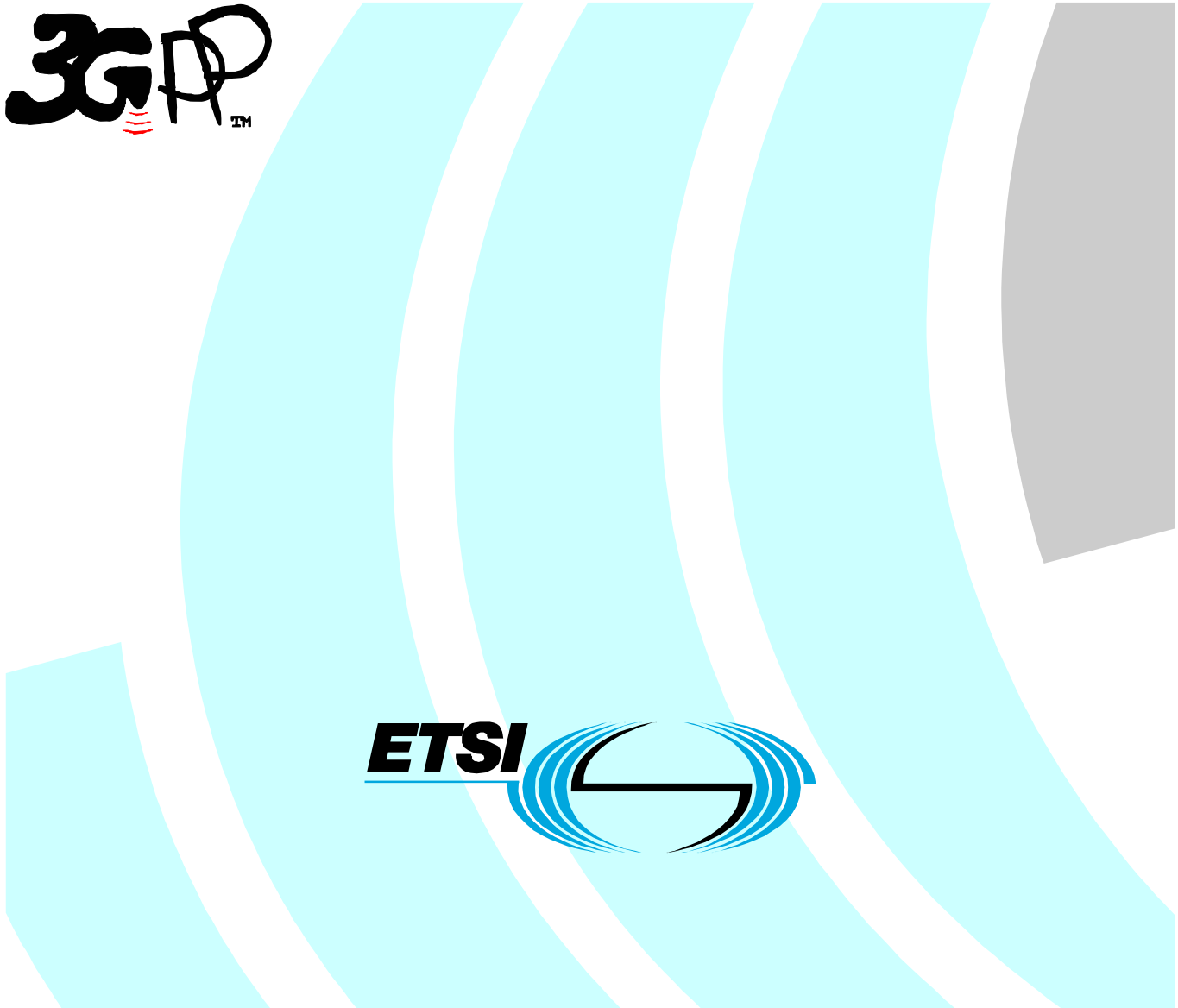
ETSI TS 125 463 V6.1.0 (2004-12)

Technical Specification

**Universal Mobile Telecommunications System (UMTS);
UTRAN Iuant interface: Remote Electrical Tilting (RET) antennas Application Part (RETAP) signalling
(3GPP TS 25.463 version 6.1.0 Release 6)**



Reference
RTS/TSGR-0325463v610

Keywords
UMTS

ETSI

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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.
- For a specific reference, subsequent revisions do not apply.
- 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.

