Bundesrepublik Deutschland
Federal Republic of Germany

Bundesamt für Seeschifffahrt und Hydrographie
Federal Maritime and Hydrographic Agency

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Conformance test report of an

AIS AtoN system

Equipment under test:	**SRT**
Type:	**CARBON 418-0002**

Applying test standards: IEC 62320-2 (2008)   Section 8

Test Report No.:   BSH/46162/4322093/12-1

Applicant:

SRT Marine Technology
Wireless House, Westfield Industrial Estate,
Midsomer Norton
BA3 4BS Bath
United Kingdom

Hamburg, 27 November 2012
For the Federal Maritime and Hydrographic Agency

Heinrich Bartels
Test engineer

Hans-Karl von Arnim
Head of section

nach EN ISO/IEC 17025:2005
akkreditiertes Prüflaboratorium

Deutscher
Akkreditierungs
Rat

DAT-P-086/98

Federal Maritime and Hydrographic Agency
Bernhard-Nocht-Str. 78

D-20359 Hamburg
Germany

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Version 2.2

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The **TGA GmbH**, represented by the **DATech Deutsche Akkreditierungsstelle Technik in der TGA GmbH**, confirms that the Testing Laboratory

Federal Maritime and Hydrographic Agency
Department Shipping
Laboratory for Type Approvals
Bernhard-Nocht-Straße 78

20359 Hamburg

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

Marine Equipment (Navigation Equipment, Radio-Communication Equipment, Life-Saving Appliances)

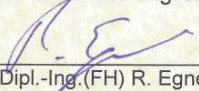according to the annexed list of standards and specifications.

The accreditation is valid until: **2013-12-22**

The annex is deemed part of this certificate and comprises **8** pages.

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

Frankfurt/Main, 2008-12-23

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

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

Member in EA, ILAC, IAF

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

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General

Applicant:	SRT Marine Technology Wireless House, Westfield Industrial Estate, Midsomer Norton, BA3 4BS Bath, United Kingdom

Equipment under test:

Type:	CARBON 418-0002
Manufacturer:	SRT Marine Technology
	Wireless House, Westfield Industrial Estate, Midsomer Norton, BA3 4BS Bath, United Kingdom
Place of test:	BSH test laboratory Hamburg, Room 916
Start of test:	05 March 2012
End of test:	30 August 2012

Test standards[1]:

IEC 62320-2 (2008)
Maritime navigation and radiocommunication equipment and systems-
Automatic Identification System (AIS) -
Part 2: AIS AtoN Stations - Operational and performance requirements, methods of testing and required test results

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[1] Numbers listed in the titles of the test sections of this report refer to the respective sections of IEC 62320-2 if not stated otherwise.

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Summary of Section 8 Functional Tests

Test No.	Reference	Section	Result (passed/ not passed / not applicable / not tested)
1	IEC 62320-2	8.1 Tests for configuration method	Passed
2	IEC 62320-2	8.2 Tests for synchronisation accuracy	Passed
3	IEC 62320-2	8.3 Tests for EPFS	Passed
4	IEC 62320-2	8.4 Additional Messages	Passed
5	IEC 62320-2	8.5 Additional Functionality	Passed
6	IEC 62320-2	8.6 Tests for BIIT	Passed
7	IEC 62320-2	8.7 Transmitter shutdown procedure	Passed
8	IEC 62320-2	8.8 Tests for power supply	Passed
9	IEC 62320-2	8.9 Environmental tests	Not included
10	IEC 62320-2	8.10 Other tests	Passed

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1   General

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	Carbon	Part No.:		418-0002
Delivery date	2012-03-05	Serial number		Prototype EP01
HW Version:	Delivery date	2012-03-05	Version no	EP01
	Installation date	2012-03-05		
SW Version:	Delivery date	2012-03-05	Version no	080200.00.05.02
	Installation date	2012-03-05		
	Installation date			
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	MA-700	Part No.:		
Delivery date	2012-03-05	Serial number		024016
HW Version:	Delivery date	2012-03-05	Version no	---
	Installation date	2012-03-05		

1.1.2 EUT system no 2

Transponder				
Type	Carbon TRS AtoN	Part No.:	---	
Delivery date	2012-07-23	Serial number	P216FTU029	
HW Version:	Delivery date	2012-07-23	Version no	
	Installation date	2012-07-23		
SW Version:	Delivery date	2012-07-23	Version no	080200.00.09.09
	Installation date	2012-07-23		
SW Version:	Delivery date	2012-07-25	Version no	080200.00.09.10
	Installation date	2012-07-25		
SW Version:	Delivery date	2012-07-25	Version no	080200.00.09.11
	Installation date	2012-07-25		
SW Version:	Delivery date		Version no	
	Installation date			

GPS antenna				
Type	MA-700	Part No.:		
Delivery date	2012-03-05	Serial number	024016	
HW Version:	Delivery date	2012-03-05	Version no	---
	Installation date	2012-03-05		

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.

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

Equipment no	Start of test	End of test	Test engineer
1	2012-03-05	2012-03-06	Bartels
2	2012-07-23	2012-07-26	Bartels
Documentation	2012-08-22	2012-08-30	Bartels

1.3   Composition

Type of AIS AtoN Station
☒ Type 1   ☐ Type 2   ☐ Type 3

Configuration method
☒ Standard PI sentences   ☒ Proprietary manufacturer sentences

☐ Control receiver   ☐ AIS Standard VDL messages

Positioning device
☒ EPFS and surveyed position   ☐ Surveyed position only

Transmission
☐ Single channel transmission   ☒ Tx message 21 for synthetic/ virtual AtoN

Transmit power: 12.5 W

Access mode msg 21
☒ FATDMA   ☐ RATDMA (type 3 only)

Access mode other messages
☒ FATDMA   ☐ RATDMA (type 3 only)   ☐ CSTDMA (type 3 only)

Syncronisation:
☐ Indirect UTC (type 3 only)   ☐ Semaphore station (type 3 only=

Chaining: ☐ chaining implemented (type 2 and 3 only)

Implemented alternatives
According to last column of table 1

Option	For AtoN type	Implemented	Remark
Tx of message 6	1, 2, 3	yes	
Tx of message 7	3	No	
Tx of message 8	1, 2, 3	yes	
Tx of message 12	1, 2, 3	yes	
Tx of message 13	3	No	
Tx of message 14	1, 2, 3	yes	
Tx of message 25	1, 2, 3	yes	

External Interfaces: RS232

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: 2011-04-27

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[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

1.5   General observations

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

General problems			
Date	Item	Remark	Result

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2   8 Functional tests

2.1   8.1 Tests for configuration method

For all of the functional tests the setup for the method of measurement shall be as defined by

the manufacturer:

- *using standard configuration sentences via direct connection to an interface, or*

- *using standard configuration sentences via VDL, or*

- *using the manufacturer's proprietary method.*

2012-03-05 Ba	Test details - Configuration methode	
Configuration methode	Remark	Result
Standard configuration sentences		Passed
Standard configuration sentences via VDL	Not implemented	N/A
Proprietary methode	Not implemented	N/A

2.1.1 8.1.1 Configure test Message 21

8.1.1.1 Purpose

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

8.1.1.2 Method of measurement

Set-up the standard test environment.

a) *Configure the EUT with the following parameters for transmission of Message 21:*

- *MMSI number: 991234567;*

- *type of AtoN: "20" – Cardinal Mark North;*

- *name of AtoN: "TEST FLOATING AIS ATON STATION";*

- *position accuracy: to accuracy of EPFS;*

- *assigned position (longitude and latitude): "within off-position threshold of current EPFS position";*

- *dimension/reference for position: "A=B=C=D=5";*

- *type of EPFS: Enter EUT's EPFS type (for example "1" for GPS);*

- *off-position threshold: 200 m;*

- *set power level;*

- *channel 1 set to channel 2087; if receiver supported, set channel 1 receiver to same;*

- *channel 2 set to channel 2088; if receiver supported, set channel 2 receiver to same;*

- *Virtual AtoN Flag set to 0 = default = Real AtoN at indicated position;*

- *set AtoN status default (00000000);*

- *off-position behaviour set to "maintain current transmission schedule";*

- *set UTC lost behaviour as per manufacturer's declaration;*

Read configuration from EUT.

b) *Remove power from the EUT for 5 min. Switch on the EUT. Read configuration from EUT.*

NOTE   *Standard configuration sentences via configuration port: the Message 21 content is configured using the AID, ACF and ACE sentence combination.*

Standard configuration sentences via VDL: the Message 21 content is configured via VDL using Message 25 or Message 6 with the appropriate application identifier/function identifier and binary data.

8.1.1.3 Required results

Verify that configuration is:

a) *accepted by EUT and that the parameters have been correctly set;*

b) *retained after power cycle.*

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2.1.1.1   Configuration using AID, ACF and ACE sentence combination

2012-03-05 Ba	Test details - Configuration using AID, ACF and ACE sentence combination Check by query for AID, ACF and ACE		
Test item	Check	Remark	Result
Apply AID, ACF and ACE sentence combination with an appropriate configuration.			
Query for AID	Check that there is an output of AID for each MMSI		Passed
	Check MMSI of AtoN	990123456	Passed
	Check create/ delete field = null		Passed
	Check MMSI		Passed
	Check virtual, real or chained		Passed
	Check Sentence status flag = "R"		Passed
Query for ACE	Check MMSI of AtoN	990123456	Passed
	Check AtoN status	00	Passed
	Check Off-position threshold	200	Passed
	Check Ackn. procedure (0/1)	0	Passed
	Check Off-positon behaviour (0/1)	0	Passed
	Check Synch lost behaviour (0/1)	Config value: 1 Response: 0 because there are no receivers for alternative sync modes	Passed
	Check Name of AtoN		Passed
	Check dimensions		Passed
	Check Sentence status flag = "R"		Passed

Query for ACF	Check that there is an output of ACE on response		Passed
	Check MMSI		Passed
	Check type of EPFS	= 1 (Internal GNSS)	Passed
	Check latitude – N/S		Passed
	Check longitude – E/W		Passed
	Check position accuracy (0/1)		Passed
	Check Rx channel 1	2084 (not used)	Passed
	Check Rx channel 2	2086 (not used)	Passed
	Check Tx channel 1	2084	Passed
	Check Tx channel 2	2086	Passed
	Check Power level	Only 12.5 W power level is supported. If configured to other values the value is stored. I recommend to respond with the actually used power level to avoid confusion, in this case to output always 0 because 0 is the actal power setting Retest 2012-07-24 Ba: Power level 0 (12.5 W) and 1 (1 W) are supported and successfully tested. Other values are also stored but do not effect the power level. Retests 2012-07-25 Ba: Other values than 0 and 1 are ignored and not stored	Passed
	Check Type of AtoN	20	Passed
	Check virtual flag	0 (real aton)	Passed
	Check Sentence status flag = "R"		Passed

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2012-03-05 Ba	Test details - Configuration using AID, ACF and ACE sentence combination Check of message 21 transmission		
Test item	Check	Remark	Result
Apply AID, ACF and ACE sentences with an appropriate configuration.			
Check transmission of message 21	Check that message 21 is transmitted		Passed
	Check channels A and B		Passed
Check content of message 21	Check message ID		Passed
	Check Repeat indicator	= 0	Passed
	Check MMSI		Passed
	Check Type of AtoN		Passed
	Check Name of AtoN		Passed
	Check longitude		Passed
	Check latitude		Passed
	Check dimensions		Passed
	Check type of EPFS		Passed
	Check time stamp		Passed
	Check off position indicator	= 0	Passed
	Check AtoN status	224 (111 00000bin)	Passed
	Check RAIM flag	= 1	Passed
	Check Virtual AtoN flag	= 0	Passed
	Check assigned mode flag	= 0	Passed
	Check Name of AtoN extension		Passed

2.1.1.2 Check that configuration is retained after power cycle

2012-03-05 Ba	Test details - Configuration using AID, ACF and ACE sentence combination Check by query for VDL response		
Test item	Check	Remark	Result
Remove the power for 5 min. Switch on the EUT and check the configuration			
Query for AID	Check that there is an output of AID for each MMSI		Passed
	Check MMSI of AtoN		Passed
	Check create/ delete field = null		Passed
	Check MMSI		Passed
	Check virtual, real or chained		Passed
	Check Sentence status flag = "R"		Passed
			Passed
Query for ACE	Check MMSI of AtoN		Passed
	Check AtoN status		Passed
	Check Off-position threshold		Passed
	Check Ackn. procedure (0/1)		Passed
	Check Off-positon behaviour (0/1)		Passed
	Check Synch lost behaviour (0/1)		Passed
	Check Name of AtoN		Passed
	Check dimensions		Passed
	Check Sentence status flag = "R"		Passed
Query for ACF	Check that there is an output of ACE on response		Passed
	Check MMSI		Passed
	Check type of EPFS		Passed
	Check latitude – N/S		Passed
	Check longitude – E/W		Passed
	Check position accuracy (0/1)		Passed
	Check Rx channel 1		Passed
	Check Rx channel 2		Passed
	Check Tx channel 1		Passed
	Check Tx channel 2		Passed
	Check Power level		Passed
	Check Type of AtoN		Passed
	Check virtual flag		Passed
	Check Sentence status flag = "R"		Passed

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2012-03-05 Ba	Test details - Configuration using AID, ACF and ACE sentence combination Check of message 21 transmission		
Test item	Check	Remark	Result
After power off for 5 minute check the content of message 21			
Check transmission of message 21	Check that message 21 is transmitted		Passed
	Check channels A and B		Passed
Check content of message 21	Check message ID		Passed
	Check Repeat indicator		Passed
	Check MMSI		Passed
	Check Type of AtoN		Passed
	Check Name of AtoN		Passed
	Check longitude		Passed
	Check latitude		Passed
	Check dimensions		Passed
	Check type of EPFS		Passed
	Check time stamp		Passed
	Check off position indicator		Passed
	Check AtoN status		Passed
	Check RAIM flag		Passed
	Check Virtual AtoN flag		Passed
	Check assigned mode flag		Passed
	Check Name of AtoN extension		Passed

2.1.2   8.1.2 Schedule mode A FATDMA Message 21 (single report, alternating channel operation)

8.1.2.1 Purpose

Test that the AIS AtoN Station operates in accordance with the configured reporting schedule

(see 5.2.4.1).

8.1.2.2 Method of measurement

Set-up the standard test environment and use the configuration as defined in 8.1.1.

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

• *start on Channel 2;*

• *start slot: 512;*

• *reporting interval: 3 min;*

• *frame for the first transmission in every UTC hour: UTC minute: 1;*

• *start the EUT 2 min ahead of a schedule transmission.*

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

If Synthetic and Virtual AIS AtoN Message 21 reports are implemented (see 5.2.1.1.2):

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

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

NOTE   *Standard configuration sentences via configuration port: the Schedule for Mode A FATDMA transmission is configured using the AAR sentence.*

Standard configuration sentences via VDL: the schedule for Mode A FATDMA transmissions via VDL is configured using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data.

8.1.2.3 Required results

Verify that the:

a)   *EUT transmits Test Message 21 in the configured slots on both channels. EUT starts transmission in the correct UTC frames and alternates channels at the reporting intervalwithin one reporting interval (3 min in this case), and should not wait until UTC minute 1.(The channel 1 transmissions shall occur in minutes 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58 with an increment of 6 min, The channel 2 transmissions shall occur in minutes 1, 7, 13, etc. with an increment of 6 min.);*

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

If Synthetic and Virtual AIS AtoN Message 21 reports are implemented:

c)   *Message 21 repeat indicator is 3;*

d)   *Message 21 Virtual flag is set.*

2.1.2.1 Configuration using AAR sentence

2012-03-05 Ba	Test details - Configuration by AAR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration			
Query for AAR sentence			
Check the contents of the AAR	Check that there is an output of AAR on response	UTC 15:02	Passed
	Check MMSI		Passed
	Check message ID = 21		Passed
	Check message index (1)	= 1	Passed
Channel 1	Check UTC hour and minute	06 04	Passed
	Check start slot	512	Passed
	Check slot interval	13500	Passed
FATDMA or RATDMA/CSTDMA setup	Check value = 0 (FATDMA)	0	Passed
Channel 2	Check UTC hour and minute	06 01	Passed
	Check start slot	512	Passed
	Check slot interval	13500	Passed
	Check Sentence Status Flag = "R"		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that message 21 is transmitted in minute 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58		Passed
	Check Tx slot = 512		Passed
Transmission on channel 2	Check that message 21 is transmitted in minute 1, 7, 13, 19, 25, 31, 37, 43, 49, 55		Passed
	Check Tx slot = 512		Passed
Check transmission over hour boundary			
Channel 1	Check that transmission continues in the configured schedule		Passed
Channel 2	Check that transmission continues in the configured schedule		Passed
Check transmission over day boundary			
Channel 1	Check that transmission continues in the configured schedule		Passed
Channel 2	Check that transmission continues in the configured schedule		Passed

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If Synthetic and Virtual AIS AtoN Message 21 reports are implemented:			
c) Apply ACF sentence with Virtual flag set to 2 = synthetic AtoN	Check that repeat indicator > 0	= 3	Passed
	Check that virtual flag in message 21 = 0	= 0	Passed
d) Apply ACF sentence with Virtual flag set to 1 = virtual AtoN	Check that virtual flag in message 21 = 1	UTC 13:38	Passed

2.1.3   8.1.3 Schedule mode B FATDMA Message 21 (dual report, dual channel operation)

8.1.3.1 Purpose

Test that the AIS AtoN Station operates in accordance with configured reporting schedule 5.2.4.2.1 and transmits correct data.

8.1.3.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1.

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

- *start Channel 1: start slot 512;*

- *Channel 2: start slot: 612;*

- *reporting interval: 3 min,*

- *frame for the first transmission in every UTC hour: UTC minute 2;*

- *start the EUT 2 min ahead of a schedule transmission.*

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

NOTE   Standard configuration sentences via configuration port: the schedule for Mode B FATDMA transmission is configured using the AAR sentence.
Standard configuration sentences via VDL: the schedule for Mode B FATDMA transmissions via VDL is configured using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data.

