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Technical Specification

**Universal Mobile Telecommunications System (UMTS);
UTRAN Iu-MS interface: Remote Electrical Tilting (RET)
antennas Application Part (RETAP) signalling
(3GPP TS 25.463 version 6.3.0 Release 6)**



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650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

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1 Scope

The present document specifies the *Remote Electrical Tilting Application Part (RETAP)* between the implementation specific O&M transport function and the RET Antenna Control unit function of the Node B. It defines the Iuant interface and its associated signaling procedures.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
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- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 25.460: "UTRAN Iuant Interface: General Aspects and Principles".
- [2] ISO/IEC 13239 (2nd Edition, March 2000): "Information Technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures".
- [3] 3GPP TS 25.462: "UTRAN Iuant Interface: Signalling Transport".
- [4] 3GPP TS 25.461: 'UTRAN Iuant Interface: Layer 1'.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Active alarm: An alarm which has an alarm state that has been raised, but not cleared

Alarm: Persistent indication of a fault

Alarm code: A code that identifies a specific alarm. The alarm code set is a subset of the return code set. The alarm codes are listed in annex A of this TS

Alarm state: A condition or state in the existence of an alarm. Alarm states are raised and cleared

ASCII character: A character forming part of the International Reference Version of the 7-bit character set defined in ISO/IEC 646:1991

Calibrate: Exercise the antenna drive unit over its entire range of travel to ensure fault-free operation and synchronise the measured and actual beam tilt of the antenna

Configuration data: A stored table or function defining the relationship between the physical position of the drive and electrical beam tilt

Data type: A definition determining the value range and interpretation of a series of octets. The following specified data types are used in this TS:

Name:	Definition:
AlarmCode	1 octet unsigned enumerated code All AlarmCode values are listed in annex A of this TS
FieldNumber	1 octet unsigned enumerated code All field number values are listed in annex B of this TS
ProcedureCode	1 octet unsigned enumerated code
ReturnCode	1 octet unsigned enumerated code All ReturnCode values are listed in annex A of this TS
TextString	Octets with integer values in the range of 32 to 126 to be interpreted as ASCII characters

Elementary procedure: The RETAP protocol consists of elementary procedures (EPs). An elementary procedure is a unit of interaction between the primary device (Node B) and the secondary devices (RET devices)

An EP consists of an initiating message and possibly a response message.

Two kinds of EPs are used:

- **Class 1:** Elementary procedures with response (success or failure).
- **Class 2:** Elementary procedures without response.

For **Class 1** EPs, the types of responses can be as follows:

Successful

- A signalling message explicitly indicates that the elementary procedure has been successfully completed with the receipt of the response.

Unsuccessful

- A signalling message explicitly indicates that the EP failed.

Class 2 EPs are considered always successful.

Error: Deviation of a system from normal operation

Fault: Lasting error condition

Little endian: The order of transmission in which the least-significant octets of a multi-octet representation of a number are transmitted first. Little endian only applies to binary integer representations

MaxDataReceiveLength: SecondaryPayloadReceiveLength minus 3 octets (see subclause 4.8.1 in [3])

MaxDataTransmitLength: SecondaryPayloadTransmitLength minus 3 octets (see subclause 4.8.1 in [3])

Procedure code: A code identifying an elementary procedure

Reset: A process by which the device is put in the state it reaches after a completed power-up

Return code: A code which defines information about the outcome of an elementary procedure execution

Tilt (also downtilt, tilt angle, beamtilt): The elevation angle between the direction orthogonal to the antenna element axis and the maximum of its main beam in the elevation plane. A positive electrical tilt angle means that the antenna beam is directed below the direction orthogonal to the antenna axis. An antenna has separate values for electrical and mechanical tilt. The mechanical tilt is fixed by the geometry of the installation. In this TS the tilt referred to is always the electrical tilt unless otherwise stated

Tilt value: A signed integer used in elementary procedures to define the electrical tilt setting of the antenna. The tilt value is 10 times the antenna electrical tilt angle in degrees.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

EP	Elementary Procedure
HDLC	High-Level Data Link Control
RET	Remote Electrical Tilting
RETAP	Remote Electrical Tilting Application Part
TCP	Time-Consuming Procedure

4 General

4.1 Procedure specification principles

The principle for specifying the procedure logic is to specify the functional behaviour of the RET antenna control unit exactly and completely. The Node B functional behaviour is left unspecified.

The following specification principles have been applied for the procedure text in clause 6:

- The procedure text discriminates between:

- 1) Functionality which "shall" be executed

The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the REQUEST message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

- 2) Functionality which "shall, if supported" be executed

The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

4.2 Forwards and backwards compatibility

The forwards and backwards compatibility of all versions of the protocol shall be assured by a mechanism in which all current and further messages will not be changed in the future. These parts can always be decoded regardless of the standard version.

New functionalities are added into the specification by introducing new procedures and thus the existing messages are not changed in the future.

4.3 Multi-antenna units

The RETAP elementary procedures are split into a single-antenna oriented part, a multi-antenna oriented part and a common part for both device types in order to support RET units controlling single- or multi-antenna devices. The RET unit responds, upon request, the number of antennas it controls. All multi-antenna oriented elementary procedures include a parameter stating which antenna the elementary procedure addresses. Antennas are numbered 1 and upwards.

4.4 Integer representation

Multi-octet integer values are transmitted in little endian order. Signed integers are represented as 2-complement values.

5 Services expected from signalling transport

RETAP requires an assured in-sequence delivery service from the signalling transport and notification if the assured in-sequence delivery service is no longer available.

5.1 Elementary procedure format

Layer 2 provides a full-duplex link for the transmission of RETAP messages.

There are two types of RETAP elementary procedures:

Class 1: Initiating messages are sent either from the primary to a secondary device, or from a secondary to the primary device, in order to initiate some action within the receiving device. The other device sends a response message completing the procedure.

Class 2: Initiating messages are sent either from the primary to a secondary device, or from a secondary to the primary device. No response message is expected.

All RETAP messages use the same basic format:

Table 5.1.1: Basic format for all RETAP messages

Elementary procedure	Number of data octets	Data
1 octet	2 octets	MaxDataReceiveLength or MaxDataTransmitLength.

NOTE: Response messages have the same basic format as initiating messages. The elementary procedure code shall be the same in the response message as in the associated initiating message.

5.1.1 Initiating message

The data part of an initiating message may contain parameters as specified in clause 6 of this TS.

5.1.2 Response message

Elementary procedures shall, unless otherwise specified, provide a response message within 1 second. The response time is measured from the time the message frame was received by the transport layer to the time the response message is ready for transfer by the transport layer.

If the class1 elementary procedure requested by the initiating message was successfully executed, the response message data part from a single-antenna device shall be <OK>. Additional information may follow in the data part. The response message data part from a multi-antenna device starts with the antenna number followed by <OK> and optional additional information.

If the elementary procedure requested by the initiating message was not successfully executed, the response message data part from a single-antenna device shall be <FAIL>.

