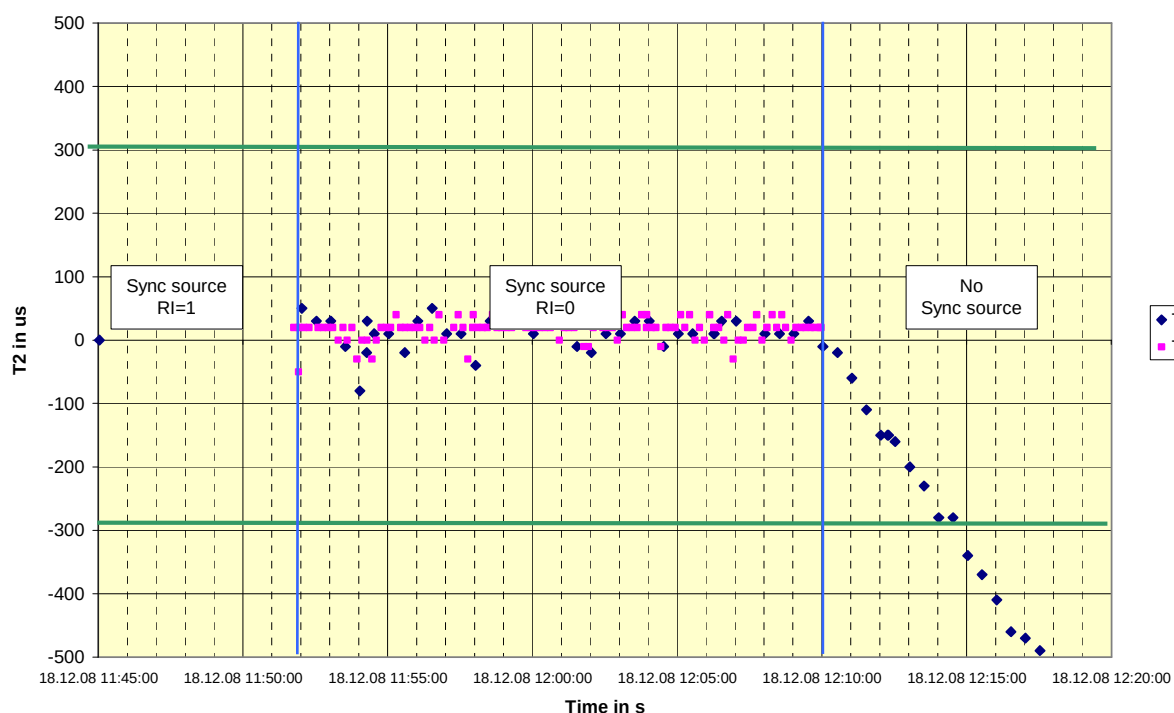
2008-12-17 Weatherdock EasyTrx2 - 12.1.1a Synchronisation test sync mode 1



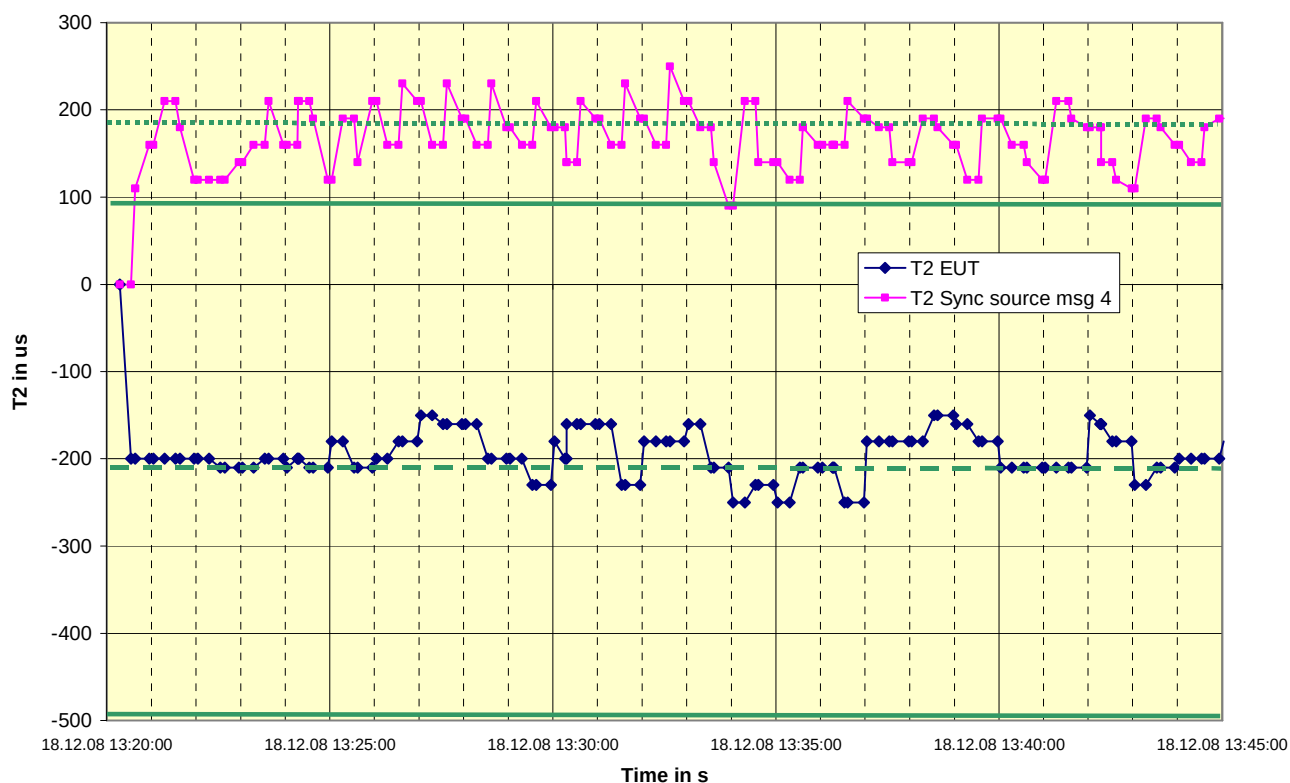
2008-12-18 Weatherdock EasyTrx2 - 12.1.1b Synchronisation test sync mode 1