8.1.3.3 Required results

Verify that the:

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

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

2.1.3.1   Configuration using AAR sentence

2012-03-05 Ba	Test details - Configuration by AAR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration			
Query for AAR sentence			
Check the contents of the AAR	Check that there is an output of AAR on response	UTC 14:40	Passed
	Check MMSI		Passed
	Check message ID = 21		Passed
	Check message index (1)		Passed

Channel 1	Check UTC our and minute		Passed
	Check start slot		Passed
	Check slot interval		Passed
FATDMA or RATDMA/CSTDMA setup	Check value = 0 (FATDMA)		Passed
Channel 2	Check UTC hour and minute		Passed
	Check start slot		Passed
	Check slot interval		Passed
	Check Sentence Status Flag = "R"		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that message 21 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.		Passed
	Check Tx slot = 1512		Passed
Transmission on channel 2	Check that message 21 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.		Passed
	Check Tx slot = 1612		Passed
Check transmission over hour boundary			
Channel 1	Check that transmission continues in the configured schedule		Passed
Channel 2	Check that transmission continues in the configured schedule		Passed
Check transmission over day boundary			
Channel 1	Check that transmission continues in the configured schedule		Passed
Channel 2	Check that transmission continues in the configured schedule		Passed

2.1.4   8.1.4 Schedule mode C FATDMA Message 21 (Single report, single channel operation)

8.1.4.1 Purpose

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

8.1.4.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1.

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

- transmit channel: A or B;

- start slot: 512;

- reporting interval: 3 min;

- frame for the first transmission in every UTC hour: UTC minute: 1;

- start the EUT 2 min ahead of a schedule transmission;

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

NOTE   *Standard configuration sentences via configuration port: the schedule for Mode C FATDMA transmission is configured using the AAR sentence.*

Standard configuration sentences via VDL: the schedule for Mode C FATDMA transmissions via VDL is configured using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data.

8.1.4.3 Required results

Verify that the:

a)   EUT transmits test Message 21 in the configured slots on the designated transmit channel, EUT starts transmission in the correct UTC frame on the designated transmit channel at the reporting interval within one reporting interval and should not wait until UTC minute 1;

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

2.1.4.1 Configuration using AAR sentence

2012-03-05 Ba	Test details - Configuration by AAR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration, transmission on channel B			
Query for AAR sentence			
Check the contents of the AAR	Check that there is an output of AAR on response	UTC 14:48	Passed
	Check MMSI		Passed
	Check message ID = 21		Passed
	Check message index (1)		Passed
Channel 1	Check no schedule	Old schedule	Passed
	Check no start slot	-1	Passed
	Check no interval	Old interval	Passed
FATDMA or RATDMA/CSTDMA setup	Check value = 0 (FATDMA)		Passed
Channel 2	Check UTC hour and minute		Passed
	Check start slot		Passed
	Check slot interval		Passed
	Check Sentence Status Flag = "R"		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that there is no transmission on channel A	Tested also with transmission on channel A only.	Passed
Transmission on channel 2	Check that message 21 is transmitted in minute 0, 3, 6, 9, ... reporting interval = 3 min.		Passed
	Check Tx slot = 1812		Passed
Check transmission over hour boundary			
Channel 1	Check no transmission		Passed
Channel 2	Check that transmission continues in the configured schedule		Passed
Check transmission over day boundary			
Channel 1	Check no transmission		Passed
Channel 2	Check that transmission continues in the configured schedule		Passed

2.1.5   8.1.5 Schedule mode A RATDMA Message 21 (Type 3) (single report, alternating channel operation)

8.1.5.1 Purpose

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

This test is not applicable for a type 1 AtoN

2.1.6   8.1.6 Schedule mode B RATDMA Message 21 (Type 3) (dual report, dual channel operation)

8.1.6.1 Purpose

The purpose of this test is to ensure that the AIS AtoN Station can be configured to operate in accordance with 5.2.4.2.

This test is not applicable for a type 1 AtoN

2.1.7   8.1.7 Schedule mode C RATDMA Message 21 (Type 3) (single channel operation)

8.1.7.1 Purpose

The purpose of this test is to ensure that the AIS AtoN Station can be configured to operate in accordance with 5.2.4.2.

This test is not applicable for a type 1 AtoN

2.1.8   8.1.8 Addressed binary data Message 6

8.1.8.1 Purpose

The purpose of this test is to verify that the Message 6 operation of the EUT using the implemented access methods.

8.1.8.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1 and transmission schedule for Message 21 as defined in 8.1.2 with an "intended recipient" MMSI.

The recipient shall acknowledge the message.

a)   *Configure the EUT as defined by manufacturer's documentation for transmission of a scheduled addressed binary data Message 6 with test binary data consisting of the bit pattern Hex "7E 3B 3C 3E 7E" forming a message by setting the parameters for the following operation modes, where implemented:*

- *FATDMA (see 8.1.2 for Mode A setup; 8.1.3 for Mode B setup; 8.1.4 for Mode C setup);*

- *RATDMA (see 8.1.5 for Mode A setup; 8.1.6 for Mode B setup; 8.1.7 for Mode C setup);*

- *CSTDMA: time (hour, minute), channel(s), reporting interval.*

b)   *Repeat the test without an acknowledgement from the intended recipient.*

c)   *If possible to use externally generated data, repeat the test exceeding the maximum length of Message 6.*

d)   *Repeat the test for the maximum length of Message 6 by repeating the bit pattern Hex "7E 3B 3C 3E 7E" sequence in the binary data field.*

8.1.8.3 Required results

Verify that the EUT continues transmitting Message 21 in all cases and that:

a) the message sent by the EUT conforms to message content, access method, channel, slot number and reporting interval;

b) the EUT behaves as configured;

c) the message is not sent;

d) the message is sent with the correct content.

NOTE CSTDMA access of Message 6 should comply with IEC 62287-1 with regard of VDL access and message length.

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2.1.8.1 Configuration using AAR/MPR sentence

2012-07-23 Ba	Test details - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 6 payload			
Apply an AID sentence to set the destination MMSI (with Virtual, real or chained filed = 0)			
Query for AAR sentence			
Check the contents of the AAR response	Check that there is an output of AAR on response		Passed
	Check message ID = 6		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that message 6 is transmitted in minute 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58		Passed
	Check Tx slot = 600		Passed
Transmission on channel 2	Check that message 6 is transmitted in minute 1, 7, 13, 19, 25, 31, 37, 43, 49, 55		Passed
	Check Tx slot = 600		Passed
Message content	Check destination MMSI		Passed
	Check the content of message 6		Passed

2012-07-23 Ba	Test details - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode B			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 6		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Transmission on channel 1	Check that message 6 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.		Passed
	Check Tx slot = 600		Passed
Transmission on channel 2	Check that message 6 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.		Passed
	Check Tx slot = 700		Passed
Message content	Check destination MMSI	= 0	Passed
	Check the content of message 6		Passed

2012-07-23 Ba	Test details - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode C			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 6		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Transmission on channel 1	Check that there is no transmission on channel A		Passed
Transmission on channel 2	Check that message 6 is transmitted in minute 1,4,7 ..., reporting interval = 3 min.		Passed
	Check Tx slot = 600		Passed
Message content	Check destination MMSI		Passed
	Check the content of message 6		Passed

2012-07-23 Ba	Test details b) - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 6 payload			
Apply an AID sentence to set the destination MMSI			
Do not apply an acknowledgement on message 6			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 6	This test is not relevant for a type 1 AtoN which cannot receive an acknowledgement	N/A

2012-07-23 Ba	Test details c) - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 6 payload, exceeding the maximum length of Message 6.			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 6	14:03	Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
	Check that message 6 is not transmitted	UTC 14:35 The MPR command is ignored. The payload of a previous valid MPR is transmitted.	Passed

2012-07-23 Ba	Test details d) - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 6 payload, with the maximum length of Message 6.			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 6	UTC 13:52	Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
	Check that message 6 is transmitted		Passed
	Check message content		Passed

2.1.9   8.1.9 Unscheduled transmission

8.1.9.1 Purpose

Unscheduled transmissions are those transmissions that are not planned, and the competent authority wishes the AtoN Station to broadcast autonomously such as an unexpected alarm condition. The VDL access method for these message types is as defined by manufacturer.

This test will verify the AtoN operation when such a message is input.

2012-07-24 Ba:
The manufacturer declares in document LD4167, issue: 4, 24 July 2012, that this function is not implemented.

2.1.10 8.1.10 Test Message 8

8.1.10.1 Purpose

The purpose of this test is to verify that Message 8 can be entered into the EUT.

8.1.10.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1 and transmission schedule for Message 21 as defined in 8.1.2.

a)   *Configure the EUT as defined by the manufacturer's documentation for transmission of a scheduled binary data Message 8 with test binary data consisting of the bit pattern Hex "7E 3B 3C 3E 7E" forming a message by setting the parameters for the following operation modes, where implemented:*

- *FATDMA (see 8.1.2 for mode A setup; 8.1.3 for mode B setup; 8.1.4 for mode C setup);*

- *RATDMA (see 8.1.5 for mode A setup; 8.1.6 for mode B setup; 8.1.7 for mode C setup);*

- *CSTDMA: time (hour, minute), channel(s), reporting interval.*

b)   *If possible, use externally generated data, repeat the test exceeding the maximum length of Message 8.*

c)   *Repeat the test for the maximum length of Message 8 by repeating the bit pattern Hex "7E 3B 3C 3E 7E" sequence in the binary data field.*

8.1.10.3 Required results

Verify that:

a)   *the message sent by the EUT conforms to message content, access method, channel, slot number and reporting interval;*

b)   *message is not sent;*

c)   *message is sent with the correct content.*

In all cases, the EUT should continue transmitting Message 21.

NOTE CSTDMA access of Message 6 should comply with IEC 62287-1 with regard to VDL access and message length.

2012-07-23 Ba	Test details a) - FATDMA Mode A		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 8 payload			
Query for AAR sentence			
Check the contents of the AAR response	Check that there is an output of AAR on response		Passed
	Check message ID = 8		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that message 8 is transmitted in minute 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58		Passed
	Check Tx slot = 800		Passed
Transmission on channel 2	Check that message 8 is transmitted in minute 1, 7, 13, 19, 25, 31, 37, 43, 49, 55		Passed
	Check Tx slot = 800		Passed
Message content	Check the content of message 8		Passed

2012-07-23 Ba	Test details a) - FATDMA Mode B		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode B			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 8		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Transmission on channel 1	Check that message 8 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.		Passed
	Check Tx slot = 800		Passed
Transmission on channel 2	Check that message 8 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.		Passed
	Check Tx slot = 900		Passed
Message content	Check the content of message 8		Passed

2012-07-23 Ba	Test details a) - FATDMA Mode C		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode C			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 8		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Transmission on channel 1	Check that there is no transmission on channel A		Passed
Transmission on channel 2	Check that message 8 is transmitted in minute 1,4,7 ..., reporting interval = 3 min.		Passed
	Check Tx slot = 800		Passed
Message content	Check the content of message 8		Passed

2012-07-23 Ba	Test details b) - Too long sentence			
Test item	Check	Remark		Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A				
Apply a MPR sentence with the message 8 payload, exceeding the maximum length of Message 8.				
Query for AAR sentence				
Check the contents of the AAR response	Check message ID = 8			Passed
	Check message index (1)			Passed
	Check the test schedule setting			Passed
Check transmission schedule on VDL				
	Check that message 8 is not transmitted	UTC 14:31 The MPR command is ignored. The payload of a previous valid MPR is transmitted.		Passed

2012-07-23 Ba	Test details c) - Maximum length sentence			
Test item	Check	Remark		Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A				
Apply a MPR sentence with the message 8 payload, with the maximum length of Message 8.				
Query for AAR sentence				
Check the contents of the AAR response	Check message ID = 8	UTC 14:25		Passed
	Check message index (1)			Passed
	Check the test schedule setting			Passed
Check transmission schedule on VDL				
	Check that message 8 is transmitted			Passed
	Check message content	MPR data bits: 546 Data bits: 544		Passed

2.1.11 8.1.11 AIS AtoN configuration Messages 12

Repeat tests 8.1.8 and 8.1.9 for Message 12.

2012-07-23 Ba	Test details - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 6 payload			
Apply an AID ??? sentence to set the destination MMSI			
Query for AAR sentence			
Check the contents of the AAR response	Check that there is an output of AAR on response		Passed
	Check message ID = 12		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that message 12 is transmitted in minute 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58		Passed
	Check Tx slot = 1200		Passed
Transmission on channel 2	Check that message 12 is transmitted in minute 1, 7, 13, 19, 25, 31, 37, 43, 49, 55		Passed
	Check Tx slot = 1200		Passed
Message content	Check destination MMSI		Passed
	Check the content of message 12		Passed

Note)
For text messages it cannot be guaranteed that the message length matches byte boundaries. The normal user who generates the text normally does not take care of byte boundaries.

Therefore the equipment should take care that all characters are transmitted. If necessary it has to fill up the message with fill bits to the next byte boundary. It is not ok if it cuts the message down to the next byte boundaries. In this case the last character would not be transmitted.

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2012-07-23 Ba	Test details - Configuration by AAR/ MPR sentence			
Test item	Check	Remark		Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode B				
Query for AAR sentence				
Check the contents of the AAR response	Check message ID = 12			Passed
	Check message index (1)			Passed
	Check the test schedule setting			Passed
Check transmission schedule on VDL				
Transmission on channel 1	Check that message 12 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.			Passed
	Check Tx slot = 1200			Passed
Transmission on channel 2	Check that message 12 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.			Passed
	Check Tx slot = 1300			Passed
Message content	Check destination MMSI			Passed
	Check the content of message 12			Passed

2012-07-23 Ba	Test details - Configuration by AAR/ MPR sentence			
Test item	Check	Remark		Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode C				
Query for AAR sentence				
Check the contents of the AAR response	Check message ID = 12			Passed
	Check message index (1)			Passed
	Check the test schedule setting			Passed
Check transmission schedule on VDL				
Transmission on channel 1	Check that message 12 is transmitted in minute 1,4,7 ..., reporting interval = 3 min.			Passed
	Check Tx slot = 1200			Passed
Transmission on channel 2	Check that there is no transmission on channel B			Passed
Message content	Check destination MMSI			Passed
	Check the content of message 12			Passed

2012-07-23 Ba	Test details b) - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 12 payload			
Apply an AID sentence to set the destination MMSI			
Do not apply an acknowledgement on message 12			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 12	This test is not relevant for a type 1 AtoN which cannot receive an acknowledgement	N/A

2012-07-23 Ba	Test details c) - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 12 payload, exceeding the maximum length of Message 12.			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 12	14:03	Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
	Check that message 12 is not transmitted	UTC 14:39 The MPR command is ignored. The payload of a previous valid MPR is transmitted.	Passed

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2012-07-23 Ba	Test details d) - Configuration by AAR/ MPR sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 12 payload, with the maximum length of Message 12.			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 12	UTC 13:52, 14:37	Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
	Check that message 6 is transmitted		Passed
	Check message content		Passed

2.1.12 8.1.12 AIS AtoN configuration Messages 14

Repeat tests 8.1.10 for Message 14.

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2012-07-23 Ba	Test details a) - FATDMA Mode A		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 8 payload			
Query for AAR sentence			
Check the contents of the AAR response	Check that there is an output of AAR on response		Passed
	Check message ID = 14		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
Start of transmission	Check that EUT starts transmission in the next scheduled slot, not waiting for the UTC hour/minute defined in AAR		Passed
Transmission on channel 1	Check that message 14 is transmitted in minute 4, 10, 16, 22, 28, 34, 40, 46, 52 or 58		Passed
	Check Tx slot = 1400		Passed
Transmission on channel 2	Check that message 14 is transmitted in minute 1, 7, 13, 19, 25, 31, 37, 43, 49, 55		Passed
	Check Tx slot = 1400		Passed
Message content	Check the content of message 14		Passed

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2012-07-23 Ba	Test details a) - FATDMA Mode B			
Test item	Check		Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode B				
Query for AAR sentence				
Check the contents of the AAR response	Check message ID = 14			Passed
	Check message index (1)			Passed
	Check the test schedule setting			Passed
Check transmission schedule on VDL				
Transmission on channel 1	Check that message 8 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.			Passed
	Check Tx slot = 1400			Passed
Transmission on channel 2	Check that message 14 is transmitted in minute 2, 5, 8, ..., reporting interval = 3 min.			Passed
	Check Tx slot = 1500			Passed
Message content	Check the content of message 14			Passed

2012-07-23 Ba	Test details a) - FATDMA Mode C			
Test item	Check		Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode C				
Query for AAR sentence				
Check the contents of the AAR response	Check message ID = 14			Passed
	Check message index (1)			Passed
	Check the test schedule setting			Passed
Check transmission schedule on VDL				
Transmission on channel 1	Check that message 14 is transmitted in minute 1,4,7 ..., reporting interval = 3 min.			Passed
	Check Tx slot = 1400			Passed
Transmission on channel 2	Check that there is no transmission on channel B			Passed
Message content	Check the content of message 14			Passed

2012-07-23 Ba	Test details b) - Too long sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 14 payload, exceeding the maximum length of Message 14.			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 14		Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
	Check that message 14 is not transmitted	UTC 14:39 The MPR command is ignored. The payload of a previous valid MPR is transmitted. If there was no previous MPR command the message is not transmitted.	Passed

2012-07-23 Ba	Test details c) - Maximum length sentence		
Test item	Check	Remark	Result
Apply an AAR sentence with the appropriate configuration for FATDMA mode A			
Apply a MPR sentence with the message 8 payload, with the maximum length of Message 8.			
Query for AAR sentence			
Check the contents of the AAR response	Check message ID = 6	UTC 14:43	Passed
	Check message index (1)		Passed
	Check the test schedule setting		Passed
Check transmission schedule on VDL			
	Check that message 8 is transmitted		Passed
	Check message content		Passed

2.2   8.2 Tests for synchronisation accuracy

2.2.1   8.2.1 Implemented synchronisation modes and synchronisation error

8.2.1.1 Purpose

The purpose is to verify the implemented synchronisation modes and measure the synchronisation error of the EUT.