The following octet shall contain a return code which describes why the execution of the requested procedure failed. The response message data part from a multi-antenna device starts with the antenna number followed by <FAIL> and a return code which describes why the execution of the requested procedure failed.

In some situations an initiating message can cause a change of operating conditions, for instance a SetTilt procedure might cause a RET device to discover that an adjuster is jammed or that a previously jammed adjuster works normally again. In these cases an alarm procedure reporting the change of operating conditions shall be used in addition to the regular <OK> or <FAIL> response message.

A complete annotated table of all return codes with their corresponding hexadecimal numbers is provided in annex A of this TS.

Return codes marked with an X in the Alarm column of annex A in this TS are used to report operating conditions in alarm procedures (see subclauses 6.6.5 and 6.7.6 for details).

6 Control elementary procedures

6.1 State model

The state model describing the RET device is shown in figure 6.1 with procedures written in *italic*.

The relation to the connection state model for layer 2 can be found in [3].

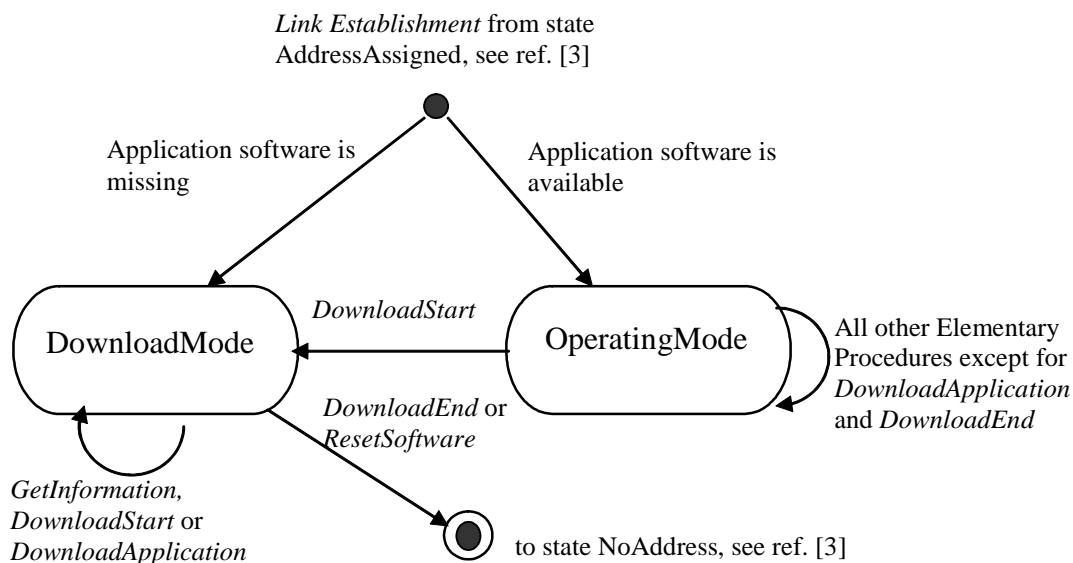


Figure 6.1: State model for the RET device

If an application software is not missing the RET device enters the state **OperatingMode**.

If an application software is missing, the RET device enters the state **DownloadMode**. In this state only software download functionality is supported in order to restore the application software.

The primary device will be notified that the RET device has entered the state **DownloadMode** when a procedure which only is supported in the state **OperatingMode** fails with the return code **WorkingSoftwareMissing**.

If no software download functionality is supported, then only the state **OperatingMode** for the RET device is supported.

6.2 General procedure handling

6.2.1 Alarms

When a fault is detected, the corresponding alarm state shall be changed to state *raised* by the secondary device. When the fault no longer exists, the corresponding alarm state shall be changed to state *cleared* by the secondary device. Alarm changes are reported through the **AlarmIndication** or **AntennaAlarmIndication** elementary procedures. Whenever an **AlarmIndication** or **AntennaAlarmIndication** elementary procedure message is transmitted, it shall contain all the alarm states changed that have not yet been reported as described in subclauses 6.6.5 and 6.7.6.

All alarm states shall be cleared by any type of reset.

6.2.2 Procedure message interpretation

The following message interpretation rules apply in the order mentioned:

- Any message shorter than 3 octets shall be disregarded;
- If a message has a length inconsistent with its 'Number of data octets' field value it shall be responded with a failure message stating 'FormatError' as the cause of failure. The response message shall be to the initiating message identified by the procedure code;
- If a secondary device in the OperatingMode state is receiving a procedure message of an optional procedure not supported or if the procedure is inapplicable to the device type, it shall respond with a failure message stating 'UnsupportedProcedure' as the cause of failure;
- If a secondary device receives a procedure message, part of the software download procedure sequence described in Annex C, without having received the previous procedure messages in that sequence it shall respond with a failure message stating 'InvalidProcedureSequence' as the cause of failure;
- If a secondary device in the DownloadMode state is receiving a procedure message not supported in that state it shall respond with a failure message stating 'WorkingSoftwareMissing' as the cause of failure;
- If a secondary device in the OperatingMode state is receiving a correct procedure message with a procedure code not known it shall respond with a failure message stating 'UnknownProcedure' as the cause of failure;
- If a message has a length inconsistent with the defined message length in the procedure definition it shall be responded with a failure message stating 'FormatError' as the cause of failure. The response message shall be to the initiating message identified by the procedure code.

6.2.3 Parallel procedure handling

The secondary device shall support parallel execution of in maximum one additional EP only in parallel to one of the Time-Consuming Procedures defined in table 6.2.3.1:

Table 6.2.3.1: Definition of TCPs and the execution of procedures in parallel to a TCP

Elementary Procedure	TCP	Execution in parallel to a TCP
<u>Common Procedure Set</u>		
(Reserved)		
Reset Software	no	mandatory
Get Alarm Status	no	mandatory
Get Information	no	mandatory
Clear Active Alarms	no	disallowed
Read User Data	no	optional
Write User Data	no	optional
Alarm Subscribe	no	optional
Self Test	yes	disallowed
Download Start	no	disallowed
Download Application	no	disallowed
Download End	no	disallowed
<u>Single-Antenna Procedure Set</u>		
Set Device Data	no	optional
Get Device Data	no	optional
Calibrate	yes	disallowed
Send Configuration Data	no	disallowed
Set Tilt	yes	disallowed
Get Tilt	no	optional
Alarm Indication	no	optional
<u>Multi-Antenna Procedure Set</u>		
Antenna Calibrate	yes	optional
Antenna Send Configuration Data	no	disallowed
Antenna Set Tilt	yes	optional
Antenna Get Tilt	no	optional
Antenna Set Device Data	no	optional
Antenna Get Device Data	no	optional
Antenna Alarm Indication	no	optional
Antenna Clear Active Alarms	no	disallowed
Antenna Get Alarm Status	no	mandatory
Antenna Get Number of Antennas	no	mandatory

'yes' in the "TCP" column indicates that the procedure is a TCP, 'no' in the "TCP" column indicates that the procedure is not a TCP. 'mandatory' in the "Execution in parallel to a TCP" column indicates that the procedure shall be executed in parallel to an ongoing TCP. 'optional' in this column indicates, that the support of the execution of the procedure in parallel to an ongoing TCP is optional and 'disallowed' indicates that the procedure shall not be executed in parallel to a TCP.