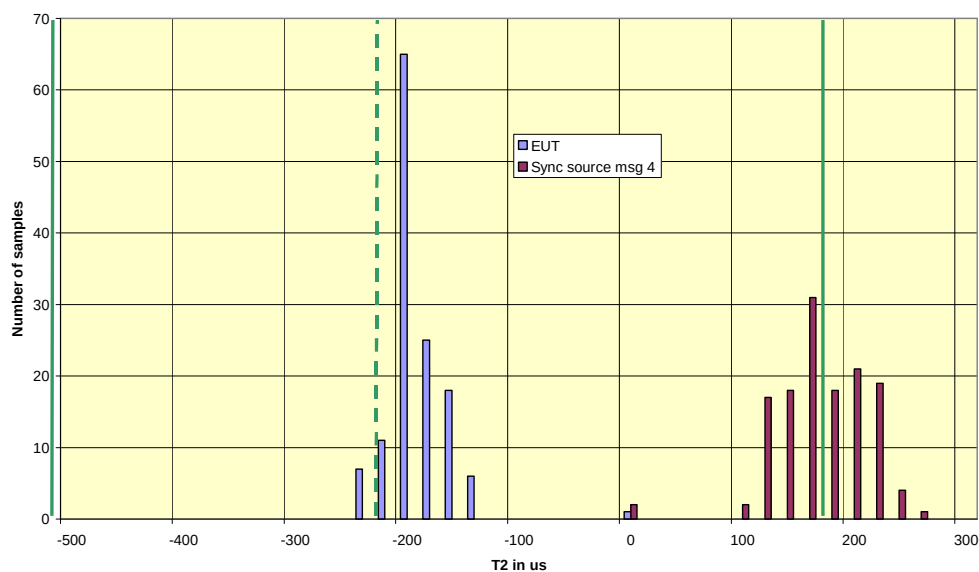
2008-12-18 Weatherdock EasyTrx2 - 12.1.1b Synchronisation test sync mode 1