8.2.1.2 Method of measurement

Set up the standard test environment and operate EUT in normal mode. Set the EUT reporting interval to 1 min for Message 21 and all other implemented messages.

Operate the EUT in all implemented synchronisation modes:

- *EUT using UTC direct synchronisation;*

- *EUT using UTC indirect synchronisation;*

- *EUT using semaphore synchronisation.*

Record VDL messages and measure the time between the nominal beginning of the slot interval and the initiation of the 'transmitter on' function by evaluating the start flag and calculating back to T_0.

8.2.1.3 Required results

The synchronisation error with its additive jitter shall not exceed:

- *± 104 µs using UTC direct synchronisation;*

- *± 312 µs using UTC indirect synchronisation;*

- *± 312 µs referenced to the semaphore's synchronisation.*

2012-03-06 Ba	Test details - Synchronisation Jitter		
Test item	Check	Remark	Result
Set EUT to an reporting interval of 1 min for message 21 Set other implemented messages to an reporting interval of 1 min			
UTC Direct synchronisation	Check that T2 is in the range of 3.328 ms ± 104 µs		Passed
Disconnect the GPS antenna. Provide other AIS station with UTC direct on the VDL	Check that T2 is in the range of 3.328 ms ± 312 µs	Not applicable because it is a type 1 AtoN	N/A
Set other station without UTC	Check that T2 is in the range of 3.328 ms ± 312 µs	Not applicable because it is a type 1 AtoN	N/A

2.2.2   8.2.2 Synchronisation test without UTC (Types 2 and 3)

8.2.2.1 Purpose

The purpose of this test is to verify that the EUT can synchronise without UTC.

This test is not applicable for a type 1 AtoN

2.3   8.3 Tests for EPFS

2.3.1   8.3.1 Position source

8.3.1.1 Purpose

The purpose of this test is to verify that the position source correctly populates the fields in Message 21.

8.3.1.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1.

a)   Using the transmission schedule for Message 21 as defined in 8.1.2, record the EUT transmissions.

b)   Repeat the test with a surveyed position.

8.3.1.3 Required results

Verify that:

a)   the position and time stamp fields are valid;

b)   the EUT has the correct parameter settings for "type of electronic position fixing device" and "RAIM-flag".

2012-03-05 Ba	Test details - Position source		
Test item	Check	Remark	Result
Set EUT to an reporting interval of 1 min for message 21			
Internal GNSS position available	Check that Latitude in msg 21 is correct		Passed
	Check that Longitude in msg 21 is correct		Passed
	Check that time stamp in msg 21 is correct		Passed
	Check that the Type of EPFS in msg 21 is correct	= 20	Passed
	Check PA flag	= 1	Passed
	Check the RAIM flag	= 1	Passed
Valid internal position			
Provide an ACF sentence with a valid position and "Type of EPFS" set to 7 = surveyed			
Surveyed position	Check that Latitude in msg 21 is correct		Passed
	Check that Longitude in msg 21 is correct		Passed
	Check that time stamp in msg 21 is correct	The time stamp is the UTC second when the message is transmitted. Perhaps 61 for Manual input mode may be more appropriate	Passed
	Check that the Type of EPFS in msg 21 is correct	7	Passed
	Check PA flag	= 1	Passed

	Check the RAIM flag	= 0	Passed
Internal position not available Provide an ACF sentence with a valid position and "Type of EPFS" set to 7 = surveyed			
Surveyed position	Check that Latitude in msg 21 is correct	The EUT stops transmission because of missing sync. The latitude in the VDO output is correct	Passed
	Check that Longitude in msg 21 is correct		Passed
	Check that time stamp in msg 21 is correct	TS = 63	Passed
	Check that the Type of EPFS in msg 21 is correct	= 7	Passed
	Check PA flag	= 1	Passed
	Check the RAIM flag	= 0	Passed

2.3.2   8.3.2 Invalid position

8.3.2.1 Purpose

The purpose of this test is to verify that the EUT responds correctly when the EPFS outputs an invalid position.

8.3.2.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1 and transmission schedule for Message 21 as defined in 8.1.2. Prevent the EPFS receiver from generating position fixes.

8.3.2.3 Required results

If the EUT is configured to continue transmission, verify the EUT transmits Message 21 with the parameters latitude and longitude set to "not available" and the time stamp is set to "63".

2012-03-05 Ba	Test details - Invalid position		
Test item	Check	Remark	Result
Set EUT to an reporting interval of 1 min for message 21 Set ACF to use internal position source			
Disable internal position source	Check that Latitude in msg 21 is 91°	The EUT stops t ransmission because of missing sync. The latitude in the VDO is 91°	Passed
	Check that Longitude in msg 21 is 181 °	The longitude in the VDO is 91°	Passed
	Check that time stamp in msg 21 is 63		Passed
	Check that PA flag = 0		Passed
	Check the RAIM flag = 0		Passed

2.3.3   8.3.3 Off-position monitor

8.3.3.1 Purpose

The purpose of this test is to verify that the EUT responds correctly when it is off position.

8.3.3.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1 and transmission schedule for Message 21 as defined in 8.1.2.

a)   *Set the EUT EPFS antenna at its assigned position and with off-position behaviour set to maintain current broadcast schedule.*

b)   *After verification of the off-position indicator in Message 21, the EUT EPFS antenna shall be moved to off-position.*

c)   *Move the EUT EPFS antenna to be on-position.*

d)   *If implemented, configure the EUT with off-position behaviour set to a new reporting interval and the EUT EPFS antenna shall be moved to off-position.*

e)   *After verification of the off-position indicator in Message 21, the EUT EPFS antenna shall be moved to on-position.*

8.3.3.3 Required results

Verify that:

a)   *message 21 has the off-position indicator field set to "0";*

b)   *message 21 has the off-position indicator field set to "1" within a time period stated by the manufacturer and that the original reporting schedule has not changed;*

c)   *message 21 has the off-position indicator field set to "0" within a time period stated by the manufacturer;*

d)   *message 21 has the off-position indicator field set to "1" within a time period stated by the manufacturer and that the original reporting schedule has changed to the new reporting interval;*

e)   *message 21 has the off-position indicator field set to "0" within a time period stated by the manufacturer and the reporting interval returns to the original reporting schedule.*

2012-03-05 Ba	Test details - Off position monitor		
Test item	Check	Remark	Result
a) Set reference position with GPS position inside threshold, Off-position behaviour = 0, off-position threshold = 100. Set Tx schedule to: FATDMA mode A, interval = 3 min Set alternative schedule to: FATDMA mode A, interval = 1 min			
Check configuration	Check off-position behaviour = 0	UTC 12:00	Passed
	Check off-position threshold = 100		Passed
	Check position: EPFS position within threshold		Passed
a) Position on-position	Check off-position flag in msg 21 = 0		Passed
	Check that the normal transmission schedule is used		Passed
b) Position off-position	Check off-position flag in msg 21 = 1		Passed
	Check that the normal transmission schedule is used		Passed
c) Position on-position	Check off-position flag in msg 21 = 0		Passed
	Check that the normal transmission schedule is used		Passed
Off-position behaviour = 1			
Query configuration	Check msg 21, index 1: FATDMA mode A, 3 min		Passed
	Check msg 21, index 2: FATDMA mode A, 1 min		Passed
d) Position off-position	Check off-position flag in msg 21 = 1		Passed
	Check that the alternativ transmission schedule is used		Passed
e) Position on-position	Check off-position flag in msg 21 = 0		Passed
	Check that the normal transmission schedule is used		Passed

2.4   8.4 Additional messages

2.4.1   8.4.1 Receive addressed message (Types 2 and 3)

8.4.1.1 Purpose

The purpose of this test is to verify that the EUT correctly receives and, if so configured, processes an addressed message.

This test is not applicable for a type 1 AtoN.

2.5   8.5 Additional functionality

Tests for additional functionality as implemented by the manufacturer.

2.5.1   8.5.1 Test for configuration of the receiver turn-on times (Types 2 and 3)

8.5.1.1 Purpose

The purpose of this test is to ensure that the operational time period for the receivers can be configured using the configuration port of the EUT or the appropriate VDL message.

This test is not applicable for a type 1 AtoN.

2.5.2   8.5.2 Test for configure proprietary AtoN control

8.5.2.1 Purpose

The purpose of this test is to ensure that the payload of this sentence is used to control the AtoN. The payload can be entered into the EUT using the configuration port of the EUT or the appropriate VDL message.

8.5.2.2 Method of measurement

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

a)   Configure the proprietary AtoN control function of the EUT with the following parameters:

- *MMSI of the AtoN Station,*

- *payload for proprietary AtoN control.*

Using the implemented methods (one or both) enter the appropriate proprietary AtoN control data.

b)   Query the proprietary AtoN control data via configuration port using the query sentence or other means provided by the manufacturer.

c)   Query the proprietary AtoN control data via the VDL and define a FATDMA slot for the VDL replay.

NOTE   Standard configuration sentences via configuration port: the proprietary AtoN control data is configured using the MCR sentence.

Standard configuration sentences via VDL: the proprietary AtoN control data is configured via the VDL using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data.

8.5.2.3 Required results

Verify that:

a) the EUT acts upon the received proprietary AtoN control data;

b) the EUT returns on a query with the appropriate message content via the PI using the MCR PI sentence;

c) the EUT returns on a query via the VDL with the appropriate VDL message on the assigned slot and channel using the appropriate application identifier and binary data.

2012-07-25 Ba	Test details -		
Test item	Check	Remark	Result
The AtoN can be configured using the MCR,SBS (status bit source) to different sources for the status bits. The following settings are possible. In all cases the first 3 bit are set to 111			
0 = ACE sentence	Check that the status bits of message 21 are set according to the ACE sentence.	All 8 status bits are transmitted as defined in the ACE sentence	Passed
1 = Transceiver mode	Check that the status bits of message 21 are set according to the manufacturers definition	The status bits in message 21 depend on the MRC,LRC setting and 3 digital input lines. See the detailed results in the following 2 tables.	Passed
2 = Sensor module		Not implemented	N/A

Table Lamp status:

Fitted Config	Health status I/O 1	On/off status I/O 0	Message 21 Bit 2, 1	Description (62320-2 Annex C)	Decimal value	Remark
0	x	x	00	No Light	224	
1	0 V	0 V	10	Light off	228	
1	0 V	5 V	01	Light on	226	
1	5 V	0 V	11	Light error	230	
1	5 V	5 V	11	Light error	230	

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Table Racon status:

Fitted Config	Monitored Config	RACON error I/O 2	Message 21 Bit 4, 3	Description (62320-2 Annex C)	Decimal value	Remark
0	0	x	00	No RACON installed	224	
1	0	0 V	01	RACON installed, not monitored	232	
1	0	5 V	01		232	
1	1	0 V	11	RACON error	248	
1	1	5 V	10	RACON operational	240	

2.5.3 8.5.3 Test for configuration of payload re-broadcast

8.5.3.1 Purpose

The purpose of this test is to ensure that the EUT can be commanded to rebroadcast the payload or to define a new message for autonomous, continuous transmission. The payload or new message type can be entered into the EUT using the configuration port of the EUT or the appropriate VDL message.

If standard sentences are used, the AAR configuration with message type/id for a specific MPR must precede the MPR to identify it as autonomous continuous transmission. If it is a single transmission, this payload will be broadcast using the slots reserved by the AAR with message id/type = 0, otherwise it will use the schedule defined by the AAR for this message id/type.

This test checks single transmissions of message 6, 8, 12 and 14 defined by MPR sentence (payload) and AAR sentence (tx slot).

2012-07-24 Ba	Test details - Payload re-broadcast		
Test item	Check	Remark	Result
Apply an MPR sentence with Message ID according to the test item, Message ID index = 0 and broadcast behaviour = 0 to the EUT			
Apply an AAR sentence with Message ID according to the test item, Message ID index = 0, and for the Tx channel UTC and Start slot as reqiered for the Tx slot and slot interval = 0.			
Send MPR and AAR sentence for message 6	Check that message 6 is transmitted		Passed
	Check the correct Tx channel		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send MPR and AAR sentence for message 8	Check that message 8 is transmitted		Passed
	Check the correct Tx channel		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send MPR and AAR sentence for message 12	Check that message 12 is transmitted		Passed
	Check the correct Tx channel		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send MPR and AAR sentence for message 14	Check that message 14 is transmitted		Passed
	Check the correct Tx channel		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed

2.5.4   8.5.4 Test for forced broadcast

8.5.4.1 Purpose

The purpose of this test is to ensure that the EUT can be forced to broadcast a specified VDL message via the PI or the VDL.

8.5.4.2 Method of measurement

Set up the standard test environment and operate the EUT in normal mode. Enter the forced broadcast data to the EUT with the following parameters:

- *message type;*

- *message identifier;*

- *VDL channel for message transmission;*

- *time and slot message transmission;*

- *number of consecutive slots for message transmission.*

Using the implemented methods (one or both) enter the appropriate forced broadcast data to the EUT.

NOTE   *Standard configuration sentences via configuration port: the forced broadcast data is configured using the AFB sentence.*

Standard configuration sentences via VDL: the forced broadcast data is configured via the VDL using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data.

8.5.4.3 Required results

Verify that the EUT transmits the requested VDL message at the defined time and slot.

2012-07-24 Ba	Test details - Forced broadcast		
Test item	Check	Remark	Result
Send AFB sentence to PI port			
Send AFB sentence for message 21	Check that message 21 is transmitted		Passed
	Check Tx channel		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send AFB sentence for message 6	Check that message 6 is transmitted		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send AFB sentence for message 8	Check that message 8 is transmitted		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send AFB sentence for message 12	Check that message 12 is transmitted		Passed

	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
Send AFB sentence for message 14	Check that message 14 is transmitted		Passed
	Check that the correct slot (UTC hour, minute and slot number) is used for transmission		Passed
General remark	The message initiated by the AFB sentence is transmitted only if there is an active transmission schedule for the same message type and message index. According to A.5.2 Description this seems to be correct. "already know ... through AAR/MPR or ACE/ACF/AAR configuration"		Passed

2.5.5   8.5.5 Test for version information

8.5.5.1 Purpose

The purpose of this test is to ensure that the EUT can provide version information.

8.5.5.2 Method of measurement

Set up the standard test environment and operate the EUT in normal mode. Enter the query for version information to the EUT using the manufacturer implemented methods.

NOTE   <u>Standard configuration sentences via configuration port</u>: the version information is queried using the QVER sentence and the response is provided using VER.

<u>Standard configuration sentences via VDL</u>: the version information is queried via VDL using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data

8.5.5.3 Required results

Verify that the EUT provides with the requested version information.

2012-03-05 Ba	Test details - Version information		
Test item	Check	Remark	Result
Query for VER	Check that there is a VER sentence response	There are 4 VER output sentences with different information	Passed
Device type	Note the Device type Check it for allowed values	AN	Passed
Vendor Id	Note the vendor Id	SMT	Passed
Unique Identifier	Note the Unique Identifier	990123456	Passed
Manufacturers serial number	Note serial number	EP01-11	Passed
Model code	Note the model code	Sentence 2: 0 - has to be set later to the final model code	Passed
Software revision	Note the software revision	Sentence 3: 080200.00.05.03	Passed
Hardware revision	Note the software revision	Sentence 4: EP01	Passed

2.5.6   8.5.6 Test for AFC – AtoN function ID capability

8.5.6.1 Purpose

The purpose of this test is to ensure that the EUT can provide a list of supported functionality.

8.5.6.2 Method of measurement

Set up the standard test environment and use the configuration as defined in 8.1.1 and transmission schedule for Message 21 as defined in 8.1.2. Enter the query for the function supported.

NOTE   <u>Standard configuration sentences via configuration port</u>: the list of supported functions is queried usingthe QAFC sentence and the response is provided using AFC.

<u>Standard configuration sentences via VDL</u>: the list of supported functions is queried via the VDL using Message 25 or Message 6 with the appropriate application identifier/function identifier, and binary data.

8.5.6.3 Required results

Verify that the EUT provides the list of functions that are supported by the AtoN Station.

2012-03-05 Ba	Test details - AFC request		
Test item	Check	Remark	Result
Query on PI port			
Query for AFC	Check the AFC response	This function is not implemented for the type 1 AtoN	Passed

2.5.6.1   8.5.6.4 Test for assigning an encryption key for VDL configuration

8.5.6.4.1 Purpose

The purpose of this test is to ensure that the encryption key for VDL configuration can be entered into the EUT using the configuration port or the appropriate VDL message.

In order to reset this key via the PI, the user must know the current encryption key. The initial encryption key, when shipped from the manufacturer, will be all 0's.

This test is not applicable for a type 1 AtoN.

2.5.7   8.5.7 Test for VDL configuration using chaining (Types 2 and 3)

8.5.7.1 Purpose

The purpose of this test is to verify that, if chaining is implemented, the AtoN Station supports receiving information from a Base Station via intermediate AtoN Stations and then transmits the response back through the intermediate AtoN Stations to the Base Station.

This test is not applicable for a type 1 AtoN.

2.6   8.6 Test for BIIT

8.6.1 Purpose

The purpose of this test is to prove the correct response by the EUT to its BIIT.