If a secondary device receives an initiating message for an EP which cannot be executed due to the ongoing execution of other EPs, the secondary device shall respond with a failure message stating 'Busy' as the cause of failure.

Parallel execution of one TCP marked 'optional' in the "Execution in parallel to a TCP" column in table 6.2.3.1 may be supported for each antenna by the secondary device. The EPs AntennaSetTilt and AntennaCalibrate shall be executed in parallel only for different antenna numbers. If more than one TCP is executed, ResetSoftware shall be executed anyway and never be responded with 'Busy'.

If the EPs Get Tilt and Antenna GetTilt are executed in parallel with a TCP, their response message shall deliver a tilt value sampled during their execution.

6.3 Overview of elementary procedures

The set of elementary procedures for RET antenna control provides procedure-oriented instructions. An overview of the procedures is given in annex D. Table 6.3.1 lists all common elementary procedures described in subclause 6.5. Table 6.3.2 lists all elementary procedures specific for single-antenna device types described in subclause 6.6. Table 6.3.3 lists all elementary procedures specific for multi-antenna device types described in subclause 6.7. subclause 6.4 describes how to interpret the elementary procedure definitions in subclauses 6.5 to 6.7.

Some elementary procedures shall be performed in sequence as described in Annex C for the software download.

Table 6.3.1: Common elementary procedure set for all device types

Elementary procedure	Requirement	Comment
Reset Software	mandatory	
Get Alarm Status	mandatory	
Get Information	mandatory	
Clear Active Alarms	mandatory	
Alarm Subscribe	mandatory	
Read User Data	mandatory	
Write User Data	mandatory	
Self Test	mandatory	
Download Start	optional	This procedure is mandatory if the software download feature is supported
Download Application	optional	This procedure is mandatory if the software download feature is supported
Download End	optional	This procedure is mandatory if the software download feature is supported

Table 6.3.2: Elementary procedure set for single-antenna device type

Elementary procedure	Requirement	Comment
Calibrate	mandatory	
Send Configuration Data	mandatory	
Set Tilt	mandatory	
Get Tilt	mandatory	
Alarm Indication	mandatory	
Set Device Data	mandatory	
Get Device Data	mandatory	

Table 6.3.3: Elementary procedure set for multi-antenna device type

Elementary procedure	Requirement	Comment
Antenna Calibrate	mandatory	
Antenna Send Configuration Data	mandatory	
Antenna Set Tilt	mandatory	
Antenna Get Tilt	mandatory	
Antenna Set Device Data	mandatory	
Antenna Get Device Data	mandatory	
Antenna Alarm Indication	mandatory	
Antenna Clear Active Alarms	mandatory	
Antenna Get Alarm Status	mandatory	
Antenna Get Number Of Antennas	mandatory	

6.4 Description of elementary procedures

Table 6.4.1: Description of elementary procedures

Name: The name used to refer to the elementary procedure				
Code: The code is defined here. All other code references are informative	Issued by: Primary device or secondary device	Procedure class: Class 1 or Class 2	DownloadMode state: Defines whether the procedure shall be supported in the DownloadMode state.	Power mode: Defines the secondary device power consumption as described in [4] during the execution of the elementary procedure.

Table 6.4.2: Initiating and response message parameters and format

Number	Length	Type	Description
The enumerated order in which the parameter occurs in the data field of the message. The first number is 1.	The length of the parameter, in number of octets, if defined.	The data type used in the parameter.	Description of the parameter.

Table 6.4.3: Response message parameters and format for common class 1 elementary procedures upon error

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code FAIL
2	1 octet	ReturnCode	Reason for failure

Table 6.4.4: Response message parameters and format for single-antenna class 1 elementary procedures upon error

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code FAIL
2	1 octet	ReturnCode	Reason for failure

Table 6.4.5: Response message parameters and format for multi-antenna class 1 elementary procedures upon error

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code FAIL
3	1 octet	ReturnCode	Reason for failure

NOTE: The response message in the elementary procedure AntennaGetAntennaNumber, has the format given in table 6.4.4, although it is defined as a multi-antenna class 1 elementary procedure.

Description:

Describes the purpose of the elementary procedure.

Table 6.4.6: Return codes

OK	FAIL	Comment
All return codes applicable in a response message to a successful procedure, except 'OK', are listed here. The return codes are listed by name as defined in annex A.	All return codes applicable in a response message to a failing procedure, except 'FAIL' are listed here. The return codes are listed by name as defined in annex A.	Any comment needed for clarification.

6.5 Common elementary procedures

6.5.1 Reset Software

Table 6.5.1.1: Elementary procedure Reset Software

Name: ResetSoftware				
Code: 0x03	Issued by: Primary device	Procedure class: 1	DownloadMode state: Yes	Power mode: Low

Table 6.5.1.2: Initiating message parameters and format for Reset Software

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.1.3: Response message parameters and format for Reset Software

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On the receipt of the initiating message the secondary device shall reset the application. All alarm states shall be cleared.

If the initiating message is received in the OperatingMode state, the transport layer shall remain unaffected.

If the initiating message is received in the DownloadMode state, the ResetSoftware procedure shall reset the entire device without activating any new application software downloaded since entering the DownloadMode state.

The device shall not execute the reset procedure before transport layer acknowledgement through sequence number update is received for the response.

Table 6.5.1.4: Return codes for Reset Software

OK	FAIL	Comment
	FormatError	In case of format error, the procedure code validity is not secured.

6.5.2 Get Alarm Status**Table 6.5.2.1: Elementary procedure Get Alarm Status**

Name: GetAlarmStatus				
Code: 0x04	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.5.2.2: Initiating message parameters and format for Get Alarm Status

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.2.3: Response message parameters and format for Get Alarm Status

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
i + 1	1 octet	AlarmCode	Active alarm number i

$i = 1 \dots N$

Description:

On receipt of the initiating message the secondary device reports the alarm codes of the active alarms.

Table 6.5.2.4: Return codes for Get Alarm Status

OK	FAIL	Comment
All return codes marked as used for alarms in Annex A.	FormatError WorkingSoftwareMissing	

6.5.3 Get Information

Table 6.5.3.1: Elementary procedure Get Information

Name: GetInformation				
Code: 0x05	Issued by: Primary device	Procedure class: 1	DownloadMode state: Yes	Power mode: Low

Table 6.5.3.2: Initiating message parameters and format for Get Information

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.3.3: Response message parameters and format for Get Information

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
2	1 octet	Unsigned integer	Length of parameter 3 in number of octets
3		TextString	Product number
4	1 octet	Unsigned integer	Length of parameter 5 in number of octets
5		TextString	Serial number
6	1 octet	Unsigned integer	Length of parameter 7 in number of octets
7		TextString	Hardware Version
8	1 octet	Unsigned integer	Length of parameter 9 in number of octets
9		TextString	Software Version

Description:

On receipt of the initiating message the secondary device shall return the product number ProdNr and the serial number SerNr of the secondary device. If known, also the hardware version and the software version may be returned. The software version should indicate the version number of the currently executed software.

