

## Nagravision SMS Gateway

### Interface Definition: HE DLK 1.0STD CAS (EIS 2.7)

Version 1.2.1

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## Preface

### Audience

This guide is directed at the following persons:

- The customer's personnel involved in the management of the SMS – CAS interface
- SMS vendors' personnel involved in the development of the interface between the SMS and the CAS
- Nagravision's personnel involved in the CAS (marketing, customer support, developer, test team)

### Related Documents

- [1] "Information technology – Syntactic meta-language – Extended BNF" (ISO/IEC 14977:1996)
- [2] "Conditional Access Kernel – IRD Command Specification" (Nagravision)

### Document History

Change logs
<b>Version 1.0 - Issue 1.2.1, October 2011</b> <ul style="list-style-type: none"><li>• Update SMS operation command '1003-Acknowledge Command with Virtual UA' to return NUID in addition of VUA.</li></ul>
<b>Version 1.0 - Issue 1.2.0, October 2011</b> <ul style="list-style-type: none"><li>• Add SMS control command '126-Assign Virtual UA to NUID'.</li><li>• Add SMS operation command '1003-Acknowledge Command with Virtual UA'.</li><li>• Update the definition of SMS commands 51 and 52.</li><li>• Add new error codes for SMS commands 51, 902 and 122.</li></ul>
<b>Version 1.0 - Issue 1.1.0, August 2011</b> <ul style="list-style-type: none"><li>• Remove all references to callbacks, IPPV and credit.</li><li>• Remove the broadcast modes and SA address sizes not supported by DLK</li></ul>
<b>Version 1.0 - Issue 1.0.0, July 2011</b> <ul style="list-style-type: none"><li>• First version based on Merlin 3.0 SMS Gateway Interface. Compared to Merlin 3.0, DLK system supports a subset of SMS commands and product types.</li></ul>

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## 1. Introduction

This document presents the interface that interconnects an SMS and the Nagravision conditional access system (CAS). It provides the connection specifications, the communication protocol and the commands used in the interface. This issue illustrates only the set of commands fully supported and tested by the DLK CAS standard delivery.

### How to use this document

You do not need to read all of this specification as some information is reference material only. Therefore, depending on your needs chose from the following:

#### **Chapter 2: System overview and communication protocols**

Chapter 2 gives an overview of the SMS Gateway and introduces you to the communication protocols it uses.

#### **Chapter 3: SMS-SMSgw connection**

Chapter 3 covers communication between the SMS and the SMS Gateway.

#### **Chapter 4: SMS commands**

Chapter 4 covers the individual SMS commands.

#### **Chapter 5: Error codes**

Chapter 5 provides reference information on error codes.

#### **Chapter 6: UA and CA-S/N checksum**

Chapter 6 describes the procedure to manage unique addresses (UAs) and conditional access serial numbers (CA-S/Ns) at the customer site.

#### **Chapter 7: ASCII Table**

Chapter 7 provides a reference table covering the ASCII characters table.

#### **Chapter 8: Error! Reference source not found.**

Chapter 8 explains the process by which a subscriber's request is carried out.

#### **Chapter 8: Examples**

Chapter 8 provides listings demonstrating a Device\_IO connection process and a command transmitted in a network packet.



## A note on licenses

This document lists and describes all the commands supported by the Nagravision CAS interface. However, the use of individual commands depends on the business licenses acquired by the customer (i.e. the site operator). Make sure you have the appropriate license **before** using a command.

## 2. System overview

This chapter presents different aspects of the system related to the SMS Gateway interface.

### 2.1 Purpose of the SMSgw

The figure below illustrates the location of the SMS Gateway (SMSgw). The SMSgw is an internal component of the Nagravision CAS system. From the outside world, it can be seen as a gate to the CAS. Through this gate, one or several SMS entities send instructions or commands to the CAS.

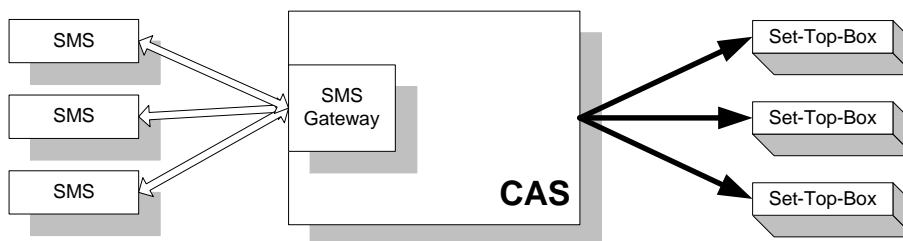


Figure 2-1: CAS overview

### 2.2 Communication protocols

#### 2.2.1 Layers

There are three communication layers. The lowest is the TCP/IP level and the most abstract is the level of the SMSgw protocol. Between those two is the Device IO layer whose role is to gather commands from the TCP/IP stream.

SMS gateway command
DeviceIO
TCP/IP

Figure 2-2: SMSgw protocol – communication layers

#### 2.2.2 TCP/IP protocol

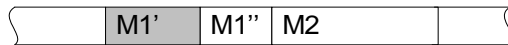
TCP/IP is a stream-based protocol. The application-oriented messages are joined together and there is no separator between these messages. When reading an application-oriented message using OS primitives from a stream like TCP/IP, we may face one of the following three possibilities:

- The message is incomplete (only  $n$  bytes of the data have been read).
- The message is complete (only the expected message has been read).
- More than the expected message has been read.

The diagrams below show these three possibilities. We assume that the TCP/IP stream contains two application-oriented messages M1 and M2:



Reading an incomplete message:



Reading one complete message:



Reading more than one message:



### 2.2.3 Device\_IO protocol

Device\_IO is a protocol used above TCP/IP to exchange data as a buffer of known size. It consists of a fixed-size header followed by the application data. The header has a size of two bytes and the application data is a stream of  $n$  bytes.

Header section	Payload section
Length (2 bytes)	Application data (n bytes)

The header is a two-byte hexadecimal value that corresponds to the number of bytes in the payload section.

The content of the payload section is described in the following chapters.

#### Warning

- The header indicates only the length of the payload section. The first transmitted byte is the most significant byte of the "Length" value".

### 2.2.4 SMSgw protocol

The SMSgw protocol defines the application-oriented message. It is a high-level protocol in which user data consists of human-readable ASCII characters (from ASCII code 32 to ASCII code 127) used to describe the value of the command attributes.

## 2.3 Device\_IO communication

### 2.3.1 Overview

Communication is established through entry points called *services*. An application establishes communication with another application by specifying the service name of the target.

For Device\_IO communication between applications running on different machines, communication must first be established at the TCP/IP transport level.

To manage communication between two systems, the following points must be addressed:

- How to establish communication with a Device\_IO server and how to indicate the internal client for which the communication is intended.
- How to transmit and receive data to and from the Device\_IO server.

In the following description, the commands involved (**open**, **send**, **receive**, **listen**, and **close**) are those of the underlying transport protocol used (TCP/IP). Device\_IO does not redefine these commands. The names used below (**open**, **send**, **receive**, **listen**, and **close**) are generic names representing the corresponding available system calls. Consequently, the calls described below only show their Device\_IO parameters. The transport protocol parameters (such as socket pointers) are not shown in the generic description of the calls.

### 2.3.2 Establishing a connection with a Device\_IO server

To open a communication with a Device\_IO server, an application must call the Device\_IO server. Two parameters must be provided:

- The name of the machine on which the server is running;
- The (TCP/IP) port number corresponding to the Device\_IO server.

Once TCP communication with the server has been established, the name of the target service must be communicated (*message\_1*) to the Device\_IO server in order to establish a link between the calling client and the requested service.

As a reply, the server must send one or two messages. The first message (*message\_2*) contains the connection status and, when the communication attempt has been successful, a second message (*message\_3*) specifies whether the call has been accepted or rejected.

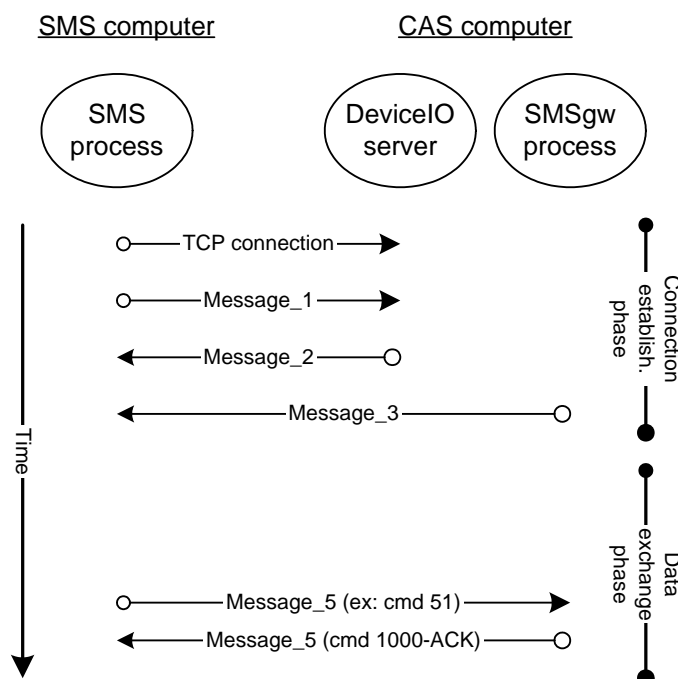


Figure 2-3: Device\_IO connection establishment and data exchange phases

An example of a Device\_IO connection can be found in section 8 *Examples* (page 104).

### 2.3.3 Data exchange between client and server

After the communication link is established, messages can be exchanged (*message\_5*) between the client (here: the SMS) and the Device\_IO server.

### 2.3.4 Closing a connection with a Device\_IO server

The connection is closed when communication is closed at TCP level.

### 2.3.5 Rules of use

If, for any reason, the SMS does not receive either *message\_2* or *message\_3* within a specified time-out period (e.g.: 30 seconds) when the communication is established, the SMS should close the communication and retry later. The same rule applies if the connection status returned by *message\_2* is different than "SUCCESS" or if the answer code returned by *message\_3* indicates that the call is rejected.

### 2.3.6 Messages format

There are four different message types in the Device\_IO protocol. The next sections present the different messages and the way they should be used.

### 2.3.7 Message\_1 (connect to the CAS)

This is the first message sent by the client (the SMS) to the Device\_IO server.

Message_1			
Syntax	Size (byte)	Format	Description
Len	2	hex	Message length in bytes (see section 2.2.3).
op_mode	1	r_hex	Data transfer operation mode 0 = Normal data transfer
ob_name_len	1	hex	Length of the object name attribute (in bytes).
ob_name	ob_name_len	text	Name of the applicative service with which the connection should be established. <i>Ob_name</i> is a string of bytes at least one byte long <i>and</i> at most 32 bytes long: 1 <= ob_name_len <= 32. This name is compulsory but its content is up to the client (ex: "SMS_GWY").

### 2.3.8 Message\_2 (answer 1 from the CAS)

This message is a response from the Device\_IO server to the client (in this case: the SMS); the message validates the connection.

Message_2			
Syntax	Size (byte)	Format	Description
Len	2	hex	Message length in bytes. In this case, the length is always 1 byte.
connect_status	1	r_hex	Connection status. Refer to the table below for applicable values.

Connect_status		
Value	Identifier	Description
0	CONNECT_FAILURE	The connection has failed for any unexpected reason
6	SUCCESS	The operation has been successfully completed.

### 2.3.9 Message\_3 (answer from the CAS)

This message is a response from the Device\_IO server, which validates the connection with the other process (in our case: the SMSgw).

Message_3			
Syntax	Size (byte)	Format	Description
len	2	hex	Message length in bytes. In this case, the length is always 1 byte.
answer_code	1	r_num	0: call accepted 1: call rejected

### 2.3.10 Message\_5 (Cmd message from the SMS or the CAS)

This message must contain only one SMSgw command.

Message_5			
Syntax	Size (byte)	Format	Description
len	2	hex	Message length in bytes (see section 2.2.3).
data	len	See note	SMSgw command data.

The data section of `message_5` follows the structure shown below:

<b>root header</b>	Common to all commands – see section 4.6.
<b>address header</b>	Depends on command type (EMM, CTRL, Operation) – see sections 4.8.2 to 4.8.4.
<b>command body</b>	Depends on command type – see sections 4.9 to 4.12.5.

#### Note

- The content of this section is command-specific: refer to the format described in sections 4.9 to 4.13.

## 3. SMS-SMSGw connections

### 3.1 Overview

The figure below illustrates the connections used by the SMS and the Nagravision SMSgw. As depicted in the figure, a connection can be seen as a data channel. On the same channel, commands follow one direction, while the opposite direction is followed by the corresponding responses (*ack* or *nack*). An *ack* response means that the incoming command is correctly formatted and it has been successfully processed. A *nack* response means that either the format or the data structure of the command is not appropriate or that the command has encountered problems during processing in the system.