8.6.2 Method of measurement

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

a)   *Disconnect the antenna from the EUT.*

b)   *Apply fault to the Channel 1 receiver.*

c)   *Apply fault to the Channel 2 receiver.*

d)   *Disable the augmentation system, if fitted.*

8.6.3 Required results

Verify that:

a)   *the EUT shall cease transmissions;*

b)   *RATDMA and CSTDMA transmissions shall cease on Channel 1;*

c)   *RATDMA and CSTDMA transmissions shall cease on Channel 2;*

d)   *he EUT shall continue to operate.*

2012-03-05 Ba	Test details -		
Test item	Check	Remark	Result
Disconnect VHF antenna	Check that EUT ceases transmission	The EUT contiuous trying to transmit. There is an output of ADS sentence and an ALR 002 VSWR exceed limit sentence	Passed
Channel 1 receiver fault	Check documentation for receiver fault detection	Not applicable because it is an type 1 AtoN	N/A
Channel 1 receiver fault	Check documentation for receiver fault detection	Not applicable because it is an type 1 AtoN	N/A
Augmentation system	Disable augmentation system	Documentation required 2012-07-23 Ba: The manufacturer declares in document LDA167, issue: 3, 20 July 2012, that EPFS augmentation is not supported	Passed

2.7 8.7 Transmitter shutdown procedure

8.7.1 Purpose

The purpose of this test is to verify that the transmitter has an automatic shutdown.

8.7.2 Method of measurement

Review the manufacturer's declaration.

8.7.3 Required results

The manufacturer shall provide a declaration in the documentation that states the EUT will function as required.

2012-07-24 Ba	Test details - Transmitter shutdown procedure		
Test item	Check	Remark	Result
Check documentation	According to the document "SRT Marine Technology, Carbon Transceiver, TX Hardware Timeout Operation" there is an software independent transmitter shutdown procedure. The document includes a circuit diagram and a function description.		Passed

2.8   8.8 Tests for power supply

2.8.1   8.8.1 Average power consumption

8.8.1.1 Purpose

The purpose of this test is to ensure that the power consumption of the AIS AtoN Station is as stated in the manufacturer's documentation.

8.8.1.2 Method of measurement

Set up the standard test environment and operate the EUT in normal mode. Configure reporting of Message 21 to have the following parameters:

- *transmit power level: 12,5 W, or the manufacturer's declared level;*

- *Channel 1 slots: 512 and 513;*

- *Channel 2 slots: 612 and 613;*

- *reporting interval: 3 min.*

The test shall be run for 30 min with 10 full duty cycles to measure the average power consumption.

Optionally, repeat the test for RATDMA for the same transmit power and reporting interval.

8.8.1.3 Required results

Verify that for 10 full duty cycles, the average power consumption of the EUT does not exceed 110 % of the value stated in the manufacturer's documentation.

2012-07-24	Test details - Average power consumption		
Test item	Check	Remark	Result
Average power consumption			
FATDMA mode	Measured value	The measured value is 5 mA for 12 Vdc and 4 mA for 24 Vdc.	Passed
	Compare measured values with the average power consumption	The measured value exceeds the state value in the manual by 1 mA.. <u>2012-08-30 Ba</u> The manufacturers has provided a test report of a average current measurement with a high precision current meter showing the stated power consumption. This is accepted. See Note)	Passed
RATDMA mode	Measured value	Not applicable because the type 1 AtoN does not support RATDMA mode	N/A
	Compare measured values with the average power consumption		N/A

Note)
The current meter has been used in a high current mode to be able to cover the high currents during transmissions (about 2 A).

In this mode the resolution is only 1 mA. Therefore the low standby current of 0.2 mA as stated by the manufacturer can only be measured with a resolution of +/- 1mA.

The difference between the average measurement (5 mA at 12 Vdc) and the definition in the manual (4 mA) is only 1 mA. This is in the range of the measurement uncertainty because of the limited resolution.

The manufacturer has performed the measurement with a higher resolution current meter and provided a test report which results in the stated 4 mA (0.1 Ah/day) power consumption. A data sheed of the high resolution current meter Keithly Model 2401 is also provided.

2.9   8.9 Environmental tests

Tests shall be done in accordance with IEC 60945, 'Durability and resistance to environmental conditions'; Protected or Exposed, or as defined by manufacturer.

This will be handled by a separate assessment report.

2.10 8.10 Other tests

2.10.1 8.10.1 Quality assurance

The manufacturer shall declare the quality assurance standard to which the EUT is manufactured.

2012-08-30 Ba	Test details - Quality assurance		
Test item	Check	Remark	Result
Check manufacturers documentation	A ISO 9001:2008 certificate for the Quality management system has been provided		Passed

2.10.2 8.10.2 Additional features

The manufacturer shall declare any additional features of the EUT. These features are not tested in accordance with this standard. The manufacturer's declaration shall confirm that additional features, including position accuracy augmentation, do not adversely affect Message 21 transmissions.

2012-07-23 Ba	Test details - Additional fieatures		
Test item	Check	Remark	Result
Check documentation	The manufacturer declares in document LDA167, issue: 3, 20 July 2012, that no additional features are implemented		Passed

2.10.3 8.10.3 Manual

The manual shall include information concerning:

- *external connectors, if applicable;*

- *correct installation of the unit and antennae;*

- *configuration;*

- *power consumption;*

- *firmware upgrades, if applicable;*

- *configuration interface, including hardware and electrical details.*

2012-03-05 Ba	Test details – Requirements of IEC 62320-2		
Test item	Check	Remark	Result
Connectors	Check that a description of the external connectors is included		Passed
	Check that information about the pin-out is provided		Passed
Installation information	Check that information about siting the GPS antenna is included		Passed
	Check that information about siting the VHF antenna is included		Passed
	Check that mechanical dimension drawings of transponder are available		Passed
Configuration	Check that information about configuration is included	A short discription how to use the configuration sentences and a detailled list of the configuration sentences.	Passed

Power consumption	Check that information about power consumption in FATDMA mode is provided	The power consumption is defined (0.1 Ah/day) but it is not defined for which voltage this value is valid (12 V or 24 V). It should be stated for which input voltage the power consumption is valid. Retest 2012-08-22 Ba: In version 2 of the manual the average power consumption is specified for 12 V input voltage	Passed
	Check that information about power consumption in RATDMA mode is provided	Not applicable for a type 1 AtoN	N/A
Firmware upgrade	Check that information about firmware upgrade is provided		Passed
Configuration interface	Check that information about configuration sentences is provided		Passed
	Check that information about configuration interface hardware is provided		Passed
	Check that electrical details of the configuration interface is provided.		Passed

2.10.4 8.10.4 Marking and identification

Verify that marking and identification complies with 5.4.3.

2012-07-24 Ba	Test details - Marking and identification		
Test item	**Check**	**Remark**	**Result**
Check that the marking and labeling includes:	Identification of the manufacturer	On a separate label	Passed
	Model identification	Carbon TRS AtoN	Passed
	Serial number	P216FTU029	Passed
	Operating voltage	12/24 Vdc, 170 mA	Passed
	Software version	Not available	Passed

Annex A Test equipment

A.1 Test equipment summary

#	description	type	identification
1	VDL Analyser / Generator	AIS Test unit MKII	S/N AA08PN Bund BSH/2012, 7200002112 BSH PC10745 SW AISterm V1.0rev47 AISmain V1.47011120R
2	Target simulator software	Furuno Navintra	BSH PC 9169
3	Presentation Interface Monitor	BSH	BSH PC 8441 BSH PC 9457 SW NewMoni V3.1
4	GMDSS-AIS-Testbox (DSC)	Futronic I/S	200 30 405
5	16 Port Serial Device Server	Moxa DE-303	06698, BSH Nr. 6084
6	Connection box for Moxa serial server With 8 converters RS 232 to RS 422	----	----
7	Active retransmitting GPS antenna	RA - 48	4800199
8	Trimble GPS reference receiver	4000RS, Part number 21000-76	S/N 3428A06700
	Auxiliaries:		
9	True RMS Multimeter DMM 916	Tektronix	S/N 138531
10	2-Kanal-Digital-Oszilloskop	Le Croy Wavesurfer 422	LCRY 0301 J 15673
11	Unbalanced Standard Attenuator	Rhode & Schwarz DPR BN 18024/50	BUND KK 11201
12	2 fixed voltage power supply (24 V/10A)	SITOP	BUND 102452, 102453
13	1 fixed voltage power supply (12 V/4,5A)	Siemens	
14	2 adjustable power supplies (30 V/5 A)	PS 405 D	S/N 2737, 2768

Reserve equipment

#	description	type	identification
15	VDL Analyser / Generator	AIS equipment tester	S/N 218 Bund 102710/2002 Prüfgerät Nr. 1
16	VDL Analyser / Generator	AIS equipment tester	Prüfgerät Nr. 2

A.1.1   VDL Analyser / Generator

The VDL analyser/generator:
- <u>receives</u> 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).
- <u>transmits</u> radio data telegrams which have been entered/edited via a control panel. The AIS under test receives these messages and either passes the received data to it's presentation interface and/or responds as appropriate.
- <u>records</u> all data contained in the received radio telegrams and radio parameters in a data base for offline evaluation and documentation purposes.
- <u>simulates</u> AIS targets by transmitting position reports of virtual targets up to the maximum channel capacity of 100% channel load on both channels (4500 messages / minute). The data are provided via serial interface to the VDL analyser/ Generator.

A.1.2   Target simulator

The target simulator consists of a standard PC with a special AIS Target Simulator software.

For tests of AIS transponders the data of up to 75 moving targets defined in text file in plain language are transferred to the „TS" input of the VDL Analyser/ Generator as VDM sentences and transmitted on the VHF data link (VDL) . Thus the AIS VHF data link is loaded with simulated AIS targets in fixed slots or in slots selected by the VDL Analyser/ Generator.

A.1.3   Presentation Interface Monitor

The Presentation Interface Monitor is a PC software running on four standard PCs.
It is used to
- analyse the AIS high speed input / output
- analyse the AIS long range function
- generate DSC calls for the DSC test box and to display, log and evaluate the received DSC calls from EUT.

For that purpose it includes the functions:
- coding / decoding of NMEA 6-bit data fields
- online AIS message filtering
- online AIS message editing
- load and transmit predefined sequences
- online modification of transmitted sequences

A.1.4 Sensor Data Simulator

The Sensor Data Simulator provides simulated sensor data to the serial sensor data inputs of the EUT. The sensor data are provided in text files to the Sensor Data Simulator which modifies the sensor data sentences e.g. adding the actual UTC time, modify some time-varying data and by adding a checksum.

The Sensor Data Simulator is basically the same software as the Presentation Interface Monitor using a special part of the functionality of the software.

A.1.5 DSC Testbox

The DSC test box is a standard GMDSS-AIS Test box used for the survey of ship stations.

For the DSC testing of AIS equipment in includes a software extension that provides a remote control input/output facility
- to transmit DSC calls according to ITU 825-3 generated in an external PC on DSC channel 70 and
- to output received DSC calls from the EUT to the external PC.

A special PC software is used to generate the DSC calls and to display, log and evaluate received DSC calls. It communicates via the serial remote control interface to the DSC Testbox.

A.1.6 Serial Interface Server

The Serial Interface Server provides 16 serial lines which can be connected in a flexible way to the EUT and to equipment of the test environment like the DSC Testbox.

The Serial Interface Server is connected to the controlling PCs via Ethernet Network. It includes:
- 8 serial lines according to RS-422 and IEC 61162-1/2
- 8 serial lines according to RS-232

A.1.7 Laboratory Network

A special laboratory network connect controlling PCs with equipment of the test environment (VDL Generator/ analyser) and with EUT if equipped with an ethernet interface.

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A.1.8 GPS Retransmitter

All AIS equipment includes a GPS receiver for the exact timing and for getting position and speed information.

To avoid the need to connect all AIS equipment to GPS antennas outside the laboratory a re-transmitting GPS antenna is installed in the lab. It amplifies and radiates a GPS signal in the laboratory which is received by active GPS antenna on the roof.

A.2 Test environment overview

GPS Antenna	GPS Antenna	Roof

GPS Antenna

GPS Tx Antenn

GPS Antenna

EUT Equipment under test

VDL – VHF Data Link

VDL analyser/ generator

Other AIS transponder

Laboratory Network

Network Switch

RS422

RS 232

RS 232

DSC- Test box

Serial Interface Server Moxa N_port server

PC with Presentation Interface Monitor

PC with Target-Simulator

PC User interface of VDL analyser/generator

PC with Presentation Interface Monitor

BSH Network for exchange evaluation data

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.

B.1.1 General configuration

General configuration sentences	
File name	Description
Sentences	
`Test_8_1_1_AID.SST`	Setting real AtoN MMSI
`$VTAID,000000000,1,990123456,R,C`	
Test_8_1_2_AID_virtual_MMSI_4.SST	Setting 4 virtual AtoN MMSIs

`$VTAID,990123456,1,990111111,V,C`
`$VTAID,990123456,1,990222222,V,C`
`$VTAID,990123456,1,990333333,V,C`
`$VTAID,990123456,1,990444444,V,C`	

Test_8_1_2_AID_virtual_MMSI_4_delete.SST	Deleting the 4 virtual AtoNs

`$VTAID,990123456,0,990111111,V,C`
`$VTAID,990123456,0,990222222,V,C`
`$VTAID,990123456,0,990333333,V,C`
`$VTAID,990123456,0,990444444,V,C`	

Test_8_1_1_ACF_ACE.SST	Standard ACF/ACE config of real AtoN
`$VTACF,990123456,1,5332.8200,N,00958.1000,E,0,2084,2086,2084,2086,0,20,0,C`	
`$VTACE,990123456,00,0200,0,0,1,TEST_FLOATING_AIS_ATON_STATION,0050050505,C`	
Test_8_1_1_ACF_ACE_synthetic.SST	ACF/ACE config of a syntheticl AtoN
`$VTACF,990111111,7,5332.0000,N,01000.0000,E,0,2084,2086,2084,2086,0,21,2,C`	
`$VTACE,990111111,00,0200,0,0,1,SYNTHETIC_ATON_STATION,0040040404,C`	
Test_8_1_1_ACF_ACE_virtual.SST	ACF/ACE config of a virtual AtoN
`$VTACF,990111111,7,5332.0000,N,01000.0000,E,0,2084,2086,2084,2086,0,21,1,C`	
`$VTACE,990111111,00,0200,0,0,1,VIRTUAL_ATON_STATION,0040040404,C`	
`Test_8_3_1_ACF_surveyed.SST`	Setting surveyed position source
`$VTACF,990123456,7,5332.8200,N,00958.1000,E,1,2084,2086,2084,2086,0,20,0,C`	

B.1.2   Transmission schedules

Message 21 configuration sentences	
File name	Description
Sentences	
Test_8_1_2_AAR_FATDMA_A.SST	FATDMA Mode A transmission schedule, 3 min interval
`VTAAR,990123456,21,01,06,04,512,13500,0,06,01,512,13500,C`	
Test_8_1_3_AAR_FATDMA_B.SST	FATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,21,01,06,02,512,6750,0,06,02,612,6750,C`	
Test_8_1_4_AAR_FATDMA_C.SST	FATDMA Mode C transmission schedule, 3 min interval
`$VTAAR,990123456,21,01,,,-1,,0,10,01,612,6750,C`	
Test_8_1_5_AAR_RATDMA_A.SST	RATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,21,01,06,01,,360,1,06,04,,360,C`	
Test_8_1_6_AAR_RATDMA_B.SST	RATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,21,01,12,01,,180,1,12,04,,180,C`	
Test_8_1_7_AAR_RATDMA_C.SST	RATDMA Mode C transmission schedule, 3 min interval
`VTAAR,990123456,21,01,12,01,,180,1,,,,0,C`	
AAR_Remove_21_1.SST	Deleting Message 21 transmission schedule
`$VTAAR,990123456,21,01,12,02,-1,,0,12,01,-1,,C`	

Message 6 configuration sentences	
File name	Description
Sentences	
Test_8_1_8_AAR_FATDMA_A.SST	FATDMA Mode A transmission schedule, 3 min interval
$VTAAR,990123456,06,01,06,04,600,13500,0,06,01,600,13500,C	
Test_8_1_8_AAR_FATDMA_B.SST	FATDMA Mode B transmission schedule, 3 min interval
$VTAAR,990123456,06,01,06,02,600,6750,0,06,02,700,6750,C	
Test_8_1_8_AAR_FATDMA_C	FATDMA Mode C transmission schedule, 3 min interval
$VTAAR,990123456,06,01,,,-1,,0,06,01,600,6750,C	
Test_8_1_8_AAR_RATDMA_A.SST	RATDMA Mode A transmission schedule, 3 min interval
$VTAAR,990123456,06,01,06,02,,360,1,06,05,,360,C	
Test_8_1_8_AAR_RATDMA_B.SST	RATDMA Mode B transmission schedule, 3 min interval
$VTAAR,990123456,06,01,06,01,,180,1,06,04,,180,C	
Test_8_1_8_AAR_RATDMA_C.SST	RATDMA Mode C transmission schedule, 3 min interv
$VTAAR,990123456,06,01,12,01,,180,1,,,,0,C	
Test_8_1_8_MPR.SST	Providing content of message 6 using MPR
$VTMPR,990123456,06,01,0,01,01,OSfGjwp,C	
Test_8_1_8_MEB.SST	Providing content of message 6 using MEB
$VTMEB,1,1,3,0,990123456,06,01,0,000001028,1,C,OSfGjwp,0	
Test_8_1_8_AAR_delete_6.SST	Deleting Message 6 transmission schedule
VTAAR,990123456,06,01,06,04,-1,,0,06,01,-1,,C	
Test_8_1_8_MPR_long_65byte.SST	Content for a too long message 6
$VTMPR,990123456,06,01,0,03,01,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C	
$VTMPR,990123456,06,01,0,03,02,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C	
$VTMPR,990123456,06,01,0,03,03,OSdt?W,C	