The parameters HWVersion and SWVersion in the response message refer to the version designators of the hardware and installed software of the secondary device. If the application is missing or no HW or SW version number is found, then an empty string shall be returned as the HW or SW version number. The empty string is represented as a length field equals 0 and no octets in the TextString field.

The response message length shall be less than or equal to the minimum SecondaryPayloadTransmitLength as given in subclause 4.8.1 in [3].

Table 6.5.3.4: Return codes for Get Information

OK	FAIL	Comment
	FormatError	

6.5.4 Clear Active Alarms

Table 6.5.4.1: Elementary procedure Clear Active Alarms

Name: ClearActiveAlarms				
Code: 0x06	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.5.4.2: Initiating message parameters and format for Clear Active Alarms

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.4.3: Response message parameters and format for Clear Active Alarms

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall first clear all stored alarm information and then return a procedure response message.

Table 6.5.4.4: Return codes for Clear Active Alarms

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing	

6.5.5 Alarm Subscribe

Table 6.5.5.1: Elementary procedure Alarm Subscribe

Name: AlarmSubscribe				
Code: 0x12	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.5.5.2: Initiating message parameters and format for Alarm Subscribe

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.5.3: Response message parameters and format for Alarm Subscribe

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall start reporting alarms to the primary device.

Table 6.5.5.4: Return codes for Alarm Subscribe

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing	

6.5.6 Self Test

Table 6.5.6.1: Elementary procedure Self Test

Name: SelfTest				
Code: 0x0A	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: High

Table 6.5.6.2: Initiating message parameters and format for Self Test

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.6.3: Response message parameters and format for Self Test

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
i + 1	1 octet	AlarmCode	Alarm code for alarm i detected during self test.

$i = 1 \dots N$

Description:

On receipt of the initiating message the secondary device shall execute a test procedure which may include a check of physical and processor functions. The specific tests to be performed are implementation specific, and may include the movement of the adjuster, which shall not exceed $\pm 5\%$ of total available tilting range starting from the current adjuster position.

The response message of the secondary device on the procedure provides information on detected faults or, if no fault is detected, with confidence that the operation of the device is normal in all respects.

During the test the operational parameters of the device shall not change beyond operationally acceptable limits and on completion all parameters shall be returned to their initial values.

In the normal response message, after the self test was executed successfully, the return codes are set to report possible detected faults during the self test. If no faults are detected, this shall be signalled by no return codes following the return code <OK>.

In the case of a failure response message, the self test could not be executed successfully and the reported return code relates to the inability of the device to perform the requested self-test operation.

Table 6.5.6.4: Return codes for Self Test

OK	FAIL	Comment
All return codes marked as alarms in annex A.	FormatError Busy WorkingSoftwareMissing NotCalibrated NotScaled	

6.5.7 Void

6.5.8 Void

6.5.9 Read User Data

Table 6.5.9.1: Elementary procedure Read User Data

Name: ReadUserData				
Code: 0x10	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.5.9.2: Initiating message parameters and format for Read User Data

Number	Length	Type	Description
1	2 octets	Unsigned integer	Memory offset
2	1 octet	Unsigned integer	Number of octets to read

NOTE: Number of octets to read shall be less than, or equal to MaxDataTransmit Length minus 1.

Table 6.5.9.3: Response message parameters and format for Read User Data

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
2	Number of octets given by parameter 2 of the initiating message	User specific	User data

Description:

On receipt of the initiating message the secondary device shall send back user specific data stored in a user data area to the primary device.

The user data area is intended for storage of user defined data, e.g. inventory information.

Table 6.5.9.4: Return codes for Read User Data

OK	FAIL	Comment
	FormatError WorkingSoftwareMissing OutOfRange	The return code OutOfRange is used, if the given memory address range is outside the valid address space.

6.5.10 Write User Data

Table 6.5.10.1: Elementary procedure Write User Data

Name: WriteUserData				
Code: 0x11	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.5.10.2: Initiating message parameters and format for Write User Data

Number	Length	Type	Description
1	2 octets	Unsigned integer	Memory offset
2	1 octet	Unsigned integer	Number of octets to write
3	Message specific, given by parameter 2	User specific	Data to write

NOTE: Number of octets to write shall be less than, or equal to MaxDataReceiveLength minus 3.

Table 6.5.10.3: Response message parameters and format for Write User Data

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall store user data in non-volatile memory. The user data is stored in the user data area using the relative memory address offset given in the initiating message and starting with zero.

The user data area is intended for storage of user defined data, e.g. inventory information.

Table 6.5.10.4: Return codes for Write User Data

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing HardwareError OutOfRange	The return code OutOfRange is used if the given memory address range is outside the valid address space.

6.5.11 Download Start**Table 6.5.11.1: Elementary procedure Download Start**

Name: DownloadStart				
Code: 0x40	Issued by: Primary device	Procedure class: 1	DownloadMode state: Yes	Power mode: Low

Table 6.5.11.2: Initiating message parameters and format for Download Start

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.11.3: Response message parameters and format for Download Start

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of this initiating message the software download process shall be initiated. Following transition to the DownloadMode state, the secondary device sends <OK>. Previous subscription of alarms by use of the AlarmSubscribe procedure is cancelled.

Table 6.5.11.4: Return codes for Download Start

OK	FAIL	Comment
	FormatError Busy UnsupportedProcedure	

6.5.12 Download Application

Table 6.5.12.1: Elementary procedure Download Application

Name: DownloadApplication				
Code: 0x41	Issued by: Primary device	Procedure class: 1	DownloadMode state: Yes	Power mode: Low

Table 6.5.12.2: Initiating message parameters and format for Download Application

Number	Length	Type	Description
1	Less than, or equal to MaxDataReceiveLength	Vendor specific	Software data

Table 6.5.12.3: Response message parameters and format for Download Application

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

This elementary procedure is used once or several times to transfer software data from the primary device to the secondary device.

Table 6.5.12.4: Return codes for Download Application

OK	FAIL	Comment
	FormatError Busy HardwareError InvalidFileContent InvalidProcedureSequence	

6.5.13 Download End

Table 6.5.13.1: Elementary procedure Download End

Name: DownloadEnd				
Code: 0x42	Issued by: Primary device	Procedure class: 1	DownloadMode state: Yes	Power mode: Low

Table 6.5.13.2: Initiating message parameters and format for Download End

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.5.13.3: Response message parameters and format for Download End

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

This elementary procedure signals the end of a multi-message data transfer to the secondary device. The secondary device shall respond after verifying the received data. The secondary device shall reset autonomously after completion of the layer 2 response and activate the new application software.