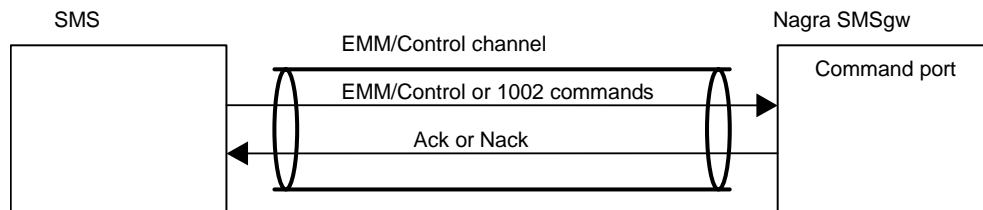


Figure 3-1: Connections between the SMS and the SMSgw

Several SMS may be connected to the same port, as shown in the following figure:

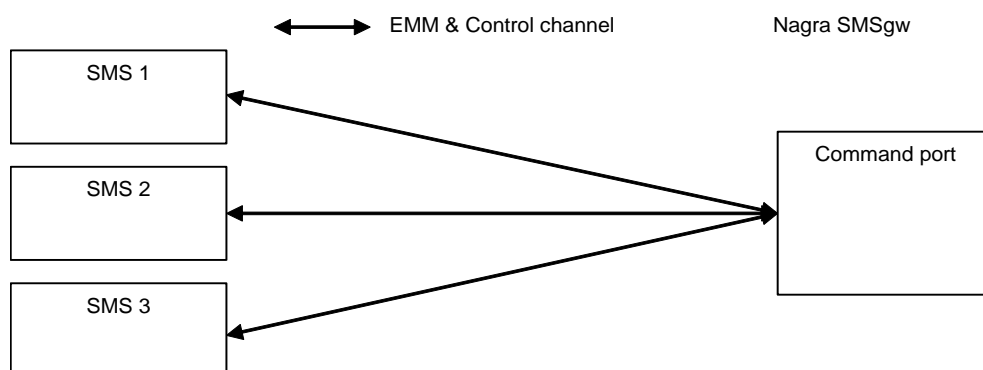


Figure 3-2: Multi SMS connections

### 3.2 EMM/Control command flow

EMM/Control commands are the commands sent by the SMS to the CAS. Some examples of such commands are "Add product", "Initialization", and "Pairing".

### 3.3 Usage

#### 3.3.1 Source identifier

Each connection established between the SMS and the Nagravision CAS has a source identifier. Each connection must have its own source identifier and it is not possible for two connections to share the same source identifier at any given time. The source identifier of a connection is given by field `source_id` in the header of each message sent from the SMS to the CAS.

#### 3.3.2 Transaction number

Each transaction number used must be unique during the life of the corresponding connection. The transaction number is given by a field in the header of each message sent from the SMS to the CAS. Transaction numbers are necessary to determine which commands have been processed successfully (`ack`, command 1000) and which commands have not (`nack`, command 1001).

#### 3.3.3 Keeping the SMS connection alive

During periods of inactivity on the SMS-CAS interface, the SMS must periodically send command 1002 on command port (EMM/Control) to the CAS. The main reason for that recommendation is that intelligent network devices (such as switches or firewalls) may not keep idle TCP connections open indefinitely. Nagravision recommends that command 1002 be sent every 5 minutes on command port.

#### 3.3.4 Establishing the SMS connection

Each time the SMS opens a connection on either the EMM/Control port, it must first generate command 1002.



## 4. SMS commands

### 4.1 Specification

#### 4.1.1 Commands and responses

The SMS sends commands to the CAS. In response, the CAS sends acknowledgment messages back to the SMS. Of course, the acknowledgment messages are reported on the same communication channel as the corresponding commands.

##### Note

- The system will not behave as expected if the following values are not handled correctly:
  - transaction\_id
  - source\_id
  - dest\_id

#### 4.1.2 Asynchronous by nature

The protocol used between the SMS and the CAS is asynchronous. Several SMS commands may be sent before acknowledgement messages are received. In other words, there is no need to wait for the acknowledgement of a command before sending the next commands to the CAS.

##### Important

- The SMS may receive the acknowledgement messages in a different order than the order in which the corresponding commands have been sent. However, for an individual smart card, the sequence of EMMs follows the sequence of SMS commands.
- Please also note that at the end of the transmission chain, i.e. at the device (smart card or MAD), the sequence of commands is not guaranteed.

### 4.2 Metrics

Metric	Value range (typical)
Connection	The EMM/Control port may accept up to 10 connections each.
SMS commands	The CAS can process from 4 up to 10 SMS EMM and control commands per second over the EMM/Control channel, with actual figures depending on the capacity of the CAS hardware.

##### Note

- Those metrics depend on factors such as system architecture and processing power; they are provided here merely as an order of magnitude.

### 4.3 Time and date

All dates are expressed in UTC, except product validity dates.

Although product validity dates are generally expressed in UTC, if the IMS product definition specifies that validity dates are in local time and if the validity dates are specified by the SMS, then the validity dates provided by the SMS will be interpreted in the subscriber's local time. Therefore, for fields **begin\_date** and **end\_date** in SMS commands 2, 902, 903 and 905, the

comment must be changed so as to specify `generally in UTC` rather than `UTC`.

## 4.4 Identifiers

This section contains descriptions of all identifiers used throughout this document.

ID	Definition
<code>circuit_id</code>	A number uniquely identifying a video/audio/data stream.
<code>command_id</code>	The identifier of an SMS command. The content of this field forms part of the command. The value of <code>command_id</code> is covered by the SMS documentation for all commands, which is covered by the IMS or CC documentation.
<code>Conditional_add_id</code>	Identifier of the <b>conditional add</b> product to be broadcast.
<code>dest_id</code>	The identifier of the addressed SMS command. It is entered at system configuration.
<code>Host_id</code>	STB id for a point of development (POD).
<code>IMS_event_id</code>	An IMS-generated identifier for individual events. It is entered using the IMS editor or generated when the EPG data feed is processed.
<code>IMS_product_id</code>	The identifier of a product in the IMS. It is the only product identifier known to the IMS.
<code>MOP_PPID</code>	The identifier of the management operator (MOP). This identifier is provided by Nagravision at system configuration.
<code>Network_id</code>	DVB network identifier.
<code>POD_id</code>	Point of development identifier (i.e. PCMCIA module).
<code>Service_id</code>	DVB service identifier.
<code>SMS_product_id</code>	A product identifier for use by the SMS. It is provided and managed by the SMS. It is entered into the system by the SMS Gateway through commands 300, 303, 305 or 307.
<code>source_id</code>	An identifier specifying the source of SMS commands. This identifier is entered into the system at system configuration.
<code>STB serial number</code>	The hardware serial number of the STB.
<code>STU_number</code>	This Nagravision STB number is used to identify the STB in the CA system, for pairing purposes.
<code>Transport_id</code>	DVB transport identifier.

Table 4-1: Identifiers

## 4.5 Special notes

### 4.5.1 `event_name` and `product_name` filler rule

The `event_name` or `product_name` field is characterized by its fixed size length. The useful section of the field is a string of (ASCII printable) characters. The remaining part of the field must be padded with space characters (value: `0x20`).

Because the previous version of the SMS Gateway document indicated that the field must be padded with series of `0x00` bytes, the CAS will continue to accept incoming SMS commands that follow the `0x00`-padded format. However, any new development in the SMS must follow the rule regarding the space characters.

When the SMS uses filler character `0x00`, the drawback for the CAS system is that the traces of the incoming SMS command become corrupted in the log file are corrupted. This is because the value `0x00` is considered as an end-of-string indicator.

On the other hand, the 0x00 byte does not affect the individual CAS applications processing the SMS commands.

#### 4.5.2 event\_name and product\_name overwriting rule

The purpose of the `event_name` or `product_name` data provided in the SMS command is for the STB menu to show a description of the available product. The CAS shall be configured to work in one of the two following modes:

- Mode 1, in which the SMS controls the product name:
  - The event or product name provided by the SMS (commands 10, 902, 903 and 905) is used to prepare the EMM data. If the length of the product name is equal to 0, the product name will be taken from the CAS database.
  - Note that for SMS command 2 and for subscription products in commands 902, the event name cannot be specified and it is therefore always taken from the IMS.
- Mode 2, in which the IMS controls the product name:
  - The product name provided by the SMS is ignored. It is overwritten by the corresponding value that is available in the CAS database.

#### 4.5.3 Price overwriting rule

The price of a product is usually provided by the SMS (as in command 10 for instance). Remember: this price is a value that will be displayed by the STB to inform the end user about the cost of a given product, i.e. it is for information purposes only. However, when the SMS cannot provide the price value, the CAS can replace it with a value set in the IMS database. The operational mode is configurable in the CAS.

##### Note

- This is not applicable to subscription products.

### 4.6 Addressing modes usage

Unique addressing is supported for all SMS commands, whereas shared and global addressing are reserved for special operations with a restricted list of SMS commands. See below for details.

##### Important

- For SMS commands in global addressing mode, the smart card records are not updated in the CAS database, except if a special feature is enabled to update the CAS database under global addressing. If this feature is enabled, only a subset of the SMS commands accepted with global addressing will trigger a CAS database update.

The table below provides the addressing modes supported for each SMS command.

CID	Description	Addressing mode		
		Unique	Shared	Global
	<b>EMM commands (0nn)</b>			
2	Add Product	X	X	X
4	Product Suspension	X		
5	Product Reactivation	X		
6	Product Cancellation	X	X	X
7	All Products Cancellation	X	X	

CID	Description	Addressing mode		
		Unique	Shared	Global
10	Add Event Product	X	X	X
20	Suspend Subscriber ICC	X	X	
21	Reactivate Subscriber ICC	X	X	
23	Suspend all ICC features	X	X	
24	Reactivate all ICC features	X	X	
25	Suspend all ICC features with Delay	X	X	
35	Create Operator	X		
36	Cancel Operator	X		
46	Set Segments	X		X
47	Set Aphanum Zip Code	X		
48	Set Zip Code	X		
50	Cancel ICC	X		
51	Initialize Card	X		
52	Pair the ICC with the STB	X		
53	Clear PIN Code	X		
69	Send Generic IRD Command	X		X
79	Force Tune	X		X
84	Send PRM Credentials	X		X
96	Purge PPV and IPPV Records	X		
99	Send Generic IRD Command II	X		X
<b>Control commands (1nn)</b>				
104	Create ICC On Call Collector	X		
105	Cancel ICC On Call Collector	X		
110	EMM cleanup	X		
122	Set Network	X		
125	Set Subscriber Private Data	X		
126	Assign Virtual UA to NUID			X
<b>Macro EMM commands (9nn)</b>				
902	Activate Smart Card Without Return Path	X		
903	Add List of Products	X	X	X
904	Cancel List of Products	X	X	X
905	Add Enhanced List of Products	X	X	X
908	Set Families of Products	X		
909	Cancel List of Products at a Given Date	X		

#### Note

- If the SMS Gateway receives an SMS command it does not supported either generally or for the given addressing mode (shared or global), the SMS command will be rejected with a 'BAD\_COMMAND\_SYNTAX' error code and an 'EXTERNAL\_SYSTEM\_ERROR' error code extension.

Additionally, the following restrictions apply:

- **Shared addressing is refused** (the SMS command is rejected) in the following cases:

- With SMS commands 2, 6, 903, 904 and 905 for subscription products under PA per Operator (this includes SMS commands intended for the product family record), for coins, as well as for SVOD and TVODSub products;
- With SMS commands 10, 904 and 905 for coins, for Rental products and for Rental PPV products;
- With SMS command 905 if the purchase mode is set to 'Re-hit'.
- With SMS 7, 20 and 21 if the system is configured to support the PA by operator.
- You can configure the SAS to disable support for global addressing, to enable it for all SMS source IDs, or to enable it only for one source ID.
- **Global addressing is refused** (the SMS command is rejected) in the following cases:
  - With SMS commands 2, 6, 903, 904 and 905 for subscription products under PA per Operator (this includes SMS commands intended for the product family record), for coins, as well as for SVOD and TVODSub products;
  - With SMS commands 10, 903, 904 and 905 for coins, as well as for Rental and for Rental PPV products;
  - With SMS commands 905 if purchase mode is set to 'Re-hit'.

**Note**

- The SMS command will be rejected with a 'BAD\_PRODUCT\_TYPE' error code and a 'NO\_EXTENDED\_ERROR\_CODE' error code extension in the following cases:
  - The product type is not supported for the SMS command (e.g.: PPV products cannot be added using SMS command 2).
  - The product type is incompatible with the addressing mode (e.g.: rental PPV products cannot be added in shared or global addressing mode).

**Note**

- The SMS command will be rejected with a 'NOT\_AUTHORIZED' error code and a 'NO\_EXTENDED\_ERROR\_CODE' error code extension in the following cases:
  - The product PA type is not consistent with the MOP PA type (e.g.: subscription products under PA per Operator cannot be added to a MOP to which PA per Operator does not apply).
  - The product PA type is incompatible with the addressing mode (e.g.: subscription products under PA per Operator cannot be added in shared or global addressing mode).

## 4.7 Command handling

### 4.7.1 Products

The table below shows the different kinds of products available in DLK and the commands that can be used to handle each of them.

SMS commands		Product Type			
Cmd ID	Label	SUB	Flexible Sub	Short term sub	PPV
2	Add Product	X	X		

SMS commands		Product Type			
Cmd ID	Label	SUB	Flexible Sub	Short term sub	PPV
4	Product Suspension	X			X
5	Product Reactivation	X			X
6	Product Cancellation	X	X	X	X
7	All Products Cancellation	X	X	X	X
10	Add Event Product			X	X
78	Refresh Smart Card	X			X
902	Activate Smart Card Without Return Path	P		V	V
903	Add List of Products	P			V
904	Cancel List of Products	X	X	X	X
905	Add Enhanced List of Products	P	P	V	V
908	Set Families of Products	X			
909	Cancel List of Products at a Given Date	X			

P: applicable to loop product (subscription)

V: applicable to loop PPVs

#### 4.7.2 Product Family – A la carte subscription

Product families allow you to handle A la carte subscriptions and to optimize memory usage in the devices (smart card or MAD).

A la carte subscriptions grant access to a certain number of subscription channels within a product family (a type of offer also known as "N out of M"). The end user's selected channels are set using SMS command 908 – Set Families of Products.