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Message 8 configuration sentences	
File name	Description
Sentences	
Test_8_1_10_AAR_FATDMA_A.SST	FATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,08,01,06,04,800,13500,0,06,01,800,13500,C`	
Test_8_1_10_AAR_FATDMA_B.SST	FATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,08,01,06,02,800,6750,0,06,02,900,6750,C`	
est_8_1_10_AAR_FATDMA_C.SST	FATDMA Mode C transmission schedule, 3 min interval
`$VTAAR,990123456,08,01,,,-1,,0,06,01,800,6750,C`	
Test_8_1_10_AAR_RATDMA_A.SST	RATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,08,01,06,02,,360,1,06,05,,360,C`	
Test_8_1_10_AAR_RATDMA_B.SST	RATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,08,01,06,01,,180,1,06,04,,180,C`	
Test_8_1_10_AAR_RATDMA_C.SST	RATDMA Mode C transmission schedule, 3 min interv
`$VTAAR,990123456,08,01,12,01,,180,1,,,,0,C`	
Test_8_1_10_AAR_delete.SST	Deleting Message 8 transmission schedule
`$VTAAR,990123456,08,01,06,04,-1,,0,06,01,-1,,C`	
Test_8_1_10_MPR.SST	Providing content of message 8 using MPR
`$VTMPR,990123456,08,01,0,01,01,OSfGjwp,C`	
Test_8_1_10_MEB.SST	Providing content of message 8 using MEB
`$VTMEB,1,1,3,0,990123456,08,01,0,,1,C,OSfGjwp,0`	
Test_8_1_10_MPR_long_69.SST	Content for a too long message 8
`$VTMPR,990123456,08,01,0,03,01,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C`	
`$VTMPR,990123456,08,01,0,03,02,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C`	
`$VTMPR,990123456,08,01,0,03,03,OSdt?Wqv>khv,C`	

Message 12 configuration sentences	
File name	Description
Sentences	
Test_8_1_11_AAR_FATDMA_A.SST	FATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,12,01,06,04,1200,13500,0,06,01,1200,13500,C`	
Test_8_1_11_AAR_FATDMA_B.SST	FATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,12,01,06,02,1200,6750,0,06,02,1300,6750,C`	
Test_8_1_11_AAR_FATDMA_C.SST	FATDMA Mode C transmission schedule, 3 min interval
`$VTAAR,990123456,12,01,,,-1,,0,06,01,1200,6750,C`	
Test_8_1_11_AAR_RATDMA_A.SST	RATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,12,01,06,03,,360,1,06,06,,360,C`	
Test_8_1_11_AAR_RATDMA_B.SST	RATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,12,01,12,01,,180,1,12,04,,180,C`	
Test_8_1_11_AAR_RATDMA_C.SST	RATDMA Mode C transmission schedule, 3 min interv
`$VTAAR,990123456,12,01,12,01,,180,1,,,,0,C`	
Test_8_1_11_AAR_delete_12.SST	Deleting Message 12 transmission schedule
`$VTAAR,990123456,12,01,06,04,-1,,0,06,01,-1,,C`	
Test_8_1_11_MPR.SST	Providing content of message 12 using MPR
`$VTMPR,990123456,12,01,0,01,01,=5CC175P6B?=P1D?>,C`	
Test_8_1_11_MEB.SST	Providing content of message 12 using MEB
`$VTMEB,1,1,3,0,990123456,12,01,0,000001028,0,C,=5CC175P6B?=P1D?>,0`	
Test_8_1_11_MPR_too_long_88_char.SST	Content for a too long message 12
`$VTMPR,990123456,12,01,0,03,01,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C`	
`$VTMPR,990123456,12,01,0,03,02,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C`	
`$VTMPR,990123456,12,01,0,03,03,OSdt?Wqv,C`	

Message 14 configuration sentences	
File name	Description
Sentences	
Test_8_1_12_AAR_FATDMA_A.SST	FATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,14,01,06,04,1400,13500,0,06,01,1400,13500,C`	
Test_8_1_12_AAR_FATDMA_B.SST	FATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,14,01,06,02,1400,6750,0,06,02,1500,6750,C`	
Test_8_1_12_AAR_FATDMA_C.SST	FATDMA Mode C transmission schedule, 3 min interval
`$VTAAR,990123456,14,01,,,-1,,0,10,01,1400,6750,C`	
Test_8_1_12_AAR_RATDMA_A.SST	RATDMA Mode A transmission schedule, 3 min interval
`$VTAAR,990123456,14,01,06,03,,360,1,06,06,,360,C`	
Test_8_1_12_AAR_RATDMA_B.SST	RATDMA Mode B transmission schedule, 3 min interval
`$VTAAR,990123456,14,01,12,01,,180,1,12,04,,180,C`	
Test_8_1_12_AAR_RATDMA_C.SST	RATDMA Mode C transmission schedule, 3 min interv
`$VTAAR,990123456,14,01,12,01,,180,1,,,,0,C`	
Test_8_1_12_AAR_delete.SST	Deleting Message 14 transmission schedule
`$VTAAR,990123456,14,01,06,04,-1,,0,06,01,-1,,C`	
Test_8_1_12_MPR.SST	Providing content of message 14 using MPR
`$VTMPR,990123456,14,01,0,01,01,=5CC175P6B?=P1D?>P6?BP1<<,C`	
Test_8_1_12_MEB.SST	Providing content of message 146 using MEB
`$VTMEB,1,1,3,0,990123456,14,01,0,,0,C,=5CC175P6B?=P1D?>P6?BP1<<,0`	
Test_8_1_12_MPR_long_92_char.SST	Content for a too long message 14
`$VTMPR,990123456,14,01,0,03,01,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C`	
`$VTMPR,990123456,14,01,0,03,02,OSdt?Wqv>khvOWps?3qvOSdt?Wqv>khvOWps?3qv,C`	
`$VTMPR,990123456,14,01,0,03,03,OSdt?Wqv>khv,C`	

B.1.3 Virtual/synthetic targets

Configuration of virtua/synthetic targets	
File name	Description
Sentences	
Test_8_1_2_AID_synth_MMSI.SST	Configuration of a synthetic AtoN MMSI
`$VTAID,990123456,1,990555555,V,C`	
Test_8_1_2_AID_virtual_MMSI.SST	Configuration of a virtual AtoN MMSI
`$VTAID,990123456,1,990111111,V,C`	
Test_8_1_2_AID_virtual_MMSI_4.SST	Configuration of 4 virtual AtoN MMSIs
`$VTAID,990123456,1,990111111,V,C`	
`$VTAID,990123456,1,990222222,V,C`	
`$VTAID,990123456,1,990333333,V,C`	
`$VTAID,990123456,1,990444444,V,C`	

Test_8_1_2_AID_virtual_MMSI_4_delete.SST	Removing of 4 virtual AtoN MMSIs
`$VTAID,990123456,0,990111111,V,C`	
`$VTAID,990123456,0,990222222,V,C`	
`$VTAID,990123456,0,990333333,V,C`	
`$VTAID,990123456,0,990444444,V,C`	

Test_8_1_1_ACF_ACE_synthetic.SST	ACF/ ACE configuration of a synthetic AtoN
`$VTACF,990555555,7,5332.0000,N,01000.0000,E,0,2084,2086,2084,2086,0,03,2,C`	
`$VTACE,990555555,00,0200,0,0,1,SYNTHETIC_ATON_STATION,0050050505,C`	

Test_8_1_1_ACF_ACE_virtual.SST	ACF/ ACE configuration of a virtual AtoN
`$VTACF,990111111,7,5332.0000,N,01000.0000,E,0,2084,2086,2084,2086,0,21,1,C`	
`$VTACE,990111111,00,0200,0,0,1,VIRTUAL_ATON_STATION,0040040404,C`	

Test_8_1_1_ACF_ACE_4_virt.SST	ACF/ ACE configuration of 4 virtual AtoNs
`$VTACF,990111111,7,5332.1000,N,01000.1000,E,1,,,,,,21,1,C`	
`$VTACE,990111111,00,0000,0,0,1,TEST_VIRTUAL_AIS_ATON_STATION1,0010010101,C`	
`$VTACF,990222222,7,5332.2000,N,01000.2000,E,1,,,,,,22,1,C`	
`$VTACE,990222222,00,0000,0,0,1,TEST_VIRTUAL_AIS_ATON_STATION2,0020020202,C`	
`$VTACF,990333333,7,5332.3000,N,01000.3000,E,1,,,,,,23,1,C`	
`$VTACE,990333333,00,0000,0,0,1,TEST_VIRTUAL_AIS_ATON_STATION3,0030030303,C`	
`$VTACF,990444444,7,5332.4000,N,01000.4000,E,1,,,,,,24,1,C`	
`$VTACE,990444444,00,0000,0,0,1,TEST_VIRTUAL_AIS_ATON_STATION4,0040040404,C`	

Test_8_1_7_AAR_FATDMA_synth_target.SST	FATDMA Tx schedule of a synthetic AtoN
`$VTAAR,990555555,21,01,06,02,2012,4500,0,06,03,2012,4500,C`	

Test_8_1_7_AAR_FATDMA_4_virt_targets.SST	FATDMA Tx schedule 4 virtual AtoNs, diff. modes
`$VTAAR,990111111,21,01,06,04,1512,13500,0,06,01,1512,13500,C`	
`$VTAAR,990222222,21,01,06,02,1512,6750,0,06,02,1612,6750,C`	
`$VTAAR,990333333,21,01,06,03,1712,6750,0,,,-1,,C`	
`$VTAAR,990444444,21,01,,,-1,,0,06,03,1812,6750,C`	

Test_8_1_7_AAR_RATDMA_4_virt_targets.SST	RATDMA Tx schedule 4 virtual AtoNs, diff. modes
`$VTAAR,990111111,21,01,06,01,,360,1,06,04,,360,C`	
`$VTAAR,990222222,21,01,06,02,,180,1,06,02,,180,C`	
`$VTAAR,990333333,21,01,06,03,,180,1,06,03,-1,,C`	
`$VTAAR,990444444,21,01,06,03,-1,,1,06,03,,180,C`	

Test_8_1_7_AAR_delete_4_virt_targets.SST	Deleting Tx schedules of 4 virtual AtoNs
`$VTAAR,990111111,21,01,12,01,-1,,0,12,01,-1,,C`	
`$VTAAR,990222222,21,01,12,01,-1,,0,12,01,-1,,C`	
`$VTAAR,990333333,21,01,12,01,-1,,0,12,01,-1,,C`	
`$VTAAR,990444444,21,01,12,01,-1,,0,12,01,-1,,C`	

B.1.4 Chaining configuration

Configuration of chaining	
File name	Description
Sentences	
AID_main_parent_Base.SST	MMSI configuration of the parent of the main AtoN
`$VTAID,990123456,1,001000005,P,C`	
AID_main_child_1.SST	MMSI configuration of the child 1 of the main AtoN
`$VTAID,990123456,1,990123457,C,C`	
AID_main_child_2.SST	MMSI configuration of the child 2 of the main AtoN
`$VTAID,990123456,1,990123458,C,C`	
AID_child1_parent.SST	MMSI configuration of the parent of the child 1 AtoN
`$VTAID,990123457,1,990123456,P,C`	
AID_child1_own.SST	MMSI configuration of the child 1 AtoN
`$VTAID,000000000,1,990123457,R,C`	
AID_child1_child.SST	MMSI configuration of the child of the child 1 AtoN
`$VTAID,990123457,1,990123458,C,C`	
AID_child1_child_delete.SST	Delete the MMSI of the child AtoN in the Child 1
`$VTAID,990123457,0,990123458,C,C`	
AID_child2_parent.SST	MMSI configuration of the parent of the child 2 AtoN
`$VTAID,990123458,1,990123457,P,C`	
AID_child2_own.SST	MMSI configuration of the child 2 AtoN
`$VTAID,000000000,1,990123458,R,C`	
AAR_FATDMA_ID0_main.SST	FATDMA Tx schedule for the chaining in the main AtoN
`$VTAAR,990123456,0,01,06,01,100,2250,0,06,01,110,2250,C`	
AAR_FATDMA_ID0_child1.SST	FATDMA Tx schedule for the chaining in the child 1 AtoN
`$VTAAR,990123457,0,01,06,01,1100,2250,0,06,01,1110,2250,C`	
AAR_FATDMA_ID0_delete.SST	Delete the chaining transmission schedule
`$VTAAR,990123456,0,01,06,01,-1,2250,0,06,01,-1,2250,C`	