Table 6.5.13.4: Return codes for Download End

OK	FAIL	Comment
	FormatError Busy HardwareError ChecksumError InvalidFileContent InvalidProcedureSequence	

6.5.14 Vendor specific procedure

Table 6.5.14.1: Elementary procedure Vendor Specific Procedure

Name: VendorSpecificProcedure				
Code: 0x90	Issued by: Vendor specific	Procedure class: Vendor specific	DownloadMode state: Vendor specific	Power mode: Vendor specific

Table 6.5.14.2: Initiating message parameters and format for Vendor Specific Procedure

Number	Length	Type	Description
1	2 octets	ASCII	Vendor code
1 + i	Vendor specific	Vendor specific	

i = 1 ... N

Table 6.5.14.3: Response message parameters and format for Vendor Specific Procedure

Number	Length	Type	Description
i	Vendor specific	Vendor specific	Vendor specific

i = 1 ... N

Description:

The vendor specific procedure is intended for vendor specific purposes like e.g. testing.

Table 6.5.14.4: Return codes for vendor specific procedure

OK	FAIL	Comment
	FormatError UnknownProcedure	If the Vendor code in the initiating message does not match that of the RET device, UnknownProcedure shall be returned.

6.6 Single-antenna elementary procedures

6.6.1 Calibrate

Table 6.6.1.1: Elementary procedure Calibrate

Name: Calibrate				
Code: 0x31	Issued by: Primary Device	Procedure class: 1	DownloadMode state: No	Power mode: High

Table 6.6.1.2: Initiating message parameters and format for Calibrate

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.6.1.3: Response message parameters and format for Calibrate

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall perform a calibration of the RET antenna where the actuator is driven through its whole tilt range.

The response time to this Calibrate procedure shall be less than 4 minutes.

Table 6.6.1.4: Return codes for Calibrate

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing MotorJam ActuatorJam NotConfigured UnsupportedProcedure	

6.6.2 Send Configuration Data

Table 6.6.2.1: Elementary procedure Send Configuration Data

Name: SendConfigurationData				
Code: 0x32	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.6.2.2: Initiating message parameters and format for Send Configuration Data

Number	Length	Type	Description
1	Less than, or equal to MaxDataReceiveLength	Vendor specific	Configuration data

Table 6.6.2.3: Response message parameters and format for Send Configuration Data

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall store the provided vendor and antenna specific configuration data for the relationship between the movement of the drive system and the beam tilt position of the antenna.

If the configuration data exceeds MaxDataReceiveLength, the data shall be split into a number of MaxDataReceiveLength segments and one final segment with whatever is left. The primary device transmits the segments in order. The layer 2 sequence numbers guarantee that no segment will be lost or received out of order.

Table 6.6.2.4: Return codes for Send Configuration Data

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing ChecksumError InvalidFileContent UnsupportedProcedure	

6.6.3 Set Tilt**Table 6.6.3.1: Elementary procedure Set Tilt**

Name: SetTilt				
Code: 0x33	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: High

Table 6.6.3.2: Initiating message parameters and format for Set Tilt

Number	Length	Type	Description
1	2 octets	Signed integer	Tilt value

Table 6.6.3.3: Response message parameters and format for Set Tilt

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall set the electrical tilt in increments of 0.1°.

The secondary device shall respond to the initiating message in less than 2 minutes.

The tilt value corresponding to the actual tilt angle shall not go outside of the range between the tilt value corresponding to the current tilt angle and the tilt value corresponding to the requested tilt angle by more than 5 during this operation.

The format of the value of parameter 1 is given in subclause 3.1.

Table 6.6.3.4: Return codes for Set Tilt

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing MotorJam ActuatorJam NotConfigured NotCalibrated OutOfRange UnsupportedProcedure	

6.6.4 Get Tilt

Table 6.6.4.1: Elementary procedure Get Tilt

Name: GetTilt				
Code: 0x34	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.6.4.2: Initiating message parameters and format for Get Tilt

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.6.4.3: Response message parameters and format for Get Tilt

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
2	2 octets	Signed integer	Tilt value

Description:

On receipt of the initiating message the secondary device shall return the current tilt value.

The returned tilt value is given in the format specified in subclause 3.1.

Table 6.6.4.4: Return codes for Get Tilt

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing NotCalibrated NotConfigured UnsupportedProcedure	HardwareError shall only be used, if error is detected in tilt detector.

6.6.5 Alarm Indication

Table 6.6.5.1: Elementary procedure Alarm Indication

Name: AlarmIndication				
Code: 0x07	Issued by: Secondary device	Procedure class: 2	DownloadMode state: No	Power mode: Low

Table 6.6.5.2: Initiating message parameters and format for Alarm Indication

Number	Length	Type	Description
2 i – 1	1 octet	Unsigned integer	Return code i; see annex A
2 i	1 octet	Unsigned integer	State flag i

i = 1 ... N

Description:

The secondary device uses this procedure to report alarm state changes to the primary device. This procedure shall only be performed if the secondary has performed an AlarmSubscribe procedure since its latest reset.

For each alarm, the current alarm state and alarm code shall be reported if and only if any change in its state has occurred during the period of time since the last reported state. An AlarmIndication procedure shall be performed if at least one alarm shall be reported. The first AlarmIndication procedure after the AlarmSubscribe procedure shall report the active alarms.

Alarm state changes are considered as reported at the time the message is passed to the transport layer.

State flag = 0 represents alarm state *cleared*.

State flag = 1 represents alarm state *raised*.

6.6.6 Set Device Data

Table 6.6.6.1: Elementary procedure Set Device Data

Name: SetDeviceData				
Code: 0x0E	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.6.6.2: Initiating message parameters and format for Set Device Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Field number, see annex B
2	See annex B	See annex B	Data to write

Table 6.6.6.3: Response message parameters and format for Set Device Data

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall write the data given in the parameters of the initiating message into the fields optionally provided for configuration data and listed in annex B of this TS. If an attempt is made to write to fields which are designated as read only, the return code *ReadOnly* is returned and the data for those fields is

ignored. If an attempt is made to write to fields which are not supported by the device the return code *UnknownParameter* is returned and the data for those fields is ignored.

Table 6.6.6.4: Return codes for Set Device Data

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing HardwareError ReadOnly UnknownParameter	

6.6.7 Get Device Data

Table 6.6.7.1: Elementary procedure Get Device Data

Name: GetDeviceData				
Code: 0x0F	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.6.7.2: Initiating message parameters and format for Get Device Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Field number; see annex B

Table 6.6.7.3: Response message parameters and format for Get Device Data

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
2	See annex B	See annex B	Field value

Description:

In this procedure the secondary device shall return the data stored in the field for configuration data specified by the field number in the procedure and listed in annex B of this TS.

Table 6.6.7.4: Return codes for Get Device Data

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing UnknownParameter	

6.7 Multi-antenna elementary procedures

6.7.1 Antenna Calibrate

Table 6.7.1.1: Elementary procedure Antenna Calibrate

Name: AntennaCalibrate				
Code: 0x80	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: High

Table 6.7.1.2: Initiating message parameters and format for Antenna Calibrate

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number

Table 6.7.1.3: Response message parameters and format for Antenna Calibrate

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall perform a calibration of the antenna addressed by the antenna number. During calibration the actuator is driven through the whole tilt range of the antenna.

The response time to this Antenna Calibrate procedure shall be less than 4 minutes.

Table 6.7.1.4: Return codes for Antenna Calibrate

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing MotorJam ActuatorJam NotConfigured UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned.