## 4.8 Headers

Any message has the following structure:

<b>Root header</b>	common to all commands (see section 4.8.1 <i>Root header</i> below)		
<b>Address header</b>	EMM 4.8.2	CTRL 4.8.3	Operation 4.8.4
<b>Command body</b>	cmd 0nn 4.9	cmd 1nn 4.9.25	cmd 10nn and 20nn 4.12.5

The next section details the internal structure of the three modules (root header, address header and command body).

#### 4.8.1 Root header

Field	Size	Format	Description
transaction_number	9	num	Number used to uniquely identify a transaction across the interface, for each source. Range: 000000000 to 999,999,999.
command_type	2	r_num	01: EMM 02: CONTROL 05: OPERATION
source_id	4	num	A number that identifies a source, such as the SMS or the IMS (this number is provided by Nagravision). Range: 0000 to 9999
dest_id	4	num	Identifier of the addressed SMS. This number is defined at system configuration. Range: 0000 to 9999
MOP_PPID	5	num	Identifier of the technical MOP. This number is provided by Nagravision at system configuration. Range: 00000 to 65,535
creation_date	8	YYYYMMDD	Creation date of the command (in UTC). Note: the CAS does not use this date to apply any rule or constraint.

The error codes (ack messages) applicable to this part of the command are listed below.

Field	Error codes	Error code extensions
any	BAD_ROOT_HEADER_SYNTAX	NO_EXTENTED_ERROR
transaction_number	BAD_HEADER_SYNTAX	BAD_TRANSACTION_NUMBER_FORMAT
transaction_number	BAD_USAGE	TRANS_NR_ALREADY_IN_USE
command_type	BAD_HEADER_SYNTAX	BAD_COMMAND_TYPE
source_id	BAD_HEADER_SYNTAX	BAD_SOURCE_ID
source_id	BAD_USAGE	SOURCE_NOT_AUTHORIZED
source_id	BAD_USAGE	SOURCE_ALREADY_IN_USE
dest_id	BAD_HEADER_SYNTAX	BAD_DEST_ID
dest_id	BAD_USAGE	DEST_NOT_AUTHORIZED
MOP_PPID	BAD_HEADER_SYNTAX	BAD_MOP_PPID
MOP_PPID	INVALID_PPID	MOP_NOT_AUTHORIZED
creation_date	BAD_HEADER_SYNTAX	BAD_DATE_FORMAT
creation_date	BAD_USAGE	DATE_IN_THE_FUTURE



#### 4.8.2 Address header – EMM cmd

Field			Size	Format	Description
broadcast_mode			1	r_text	<p><b>A value of N or B</b> means that the EMMs are delivered in-band (i.e. in the transport stream) with the default broadcast profile associated with the SMS command.</p> <p><b>Values 1 to 9</b> specify alternative broadcast profiles to be used instead of the default profile. If the alternative profile specified by the SMS does not exist in the CAS database, then the default broadcast profile is used.</p> <p><b>A value of E</b> means that the EMMs are returned via the Portal (i.e. through acknowledgment SMS command 2000) and therefore delivered neither in-band nor out-of-band when the STB calls back. No contradiction is handled for these EMMs.</p> <p><b>A value of W</b> means that the CAS database is updated – but without EMM generation.</p>
broadcast_start_date			8	YYYYMMDD	Broadcast start date (in UTC). The command must be sent to the smart card starting from this date. See the <b>Note</b> below.
broadcast_end_date			8	YYYYMMDD	Broadcast end date (in UTC). The command must be sent to the smart card up until this date. See the <b>Note</b> below.
address_type			1	r_text	EMM addressing mode for EMM commands: U = unique G = addresses all smart cards of an individual MOP S = Shared
Address type	U	UA	10	r_num	The unique address (UA) of the device (smart card or MAD) for which the command is intended. Range: 0000000000 to 4,294,967,295

Field			Size	Format	Description
	G	UA	0	-	-
	S	SA	8	r_num	The shared address (SA), which is the first UA of the group divided by the group size. Range: 00000000 to 16777215.
		ADF mode	1	r_text	Address Field mode (for future use). B = Bitmap. For the time being, ADF mode must be set to B.
		Bitmap length	3	r_num	The length (in bytes) of the bitmap.  It is 064 for DLK system.
		Bitmap	2 x bitmap_length	r_text (see note below)	The bitmap of the UA for which the command is intended. The first bit of the bitmap from the left (i.e. the most significant bit) represents the first UA of the SA (it is equal to SA x group size), whereas the last bit on the right (i.e. the least significant bit) represents the last UA of the SA (equal to SA x [group size] + [group size] - 1). The bitmap field contains a string of characters representing hexadecimal data coded in the ASCII format (two characters for one byte).

**Important**

- As indicated in the table above, the format of the bitmap field is r\_text. However, it does not contain a regular string: it is not a text field, such as "this is a sentence with characters and 1 2 3 4 numerical values". The data in the bitmap field is a sequence of hexadecimal numbers encoded in a text format. Consequently, the field will only accept alpha characters A, B, C, D, E, F representing the numbers 10 to 15 in a hexadecimal form.
- As an example – the CAS will accept the following bitmap value:  
A0BCD12A29327B9F. In this example, bitmap\_length is equal to 8.

**Note**

- The broadcast\_start\_date is always used by the SAS, except when handling family products (in which case it is replaced by the current start date). If it is in the past then it is set to the current date and time, otherwise it is used as is. The broadcast\_end\_date is always ignored (unless the SAS has been explicitly configured to use it) and rather computed using the broadcast\_start\_date and adding the duration specified in the broadcasting profile associated to the SMS command (association between SMS command and broadcasting profile is configurable at SAS level). It is recommended to set the broadcast\_start\_date in the past or to the current date and time. This allows a better control of the EMM bandwidth. Please do not confuse the broadcast period that specifies the period when the EMM are

broadcasted, with the right validity period that specifies when a right is valid.

The error codes (`nack` messages) applicable to this part of the command are listed below.

Field	Error codes	Error code extensions
any	BAD_HEADER_SYNTAX	BAD_DATA_FORMAT
broadcast_mode	BAD_HEADER_SYNTAX	BAD_BROADCAST_MODE
broadcast_start_date	BAD_HEADER_SYNTAX	BAD_DATE_FORMAT
broadcast_end_date	BAD_HEADER_SYNTAX	BAD_DATE_FORMAT
broadcast_end_date	BAD_HEADER_SYNTAX	BAD_DATE_SEQUENCE
broadcast_end_date	BAD_HEADER_SYNTAX	DATE_IN_THE_PAST
address_type	BAD_HEADER_SYNTAX	BAD_ADDRESS_TYPE
address_type	BAD_USAGE	ADDRESS_TYPE_NOT_AUTHORIZED
UA	BAD_HEADER_SYNTAX	BAD_UA_FORMAT
SA	BAD_HEADER_SYNTAX	BAD_UA_FORMAT
ADF_mode	BAD_HEADER_SYNTAX	BAD_FLAG_VALUE
bitmap_length	BAD_HEADER_SYNTAX	BAD_NUMBER_FORMAT
bitmap	BAD_HEADER_SYNTAX	BAD_DATA_FORMAT

Example of shared addressing: consider the following list of UAs:

0200769712, 0200769715, 0200769787, 0200769789.

The address header will look as follows:

N2007050220070502S00784256B06400000000000000000000000000000000000090000000000  
0000001400

Breaking down this example into fields:

[illegible]

Field value	Field name / Interpretation
	shared address 392128 Card 200769789 is the 254 <sup>nd</sup> card with shared address 392128

#### 4.8.3 Address header – Control cmd

Field			Size	Format	Description
broadcast_mode			1	r_text	A value of 'N' or 'B' means that the mode used is the default broadcast profile associated with the SMS command. <b>Warning:</b> The description of Address header – EMM cmd (section 4.8.2) also applies to command 122 – Set Network.
broadcast_start_date			8	YYYYMMDD	Current date (today, in UTC)
broadcast_end_date			8	YYYYMMDD	Current date (today, in UTC)
address_type			1	r_text	EMM addressing mode for EMM commands. U = unique G = addresses all smart cards of the MOP
Type	U	UA	10	num	UA is the unique address of the device (smart card or MAD) for which the command is intended. Range: 0 to 4,294,967,295
	G	UA	0	–	–

The error codes (ack messages) applicable to this part of the command are listed below.

Field	Error codes	Error code extensions
any	BAD_HEADER_SYNTAX	BAD_DATA_FORMAT
broadcast_mode	BAD_HEADER_SYNTAX	BAD_BROADCAST_MODE
broadcast_start_date	BAD_HEADER_SYNTAX	BAD_DATE_FORMAT
broadcast_end_date	BAD_HEADER_SYNTAX	BAD_DATE_FORMAT
broadcast_end_date	BAD_HEADER_SYNTAX	BAD_DATE_SEQUENCE
broadcast_end_date	BAD_HEADER_SYNTAX	DATE_IN_THE_PAST
address_type	BAD_HEADER_SYNTAX	BAD_ADDRESS_TYPE
address_type	BAD_USAGE	ADDRESS_TYPE_NOT_AUTHORIZED
UA	BAD_HEADER_SYNTAX	BAD_UA_FORMAT

#### 4.8.4 Address header – Operation cmd

Field	Size	Format	Description
none			There is no header for this command type.

The error codes (ack messages) applicable to this part of the command are listed below.

Field	Error codes	Error code extensions
any	BAD_HEADER_SYNTAX	BAD_DATA_FORMAT

#### 4.8.5 Errors due to abnormal operational conditions

Field	Error codes	Error code extensions
not applicable	BAD_ROOT_HEADER_SYNTAX	NO_EXTENDED_ERROR
not applicable	FATAL_ERROR	EXTERNAL_SYSTEM_ERROR
not applicable	NO_RTM_PRESENT	NO_EXTENDED_ERROR_CODE
not applicable	NO_SERVER_AVAILABLE	NO_EXTENDED_ERROR_CODE
not applicable	SMS_NOT_IDENTIFIED	NO_EXTENDED_ERROR_CODE
not applicable	TM_SERVER_ERROR	CORBA_EXCEPTION
MOP_PPID	NOT_AUTHORIZED	NO_EXTENDED_ERROR_CODE
source_id	SOURCE_ID_ALREADY_USED	NO_EXTENDED_ERROR_CODE
source_id	SMS_NOT_AUTHORIZED	NO_EXTENDED_ERROR_CODE
source_id	NOT_AUTHORIZED	NO_EXTENDED_ERROR_CODE

## 4.9 EMM commands (0nn)

In this section, we present the structure of all commands related to the alteration of the device (smart card or MAD). These commands are generated by the SMS. For each command, there are two tables. The first table illustrates the data structure of the command. The second table provides the different types of error messages that the CAS could return.

### 4.9.1 Command 2: Add Product

<b>SAS replaces original MOP by smart card operator (SOP)</b>	no
---	----

#### Usage Note

- For new development, it is advised to use SMS command 905 (Add Enhanced List of Products) instead of SMS command 2.

The SMS uses this command to add a service entitlement in a smart card for a certain product.

#### Important

- Command 2 must not be used to authorize a PPV. Command 10 should be used instead.
- SMS command 2 will be rejected if the MOP is suspended (by means of SMS command 20) or if the SOP is suspended (by means of SMS command 23).

Command 2: Add Product			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0002
IMS_product_id	12	num	IMS product ID Range: 000000000000 to 004294967295
begin_date	8	YYYYMMDD	Subscription begin date (in UTC). The subscription is not valid before this date.
end_date	8	YYYYMMDD	Subscription end date (in UTC). The subscription is not valid after this date.

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_TYPE	PPV_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	CANCELLED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	SUSPENDED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	INVALID_PURCHASE_DATE
IMS_product_id	BAD_PRODUCT_TYPE	DRAFT_PRODUCT
IMS_product_id	PRODUCT_INCONSISTENT	NO_EXTENDED_ERROR_CODE
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SUSPENDED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
None	DATABASE_ERROR	BAD_PARAM_IN_CASDB
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND
MOP_PPID	SUSPENDED_MOP	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR



#### 4.9.2 Command 4: Product Suspension

SAS replaces original MOP by SOP	no
----------------------------------	----

##### Usage Note

- It is not advised to use this command for new developments. Use command 20 (Suspend Subscriber ICC) instead.

The SMS uses this command to suspend a service or PPV entitlement in a smart card for a certain product.

The end user will not be able to watch the corresponding services or PPVs until the SMS sends a product reactivation command. Command 4 may be used when there is a payment problem with the end user.

##### Important

- This command shall not be used for A-la-carte subscription products.

Command 4: Product Suspension			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0004
IMS_product_id	12	num	IMS product ID Range: 000000000000 to 004294967295

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.3 Command 5: Product Reactivation

SAS replaces original MOP by SOP	no
----------------------------------	----

##### Usage Note

- It is not advised to use this command for new developments. Use command 21 (Reactivate Subscriber ICC) instead.

The SMS uses this command to reactivate a service or PPV entitlement in a smart card in cases where the entitlement has previously been suspended with command 4 (Product Suspension). The end user will then be able to watch the corresponding services or PPVs again.

##### Important

- This command shall not be used for A-la-carte subscription products.

Command 5: Product Reactivation			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0005
IMS_product_id	12	num	IMS Product ID Range: 000000000000 to 004294967295

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
IMS_product_id	RIGHT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.4 Command 6: Product Cancellation

SAS replaces original MOP by SOP	no
----------------------------------	----

##### Usage Note

- It is not advised to use this command to cancel more than one product at once. Use command 904 (Cancel List of Products) instead.