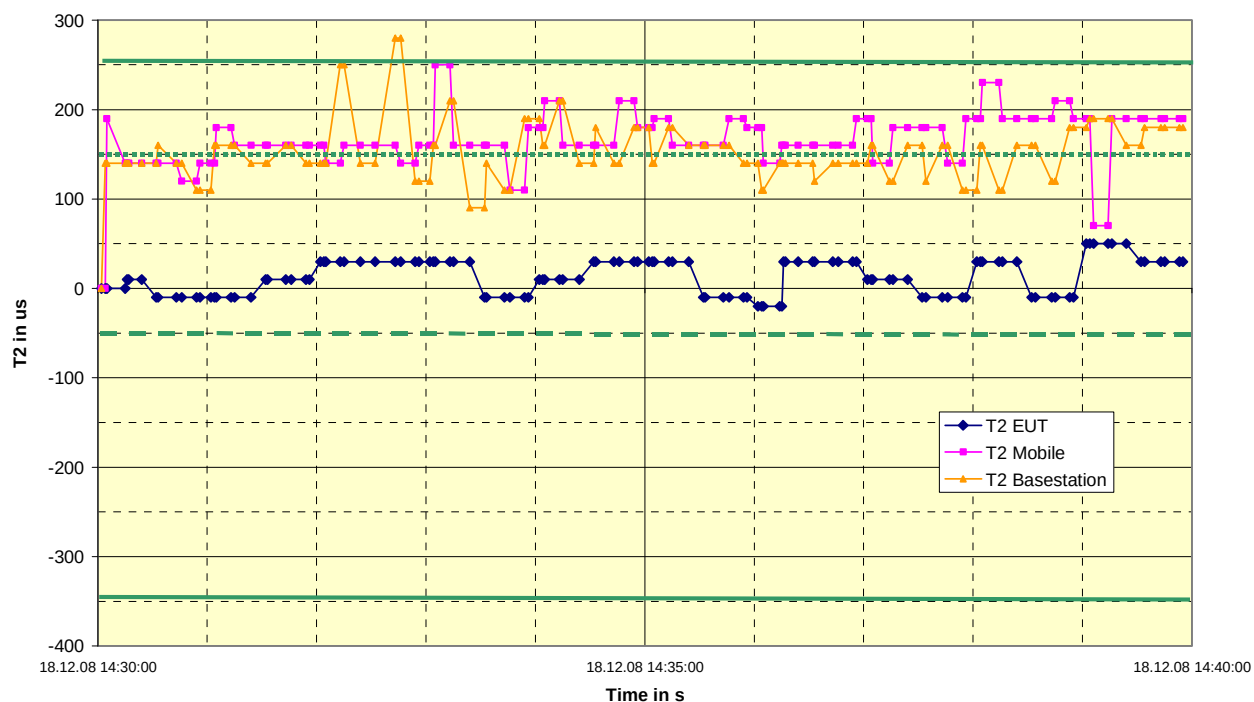
2008-12-18 Ba - Weatherdock EasyTRX2 - 12.1.1d Synchronisation test sync mode 1



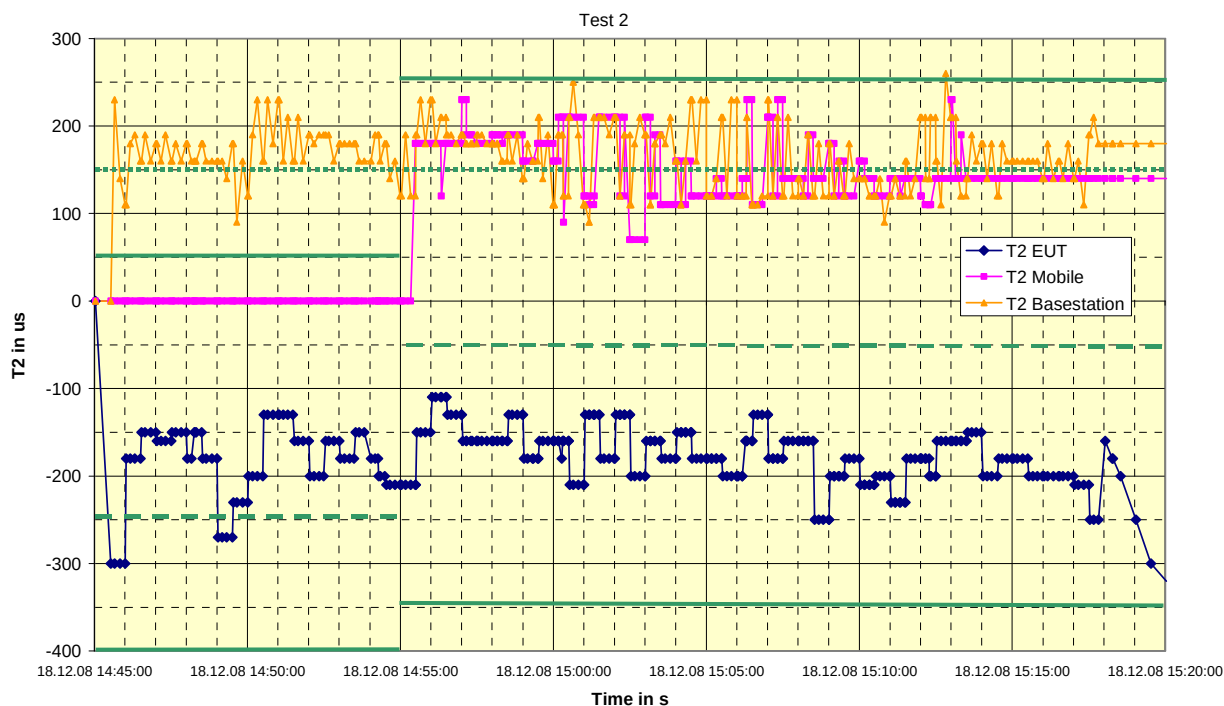
2008-12-18 Ba - Weatherdock EasyTRX2 - 12.1.1d Synchronisation test sync mode 1



2008-12-18 Ba - Weatherdock EasyTRX2 - 12.1.1e - Sync jitter deviation vs. time in sync mode 1