6.7.2 Antenna Set Tilt**Table 6.7.2.1: Elementary procedure Antenna Set Tilt**

Name: AntennaSetTilt				
Code: 0x81	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: High

Table 6.7.2.2: Initiating message parameters and format for Antenna Set Tilt

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	2 octets	Signed integer	Tilt value

Table 6.7.2.3: Response message parameters and format for Antenna Set Tilt

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall set the electrical tilt of the antenna addressed by the antenna number in increments of 0.1°.

The secondary device shall respond to the initiating message in less than 2 minutes.

The tilt value corresponding to the actual tilt angle shall not go outside of the range between the tilt value corresponding to the current tilt angle and the tilt value corresponding to the requested tilt angle by more than 5 during this operation.

The format of the value of parameter 2 is given in subclause 3.1.

Table 6.7.2.4: Return codes for Antenna Set Tilt

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing MotorJam ActuatorJam NotConfigured NotCalibrated OutOfRange UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned.

6.7.3 Antenna Get Tilt

Table 6.7.3.1: Elementary procedure Antenna Get Tilt

Name: AntennaGetTilt				
Code: 0x82	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.3.2: Initiating message parameters and format for Antenna Get Tilt

Number	Length	Type	Description
1	1 octet	Unsigned interger	Antenna number

Table 6.7.3.3: Response message parameters and format for Antenna Get Tilt

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK
3	2 octets	Signed integer	Tilt value

Description:

On receipt of the initiating message the secondary device shall return the current tilt value of the antenna addressed by the antenna number.

The returned tilt value is in the format specified in subclause 3.1.

Table 6.7.3.4: Return codes for Antenna Get Tilt

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing NotConfigured NotCalibrated UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned. HardwareError shall only be used, if an error is detected in tilt detector.

6.7.4 Antenna Set Device Data

Table 6.7.4.1: Elementary procedure Antenna Set Device Data

Name: AntennaSetDeviceData				
Code: 0x83	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.4.2: Initiating message parameters and format for Antenna Set Device Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	Unsigned integer	Field number; see annex B
3	See annex B	See annex B	Data to write

Table 6.7.4.3: Response message parameters and format for Antenna Set Device Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall write the provided data for the antenna addressed by the antenna number into the fields optionally provided for configuration data and listed in annex B of this TS. If an attempt is made to write to fields which are designated as read only for the addressed antenna the return code ReadOnly is returned and the data for those fields is ignored. If an attempt is made to write to fields which are not supported for the addressed antenna the return code UnknownParameter is returned and the data for those fields is ignored.

Table 6.7.4.4: Return codes for Antenna Set Device Data

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing ReadOnly UnknownParameter UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned.

6.7.5 Antenna Get Device Data

Table 6.7.5.1: Elementary procedure Antenna Get Device Data

Name: AntennaGetDeviceData				
Code: 0x84	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.5.2: Initiating message parameters and format for Antenna Get Device Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	Unsigned integer	Field number to read; see annex B

Table 6.7.5.3: Response message parameters and format for Antenna Get Device Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK
3	See annex B	See annex B	Field value

Description:

On receipt of the initiating message the secondary device shall return the data stored for the addressed antenna in the field for configuration data specified by the field number in the initiating message and listed in annex B of this TS.

Table 6.7.5.4: Return codes for Antenna Get Device Data

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing UnsupportedProcedure UnknownParameter	If the addressed antenna is not existing, FormatError is returned.

6.7.6 Antenna Alarm Indication**Table 6.7.6.1: Elementary procedure Antenna Alarm Indication**

Name: AntennaAlarmIndication				
Code: 0x85	Issued by: Secondary device	Procedure class: 2	DownloadMode state: No	Power mode: Low

Table 6.7.6.2: Initiating message parameters and format for Antenna Alarm Indication

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2 i	1 octet	Unsigned integer	Return code i; see annex A
2 i +1	1 octet	Unsigned integer	State flag i

$i = 1 \dots N$

Description:

The multi-antenna secondary device uses this procedure to report antenna alarm state changes to the primary device. This procedure shall only be performed if the secondary has performed an AlarmSubscribe procedure since its latest reset. Multi-antenna devices shall use this AntennaAlarmIndication procedure only for multi-antenna specific alarms and the AlarmIndication procedure in subclause 6.6.5 for the other alarms.

For each alarm, the current alarm state and alarm code shall be reported if and only if any change in its state has occurred during the period of time since the last reported state. An AntennaAlarmIndication procedure shall be performed if at least one multi-antenna specific alarm shall be reported. The first AntennaAlarmIndication procedure after the AlarmSubscribe procedure shall report the active alarms.

Alarm state changes are considered as reported at the time the message is passed to the transport layer.

State flag = 0 represents alarm state *cleared*.

State flag = 1 represents alarm state *raised*.

6.7.7 Antenna Clear Active Alarms

Table 6.7.7.1: Elementary procedure Antenna Clear Active Alarms

Name: AntennaClearActiveAlarms				
Code: 0x86	Issued by: Secondary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.7.2: Initiating message parameters and format for Antenna Clear Active Alarms

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number

Table 6.7.7.3: Response message parameters and format for Antenna Clear Active Alarms

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall first clear all stored alarm information for the addressed antenna and then return a procedure response message.

Table 6.7.7.4: Return codes for Antenna Clear Active Alarms

OK	FAIL	Comment
	FormatError Busy WorkingSoftwareMissing UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned.

6.7.8 Antenna Get Alarm Status

Table 6.7.8.1: Elementary procedure Antenna Get Alarm Status

Name: AntennaGetAlarmStatus				
Code: 0x87	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.8.2: Initiating message parameters and format for Antenna Get Alarm Status

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number

Table 6.7.8.3: Response message parameters and format for Antenna Get Alarm Status

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK
i + 2	1 octet	AlarmCode	Active alarm number i

$i = 1 \dots N$

Description:

On receipt of the initiating message the secondary device shall report the alarm codes of the active alarms for the addressed antenna.

Table 6.7.8.4: Return codes for Antenna Get Alarm Status

OK	FAIL	Comment
All return codes marked as used for alarms in Annex A	FormatError WorkingSoftwareMissing UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned.

6.7.9 Antenna Get Number Of Antennas

Table 6.7.9.1: Elementary procedure Antenna Get Number Of Antennas

Name: AntennaGetNumberOfAntennas				
Code: 0x88	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.9.2: Initiating message parameters and format for Antenna Get Number Of Antennas

Number	Length	Type	Description
None	0 octets	None	No data carried

Table 6.7.9.3: Response message parameters and format for Antenna Get Number Of Antennas

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code OK
2	1 octet	Unsigned integer	Number of antennas

Description:

On receipt of the initiating message the secondary device shall return the number of antennas it controls.