The SMS uses this command to remove an entitlement from a smart card for a certain product. This command is applicable to entitlements that have been purchased through the SMS.

##### Important

- When several instances of the same product are created on the smart cards, command 6 cancels all instances of this product.
- This SMS command will be rejected if the MOP is suspended (by means of SMS command 20) or if the SOP is suspended (by means of SMS command 23). This important fact applies only to products within a product family (A la carte subscription products).

Command 6: Product Cancellation			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0006
IMS_product_id	12	num	IMS Product ID Range: 000000000000 to 004294967295

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SUSPENDED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	SUSPENDED_MOP	NO_EXTENDED_ERROR_CODE

#### 4.9.5 Command 7: All Products Cancellation

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to remove all types of entitlements from a smart card.

Command 7: All Products Cancellation			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0007

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
address_type	BAD_USAGE	ADDRESS_TYPE_NOT_AUTHORIZED
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND

#### 4.9.6 Command 10: Add Event Product

SAS replaces original MOP by SOP	no
----------------------------------	----

##### Usage Note

- For new development, it is advised to use SMS command 905 – Add Enhanced List of Products – instead of SMS command 10.

The SMS uses this command to add an entitlement to an event product in a smart card. Event products are typically movies showing on a certain channel at a certain date and time.

##### Important

- The purge mechanism will delete event products when the event product date meets the purge date condition.
- PPV entitlements recorded in the end user's smart card should be deleted using either a background EMM cleanup command or SMS command 96 (Purge PPV and IPPV Records).
- The CAS does not alter the data in the `event_name` field of the command. The data is transmitted as it is in the smart card. The STB then displays the data as it displays the EIT (Event Information Table) data. Consequently, the SMS must format this string in accordance with the specification of the character set used by the STB.
- The `event_name` string must also include control characters. Consequently, the number of displayable characters is reduced accordingly.
- This SMS command will be rejected if the MOP is suspended (by means of SMS command 20) or if the SOP is suspended (by means of SMS command 23).

Command 10: Add Event Product			
Field	Size	Format	Description
<code>command_id</code>	4	<code>r_num</code>	<code>command_id</code> = 0010
<code>ims_product_id</code>	12	<code>num</code>	IMS Product ID Range: 000000000000 to 004294967295
<code>length_event_name</code>	2	<code>r_num</code>	Length of the valid data in the <code>event_name</code> field. It must not exceed 30 bytes. This is due to storage limitations in the smart card.
<code>event_name</code>	32	<code>text</code>	The event name as displayed in the PPV purchase history of the STB user interface. The number of characters must match the length set in <code>length_event_name</code> . The remaining bytes should be filled up with space characters. See the special note in section 4.5.1.
<code>price</code>	5	<code>num</code>	The price of the product, from 000.00 to 999.99.

List of error codes:

Field	Error codes	Error code extensions
<code>command_id</code>	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
<code>command_id</code>	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
<code>ims_product_id</code>	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
<code>ims_product_id</code>	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
<code>ims_product_id</code>	PPV_IN_THE_PAST	NO_EXTENDED_ERROR_CODE
<code>ims_product_id</code>	BAD_PRODUCT_TYPE	REGULAR_PRODUCT
<code>ims_product_id</code>	PRODUCT_INCONSISTENT	NO_EXTENDED_ERROR_CODE

Field	Error codes	Error code extensions
IMS_product_id	BAD_PRODUCT_STATUS	CANCELLED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	SUSPENDED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	INVALID_PURCHASE_DATE
IMS_product_id	BAD_PRODUCT_TYPE	DRAFT_PRODUCT
IMS_product_id	PPV_PURCHASE_NOT_ALLOWED	NO_EXTENDED_ERROR_CODE
length_event_name	BAD_COMMAND_SYNTAX	LENGTH_TOO_LONG
length_event_name	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
price	BAD_COMMAND_SYNTAX	BAD_PRICE_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SUSPENDED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
None	DATABASE_ERROR	BAD_PARAM_IN_CASDB
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND
MOP_PPID	SUSPENDED_MOP	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR

#### 4.9.7 SMS Command 20: Suspend Subscriber ICC

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to suspend all entitlements in a smart card for an individual MOP. However, depending on the configuration of the head end, viewing the "free access" services may or may not be possible once the relevant MOP is suspended.

#### Important

- In order to reactivate a MOP, the SMS must use command 21.

The SMS can still continue to send EMM command to a deactivated smart card (no error will be returned).

Command 20: Suspend Subscriber ICC			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0020

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND

#### 4.9.8 Command 21: Reactivate Subscriber ICC

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to reactivate all entitlements for an individual MOP.

Command 21: Reactivate Subscriber ICC			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0021

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND



#### 4.9.9 Command 23: Suspend All ICC Features

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to suspend all features in a smart card, i.e. all entitlements to services and PPVs, as well as entitlements to free access services.

##### Important

- In order to reactivate smart card features, the SMS should use command 24.

The SMS can still continue to send EMM commands to a deactivated smart card (this will not cause any errors).

Command 23: Suspend All ICC Features			
Field	Size	Format	Description
command_id	4	r_num	command_id = 23

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	EXPIRED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.10 Command 24: Reactivate All ICC Features

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to reactivate all entitlements to services and PPVs in a smart card, as well as the entitlements to the free access services.

Command 24: Reactivate All ICC Features			
Field	Size	Format	Description
command_id	4	r_num	command_id = 24

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	EXPIRED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.11 Command 25: Suspend All ICC Features With Delay

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to schedule a smart card suspension. At the date and time specified, command 25 suspends all features in a smart card, i.e. all entitlements to services and PPVs, as well as the entitlements to free access services.

#### Important

- To reactivate smart card features, the SMS should use command 24.

The SMS can still continue to send EMM commands to a deactivated smart card (this will not cause any errors).

Command 25: Suspend All ICC Features With Delay			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0025
suspension_date	8	YYYYMMDD	Suspension date (generally in UTC).
suspension_time	6	HHMMSS	Suspension time (generally in UTC). For Aladin smart cards, the time is set to 23:59:56 and the time provided by the SMS is ignored.

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	EXPIRED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
suspension_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
suspension_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
suspension_time	BAD_COMMAND_SYNTAX	BAD_TIME_FORMAT

#### 4.9.12 Command 35: Create Operator

<b>SAS replaces original MOP by SOP</b>	yes
---	-----

The SMS uses this command to add a new MOP zone in a smart card.

This command is used **only** when there are several operators sharing device (smart card or MAD) for independent Pay-TV operations.

For the relevant operator, this command must precede any other command such as command 2 (Add Product).

The SMS can send this command several times without damaging the entitlements already stored in the smart card.

#### Important

- In a single-MOP environment, this command should not be used because each new smart card already contains a pre-defined MOP zone for the unique operator.
- The purpose of this command is not to render a smart card pristine: this command does not perform any cleanup in the smart card.
- With a foreign smart card, SMS command 35 will be rejected.

Command 35: Create Operator			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0035
MOP_PPID	5	num	Identifier of the MOP to be created. Range: 00000 to 99999

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
MOP_PPID	DATABASE_ERROR	DATA_ERROR
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	FOREIGN_SC	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.13 Command 36: Cancel Operator

<b>SAS replaces original MOP by SOP</b>	yes
---	-----

The SMS uses this command to remove a MOP zone and all its associated data from a smart card.

#### Important

- This command will indirectly remove all entitlements and the entire record currently stored in the device (smart card or MAD) for a given operator.

Command 36: Cancel Operator			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0036
MOP_PPID	5	num	Identifier of the MOP to be deleted. Range: 00000 to 99999

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
MOP_PPID	DATABASE_ERROR	DATA_ERROR
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	FOREIGN_SC	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.14 Command 46: Set Segments

<b>SAS replaces original MOP by SOP</b>	yes
---	-----

The SMS use this command to set or update the segments in the device (smart card or mAD).

#### Note

- The segments can be used to address a subset of all the subscribers.
- This command contains only the segment changes, and therefore the segments not specified in the command remain unchanged.
- The method to reset a segment is to set to 0 the segment subcategory of the given segment category.

<b>Command 46: Set Segments</b>			
<b>Field</b>	<b>Size</b>	<b>Format</b>	<b>Description</b>
command_id	4	r_num	command_id = 0046
nb_of_segments	2	r_num	The number of segments provided in this command. Range: 00 to 56
for(i=0;i<nb_of_segments;i++) {			A counter.
segment_category	2	r_num	Segment category. Range: 00 to 55
segment_subcategory	3	r_num	Segment subcategory. Range: 000 to 255
}			

List of error codes:

<b>Field</b>	<b>Error codes</b>	<b>Error code extensions</b>
command_id	BAD_COMMAND_SYNTAX	NO_EXTENDED_ERROR_CODE
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	BAD_COMMAND_SYNTAX	BAD_UA_FORMAT
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
nb_of_segments	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
segment_category	BAD_COMMAND_SYNTAX	BAD_CATEGORY_FORMAT
segment_category	SEGMENT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
segment_subcategory	BAD_COMMAND_SYNTAX	BAD_SUBCATEGORY_FORMAT
segment_subcategory	SEGMENT_NOT_FOUND	NO_EXTENDED_ERROR_CODE

#### 4.9.15 Command 47: Set Alphanum Zip Code

SAS replaces original MOP by SOP	Yes
----------------------------------	-----

The SMS uses this command to set or update the zip code on the device (smart card or MAD). Command 47 is also used when the subscriber moves to a different location.

#### Note

- The zip code is used for blackouts.

Command 47: Set Alphanum Zip Code			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0047
zip_code	9	r_text	The subscriber's zip code. The range is restricted to alphanumeric values. The value is right-padded with trailing space characters.
		num	The subscriber's zip code. The range is restricted to numeric values. The value is left-padded with zeros.

List of error codes sent by the CAS (nack messages):

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	NO_EXTENDED_ERROR_CODE
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	BAD_COMMAND_SYNTAX	BAD_UA_FORMAT
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
zip_code	BAD_COMMAND_SYNTAX	BAD_ZIP_CODE_FORMAT
zip_code	ZIP_CODE_NOT_FOUND	NO_EXTENDED_ERROR_CODE

#### 4.9.16 Command 48: Set Zip Code

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to set or update the zip code of the smart card. The zip code information is primarily used for blackout.

#### Important

- For countries that use a different zip code scheme (such as zip codes with more than five digits or alphanumeric zip codes), the operator should create a lookup table that translates the local zip code format into zip code format of the SMS.

Command 48: Set Zip Code			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0048
zip_code	5	num	The end-user's zip code. Range: 00000 to 99999

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
zip_code	BAD_COMMAND_SYNTAX	BAD_ZIP_CODE_FORMAT
zip_code	ZIP_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE



#### 4.9.17 Command 50: Cancel ICC

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to permanently disable a device (smart card or MAD). Command 50 is sent when a device is taken out of operation (for instance, when a device is reported to be stolen, lost, or damaged).

The SMS is not allowed to use a cancelled device again because the device is not recoverable after the cancellation operation.

The UA is flagged as cancelled and deactivated in the CAS database. For that reason, any incoming commands addressed to this device will remain unacknowledged by the CAS system.

#### Important

- The effect of this command in the smart card is **not** reversible. In other words, the device will be permanently decommissioned.

Command 50: Cancel ICC			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0050

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
address_type	BAD_USAGE	ADDRESS_TYPE_NOT_AUTHORIZED
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.18 Command 51: Initialize Smart Card

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to initialize the MOP zone of a new device.

The SMS must issue this command prior to any other command except in the 2 following cases:

- SMS targets a virtual UA: SMS '126-Assign Virtual UA to NUID' shall first issue to link virtual UA to NUID.
- System manages multiple networks: SMS '122-Set Network' shall be issued before this command to allow routing generated EMM on the network of the targeted device (UA or virtual UA).

The CAS will reject all other commands it receives before processing of command 51 successfully completes.

The initialization of a device can occur several times and has no effect on the entitlements stored in the device.

#### Important

- The purpose of this command is not to reset the device content, i.e. this command does not perform any cleanup in the device.
- This command does not refurbish a smart card in any way.
- This command creates the MOP specified in its header. Therefore, even when the command has SOP privileges, the PPID of the MOP must be specified in the header of the command (rather than the PPID of the SOP).

Command 51: Initialize Smart Card			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0051

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_OUT_OF_RANGE	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SC_SET_ID_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
UA	CARD_REFURBISHMENT_FAILED	NO_EXTENDED_ERROR_CODE
UA	VUA_NOT_LINKED_TO_NUID	NO_EXTENDED_ERROR_CODE
MOP_PPID	CB_PROFILE_NOT_FOUND	NO_EXTENDED_ERROR_CODE
MOP_PPID	INVALID_PPID	MOP_NOT_AUTHORIZED

#### 4.9.19 Command 52: Pair the ICC With the STB

SAS replaces original MOP by SOP	yes
----------------------------------	-----

The SMS uses this command to pair a smart card with the STB.

This command is mandatory and must be sent before any services can be authorized.

Before pairing can take place, the smart card must have been previously initialized with command 51.

#### Important

- For virtual UA, this command was no effect on the device. IRDSN will be stored in CAS database only.
- STU\_number is a 14-digit string representing a decimal value.
- STU\_number can be in one of the following formats:
  - A 10-digit string followed by 4 space characters, ranging from "0000000000 " to "4294967295 "
  - A 14-digit string ranging from 00000000000000 to 00004294967295
- The un-pairing action is performed with the same command, with STU\_number set to "0000000000 " or 00000000000000.
- The value of STB\_number as provided in the command coming from the SMS must not include any checksum.