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.

Max Data Receive Length: Secondary Payload Receive Length subtracted by 3 octets. (see [3])

Max Data Transmit Length: Secondary Payload Transmit Length subtracted by 3 octets. (see [3])

Procedure code: A code identifying an elementary procedure.

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.

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

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 section 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.

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	Max Data Receive Length or Max Data Transmit Length.

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 section 6 of this TS.

5.1.2 Response message

Elementary procedures shall, unless otherwise specified, provide a response message within one 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 transmit 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>. Following the initiating message, a response message is expected within a default period of 1 second unless otherwise specified.

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.

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 sections 6.6.5 and 6.7.6 for details).

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.

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].

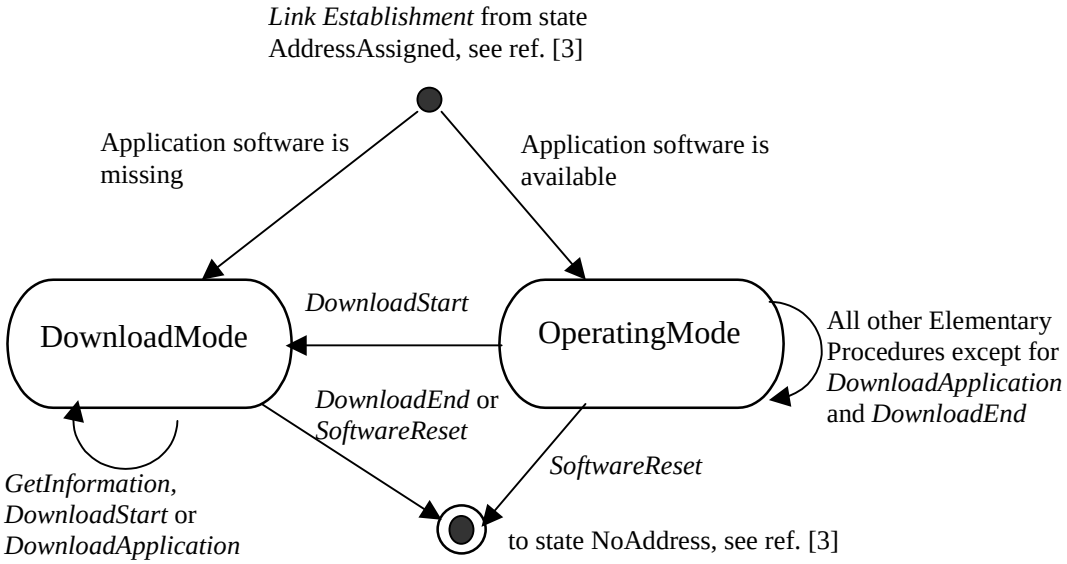

Figure 6.1: State Model for the RET Device

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

All procedures are blocking i.e. no new initiation messages will have to be executed before a response message has been delivered as result of the previously initiated procedure.

The Reset Software procedure shall always be handled in all states and never be blocked.

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 sections 6.6.5 and 6.7.6.

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.

6.3 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 section 6.5. Table 6.3.2 lists all elementary procedures specific for single-antenna device types described in section 6.6. Table 6.3.3 lists all elementary procedures specific for multi-antenna device types described in section 6.7. Section 6.4 describes how to interpret the elementary procedure definitions in sections 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

Command	Requirement	Comment
Reset Software	mandatory	
GetAlarm 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

Command	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 multiple-antenna device type

Command	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 Error 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 message parameters and format

Number	Length	Type	Description
The enumerated order in which the parameter	**The length of the parameter, in number**	**The data type used in the parameter**	**Description of the**

occurs in the data field of the message. The first number is 1.	**of octets, if defined.**		**parameter.**

Table 6.4.3: 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 6.4.4: 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 6.4.5: 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 6.4.6: 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 6.4.5, although it is defined as a multi-antenna class 1 elementary procedure.

Description:

Describes the purpose of the elementary procedure.