Annex C test diagrams

C.1 Test 8.1.2   Message 21 FATDMA mode A

2012-03-06 Ba - SRT Carbon - 8.1.2 Tx Schedule mode A FATDMA message 21
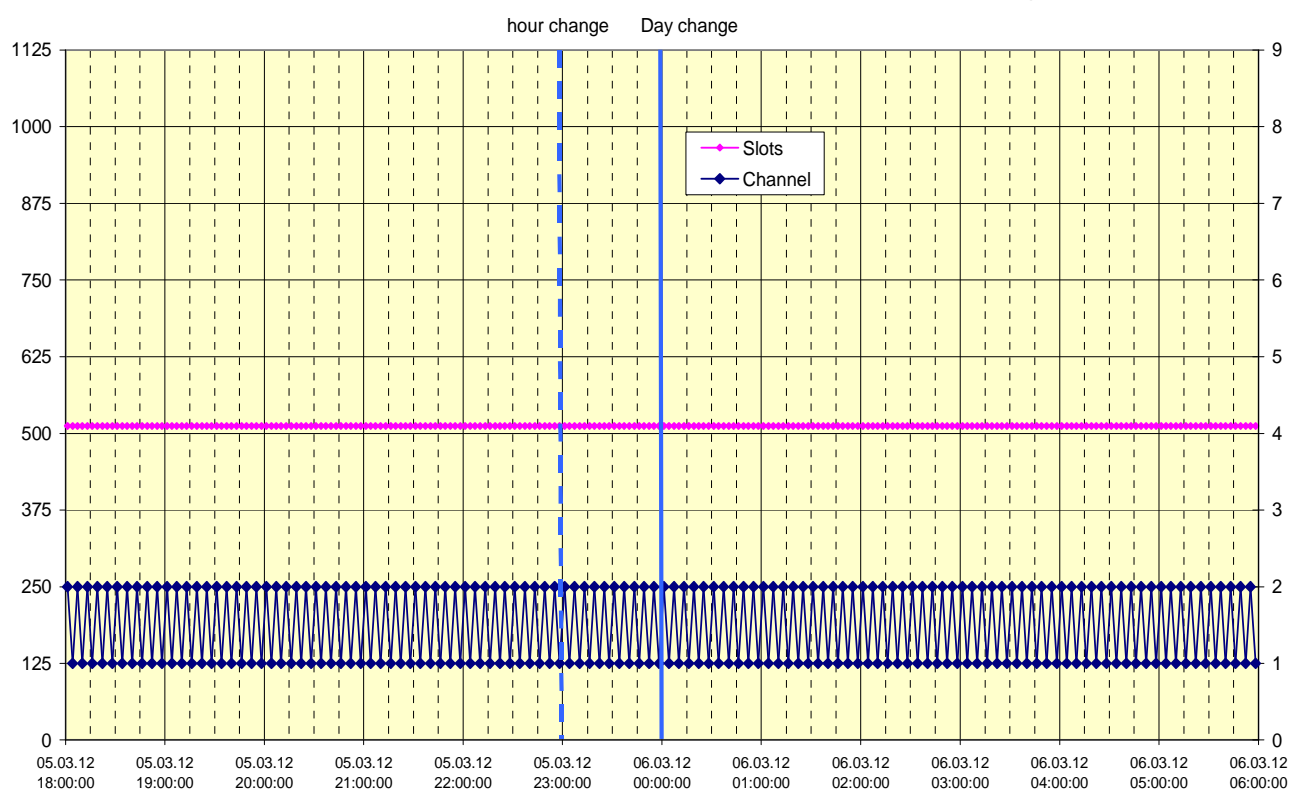
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2012-03-06 Ba - SRT Carbon - 8.1.2 Tx Schedule mode A FATDMA message 21
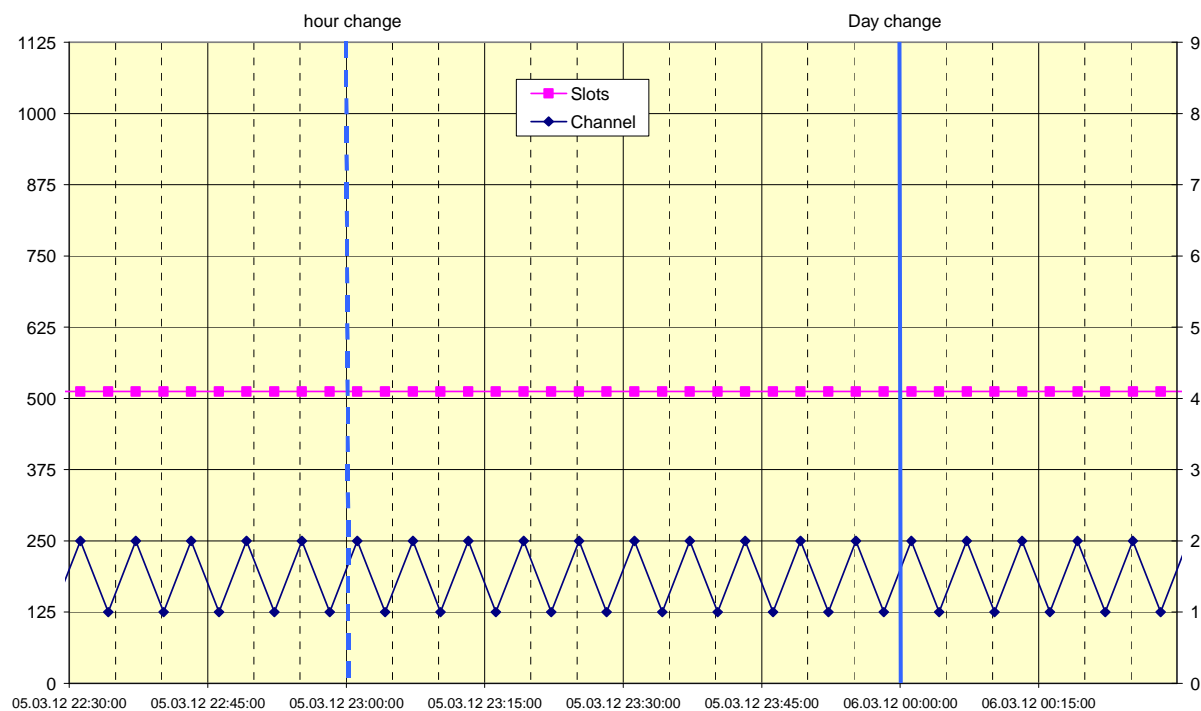
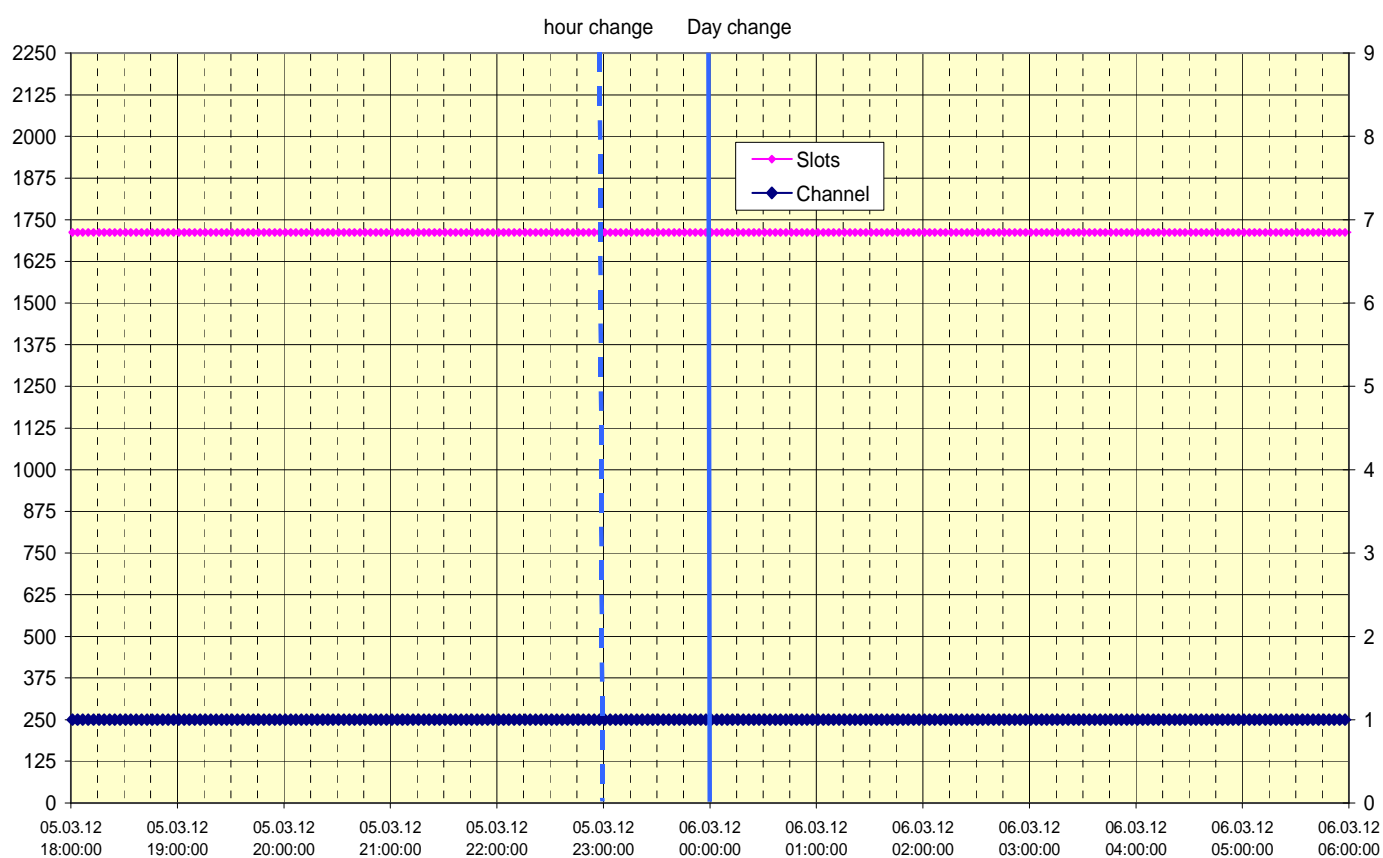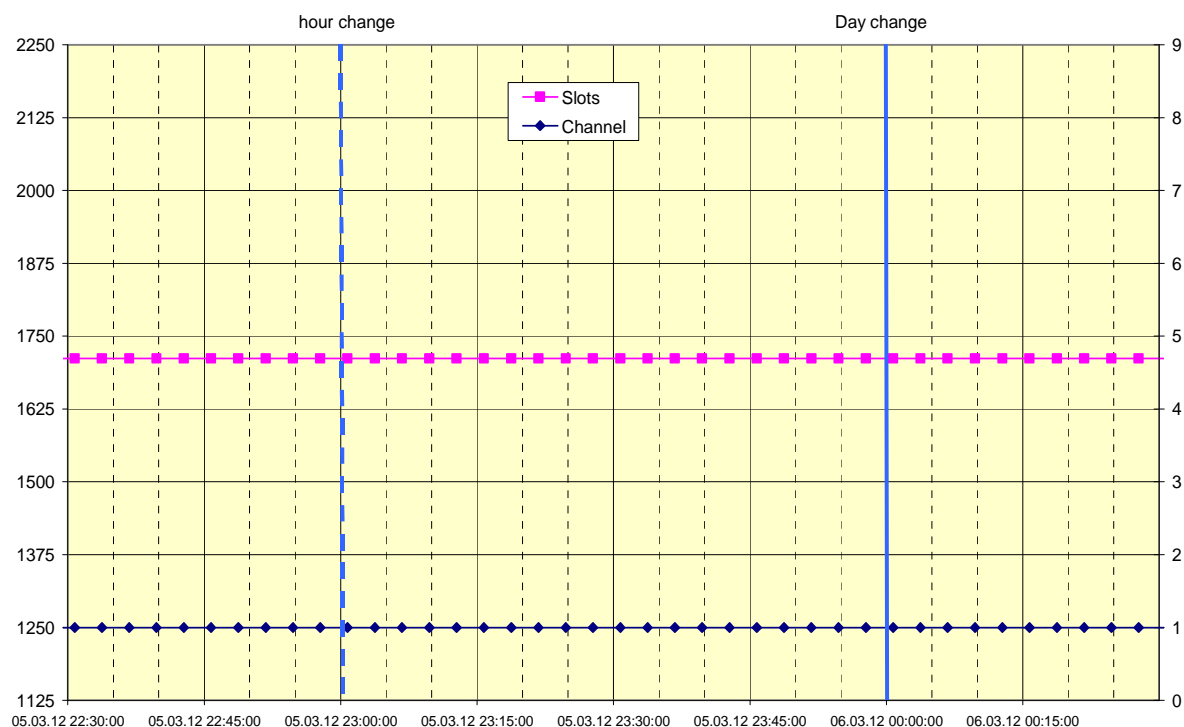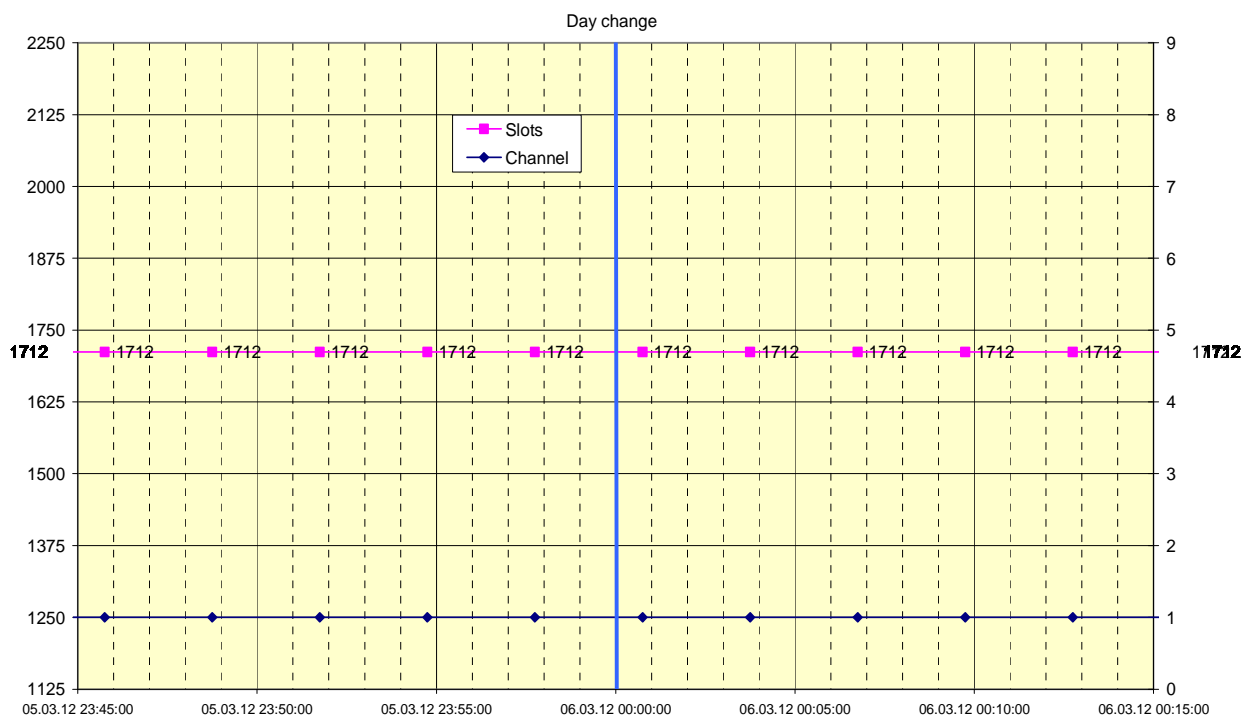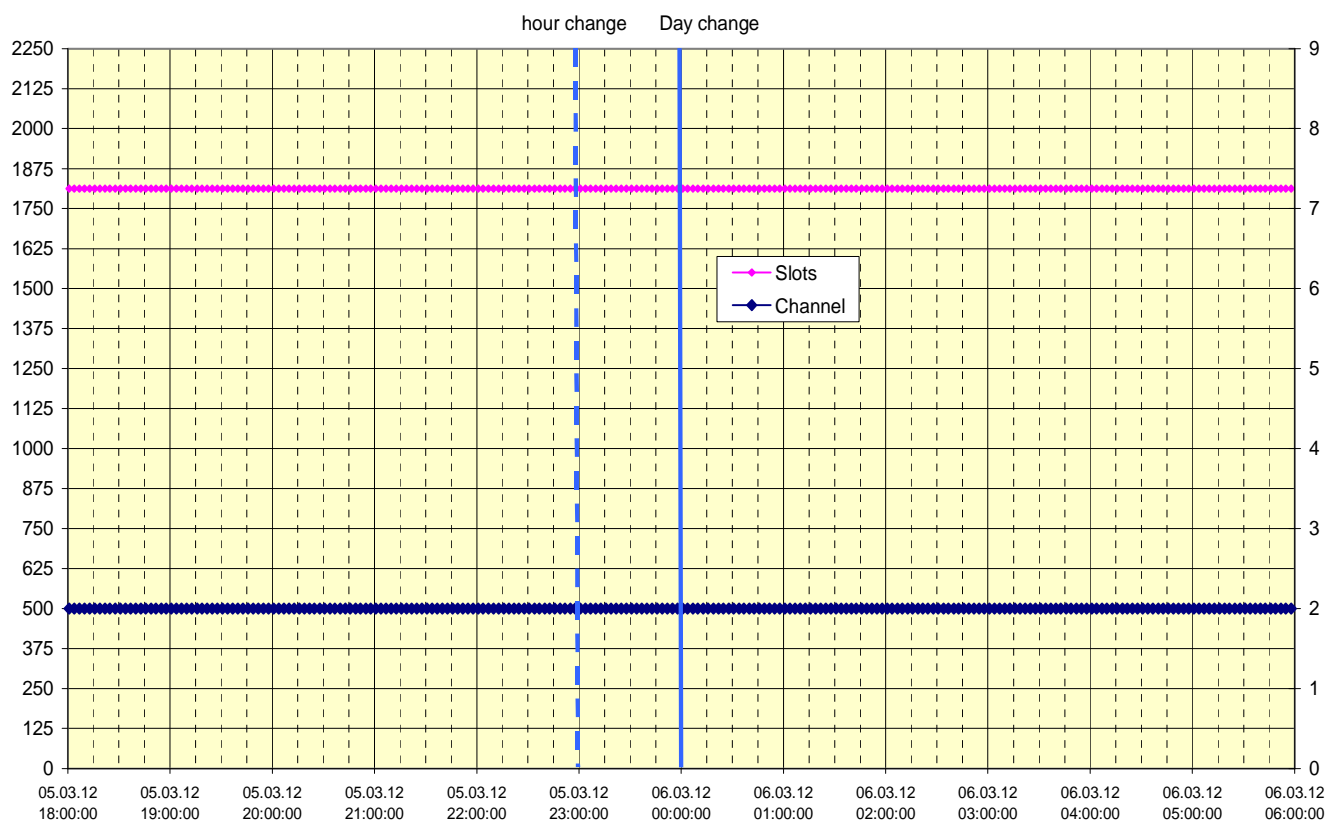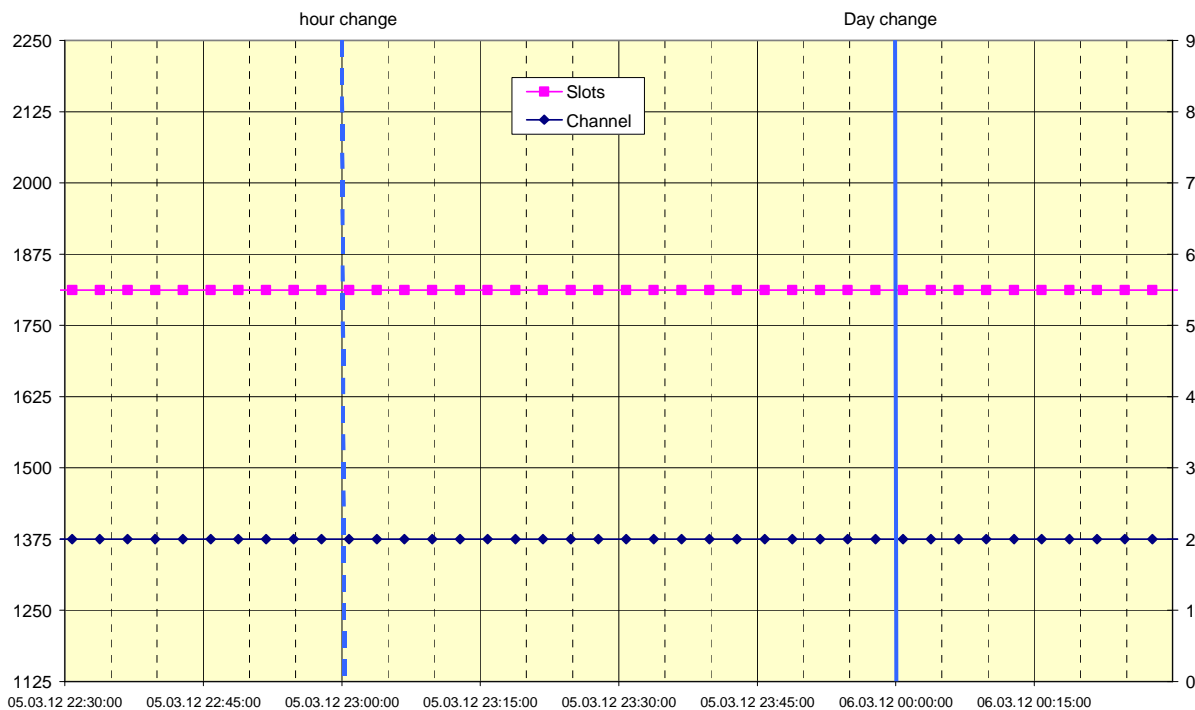**2012-03-06 Ba - SRT Carbon - 8.1.2 Tx Schedule mode A FATDMA message 21**
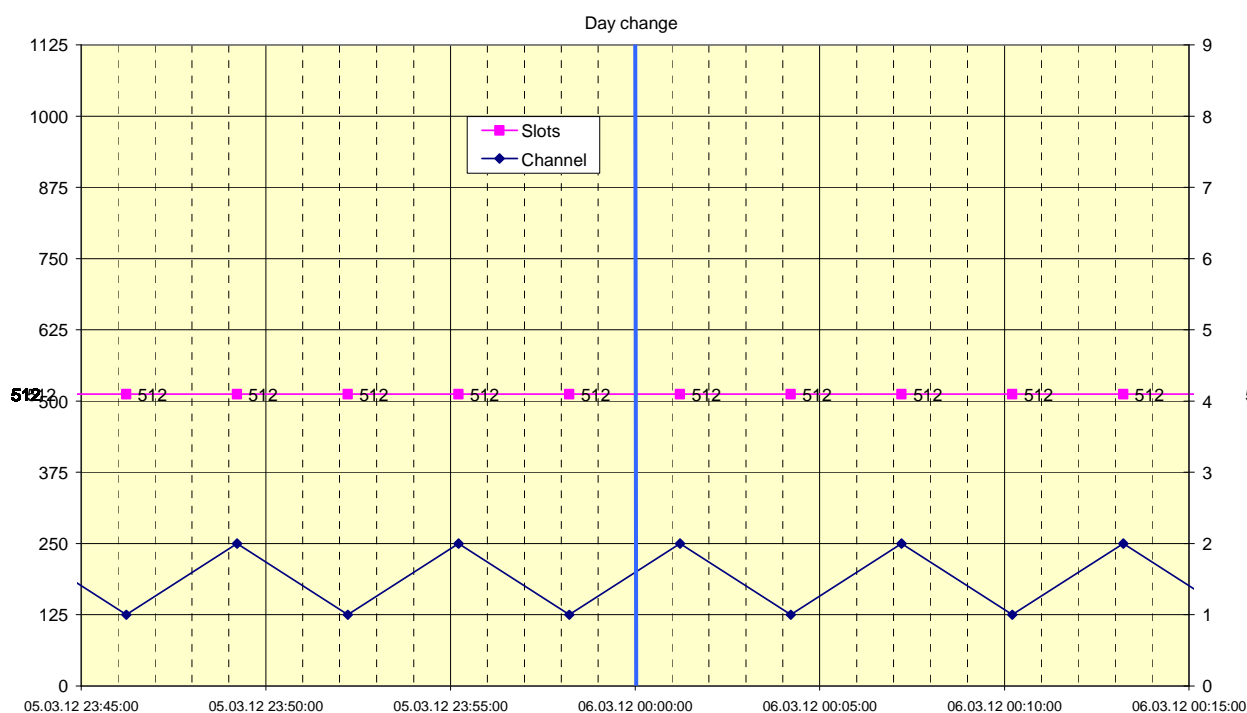
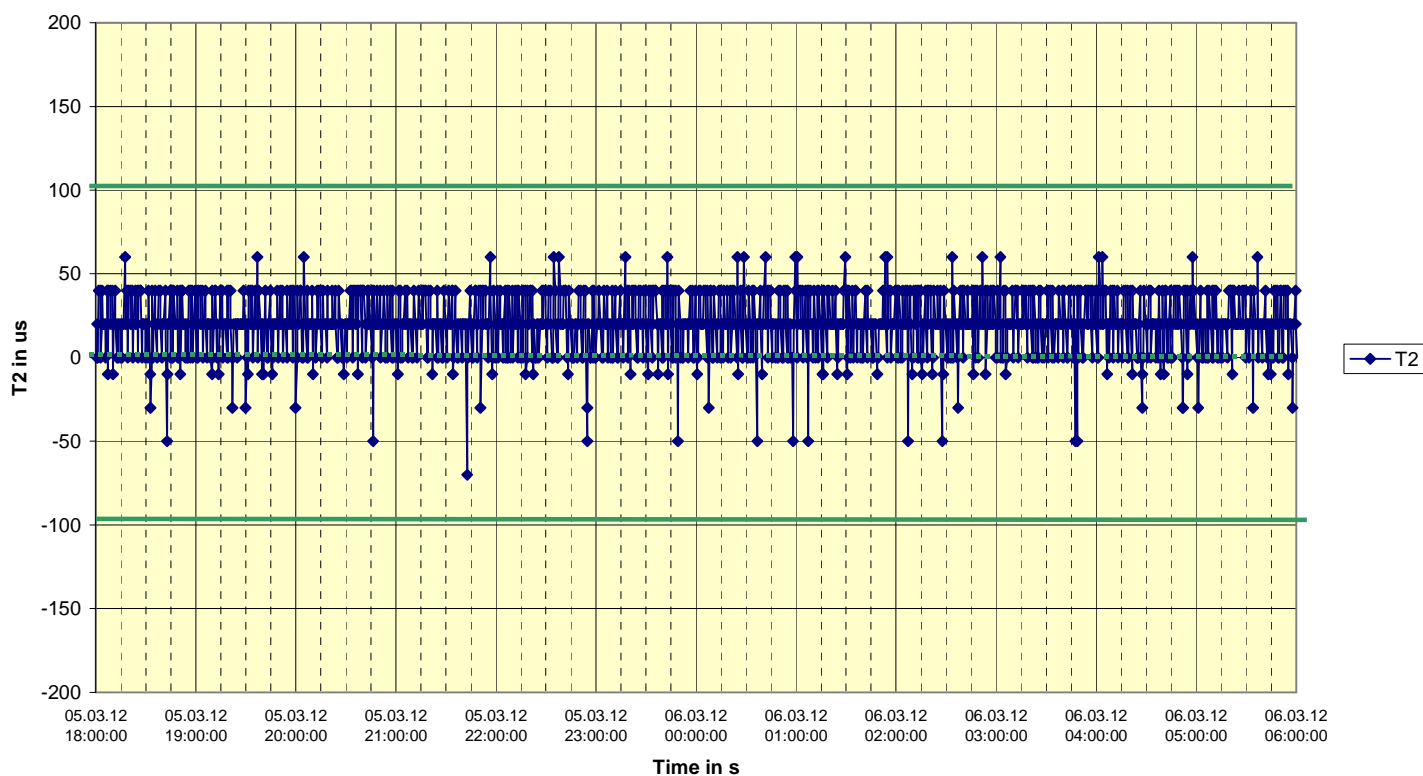## C.2 Test 8.1.3   Message 21 FATDMA mode B