Command 52: Pair the ICC With the STB			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0052
STU_number	14	r_num	The serial number of the conditional access (CA) STB, in a decimal form. Range: see the <b>Important</b> note above

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
STU_number	BAD_COMMAND_SYNTAX	BAD_STU_NUMBER_FORMAT
None	DATABASE_ERROR	BAD_PARAM_IN_CASDB
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.20 Command 53: Clear PIN Code

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to reset the PIN code of the STB to its default factory value. In other words, the new PIN code value to which this command forces the STB is not always 0000. Also, note that it is the design of individual STBs that determine which features or menus will be protected by the PIN code.

#### Important

- **For STBs with a Nagravision CAK and when strong pairing is used:**
  - Unlike the other commands described in this document, command 53 is sensitive to the pairing status of the smart card and the STB: when the SMS sends command 53 to an individual STB, it will **only** work if the STB is paired with its smart card.
  - The pairing function is achieved with command 52.

Command 53: Clear PIN Code			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0053

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.21 Command 69: Send Generic IRD Command

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to send an IRD command to a decoder. The decoder will execute an operation based on the instruction in the IRD command (e.g.: set the network ID, force tune, etc.). In other words, this command is not intended to modify the data in the device (smart card or MAD), but rather to have the decoder execute an action. To complement command 69, the CAS provides a secure transport mechanism between the head end and the STB.

#### Important

- This command is applicable to native Nagravision STBs with a CAK. For other STBs, refer to command 99 (section 4.9.25).
- **For STBs with a Nagravision CAK when strong pairing used:** unlike the other commands described in this document, command 69 takes into consideration the pairing status of the smart card and the STB: command 69, when sent to an individual STB, will work **only** if the STB is paired with its smart card. The pairing takes place using command 52.

The data structure that the CAS sends to the STB is described below. The SMS Gateway computes fields "sequence\_number" and "checksum" for the convenience of the SMS: the SMS does not provide these two parameters.

```
command_body{
    sequence_number    32  uimsbf
    command_id         8   uimsbf
    operation          8   uimsbf
    for (i=0;i<N;i++){
        data           8   uimsbf
    }
    checksum           8   uimsbf
}
```

As explained above, the purpose of an IRD command is to provide the decoder with a message that will instruct the decoder to execute an action (e.g.: reset the PIN code). The `command_id` and `operation` parameters provided to the decoder contain two indexes that indicate which subroutine the decoder should execute.

Nagravision provides STB manufacturers with a list of `command_id` and `operation` values for a list of specific actions. This document is entitled "Conditional Access Kernel – IRD Command Specification" (see reference [2]).

<b>Command 69: Send Generic IRD Command</b>			
<b>Field</b>	<b>Size</b>	<b>Format</b>	<b>Description</b>
command_id	4	r_num	command_id = 0069
IRD_command_id	3	r_num	The command_id field of IRD command_body. Range: 000 to 255
IRD_operation	3	r_num	The operation field of IRD command_body. Range: 000 to 255
IRD_data_length	2	r_num	Length of the useful portion of the IRD_data field, in bytes. Range: 00 to 48
IRD_data	96	r_text	Hexadecimal data coded in the ASCII format. The string must be transferred in full (96 characters representing 48 bytes). However, only the first IRD_data_length bytes on the left will be included in the data field of the IRD command_body.

List of error codes:

<b>Field</b>	<b>Error codes</b>	<b>Error code extensions</b>
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IRD_command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IRD_operation	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IRD_data_length	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IRD_data	BAD_COMMAND_SYNTAX	BAD_DATA_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

Below is an example on how `IRD_data` should be formatted. In this example, IRD command **Force Tune** is sent to the STB. In the IRD command specification document (reference [2]), the data structure is as follows:

Parameter	Value in a decimal form	Value in a hexadecimal form	Size in bytes
command_id	193	–	3
operation	001	–	3
network_id	–	05 11	2
transport_id	–	00 09	2
service_id	–	00 0C	2

In this example, `IRD_data_length` is 6. The following figure shows the detailed string of bytes in the buffer that should be sent by the SMS. Note that the remaining byte of field `IRD_data` must be filled with zero characters (`0x30` in a hexadecimal form).

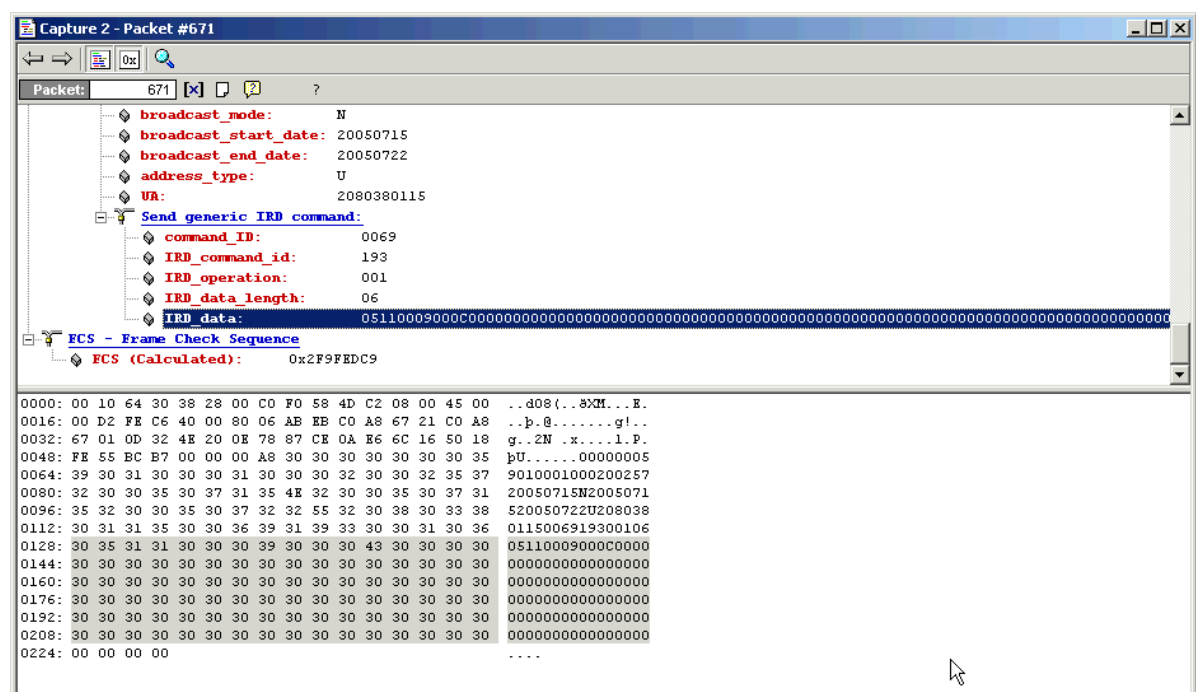


Figure 4-1: Buffer of command 69 sent by the SMS

#### 4.9.22 Command 79: Force Tune

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to force the STB to tune to a given TV program (i.e. a service). The SMS identifies this service using three parameters. For a detailed description, refer to the DVB specifications.

- **network:** the DVB network of the service
- **transport:** the transport ID of the service within the network
- **service:** the program number to which the STB must tune within the transport

#### Important

- For backward compatibility, the CAS supports the following fields in both a decimal and a hexadecimal data format:
  - Network\_id
  - Transport\_id
  - Service\_id
- The SMS provides data in either a decimal (mode 1 as illustrated below) or a hexadecimal format (mode 2). The default CAS package complies with mode 1. For mode 2, a special CAS package should be installed.

#### Important

- **For STB with a Nagravision CAK when strong pairing used:** unlike the other commands described in this document, command 79 takes into account the pairing status of the smart card and the STB: command 79 will work **only** if the STB is paired with its smart card.

Command 79: Force Tune – Mode 1 (Decimal Format)			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0079
network_id	5	r_num	Range: 00000 to 65535
transport_id	5	r_num	Range: 00000 to 65535
service_id	5	r_num	Range: 00000 to 65535

Command 79: Force Tune – Mode 2 (Hexadecimal Format)			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0079
network_id	4	hex	Range: 0000 to FFFF
transport_id	4	hex	Range: 0000 to FFFF
service_id	4	hex	Range: 0000 to FFFF



List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.23 Command 84: Send PRM Credentials

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to send credentials to the PRMLib hosted on a decoder. The PRMLib will execute an operation based on the credentials instruction (ex: provide a VOD license to STB, etc.). In other words, this command is not intended to modify the data of the device (smartcard or MAD), but it is intended to start an action executed by the decoder. The CAS provides with this command a secure transport mechanism between the head-end and the STB.

##### Important

- This command can only be used to send a PRM credentials to a STB having a Nagravision CAK (i.e. it cannot be used with MediaGuard STB without Nagravision CAK). The CAS does check the STB context to accept or reject this SMS command.
- This command carries the credentials using IRD commands. Thus this command can only be processed once the STB is correctly paired with the device (smart card or MAD). The pairing means either "strong pairing" or "secured channel".
- The pairing function is achieved with command 52.

Command 84: Send PRM Credentials			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0084
credentials_op_id	3	r_num	The operation identifier of the credentials. Range: 000 to 063 The values currently supported are: 000 = VOD license
credentials_len	5	r_num	Length of the credentials in bytes. Range: 00000 to 16065
credentials	2 x credentials_len	r_text (see note below)	This field contains a string of characters representing hexadecimal data encoded in the ASCII format (two characters for one byte).

##### Important

- As indicated in the table above, the format of the credentials field is r\_text. However, it does not contain a regular string: it is not a text field, such as "this is a sentence with characters and 1 2 3 4 numerical values". The data in the bitmap field is a sequence of hexadecimal numbers encoded in a text format. Consequently, the field will only accept alpha characters A, B, C, D, E, F representing the numbers 10 to 15 in a hexadecimal form.
- As an example – the CAS will accept the following credential value: A0BCD12A29327B9F. In this example, credentials\_len is equal to 8.

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
credentials_op_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
credentials_len	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
credentials	BAD_COMMAND_SYNTAX	BAD_DATA_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.24 Command 96: Purge PPV and IPPV Records

<b>SAS replaces original MOP by SOP</b>	no
---	----

The SMS uses this command to purge individual smart cards from PPV, SUB, EPR or IND record data that match a deletion condition. The two examples below illustrate how this command works:

Example 1: to purge old PPV records stored in device (smart card or MAD) when end users complain that their device is full.

Example 2: to prevent useless PPV records from filling up the device (smart card or MAD). This can be seen as a preventive cleanup task. In this example, each time an end user calls the SMS center for additional credit, the SMS will issue command 96.

The SMS provides the following two parameters:

- `cleanup_date`: the date according to which PPV records are deleted (records older than `cleanup_date` will be deleted).
- `condition_date = cleanup_date` (because no return path)

The SMS is responsible for correctly managing these parameters: the CAS system cannot verify the coherence of these parameters.

Command 96: Purge PPV and IPPV Records			
Field	Size	Format	Description
<code>command_id</code>	4	<code>r_num</code>	<code>command_id = 0096</code>
<code>cleanup_date</code>	8	<code>YYYYMMDD</code>	Purge the smart card of all PPV records for which the PPV expiration date antedates <code>cleanup_date</code> .
<code>condition_date</code>	8	<code>YYYYMMDD</code>	<code>condition_date = cleanup_date</code>

List of error codes:

Field	Error codes	Error code extensions
<code>command_id</code>	<code>BAD_COMMAND_SYNTAX</code>	<code>EXTERNAL_SYSTEM_ERROR</code>
<code>command_id</code>	<code>BAD_COMMAND_SYNTAX</code>	<code>BAD_NUMBER_FORMAT</code>
<code>cleanup_date</code>	<code>BAD_COMMAND_SYNTAX</code>	<code>BAD_DATE_FORMAT</code>
<code>cleanup_date</code>	<code>BAD_COMMAND_SYNTAX</code>	<code>DATE_NOT_IN_THE_PAST</code>
<code>condition_date</code>	<code>BAD_COMMAND_SYNTAX</code>	<code>BAD_DATE_FORMAT</code>
<code>UA</code>	<code>UA_NOT_FOUND</code>	<code>NO_EXTENDED_ERROR_CODE</code>
<code>UA</code>	<code>CANCELLED_CARD</code>	<code>NO_EXTENDED_ERROR_CODE</code>
<code>UA</code>	<code>UA_LOCKED_WHILE_EXCHANGED</code>	<code>NO_EXTENDED_ERROR_CODE</code>
<code>UA</code>	<code>EXCHANGED_CARD</code>	<code>NO_EXTENDED_ERROR_CODE</code>
<code>MOP_PPID</code>	<code>INVALID_PPID</code>	<code>ISD_MOP_NOT_FOUND</code>

#### 4.9.25 Command 99: Send Generic IRD Command II

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to send an IRD command to a decoder. The decoder will execute an operation based on the instruction in the IRD command (e.g.: set the network ID, force tune, etc.). In other words, this command is not intended to modify the data in the device (smart card or MAD), but rather to have the decoder execute an action. To complement command 99, the CAS provides a secure transport mechanism between the head end and the STB.

#### Important

- Use this command to send an IRD command to an STB with a CAK.
- For native Nagravision STBs with a CAK, IRD commands can only be processed once the STB is correctly paired with the smart card (here the term "pairing" means either "strong pairing" or "secure channel").
- For STBs with a Nagravision CAK when strong pairing is used:** unlike the other commands described in this document, command 99 takes into consideration the pairing status of the smart card and the STB: command 99 will work **only** if the STB is paired with its smart card.

Examples are provided below (see sections 4.9.25.1 to 4.9.25.2).