Table 6.7.9.4: Return codes for Antenna Get Number Of Antennas

OK	FAIL	Comment
	FormatError WorkingSoftwareMissing UnsupportedProcedure	

6.7.10 Antenna Send Configuration Data

Table 6.7.10.1: Elementary procedure Antenna Send Configuration Data

Name: AntennaSendConfigurationData				
Code: 0x89	Issued by: Primary device	Procedure class: 1	DownloadMode state: No	Power mode: Low

Table 6.7.10.2: Initiating message parameters and format for Antenna Send Configuration Data

Number	Length	Type	Description
1	1 octet	Unsigned Integer	Antenna number
2	Less than, or equal to MaxDataReceiveLength minus 1	Vendor specific	Configuration data

Table 6.7.10.3: Response message parameters and format for Antenna Send Configuration Data

Number	Length	Type	Description
1	1 octet	Unsigned integer	Antenna number
2	1 octet	ReturnCode	Return code OK

Description:

On receipt of the initiating message the secondary device shall store the provided vendor and antenna specific configuration data for the relationship between the movement of the drive system and the beam tilt position of the addressed antenna.

If the configuration data exceeds MaxDataReceiveLength, the data shall be split into a number of MaxDataReceiveLength minus 1 segments and one final segment with whatever is left. The primary device transmits the segments in order. The layer 2 sequence numbers guarantee that no segment will be lost or received out of order.

Table 6.7.10.4: Return codes for Antenna Send Configuration Data

OK	FAIL	Comment
	FormatError Busy HardwareError WorkingSoftwareMissing ChecksumError InvalidFileContent UnsupportedProcedure	If the addressed antenna is not existing, FormatError is returned.

7 Unknown elementary procedures

If a secondary device in the OperatingMode state is receiving a correct procedure message with a procedure code not known, it shall respond with a failure message stating 'UnknownProcedure' as the cause of failure.

Table 7.1.1: Response message parameters and format for unknown procedures

Number	Length	Type	Description
1	1 octet	ReturnCode	Return code FAIL
2	1 octet	ReturnCode	Return code UnknownProcedure

Annex A (normative): Return codes for secondary devices

Table A.1: Return Codes for Secondary Devices

Code	Meaning		Alarm	DownloadMode state
0x00	OK	Normal response		X
0x02	Motor Jam	Motor cannot move	X	
0x03	ActuatorJam	Actuator jam has been detected. No movement of the actuator, but movement of the motor was detected	X	
0x05	Busy	The device is busy and cannot respond until an ongoing activity is completed		
0x06	ChecksumError	Checksum incorrect for otherwise valid data..		
0x0B	FAIL	Abnormal response. Indicates that a procedure has not been executed successfully		X
0x0E	NotCalibrated	The device has not completed a calibration operation, or calibration has been lost	X	
0x0F	NotConfigured	Actuator configuration data is missing	X	
0x11	HardwareError	Any hardware error which cannot be classified. May not be reported as an alarm until the fault is likely to be persistent	X	X
0x13	OutOfRange	A parameter given by an operator (e.g. tilt value or memory offset) is out of range		
0x19	UnknownProcedure	Received procedure code is not defined		X
0x1D	ReadOnly	Invalid device data parameter usage		X
0x1E	UnknownParameter	Specified parameter is not supported for the used procedure		X
0x21	WorkingSoftwareMissing	The unit is inDownloadMode state. Returned upon unsupported procedure when in DownloadMode state		X
0x22	InvalidFileContent	The data being downloaded is detected to be of wrong format or size		X
0x24	FormatError	Procedure message is inconsistent or if an addressed field or antenna is invalid or the data parameter field length is inconsistent with the corresponding field length parameter		X
0x25	UnsupportedProcedure	The procedure is optional and not supported or the procedure does not apply to this device type		
0x26	InvalidProcedureSequence	Procedure sequence as described in annex C is expected but not experienced by the secondary device		
0x27	ActuatorInterference	An actuator movement outside the control of the RET unit has been detected. Probable cause is manual interference	X	

Annex B (normative): Assigned fields for additional data

The following standard fields have no operational impact and are used by the procedures SetDeviceData, GetDeviceData, AntennaSetDeviceData and AntennaGetDeviceData. Little endian order is used for storage of multiple-octet numbers. Where ASCII variables are shorter than the assigned field lengths the characters are right aligned and leading blanks are filled with null characters (0x00).

Table B.1: Assigned fields for additional data

Field No.	Length (octets)	Format	Description
0x01	15	ASCII	Antenna model number
0x02	17	ASCII	Antenna serial number
0x03	2	16-bit unsigned	Antenna operating band(s): see below
0x04	8	4 x 16-bit unsigned	Beamwidth for each operating band in band order (deg) (example width for band I, width for band III)
0x05	4	4 x 8-bit unsigned	Gain for each operating band in band order (dBi * 10) (example gain for band I, gain for band III)
0x06	2	16-bit signed	Maximum supported tilt (degrees * 10), format as in subclause 3.1
0x07	2	16-bit signed	Minimum supported tilt (degrees * 10), format as in subclause 3.1
0x21	6	ASCII	Installation date
0x22	5	ASCII	Installer's ID
0x23	32	ASCII	Base station ID
0x24	32	ASCII	Sector ID
0x25	2	16-bit unsigned	Antenna bearing
0x26	2	16-bit signed	Installed mechanical tilt (degrees * 10), format as in subclause 3.1

Table B.2: Coding for operating bands in field 0x03

Bit no	15...6	5	4	3	2	1	0
Operating band	Spare	I	II	III	IV	V	VI

The operating bands are defined in subclause 4.3.7 in [4].

Bits are numbered from 0 to 15, bit no 0 set=1 represents the value 0x0001.

Bit set=1 represents operating band is supported.

Bit set=0 represents operating band is not supported.

Spare bits shall be set=0.

Unused Beamwidth and Gain octets shall be set to 0x0000.

Examples of operating bands: 0000 0000 0001 0000 = Operating band II

0000 0000 0011 1000 = Operating band I, II and III

Annex C (normative): Procedure sequence for download of software to a secondary device