2012-03-06 Ba - SRT Carbon - 8.1.3 Tx Schedule mode B FATDMA message 21
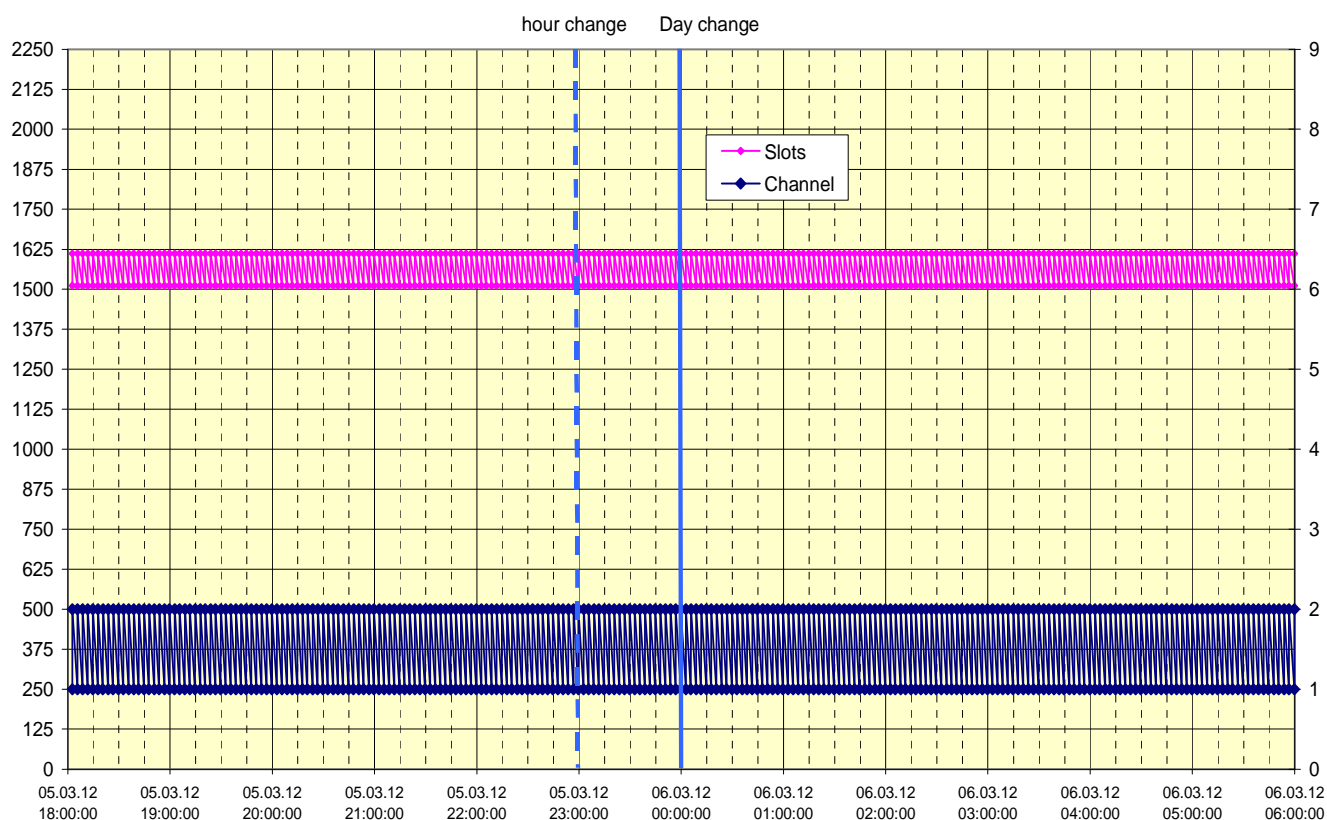
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2012-03-06 Ba - SRT Carbon - 8.1.3 Tx Schedule mode B FATDMA message 21
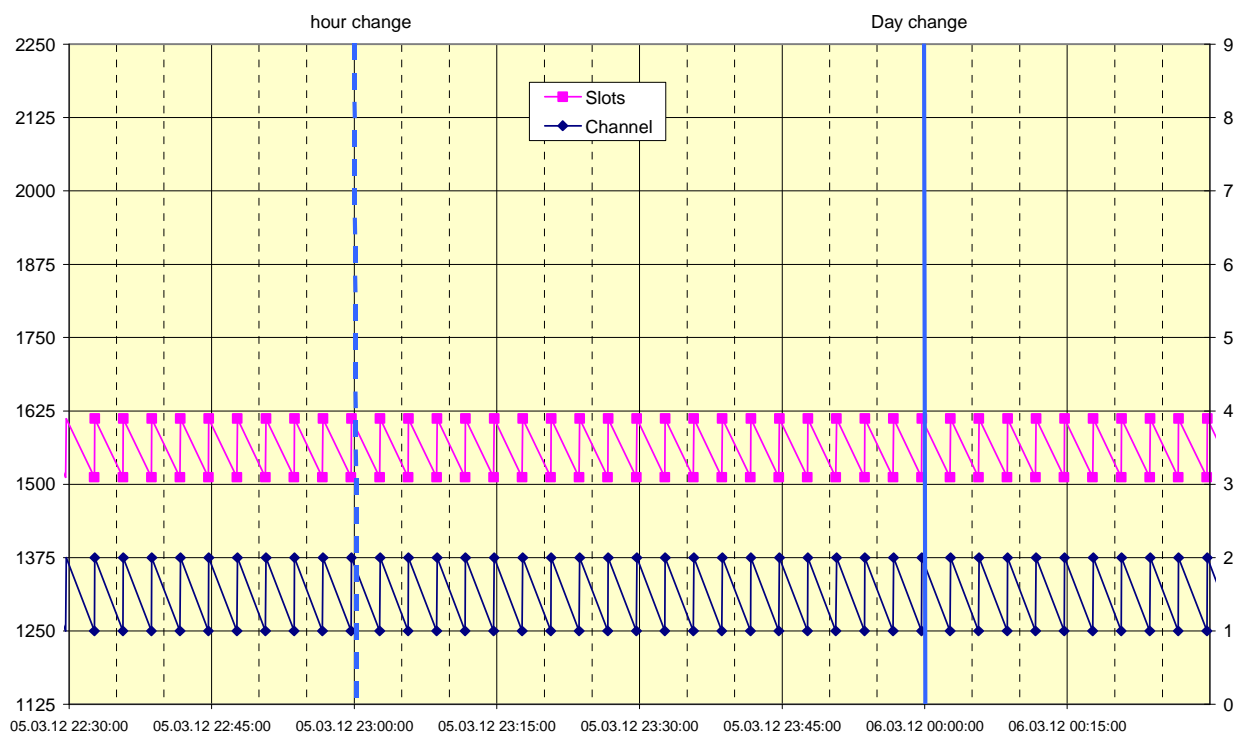
**2012-03-06 Ba - SRT Carbon - 8.1.3 Tx Schedule mode B FATDMA message 21**
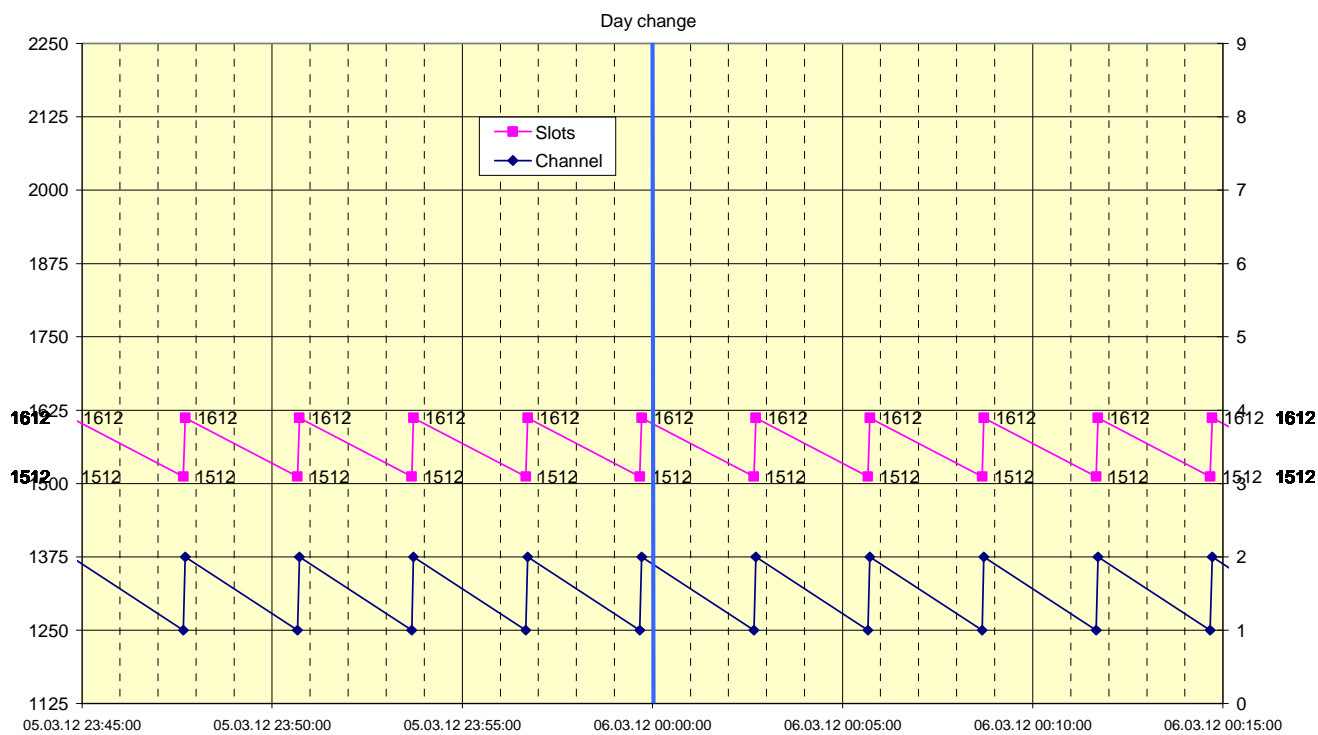
C.3 Test 8.1.4   Message 21 FATDMA mode C

C.3.1   Mode C on channel A

2012-03-06 Ba - SRT Carbon - 8.1.4 Tx Schedule mode C FATDMA message 21, Channel A

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2012-03-06 Ba - SRT Carbon - 8.1.4 Tx Schedule mode C FATDMA message 21, Channel A

2012-03-06 Ba - SRT Carbon - 8.1.4 Tx Schedule mode C FATDMA message 21, Channel A

C.3.2 Mode C on channel B

2012-03-06 Ba - SRT Carbon - 8.1.4 Tx Schedule mode C FATDMA message 21, Channel B

2012-03-06 Ba - SRT Carbon - 8.1.4 Tx Schedule mode C FATDMA message 21, Channel B

2012-03-06 Ba - SRT Carbon - 8.1.4 Tx Schedule mode C FATDMA message 21, Channel B
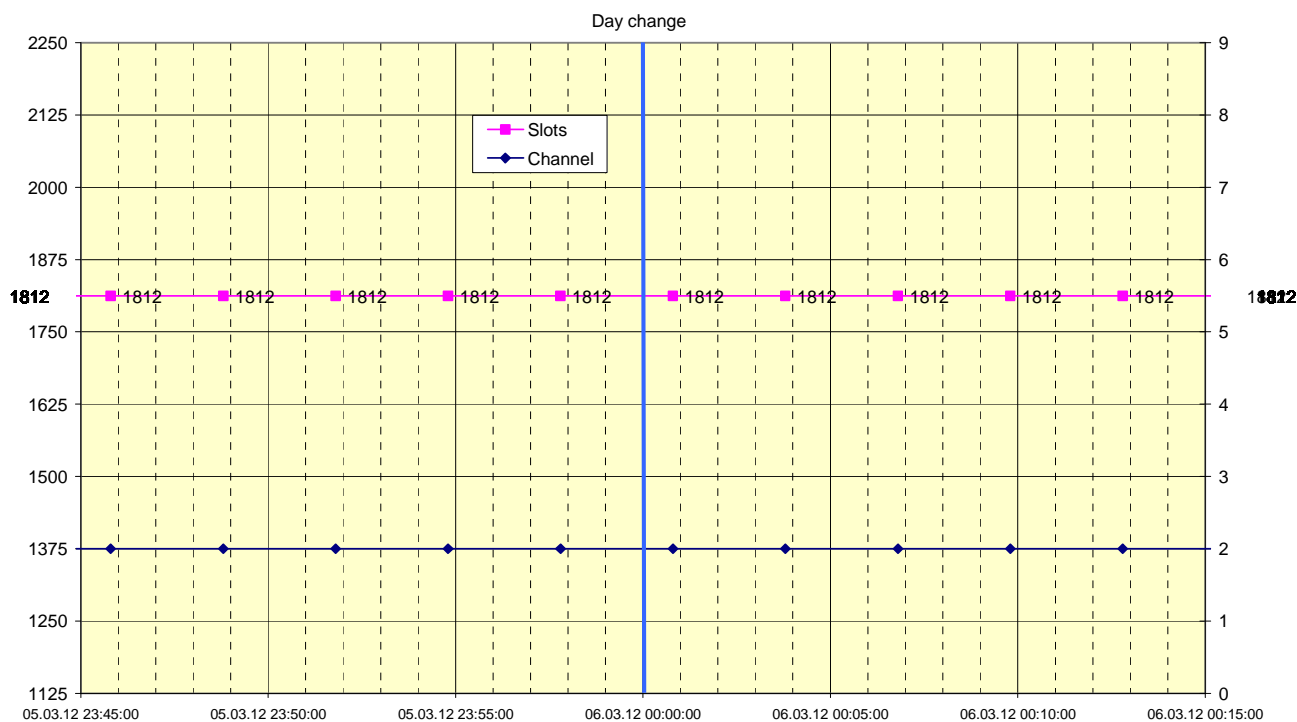
C.4 Test 8.2.   Synchronisation error