Command 99: Send Generic IRD Command II			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0099
IRD_command_id	3	r_num	The command_id field of the IRD command_body. Value 254 is reserved for specifying that the command targets an MG STB without CAK. Range: 000 to 255
#	3	r_num	The Operation field of the IRD command_body (for STBs with a CAK) or the Type field of the IRD action (for MG STBs without CAK). Range: 000 to 255
IRD_data_length	3	r_num	Length of IRD_data, in bytes. Range: 000 to 255 – the following restrictions may apply depending on the STB context: <ul style="list-style-type: none"> <li>000 to 048 for DNASP-2 Nagravision CAKs</li> <li>000 to 064 for DNASP-3 Nagravision CAKs (Aladin)</li> <li>000 to 128 for DNASP-4 Nagravision CAKs (Merlin)</li> <li>000 to 142 for cardless Nagravision CAKs</li> <li>000 to 088 for STBs with a native MG CAK (IRD action)</li> </ul> The CAS does not perform any consistency check between IRD_data_length and the STB context.
IRD_data	2 x IRD_data_length	r_text (see note below)	This field contains a string of characters representing hexadecimal data encoded in the ASCII format (two characters for one byte).

#### Important

- As indicated in the table above, the format of the IRD\_data field is r\_text. However, it

does not contain a regular string: it is not a text field, such as "this is a sentence with characters and 1 2 3 4 numerical values". The data in the `IRD_data` field is a sequence of hexadecimal numbers encoded in a text format. Consequently, the field will only accept alpha characters A, B, C, D, E, F representing the numbers 10 to 15 in a hexadecimal form.

- As an example – the CAS will accept the following `IRD_data_byte` value: A0BCD12A29327B9F. Therefore, the value of `IRD_data_length` is 8.

List of error codes:

Field	Error codes	Error code extensions
<code>command_id</code>	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
<code>command_id</code>	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
<code>IRD_command_id</code>	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
<code>IRD_operation</code>	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
<code>IRD_data_length</code>	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
<code>IRD_data</code>	BAD_COMMAND_SYNTAX	BAD_DATA_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.9.25.1 Example: an STB with a Nagravision CAK

The `IRD_command_id` field has a value different from 254.

The following describes the structure of the data sent to the STB. The SMS gateway computes fields `sequence_number` and `checksum` for the SMS: the SMS does not provide these two parameters.

```

command_body{
    sequence_number    32 uimsbf
    command_id         8  uimsbf
    operation          8  uimsbf
    for (i=0;i<N;i++){
        data           8  uimsbf
    }
    checksum           8  uimsbf
}

```

As explained above, the purpose of an IRD command is to provide a message that will instruct the decoder to execute an action (e.g.: set the network ID). The `command_id` and `operation` parameters provided to the decoder contain two indexes that indicate which subroutine the decoder should execute.

Nagravision provides STB manufacturers with a list of `command_id` and `operation` values for a list of specific actions. This document is entitled "Conditional Access Kernel – IRD Command Specification" (see reference [2]).

#### 4.9.25.2 Example: an STB with a native MG CAK

The `IRD_command_id` field is set to 254.

The following describes the structure of the data sent to the STB. The SMS Gateway computes field `sequence number` (named `index` in the MG terminology) for the SMS: the SMS does not

provide this parameter.

```
command_body{
    type                8    uimsbf
    sequence_number     8    uimsbf
    for (i=0;i<N;i++){
        data            8    uimsbf
    }
}
```

As explained above, the purpose of an IRD command is to provide a message that will instruct the decoder to execute an action (e.g.: reset the PIN code). The `type` parameter provided to the decoder contain an index that indicate which subroutine the decoder should execute.

Nagravision provides STB manufacturers with a list of `type` values for a list of specific actions. This document is entitled "Mediaguard DVB Header Specification & Clear EMM Specification".

## **4.10 CONTROL commands (1nn)**

Commands of the 1nn series are used to set the data that is related to a subscriber but not sent to the device (smartcard or MAD). The data provided in 1nn commands is stored in the CAS database. This means that the data is persistent.



#### 4.10.1 Command 104: Create ICC in Call Collector

The SMS uses this command to create a new ICC record in the CAS database.

##### Important

- This command is redundant with respect to command 51: Initialize Smart Card. This command is supported solely for the sake of backward compatibility with SMS packages operating under DN2 systems. Consequently, new SMS-CAS interfaces should not use this command.

Command 104: Create ICC in Call Collector			
Field	Size	Format	Description
command_id	4	0104	command_id = 0104
STU_number	14	num	The Nagravision STB serial number in a decimal form: 10 digits with 4 trailing space characters. E.g.: "1234567890 "

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
STU_number	BAD_COMMAND_SYNTAX	BAD_STU_NUMBER_FORMAT
STU_number	STU_ALREADY_EXISTS	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.10.2 Command 105: Cancel ICC in Call Collector

The SMS uses this command to cancel an existing device record in the CAS database. This command should be issued when the device is deleted from the SMS database.

##### Important

- The end user's records in the CAS database are cancelled. As a result of this command, the CAS will accept no more SMS commands.

Command 105: Cancel ICC in Call Collector			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0105

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	CB_PROFILE_NOT_FOUND	NO_EXTENDED_ERROR_CODE
MOP_PPID	ACCOUNT_NOT_FOUND	NO_EXTENDED_ERROR_CODE

### 4.10.3 Command 110: EMM Cleanup

The SMS uses this command to delete all EMMs in the CAS and EMM broadcaster for an individual device (smart card or MAD). This command should be used when a discrepancy is suspected between the SMS customer data and the EMMs for this customer.

Command 110: EMM Cleanup			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0110

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE

#### 4.10.4 Command 122: Set Network

Command 122 sets or updates the CAS network ID and the STB context associated with the ICC.

In an advanced broadcast system, there are several data paths for the EMMs. The CAS network ID is one of the CAS parameters that allow setting this data path.

In non-Nagravision native STBs, the external format of the EMMs is different. The STB context value allows the CAS system to specify the appropriate EMM external format.

#### Note

- If the device does not yet exist in the SAS database, this command will create an entry for the device.
- When several CAS networks or STB contexts are applicable to a single head end, this command must be the first command issued by the SMS for a new device. Otherwise, the EMMs generated by the SMS commands will either not be routed to the appropriate CAS network or not be processed by the STB (the EMMs will be in the wrong external format).
- If the CAS network changes, the EMMs that are still broadcast over the previous CAS network will not move to the new CAS network.

Command 122: Set Network			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0122
CAS_network_id	3	r_num	The CAS network identifier. Range: 000 to 999
STB_context	2	r_num	The STB context. A combination of STB types (e.g.: native Nagravision STBs or MediaGuard STBs) and CAK types (e.g.: Merlin or MediaGuard). Range: 00 to 99 Currently supported values: <ul style="list-style-type: none"> <li>• 00 = Undefined</li> <li>• 01 = CAK DN2</li> <li>• 02 = CAK DN3</li> <li>• 03 = CAK DN4</li> <li>• 10 = MG (MediaGuard) STB</li> <li>• 11 = MG STB, downloadable with a CAK</li> <li>• 20 = BetaCrypt STB</li> </ul>

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	NO_EXTENDED_ERROR_CODE
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	BAD_COMMAND_SYNTAX	BAD_UA_FORMAT
UA	SC_SET_ID_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
UA	VUA_NOT_LINKED_TO_NUID	NO_EXTENDED_ERROR_CODE
CAS_network_id	BAD_COMMAND_SYNTAX	BAD_NETWORK_FORMAT
CAS_network_id	NETWORK_NOT_FOUND	NO_EXTENDED_ERROR_CODE
STB_context	BAD_COMMAND_SYNTAX	BAD_STB_CONTEXT_FORMAT
STB_context	STB_CONTEXT_NOT_FOUND	NO_EXTENDED_ERROR_CODE

#### 4.10.5 Command 125: Set Subscriber Private Data

The SMS uses this command to store subscribers' private data in the CAS database. The data is provided in a string. The format of that string is specified by the SMS. The CAS is only used for storing the data: it does not check the format or content of the data, neither does it process on the data in any way. This command is typically used to store the account number.

##### Important

- When the SMS issues this command, any previous value stored in the CAS database is overwritten by the new value.
- The subscriber data is not altered by the CAS. The data is stored as it is in the CAS database.
- The subscriber data must only contain printable characters.
- There is no SMS command provided for retrieving the subscribers' private data.

Command 125: Set Subscriber Private Data			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0125
sub_data_length	3	r_num	The number of characters forming the subscriber data. Range: 000 to 064
sub_data	sub_data_length	r_text	A string of characters representing the subscriber data (this string must only contain printable characters).

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
sub_data_length	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
sub_data	BAD_COMMAND_SYNTAX	BAD_DATA_FORMAT

#### 4.10.6 Command 126: Assign Virtual UA to NUID

The SMS uses this command to associate a Virtual UA to NUID and get this one in the acknowledgment command returned by CAS (see SMS '1003-Acknowledge Command with Virtual UA').

The CAS assigns a virtual UA to NUID (and stores the link into CAS database) if NUID is not already linked to virtual UA. Else, it returns the virtual UA already linked to NUID.

##### Important

- This command shall be sent for the devices without smart card only. And it shall be the first SMS command sent. The device could not be initialized if this command is not sent before.

Command 126: Assign Virtual UA to NUID			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0126
NUID	10	r_num	Identifier of the STB chipset.  Range: 0000000001 to 4,294,967,295

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
Command_id	NO_VUA_AVAILABLE	NO_EXTENDED_ERROR_CODE
NUID	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT

#### 4.11 Internal CAS commands (7nn)

The series of command 701 to 799 is reserved for private CAS commands.

#### 4.12 MACRO EMM commands (9nn)

This chapter describes the data of the command section for the 9nn SMS command series. Those commands are the same kind as the 0nn SMS command series (see previous chapter). The aim of this series is to optimize the overall command message bandwidth of the SMS – CAS interface. Indeed, for a large volume of end users, the amount of transactions (EMM command messages) is very high. Thus the use of the interface should be optimized. The solution adopted here is to concatenate several commands of the 0nn series into one macro command.



#### 4.12.1 Command 902: Activate Smart card Without Return Path

<b>SAS replaces original MOP by SOP</b>	Please refer to individual commands (0nn)
---	---

This command is a 'one-shot' initialization command designed to improve the performances of the CAS when initializing a new device in the CAS database.

##### Important

- Read the **Important** note under command 2, 10, 13, 48, 49, 52, 61, 100, 101
- If the CAS must generate a negative acknowledgement (i.e. `nack`) upon processing this SMS command, the body of the command will be truncated to 999 characters long before being inserted in field '`command_section`' of the negative acknowledgement.

Command 902: Activate Smart card Without Return Path			
Field	Size	Format	Description
<code>command_id</code>	4	<code>r_num</code>	<code>command_id = 0902</code>
<code>zip_code</code>	5	<code>num</code>	The end user's zip code. Range: 00000 to 99999
<code>STU_number</code>	14	<code>r_num</code>	The serial number of the CA STB in a decimal form. Range: see <b>Important</b> note in section 4.9.19.
<code>nb_of_products</code>	2	<code>r_num</code>	Number of products provided in this command. Range: 00 to 99
<code>for(i=0; i&lt;nb_of_products; i++) {</code>			A counter.
<code>IMS_product_id</code>	12	<code>num</code>	IMS product ID Range: 000000000000 to 004294967295
<code>begin_date</code>	8	<code>YYYYMMDD</code>	Subscription begin date (in UTC). The subscription is not valid before this date.
<code>end_date</code>	8	<code>YYYYMMDD</code>	Subscription end date (in UTC). The subscription is not valid after this date.
<code>}</code>			
<code>nb_of_ppv</code>	2	<code>num</code>	Number of PPV products provided in the command. Range: 00 to 99
<code>for(i=0; i&lt;nb_of_ppv; i++) {</code>			A counter.
<code>IMS_product_id</code>	12	<code>num</code>	IMS product ID. Range: 000000000000 to 004294967295
<code>length_event_name</code>	2	<code>r_num</code>	The length of valid data in the <code>event_name</code> field. It must not exceed 30 bytes. This is due to storage limitations in the smart card.
<code>event_name</code>	32	<code>text</code>	Event name as displayed in the PPV purchase history in the STB user interface. The number of characters must match <code>length_event_name</code> . The remaining bytes should be filled-up with space characters. See special note in section 4.5.1.
<code>price</code>	5	<code>num</code>	Price of the product, representing 0.00 to 999.99
<code>}</code>			

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_OUT_OF_RANGE	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
UA	CARD_REFURBISHMENT_FAILED	NO_EXTENDED_ERROR_CODE
UA	VUA_NOT_LINKED_TO_NUID	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR (invalid parent MOP)
MOP_PPID	CB_PROFILE_NOT_FOUND	NO_EXTENDED_ERROR_CODE
MOP_PPID	INVALID_PPID	MOP_NOT_AUTHORIZED
zip_code	BAD_COMMAND_SYNTAX	BAD_ZIP_CODE_FORMAT
zip_code	ZIP_NOT_FOUND	NO_EXTENDED_ERROR_CODE
STU_number	BAD_COMMAND_SYNTAX	BAD_STU_NUMBER_FORMAT
nb_of_products	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_TYPE	PPV_PRODUCT
IMS_product_id	BAD_PRODUCT_TYPE	REGULAR_PRODUCT
IMS_product_id	BAD_PRODUCT_TYPE	DRAFT_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	CANCELLED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	SUSPENDED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	INVALID_PURCHASE_DATE
IMS_product_id	PPV_IN_THE_PAST	NO_EXTENDED_ERROR_CODE
IMS_product_id	PRODUCT_INCONSISTENT	NO_EXTENDED_ERROR_CODE
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
length_event_name	BAD_COMMAND_SYNTAX	LENGTH_TOO_LONG
length_event_name	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
None	DATABASE_ERROR	BAD_PARAM_IN_CASDB
price	BAD_COMMAND_SYNTAX	BAD_PRICE_FORMAT

#### 4.12.2 Command 903: Add List of Products

SAS replaces original MOP by SOP	no
----------------------------------	----

##### Usage Note

- For new development, it is advised to use SMS command 905 (Add Enhanced List of Products) instead of SMS command 903.