Table 6.4.7: 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	**All return codes applicable in a response message to a failing procedure, except 'FAIL' are listed here. The return codes are listed by**	**Any comment needed for clarification.**

by name as defined in Annex A.	**name as defined in Annex A.**	

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 set the HDLC address to the No-station address and place the device in the *No Address* state.

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

The secondary device shall not fail to reset for any reason.

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:	Issued by:	Procedure class:	DownloadMode state:	Power mode:

0x04	**Primary device**	**1**	**No**	**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 error number i**

i = 1 … 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** **Busy** **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 version number is found, then an empty string shall be returned as the version number.

The response message length shall be less than or equal to the minimum Secondary Payload Transmit Length [3].

Table 6.5.3.4: Return codes for Get Information

OK	FAIL	Comment
	FormatError **Busy**	

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 first clears all stored alarm information and then returns 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 fault i detected during self test.**

i = 1 … N

Description:

On receipt of the initiating message the secondary device executes 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 +-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, in which 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 <OK>.

In the case of a failure response message, the self test could not be executed and the 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 or equal to Max Data Transmit Length − 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**	**User specific**	**User data**

Description:

On receipt of the initiating message the secondary device sends 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 **Busy** **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:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x11	**Primary device**	**1**	**No**	**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 or equal to Max Data Receive Length − 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:	Issued by:	Procedure class:	DownloadMode state:	Power mode:
0x40	**Primary device**	**1**	**Yes**	**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
None	≤ Max Data Receive Length	**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 responds 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**	

6.6 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:	Issued by:	Procedure class:	DownloadMode state:	Power mode:

0x32	**Primary device**	**1**	**No**	**Low**

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

Number	Length	Type	Description
1	**≤ Max Data Transmit Length**	**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 Max Data Transmit Length, the data shall be split into a number of Max Data Transmit Length 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 electrical tilt value describes 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.

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

The value of parameter 1 is 10 times the tilt in degrees.

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 will return the current tilt value.

The returned tilt value is given in the format specified in section 6.6.3.

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 alarm states.

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 should 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**	**Signed 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 electrical tilt value describes 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.

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

The format of the value of parameter 2 is given in section 6.6.3.

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 will return the current tilt value of the antenna addressed by the antenna number.

The returned tilt value is in the format specified in section 6.6.3.

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 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 should 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 not supported by a particular device no error is returned but 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	**1 octet**	**Unsigned integer**	**Return code i; see annex A**
2 i	**1 octet**	**Unsigned integer**	**State flag i**

i = 1 … 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 alarm shall be reported. The first AntennaAlarmIndication procedure after the AlarmSubscribe procedure shall report the active alarm states.

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**	**Alarm code for error number i**

i = 1 ... 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** **Busy** **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 **Busy** **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	**≤ Max Data Transmit Length**	**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 antenna.

If the configuration data exceeds Max Data Transmit Length, the data shall be split into a number of Max Data Transmit Length 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**	**If the addressed antenna is not existing, FormatError is returned.**

	HardwareError **WorkingSoftwareMissing** **ChecksumError** **InvalidFileContent** **UnsupportedProcedure**	

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	Download Mode 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 activity is complete.		
0x06	ChecksumError	Checksum incorrect for otherwise valid data..		
0x0B	FAIL	Abnormal response. Indicates that a procedure has not been executed.		X
0x0E	NotCalibrated	The device has not completed a calibration operation, or calibration has been lost.	X	
0x0F	NotConfigured	Actuator configuration datais 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	Responded if the 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	Responded to indicate that the 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 and GetDeviceData. 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 frequency band(s): see below
0x04	1	1 x 8-bit unsigned	Beamwidth for each band in frequency order (deg) (example 800/900MHz, 1800/1900MHz, 2100MHz)
0x05	3	3 x 8-bit unsigned	Gain for each band in frequency order (dB/10) (example 800/900MHz, 1800/1900MHz, 2100MHz)
0x06	2	16-bit signed	Maximum supported tilt (degrees * 10), Format as in section 6.6.3
0x07	2	16-bit signed	Minimum supported tilt (degrees * 10), Format as in section 6.6.3
0x21	6	ASCII	Installation date
0x22	5	ASCII	Installer's ID
0x23	12	ASCII	Base station ID
0x24	4	ASCII	Sector ID
0x25	2	16-bit unsigned	Antenna bearing
0x26	2	16-bit signed	Installed mechanical tilt (degrees * 10), Format as in section 6.6.3