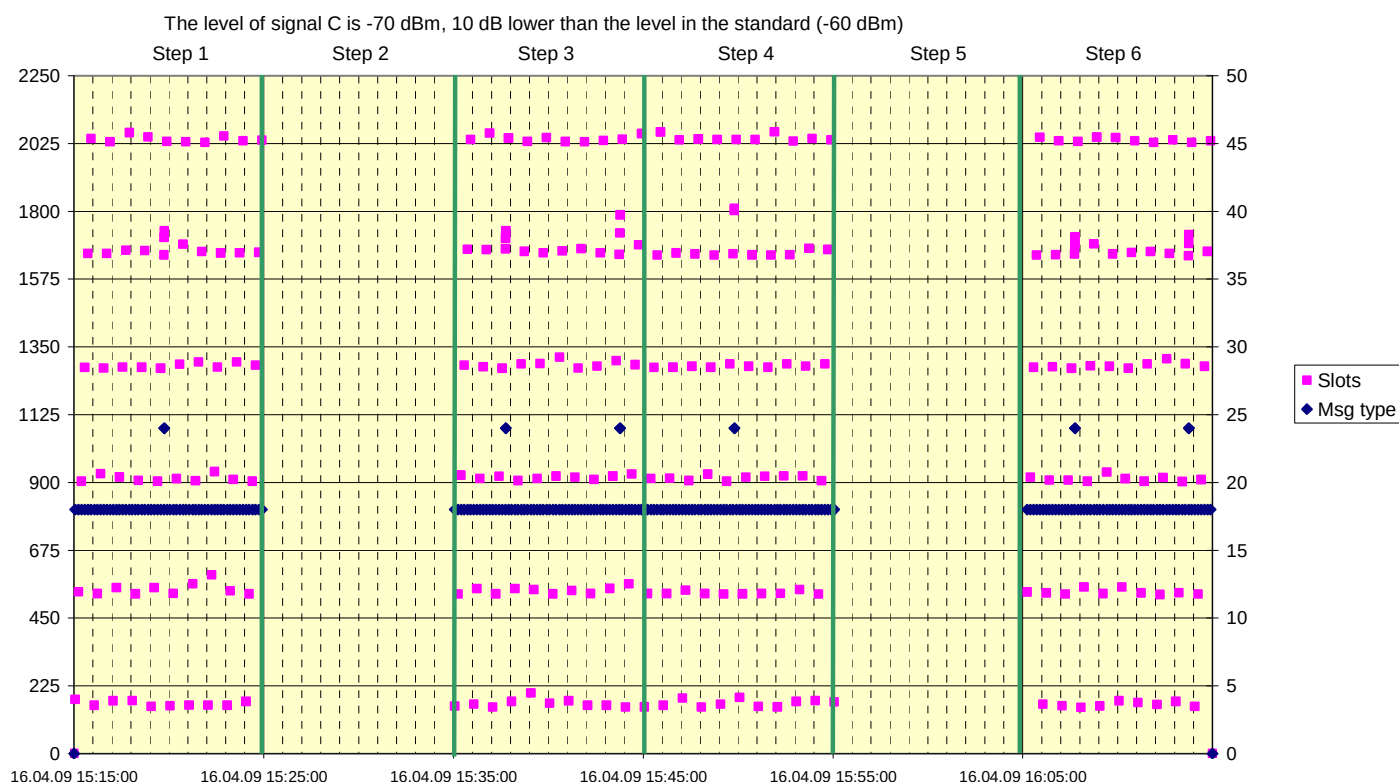


2008-12-18 Ba - Weatherdock EasyTRX2 - 12.1.1e - Sync jitter deviation vs. time in sync mode 1

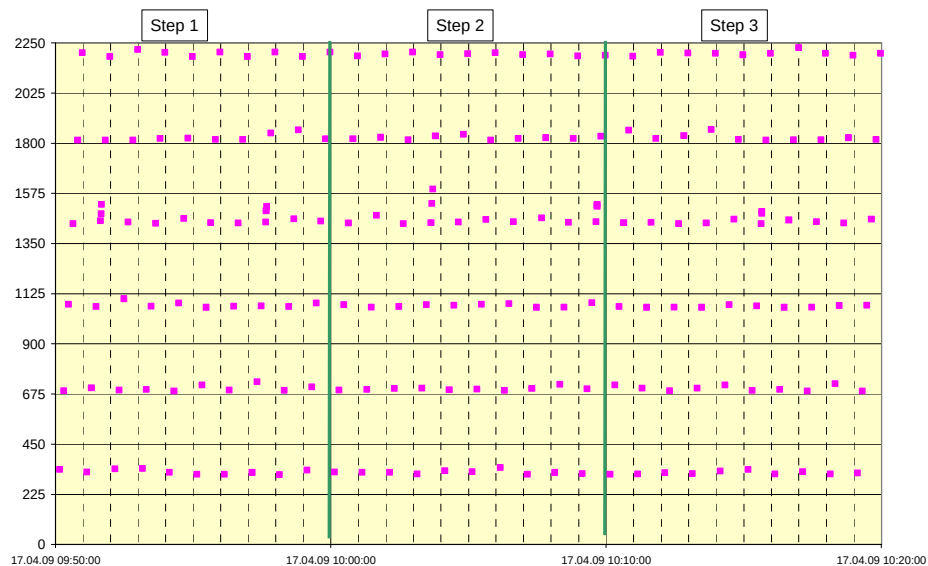


C.6 12.2 Carrier sense test

2009-04-16 Ba Weatherdock EasyTrx2 - 12.2.1 Carrier sense tests - Threshold level