The SMS uses this command to add a list of new products (service products, non-impulsively purchasable event products and package products) in a smart card.

##### Important

- Read the **Important** note under command 2, 10, 13, 48, 49, 52, 61, 100, 101
- If the CAS must generate a negative acknowledgement (i.e. *nack*) upon processing this SMS command, the body of the command will be truncated to 999 characters long before being inserted in field 'command\_section' of the negative acknowledgement.

Command 903: Add List of Products			
Field	Size	Format	Description
command_id	4	r_num	command_id = 903
nb_of_products	2	r_num	Number of products provided in this command. Range: 00 to 99
for(i=0; i<nb_of_products; i++) {			A counter.
IMS_product_id	12	num	IMS product ID Range: 000000000000 to 004294967295
begin_date	8	YYYYMMDD	Subscription begin date (in UTC). The subscription is not valid before this date.
end_date	8	YYYYMMDD	Subscription end date (in UTC). The subscription is not valid after this date.
}			
nb_of_ppv	2	r_num	Number of PPV product provided in this command. Range: 00 to 99
for(i=0; i<nb_of_ppv; i++) {			A counter.
IMS_product_id	12	num	IMS product ID Range: 000000000000 to 004294967295
length_event_name	2	r_num	Length of valid data in the event_name field. It must not exceed 30 bytes. This is due to storage limitations in the smart card.
event_name	32	text	Event name as displayed in the PPV purchase history in the STB user interface. The number of characters must match the length length_event_name. The remaining bytes should be filled-up with space characters. See special note in section 4.5.1.
price	5	num	Price of the product. Range: 0.00 to 999.99
}			

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SUSPENDED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
None	DATABASE_ERROR	BAD_PARAM_IN_CASDB
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND
MOP_PPID	SUSPENDED_MOP	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR (invalid parent MOP)
nb_of_products	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_TYPE	PPV_PRODUCT
IMS_product_id	BAD_PRODUCT_TYPE	REGULAR_PRODUCT
IMS_product_id	BAD_PRODUCT_TYPE	DRAFT_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	CANCELLED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	SUSPENDED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	INVALID_PURCHASE_DATE
IMS_product_id	PPV_IN_THE_PAST	NO_EXTENDED_ERROR_CODE
IMS_product_id	PRODUCT_INCONSISTENT	NO_EXTENDED_ERROR_CODE
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
length_event_name	BAD_COMMAND_SYNTAX	LENGTH_TOO_LONG
length_event_name	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
price	BAD_COMMAND_SYNTAX	BAD_PRICE_FORMAT

#### 4.12.3 Command 904: Cancel List of Products

<b>SAS replaces original MOP by SOP</b>	no
---	----

The SMS uses this command to cancel a list of products (entitlements of services or/and PPV) from a device (smart card or MAD).

#### Important

- Read the **Important** note under command 6.

Command 904: Cancel List of Products			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0904
nb_of_products	2	r_num	Number of products provided in this command. The range is 00 to 99
for(i=0; i<nb_of_products; i++) {			A counter.
IMS_product_id	12	num	IMS Product ID Range: 000000000000 to 004294967295
}			

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	NO_EXTENDED_ERROR_CODE
UA	CANCELED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_OUT_OF_RANGE	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR
MOP_PPID	CB_PROFILE_NOT_FOUND	NO_EXTENDED_ERROR_CODE
nb_of_products	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE

#### 4.12.4 Command 905: Add Enhanced List of Products

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to add a list of new products (service products, non-impulsively purchasable event products and package products) into a device (smart card or MAD).

##### Important

- Read the **Important** note under commands 2, 10 and 903.
- A “re-hit purchase” is a case where customers purchase a product through the SMS, and later complain that they do not have access to the requested product. The SMS command is issued a second time. The SMS/SAS must make sure that the subscriber will only have access to the same content and validity period as initially granted by the first SMS command.
- If the CAS must generate a negative acknowledgement (i.e. `nack`) upon processing this SMS command, the body of the command will be truncated to 999 characters long before being inserted in field `'command_section'` of the negative acknowledgement.

Command 905: Add Enhanced List of Products			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0905
nb_of_products	2	r_num	Number of products provided in this command. Range: 00 to 99
for(i=0; i<nb_of_products; i++) {			A counter.
IMS_product_id	12	num	IMS product ID Range: 000000000000 to 004294967295
purchase_mode	1	r_text	A flag specifying whether the product purchase is a new purchase (P) or a re-hit of the product ®. This flag is only used with Merlin smart cards: it is ignored with Aladin smart cards (the value is overwritten as P). This flag is only applicable to multi-instance products where the validity dates are specified by the SMS (Flexible Subscription and PPT by points products). With other product types (regular subscriptions and PPT by coins products), the flag is ignored. With Flexible Subscription and PPT by points, the SMS command handling is as follows: <ul style="list-style-type: none"> <li>A new purchase creates a new instance of the product.</li> <li>A re-hit retrieves the active instances of the product in the smart card and recreates the latest purchased instance of the product. If no active instance is found, then the SMS command will be handled as a new purchase.</li> </ul>
begin_date	8	YYYYMM DD	Subscription begin date (generally in UTC). The subscription is not valid before this date.
begin_time	6	HHMMSS	Subscription begin time (generally in UTC). The subscription is not valid before this time.
end_date	8	YYYYMM DD	Subscription end date (generally in UTC). The subscription is not valid after this date.
end_time	6	HHMMSS	Subscription end time (generally in UTC). The subscription is not valid after this time.
length_product_name	2	r_num	The length of valid data in the product_name field. It must not exceed 30 bytes. This is due to storage limitations in the smart card.
product_name	32	Text	The product name as displayed in the PPV purchase history in the STB user interface. The number of characters must match the length specified in length_product_name. The remaining bytes should be padded with space characters. See special note in section 4.5.1.
price	5	num	The price of the product. Range: 000.00 to 999.99
}			
nb_of_ppv	2	r_num	The number of PPV products included in this command. Range: 00 to 99

Continued...

Command 905: Add Enhanced List of Products (continued)			
Field	Size	Format	Description
<code>for(i=0; i&lt;nb_of_ppv; i++) {</code>			A counter.
<code>IMS_product_id</code>	12	Num	The IMS product ID. Range: 000000000000 to 004294967295
<code>purchase_mode</code>	1	r_text	<p>A flag specifying whether the product purchase is a new purchase (P) or a re-hit of the produ®(R).</p> <p>This flag is only used with Merlin smart cards: it is ignored with Aladin smart cards (the value is overwritten as P).</p> <p>This flag is only applicable to multi-instance products where the validity dates are specified by the IMS (N of M products) or computed by the SAS at purchase time (rental PPVs and PFPs), as well as to coin products. With rental DVR products, the flag is ignored and the SMS command is handled as a new purchase. With other product types (short-term subscriptions and PPVs), the flag is ignored.</p> <p>With N of M products, the SMS command is handled as follows:</p> <ul style="list-style-type: none"> <li>A new purchase creates a new instance of the product.</li> <li>A re-hit retrieves the latest purchased instance in the smart card and recreates the same instance of the product. If no instance is found, then the SMS command will be handled as a new purchase.</li> </ul> <p>With rental PPV and PFP products, the SMS command is handled as follows:</p> <ul style="list-style-type: none"> <li>A new purchase creates a new instance of the product.</li> <li>A re-hit retrieves the active instance of the product in the smart card and recreates the same instance of the product. If no active instance is found, then the SMS command will be handled as a new purchase.</li> </ul> <p>With coin products, the SMS command is handled as follows:</p> <ul style="list-style-type: none"> <li>A new purchase adds the amount of credit associated with the product to the credit level in the smart card.</li> <li>A re-hit sets the credit figure in the smart card to the current absolute value of the smart card credit level.</li> </ul>
<code>length_product_name</code>	2	r_num	The length of valid data in the <code>product_name</code> field. It must not exceed 30 bytes. This is due to storage limitations in the smart card.
<code>product_name</code>	32	text	The product name as displayed in the PPV purchase history in the STB user interface. The number of characters must match the length specified by <code>length_product_name</code> . The remaining bytes should be padded with space characters. See special note in section 4.5.1.
<code>price</code>	5	num	The price of the product. Range: 000.00 to 999.99
<code>}</code>			



List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	EXTERNAL_SYSTEM_ERROR
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SUSPENDED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND
MOP_PPID	SUSPENDED_MOP	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR
nb_of_products	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_TYPE	PPV_PRODUCT
IMS_product_id	BAD_PRODUCT_TYPE	REGULAR_PRODUCT
IMS_product_id	BAD_PRODUCT_TYPE	DRAFT_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	CANCELLED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	SUSPENDED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	INVALID_PURCHASE_DATE
IMS_product_id	PPV_IN_THE_PAST	NO_EXTENDED_ERROR_CODE
IMS_product_id	PRODUCT_INCONSISTENT	NO_EXTENDED_ERROR_CODE
IMS_product_id	PPV_PURCHASE_NOT_ALLOWED	NO_EXTENDED_ERROR_CODE
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
purchase_mode	BAD_COMMAND_SYNTAX	BAD_PURCHASE_MODE
begin_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
begin_time	BAD_COMMAND_SYNTAX	BAD_TIME_FORMAT
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_FORMAT
end_date	BAD_COMMAND_SYNTAX	BAD_DATE_SEQUENCE
end_time	BAD_COMMAND_SYNTAX	BAD_TIME_FORMAT
length_product_name	BAD_COMMAND_SYNTAX	LENGTH_TOO_LONG
length_product_name	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
price	BAD_COMMAND_SYNTAX	BAD_PRICE_FORMAT

#### 4.12.5 Command 908: Set Families of Products

<b>SAS replaces original MOP by SOP</b>	no
---	----

This command is for managing subscription products associated with a family. For more information about product families, refer to section 4.7.2.

The SMS uses this command to specify an exhaustive list of products for a subscriber. The subscriber will only be granted access to products listed within the relevant product family. In other words, if a subscriber previously had access to a product and the product was later removed from the list, the customer would then be denied access to this product.

The product is active until it is explicitly cancelled (removed from the list of products).

#### Important

- This SMS command will be rejected if the MOP is suspended (by means of SMS command 20) or if the SOP is suspended (by means of SMS command 23).

Command 908: Set Families of Products			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0908
nb_of_families	2	r_num	The number of product families included in this command. Range: 01 to 64
for(i=0;i<nb_of_families;i++) {			A counter.
IMS_family_index	2	r_num	The IMS family index. Range: 00 to 63
nb_of_products	3	r_num	The number of products included in this family. Range: 000 to 256
for(i=0;i<nb_of_products;i++) {			A counter.
IMS_product_id	12	num	The IMS product ID. Range: 000000000000 to 004294967295
}			
}			

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	BAD_COMMAND_ID
command_id	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
UA	UA_NOT_FOUND	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	SUSPENDED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	INVALID_PPID	ISD_MOP_NOT_FOUND
MOP_PPID	SUSPENDED_MOP	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR
nb_of_families	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_family_index	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
nb_of_products	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_FAMILY	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_STATUS	CANCELLED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	SUSPENDED_PRODUCT
IMS_product_id	BAD_PRODUCT_STATUS	INVALID_PURCHASE_DATE
IMS_product_id	BAD_PRODUCT_TYPE	NO_EXTENDED_ERROR_CODE
IMS_product_id	BAD_PRODUCT_TYPE	DRAFT_PRODUCT

#### 4.12.6 Command 909: Cancel List of Products at a Given Date

SAS replaces original MOP by SOP	no
----------------------------------	----

The SMS uses this command to cancel a list of products from a given date (instead from now as with the SMS command 904).

#### Important

- SMS command will be rejected if the MOP is suspended (by means of SMS command 20) or if the SOP is suspended (by means of SMS command 23).

Command 909: Cancel List of Products at a Given Date			
Field	Size	Format	Description
command_id	4	r_num	command_id = 0909
nb_of_products	2	r_num	Number of products provided in this command. The range is 00 to 99
for(i=0; i<nb_of_products; i++) {			A counter.
IMS_product_id	12	num	IMS Product ID Range: 000000000000 to 004294967295
end_date	8	YYYYMMDD	Product end date (generally in UTC). The product will be not valid after this date.
}			

List of error codes:

Field	Error codes	Error code extensions
command_id	BAD_COMMAND_SYNTAX	NO_EXTENDED_ERROR_CODE
UA	CANCELLED_CARD	NO_EXTENDED_ERROR_CODE
UA	UA_OUT_OF_RANGE	NO_EXTENDED_ERROR_CODE
UA	UA_LOCKED_WHILE_EXCHANGED	NO_EXTENDED_ERROR_CODE
UA	EXCHANGED_CARD	NO_EXTENDED_ERROR_CODE
MOP_PPID	DATABASE_ERROR	DATA_ERROR
MOP_PPID	CB_PROFILE_NOT_FOUND	NO_EXTENDED_ERROR_CODE
nb_of_products	BAD_COMMAND_SYNTAX	BAD_NUMBER_FORMAT
IMS_product_id	BAD_COMMAND_SYNTAX	BAD_IMS_PRODUCT_ID_FORMAT
IMS_product_id	PRODUCT_NOT_FOUND	NO_EXTENDED_ERROR_CODE

#### **4.12.7 Commands 910 to 919: Reserved for Internal CAS Actions**

## 4.13 OPERATION commands (10nn and 20nn)

### 4.13.1 Command 1000: Acknowledge Command

The CAS and the SMS use this command to acknowledge a command issued by the other side of the interface. Field "transaction\_number" identifies the corresponding command that has been processed successfully.