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

	Field 0x03
Bit No	Frequency band(MHz)
1	800
2	900
3	1500
4	1800
5	1900

6	2100
7 and above	Reserved

Examples of frequency bands: 0000 0000 0001 0000 = 1800MHz,

0000 0000 0001 1100 = 1800, 1900 and 2100MHz

NOTE: Field numbers 0x01, 0x02, and 0x21 to 0x26 in Table B:1 are common for multi-antenna device antennas. These fields may be addressed through any antenna number procedure.

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

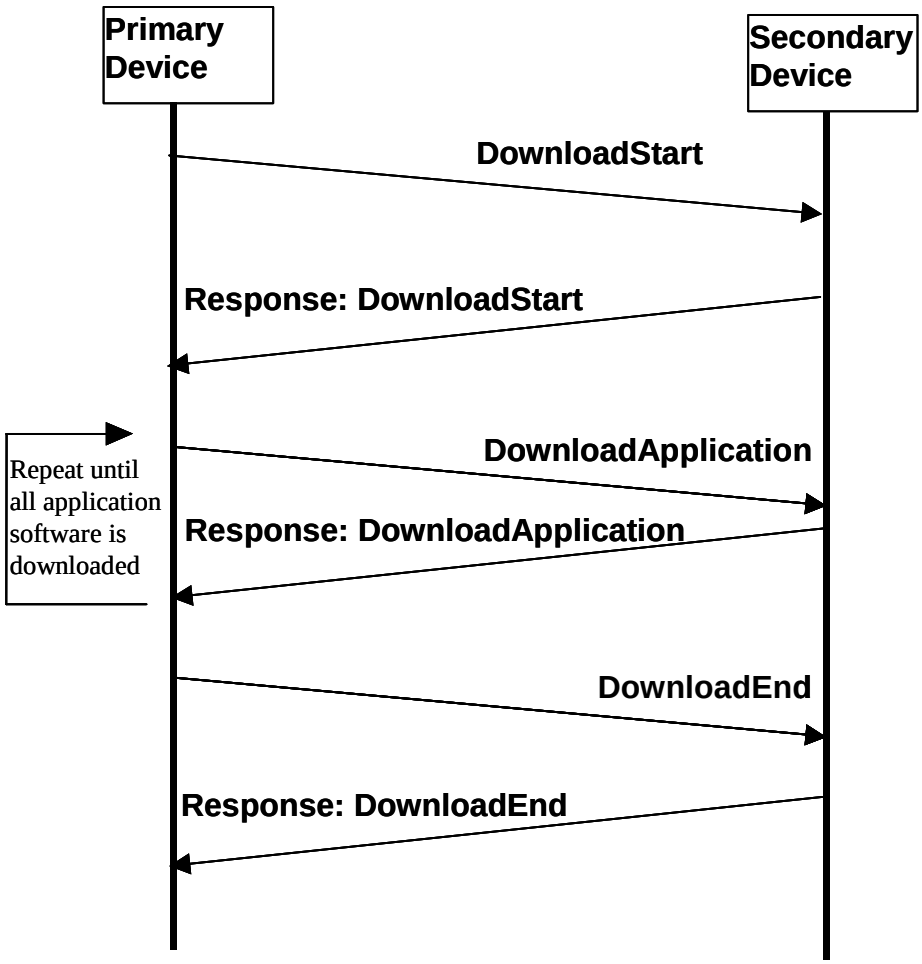

Figure C.1: Procedure sequence for Software Download

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
Common Procedure Set			
(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
Single-Antenna Procedure Set			
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
Multi-Antenna Procedure Set			
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 Data	0x83	primary device	no
Antenna Get 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	0x88	primary device	no

Antennas			

NOTE: The notion yes in the download boot mode operation indicates that the listed procedures are mandatory if the download boot mode 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 accidentional 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 appication 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

History

Document history		
V6.0.0	September 2004	Publication
V6.1.0	December 2004	Publication