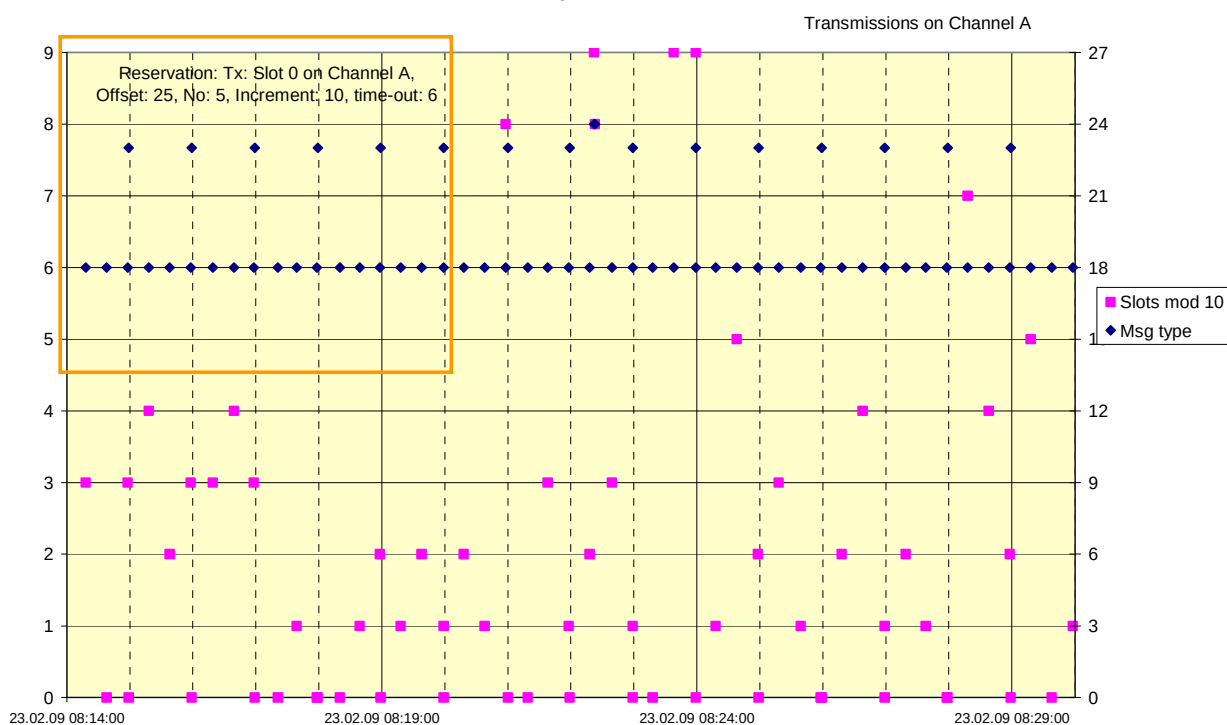


2009-04-17 Ba - Weatherdock EasyTRX2 - 12.2.2 Carrier sense tests - CS timing

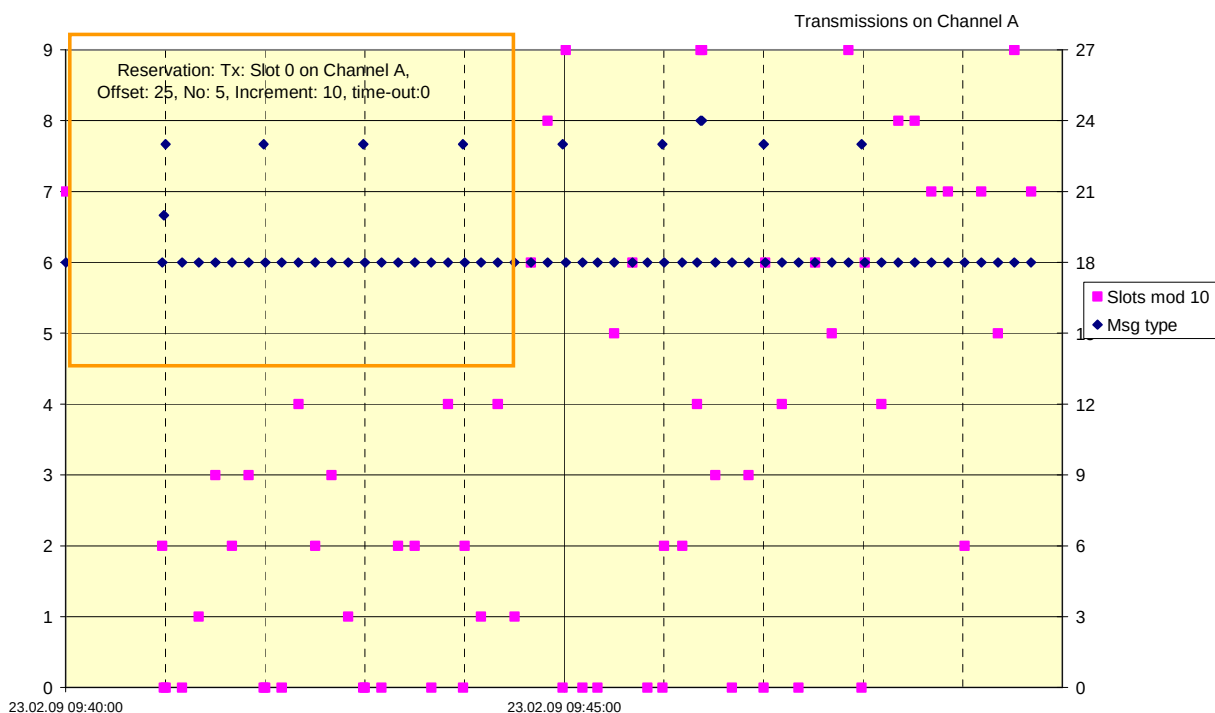


C.7 12.3 VDL state/ reservations

2009-02-23 Ba - Weatherdock easyTRX2 - 12.3a VDL state/Reservations