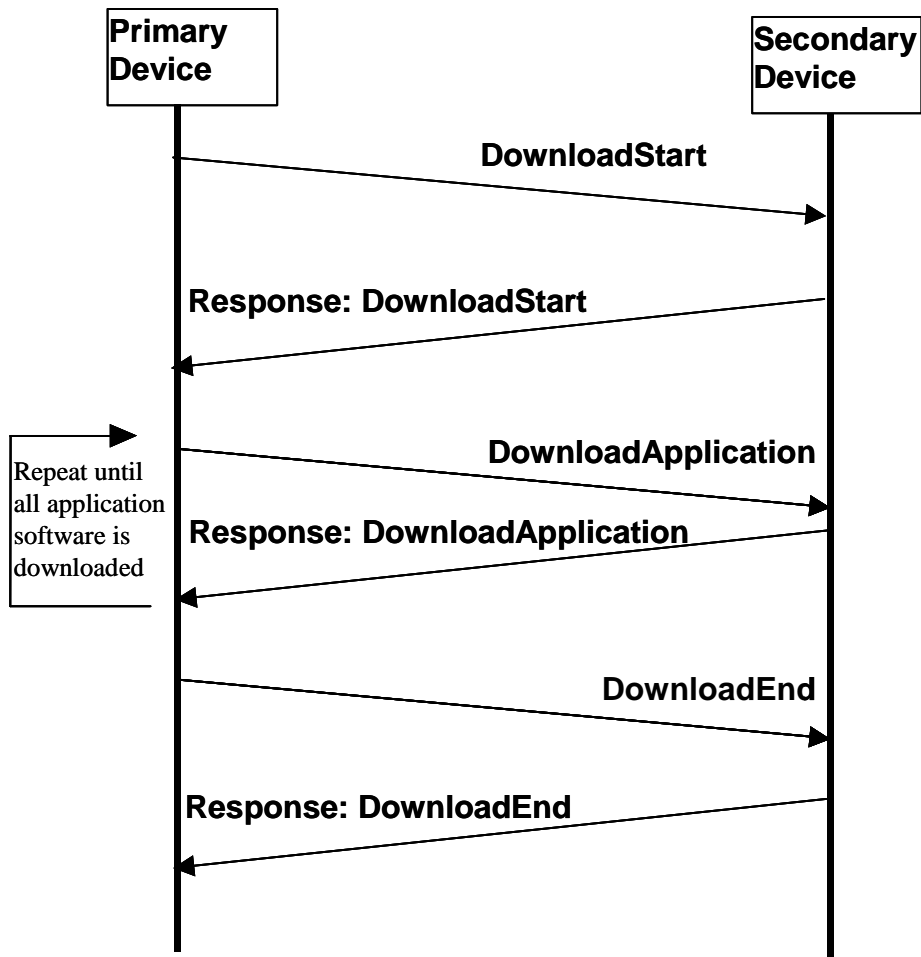


Figure C.1: Procedure sequence for Software Download

The erasure of the secondary device application software shall not be done before the reception of the Download Application message. The data content of the Download Application message is implementation specific but it is recommended to support an application software validity feature that shall minimise the risk of downloading faulty or invalid application software.

Annex D (informative): Overview of elementary procedures

Table D.1: Elementary Procedures and Procedure Codes

Elementary Procedure	Procedure Code	Issued by	DownloadMode state
<u>Common Procedure Set</u>			
(Reserved)	0x01		
Reset Software	0x03	primary device	yes
Get Alarm Status	0x04	primary device	no
Get Information	0x05	primary device	yes
Clear Active Alarms	0x06	primary device	no
Read User Data	0x10	primary device	no
Write User Data	0x11	primary device	no
Alarm Subscribe	0x12	primary device	no
Self Test	0x0A	primary device	no
Download Start	0x40	primary device	yes
Download Application	0x41	primary device	yes
Download End	0x42	primary device	yes
Vendor Specific Procedure	0x90	primary device	Vendor specific
<u>Single-Antenna Procedure Set</u>			
Set Device Data	0x0E	primary device	no
Get Device Data	0x0F	primary device	no
Calibrate	0x31	primary device	no
Send Configuration Data	0x32	primary device	no
Set Tilt	0x33	primary device	no
Get Tilt	0x34	primary device	no
Alarm Indication	0x07	secondary device	no
<u>Multi-Antenna Procedure Set</u>			
Antenna Calibrate	0x80	primary device	no
Antenna Send Configuration Data	0x89	primary device	no
Antenna Set Tilt	0x81	primary device	no
Antenna Get Tilt	0x82	primary device	no
Antenna Set Device Data	0x83	primary device	no
Antenna Get Device Data	0x84	primary device	no
Antenna Alarm Indication	0x85	secondary device	no
Antenna Clear Active Alarms	0x86	primary device	no
Antenna Get Alarm Status	0x87	primary device	no
Antenna Get Number of Antennas	0x88	primary device	no

NOTE: The notion "yes" in the DownloadMode state column indicates that the listed procedures are mandatory if the DownloadMode state can be entered by the secondary device.

Annex E (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
September 2004	TSG-RAN#25	RP-040346	-	-	presentation to TSG-RAN for information	-	1.0.0
September 2004	TSG-RAN#25	RP-040346	-	-	approved at TSG-RAN#25 and placed under change control	1.0.0	6.0.0
12/2004	26	RP-040445	1	2	Reduction of risk of accidental erasure of Ret application SW	6.0.0	6.1.0
12/2004	26	RP-040445	2	-	Clarification of allowed tilt operation during self test	6.0.0	6.1.0
12/2004	26	RP-040445	3	-	State Model for RET device	6.0.0	6.1.0
12/2004	26	RP-040445	4	-	Corrections and editorial changes to 25.463 according to RAN3#44	6.0.0	6.1.0
12/2004	26	RP-040445	5	1	Antenna Send Configuration Data procedure missing	6.0.0	6.1.0
12/2004	26	RP-040445	7	1	Introduction of Software Download State model	6.0.0	6.1.0
12/2004	26	RP-040445	8	3	Alarm handling clarification	6.0.0	6.1.0
12/2004	26	RP-040445	9	2	RET DC power consumption clarification	6.0.0	6.1.0
12/2004	26	RP-040445	10	2	Response message format clarification	6.0.0	6.1.0
12/2004	26	RP-040445	12	2	Return code clean-up and clarification	6.0.0	6.1.0
12/2004	26	RP-040445	15	2	Clarification on the intention of the elementary procedures ReadUserData and WriteUserData	6.0.0	6.1.0
12/2004	26	RP-040445	16	2	Maximum data payload size in elementary procedures	6.0.0	6.1.0
12/2004	26	RP-040445	17	-	Definition of response time in the application layer	6.0.0	6.1.0
12/2004	26	RP-040445	18	2	Redefinition of the Elementary Procedures GetDeviceData and SetDeviceData	6.0.0	6.1.0
03/2005	27	RP-050061	20		Wrong numbering in table 6.7.6.2	6.1.0	6.2.0
03/2005	27	RP-050061	23	1	Editorial Corrections to 25.463 after RAN3#45	6.1.0	6.2.0
03/2005	27	RP-050061	24		Minor Corrections to 25.463 after RAN3#45	6.1.0	6.2.0
03/2005	27	RP-050061	25	2	Clarification on antenna movement during Set Tilt	6.1.0	6.2.0
03/2005	27	RP-050061	26	1	Redefinition of the Software Reset procedure	6.1.0	6.2.0
06/2005	28	RP-050237	31		Antenna Set Device Data	6.2.0	6.3.0
06/2005	28	RP-050237	32		Editorial Corrections to 25.463	6.2.0	6.3.0
06/2005	28	RP-050237	35		Clarification of Tilt	6.2.0	6.3.0
06/2005	28	RP-050237	36		Definition of "empty string"	6.2.0	6.3.0
06/2005	28	RP-050237	37		Improvement of Annex B	6.2.0	6.3.0
06/2005	28	RP-050237	38		Vendor specific procedure	6.2.0	6.3.0
06/2005	28	RP-050237	39	2	Set Tilt Correction	6.2.0	6.3.0
06/2005	28	RP-050237	43	3	Parallel procedure handling	6.2.0	6.3.0
06/2005	28	RP-050237	48		Forward and backward compatibility clarification	6.2.0	6.3.0

History

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