2012-03-06 Ba   SRT Carbon - 8.2.1 - Sync jitter deviation vs. time in sync mode 0

2012-03-06 Ba   SRT Carbon - 8.2.1 - Sync jitter deviation vs. time in sync mode 0
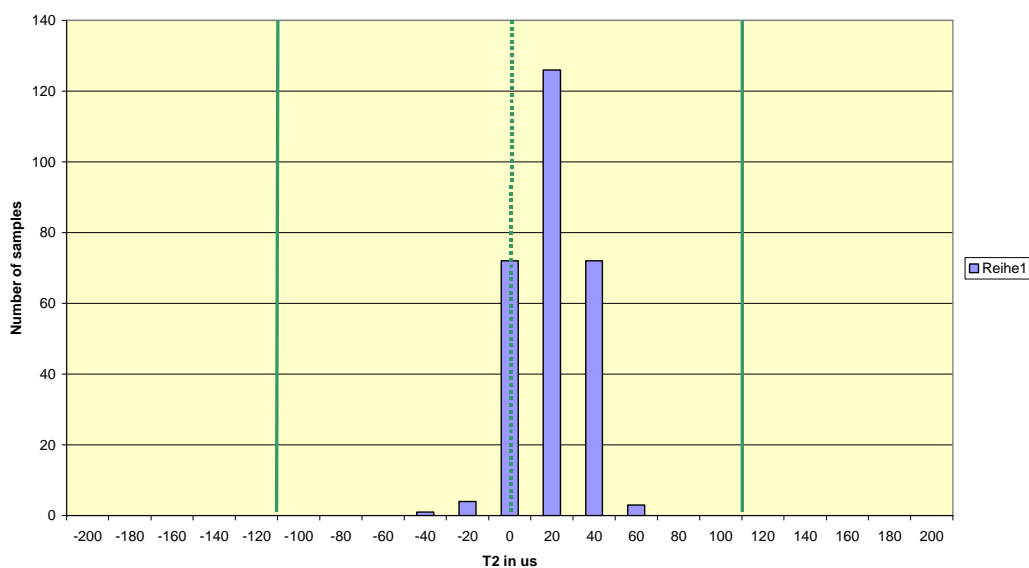
C.5 Test 8.1.8-12   Message 6, 8, 12, 14

C.5.1   FATDMA mode A

2012-07-23 SRT Carbon AtoN - 8.1.8-12 Schedule FATDMA mode A
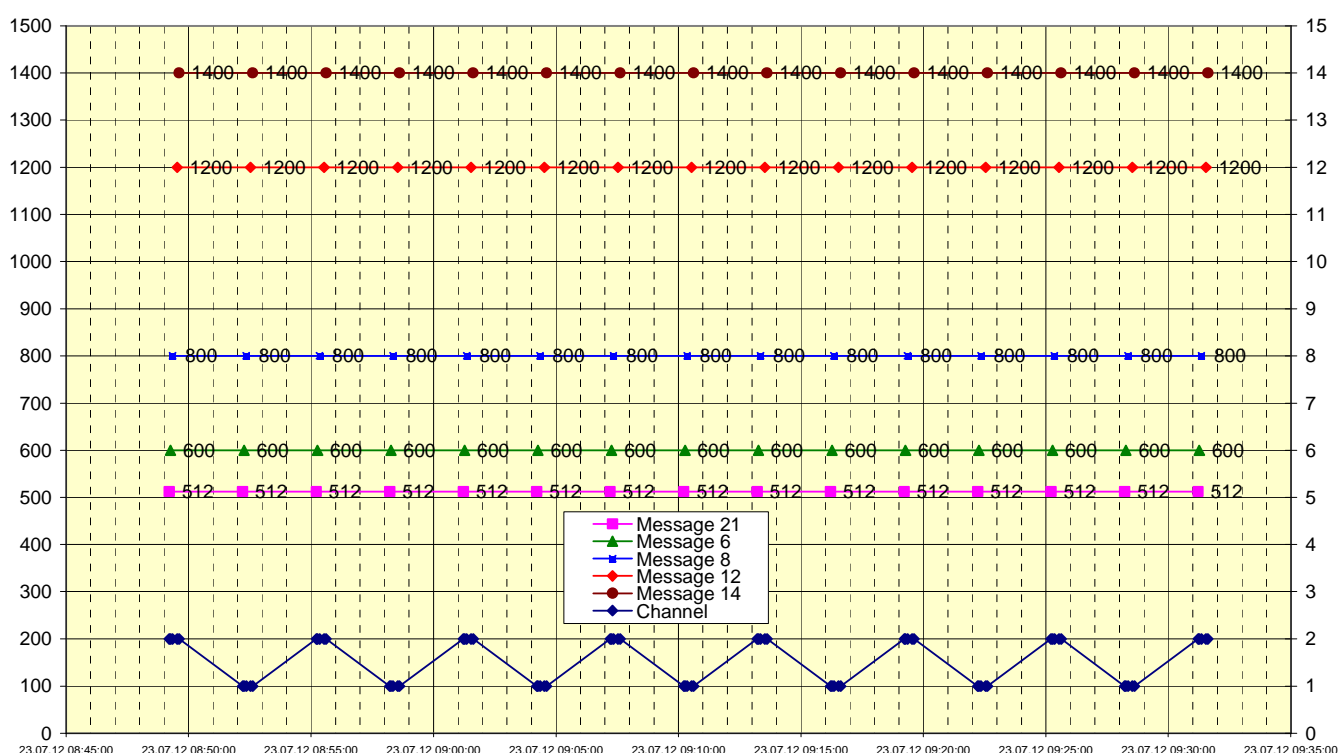
C.5.2 FATDMA mode B

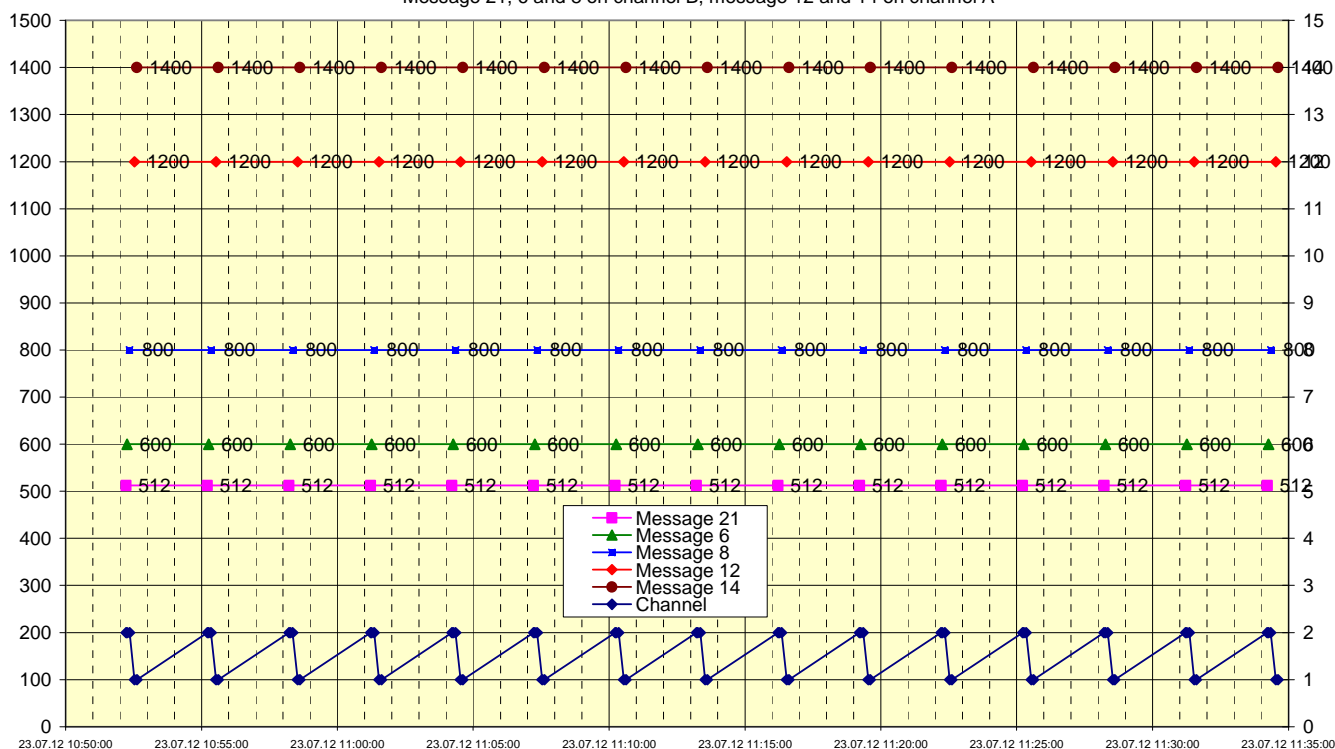**2012-07-23 SRT Carbon AtoN - 8.1.8-12 Schedule FATDMA mode B**
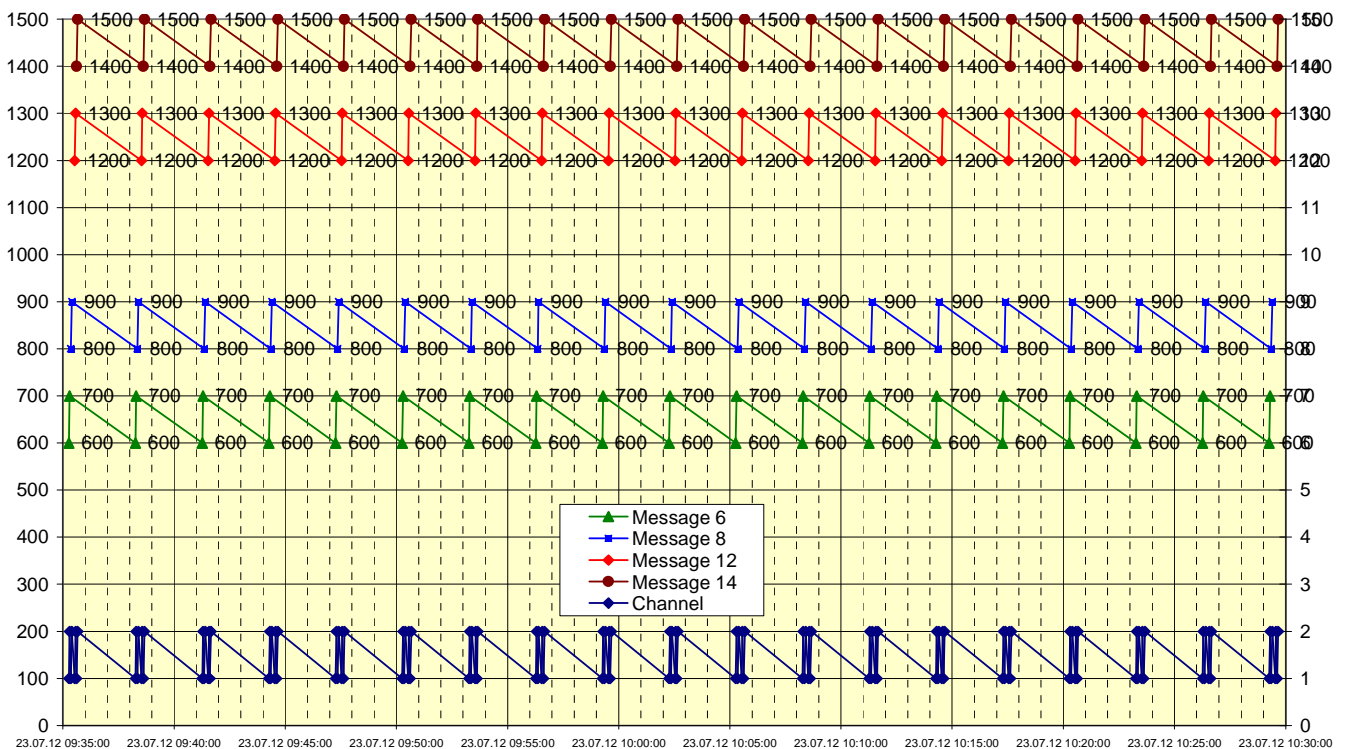
2012-07-23 SRT Carbon AtoN - 8.1.8-12 Schedule FATDMA mode B
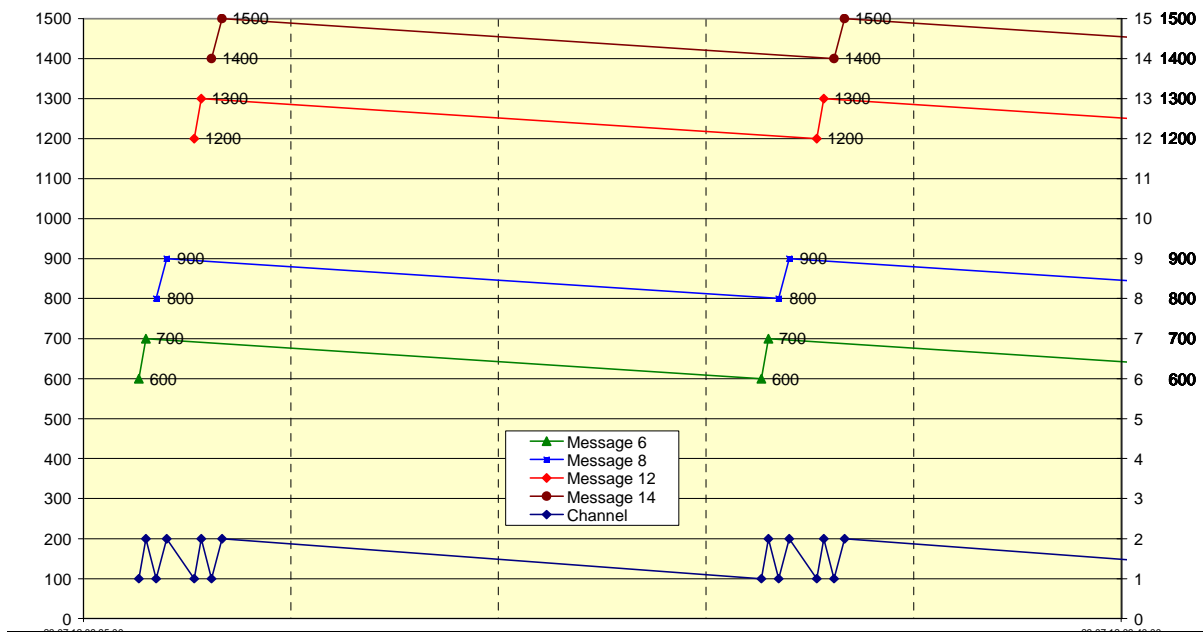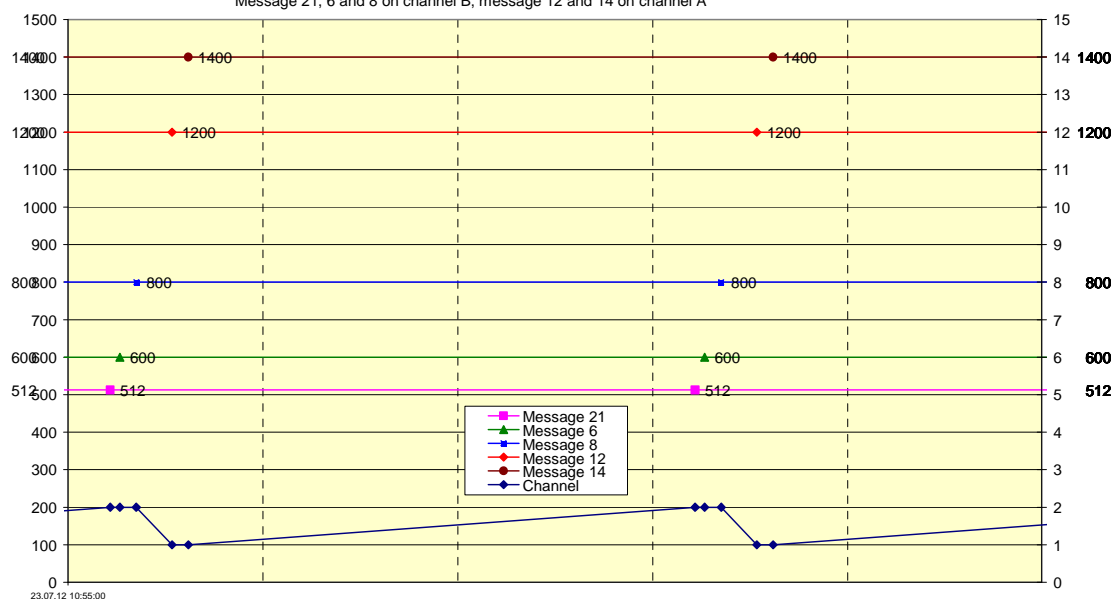
C.5.3 FATDMA Mode C

2012-07-23 SRT Carbon AtoN - 8.1.8-12 Schedule FATDMA mode C

Message 21, 6 and 8 on channel B, message 12 and 14 on channel A

2012-07-23 SRT Carbon AtoN - 8.1.8-12 Schedule FATDMA mode C

Message 21, 6 and 8 on channel B, message 12 and 14 on channel A

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Annex D Photos of equip m ent under test

D.1 Transponder Unit

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D.2 GPS antenna