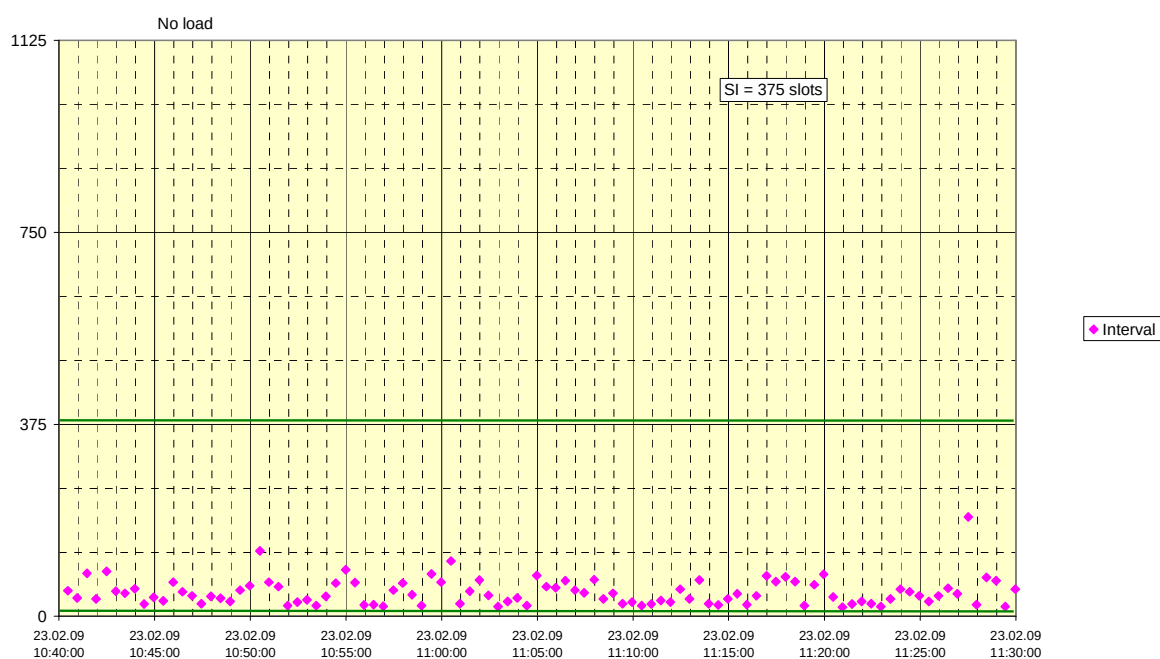


2009-02-23 Ba - Weatherdock easyTRX2 - 12.3b VDL state/Reservations

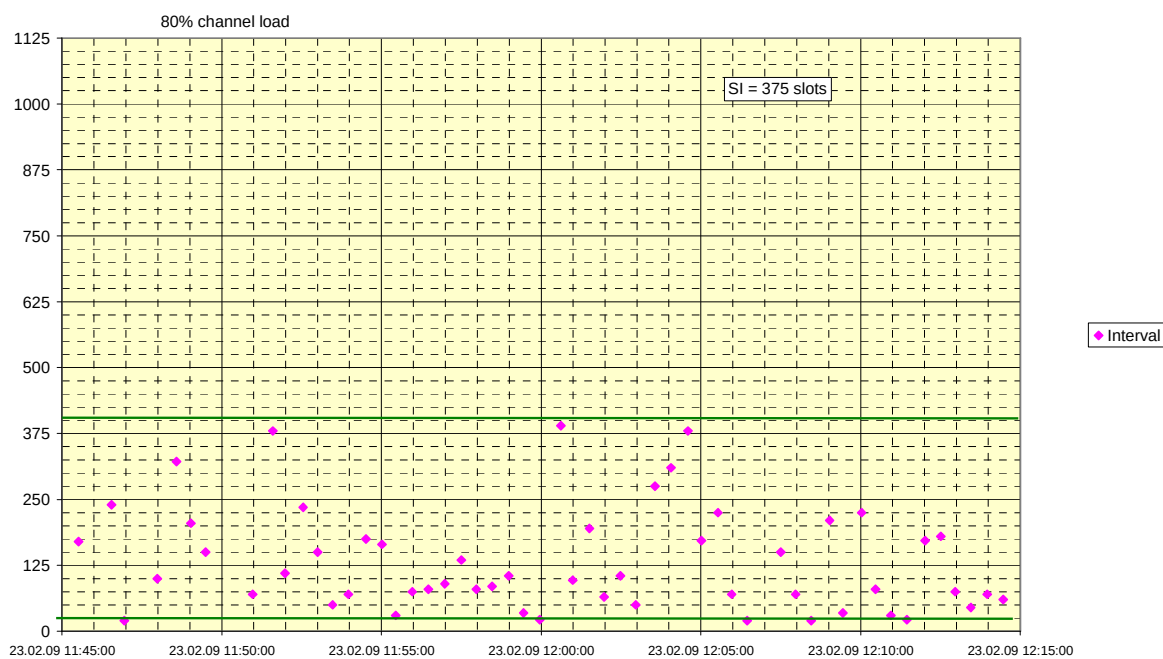


C.8 12.6.1 Autonomous mode allocation

2009-02-23 Ba - Weatherdock EasyTRX2 - 12.6.1 Autonomous mode allocation

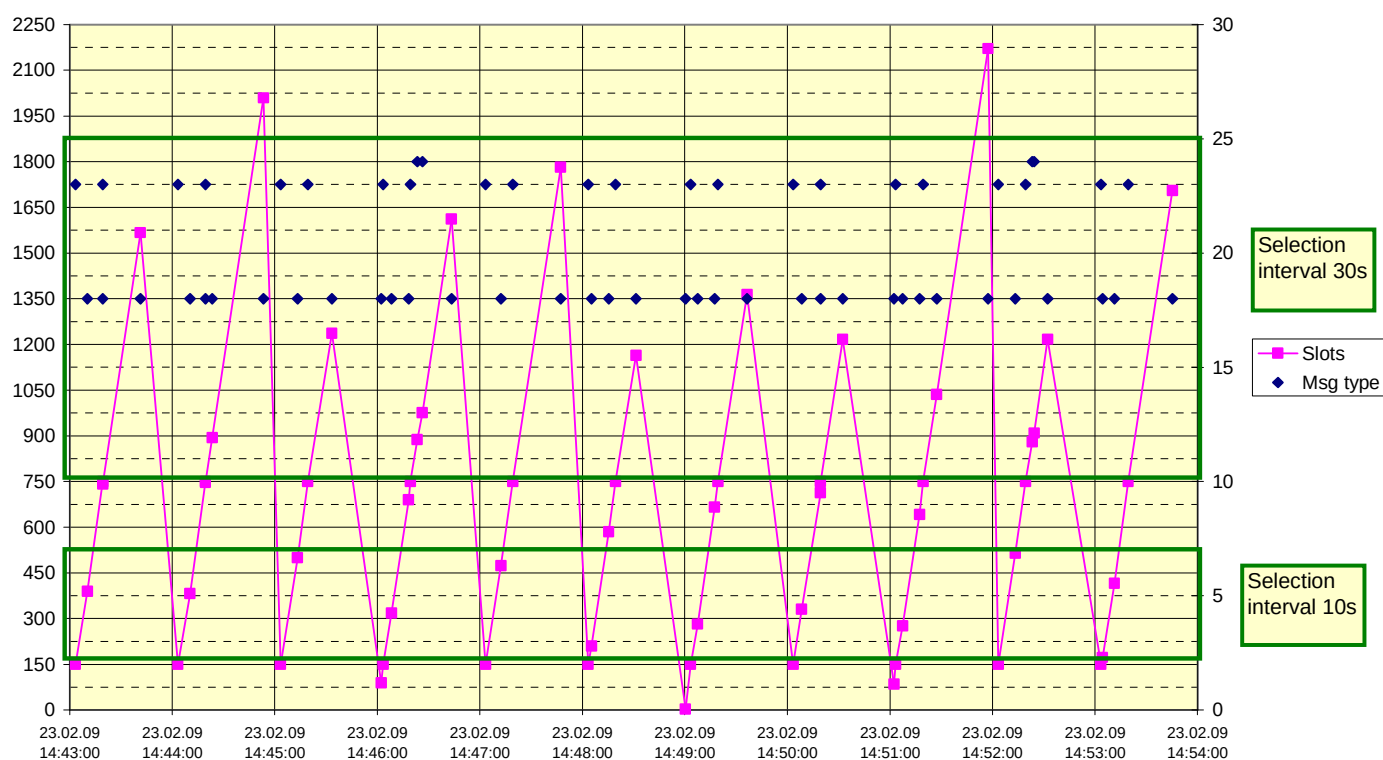


2009-02-23 Ba - Weatherdock EasyTRX2 - 12.6.1 Autonomous mode allocation



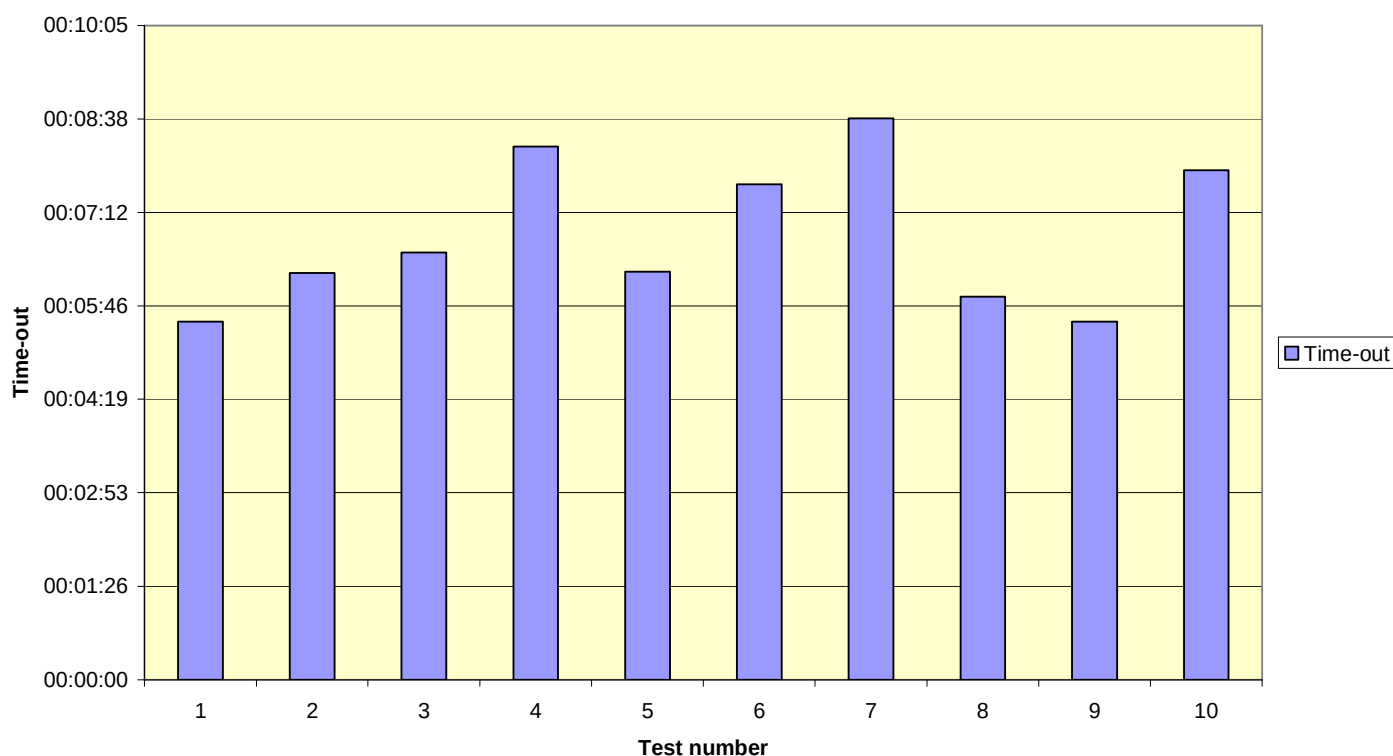
C.9 12.7.2 Entering rate assignment

2009-02-23 Ba - Weatherdock easyTRX2 - 12.7.2 Entering rate assignment



C.1012.7.3 Reverting from rate assignment

2009-02-24 Ba Test 12.7.3 Reverting from rate assignment



Annex D Photos of equipment under test

D.1 Transponder Unit





D.2 GPS antenna