#### Important

- Fields IMS\_product\_id and SMS\_product\_id are no longer applicable since the series of cmd 3nn is not supported by the interface. Consequently, these fields will be set to 000000000000 and 000000000000 respectively.

Command 1000: Acknowledge Command			
Field	Size	Format	Description
command_id	4	r_num	command_id = 1000
transaction_number	9	num	Transaction number acknowledged. Range: 000000000 to 999999999
IMS_product_id	12	num	IMS product ID is always 000000000000
SMS_product_id	12	num	SMS product ID is always 000000000000

#### 4.13.2 Command 1001: Non-acknowledged Command

The command specified could not be completed because it is either REJECTED or POSTPONED. A rejected command is a consequence of a mistake in the command format or in the command processing. A postponed command is a consequence of a CAS system that is busy.

##### Important

- When a command is POSTPONED, the SMS should resubmit the command after a delay of 60 min. Note that the resubmitted command should be identified with a new transaction id.

Command 1001: Non-Acknowledge Command			
Field	Size	Format	Description
command_id	4	r_num	command_ID = 1001
transaction_number	9	num	transaction_number acknowledged Range: 000000000 to 999999999
nack_status	1	r_num	1 = REJECTED means that the command has been rejected because an error has been detected. 2 = POSTPONED means that the command could not be completed because the system is busy.
error_code	4	r_num	Main error code, refers to section 5.1
error_code_ext	4	r_num	Extension error code, refers to section 5.2
length_of_command_body	3	num	Length of the following section
command_section	n		Command section of the command that caused the error, where n = length_of_command_body

#### 4.13.3 Command 1002: No Command

The SMS should send this command in the following two conditions:

- While the SMS opens a channel.
- While there is no activity, i.e. no command to send or receive. The period should be 5 min.

Command 1002: No Command			
Field	Size	Format	Description
command_id	4	r_num	command_id = 1002



#### 4.13.4 Command 1003: Acknowledge Command with Virtual UA

The CAS uses this command to acknowledge the SMS command '126-Assign Virtual UA to NUID' issued by the SMS and to return the virtual UA that SAS has linked to given NUID.

Field "transaction\_number" identifies the corresponding command that has been processed successfully.

Command 1003: Acknowledge Command with Virtual UA			
Field	Size	Format	Description
command_id	4	r_num	command_id = 1003
transaction_number	9	num	Transaction number acknowledged. Range: 000000000 to 999999999
VUA	10	num	Virtual UA associated to NUID given in SMS command 126.  Range: 0000000001 to 4,294,967,295
NUID	10	r_num	Identifier of the STB chipset.  Range: 0000000001 to 4,294,967,295

#### 4.13.5 Command 2000: EMM via Portal Acknowledge command

The CAS uses this command to acknowledge a command issued by the SMS when the broadcasting mode specified in the Address Header of the EMM command or control command is of type E (EMM via Portal). Field "transaction number" identifies the corresponding command that has been processed successfully.

Command 2000: EMM via Portal Acknowledge command			
Field	Size	Format	Description
command_id	4	2000	command_id = 2000
transaction_number	9	num	Transaction number acknowledged. Range: 000000000 to 999999999
nb_of_emm	3	num	Number of EMM. Range: 000 to 999
for(i=0; i<nb_of_emm; i++){			
emm_data_length	3	num	Length of emm_data, in bytes. Range: 000 to 999
emm_data	2 x emm_data_length	r_text (see note below)	This field contains a string of characters representing hexadecimal data encoded in the ASCII format (two characters for one byte).
}			

#### Important

- As indicated in the table above, the format of the `emm_data` field is `r_text`. However, it does not contain a regular string: it is not a text field, such as "this is a sentence with characters and 1 2 3 4 numerical values". The `emm_data` field contains a sequence of hexadecimal numbers encoded in a text format. Consequently, the field will only accept alpha characters A, B, C, D, E, F representing the numbers 10 to 15 in a hexadecimal form.
- As an example – the CAS will accept the following data:  
A0BCD12A29327B9F. Therefore, the value of `emm_data_length` is 8.

#### 4.13.6 Command 2001: EMM via Portal Negative-Acknowledge command

The command specified could not be completed because it is either REJECTED or POSTPONED. A rejected command is a consequence of a mistake in the command format or in the command processing. A postponed command is a consequence of a CAS system that is busy.

Command 2001: EMM via Portal Negative-Acknowledge command			
Field	Size	Format	Description
command_id	4	2001	command_id = 2001
transaction_number	9	num	Transaction number acknowledged. Range: 000000000 to 999999999
nack_status	1	r_num	1 = REJECTED means that the command has been rejected because an error has been detected. 2 = POSTPONED means that the command could not be completed because the system is busy.
error_code	4	r_num	Main error code.
error_code_ext	4	r_num	Error code extension.

The CAS will return the following error codes:

- SYSTEM\_ERROR with code extension EXTERNAL\_SYSTEM\_ERROR (nack postponed returned in SMS command 2001 when the CAS is not ready to handle the request or in case of time-out with the EME, etc.)
- SYSTEM\_ERROR with code extension CIPHERING\_ERROR (nack rejected returned in SMS command 2001 in case of ciphering error)

## 5. Error codes

If an error occurs when executing an SMS command, it is reported by the use of an error code and an error code extension. The error code indicates an error category and the error code extension gives more details regarding the error source (e.g., an incorrectly specified field or value exceeded).

An error code is always followed by an error code extension (possibly extension 0000: NO\_EXTENDED\_ERROR\_CODE). The error codes and extensions available are indicated in the following tables.

### 5.1 Table of Error codes

Error Code Name	Code	Description
FATAL_ERROR	0000	The Oracle database interface returns an exception as database error or protocol error due to a non-understood field in the SMS command. All SMS EMM commands might generate such FATAL_ERROR.
BAD_ROOT_HEADER_SYNTAX	0001	The syntax of the command root header is not correct. See error code extension
BAD_HEADER_SYNTAX	0002	The syntax of the command header is not correct. See error code extension
BAD_COMMAND_SYNTAX	0003	The syntax of the command is not correct. See error code extension.
DATABASE_ERROR	0004	An error occurred during an CAS database query processing.
MESSAGE_NOT_FOUND	0005	The message referenced in the command does not exist.
PRODUCT_NOT_FOUND	0006	The product_id used in the command does not exist in the CAS database.
CANCELED_CARD	0007	The smart card referenced in the command has been canceled.
UA_NOT_FOUND	0008	The smart card UA referenced in the command does not exist
PPV_IN_THE_PAST	0009	The command attempts to access a PPV whose validity has expired.
STU_ALREADY_EXISTS	0010	The command attempts to create a smart card in the CC database, but the smart card is bound to an already existing STB.
SERVICE_NOT_FOUND	0011	The service referenced in the command does not exist in the CAS database.
PRODUCT_ALREADY_EXISTS	0013	The command attempts to create an already existing product.
UA_ALREADY_EXISTS	0014	The command attempts to create in the CC database a smart card that already exists.
BAD_EPG_FORMAT	0015	The format of the EPG data feed is not correct.
DB_INCONSISTENT_TOO_MANY_ROWS	0021	Inconsistency in the CAS database
DB_INCONSISTENT_INVALID_PRODUCT	0022	Inconsistency in the CAS database
PRODUCT_INCONSISTENT	0024	There is an inconsistency between the product definition received and the internal SMS Gateway product database.

Error Code Name	Code	Description
TOO_MANY_ITEMS	0025	Too many items are given in the list.
VALUE_OUT_OF_RANGE	0026	The value in the incoming command is out of the authorized range.
BAD_USAGE	0027	The usage of this parameter is not correct. See error code extension.
INVALID_PPID	0028	The MOP PPID used in this command is invalid.
SYSTEM_ERROR	0029	An error not related to the business or to the field value occurs within the system. See error code extension.
BAD_PRODUCT_TYPE	0030	The type of the product is wrong (not supported for this command or for this addressing type).
BAD_PRODUCT_STATUS	0031	The status of the product does not allow the execution of this command.
ACCOUNT_NOT_FOUND	0032	The account that corresponds to this UA and to this MOP does not exist in the database.
ZIP_NOT_FOUND	0034	The Zip code does not exist in the database.
RIGHT_NOT_FOUND	0035	The Right does not exist in the database
NO_LICENSE	0036	No license for this type of SMS command
NOT_AUTHORIZED	0037	This command is not authorized. The underlying cause can be a misuse of one of the following parameters: <ul style="list-style-type: none"> <li>• MOP</li> <li>• SMS source ID</li> <li>• bad product PA type vs MOP PA type</li> <li>• bad product PA type vs addressing type</li> </ul>
NO_RTM_PRESENT	0040	A cmd 1002 is issued by SMS on EMM/control channel, but no RTM is configured in the CAS system.
SMS_NOT_AUTHORIZED	0041	Invalid <code>source_ID</code> used by SMS.
NO_SERVER_AVAILABLE	0043	There is no TM application available to handle the command
TM_SERVER_ERROR	0044	Occurs when system returns a CORBA exception
SOURCE_ID_ALREADY_USED	0045	The SMS Source ID is already used by another connection. Check why two different SMS are connected with the same <code>source_ID</code>
UA_OUT_OF_RANGE	0046	smart card Unique Address is out of range for the operator
EXPIRED_CARD	0047	The smart card life time has expired
COMMAND_THRESHOLD_OVERFLOW	0048	This error is generated back to the SMS if there are too many commands for a certain smart card coming in a short time frame.
INVALID_VOUCHER	0049	The voucher checked is invalid
NO_CIPHER_PRESENT	0050	There is no cipher available
CARD_NOT_PAIED	0051	Card is not paired with STB.
SEGMENT_NOT_FOUND	0052	The segment requested in not defined in CAS.
PRODUCT_CAT_NOT_FOUND	0053	The product category requested in not defined in CAS.
NETWORK_NOT_FOUND	0054	The network ID requested in not defined in CAS.
STB_CONTEXT_NOT_FOUND	0055	The STB context requested in not defined in CAS.

Error Code Name	Code	Description
CONDITIONAL_ID_NOT_FOUND	0056	The conditional add ID requested is not defined in CAS.
ONLINE_PURCHASE_REFUSED	0057	Online purchase has been refused.
UA_LOCKED_WHILE_EXCHANGED	0058	A smart card exchange is in progress for the specified UA. No other SMS command can be accepted as long as the exchange is not finished.
NO_FREE_PAIRING_SLOT	0059	All the available pairing slots are already used.
EXCHANGED_CARD	0060	The smart card has been exchanged with a new one, therefore it cannot be used anymore.
SC_SET_ID_NOT_FOUND	0061	There is no smart card set ID defined in CAS for the requested UA.
PPV_PURCHASE_NOT_ALLOWED	0062	The SMS sends a command to add a PPV for a subscriber that is not authorized for PPV.
ALREADY_LINKED_CARD	0063	UA already linked to another UA.
NO_LINKED_CARD	0064	UA has not substitute UA linked to it.
EXCHANGED_CARD_REVERSED	0065	A reverse exchange command 503 has been issued for this UA. No SMS command is accepted anymore for this UA.
BAD_CARD_TYPE	0066	The substitute UA is of the wrong smartcard type and cannot be used as a new smartcard for the swap.
BAD_PRODUCT_FAMILY	0067	There is an inconsistency between the IMS family index specified in the SMS command and the one assigned to the product.
BAD_REPLACED_CARD_TYPE	0068	The replaced UA is of the wrong smartcard type and cannot be used for the swap.
DISCONNECTED_CARD	0069	The smartcard is disconnected.
SUSPENDED_CARD	0070	The smartcard is suspended.
SUSPENDED_MOP	0071	The MOP is suspended.
FOREIGN_SC	0072	The SC is a foreign SC.
CARD_REFURBISHMENT_FAILED	0074	An operation was attempted on a card which wasn't refurbished successfully, and this operation is not allowed on such cards.
VUA_NOT_LINKED_TO_NUID	0076	Virtual UA was not assigned to NUID.  <b>Reasons:</b> <ul style="list-style-type: none"> <li>The SMS command '126-Assign Virtual UA to NUID' was not sent</li> <li>Or the given virtual UA is not the virtual UA returned in the acknowledgment of the SMS 126.</li> </ul>
NUID_OUT_OF_RANGE	0077	NUID is out of range for the operator.
NO_VUA_AVAILABLE	0078	All vUA defined in the system were already assigned to NUID. A new range of vUA shall be deployed.

Table 5-1: Error codes

## 5.2 Table of Error code extensions

Error code extension Name	Code	Description
NO_EXTENDED_ERROR_CODE	0000	No error code extension is available for the error code specified.
BAD_DATE_FORMAT	0004	The command contains a date whose format is incorrect.
BAD_DATE_SEQUENCE	0005	The command contains a begin date and an end date that are out of sequence.
BAD_FREQUENCY_FORMAT	0006	The <code>call_freq</code> field of the command contains a value whose format is incorrect.
BAD_STU_NUMBER_FORMAT	0007	The format of the STB number specified in the command is incorrect.
BAD_IMS_PRODUCT_ID_FORMAT	0008	The format of the <code>CAS_product_id</code> of the command is incorrect.
BAD_MESSAGE_NUMBER_FORMAT	0010	The value of the <code>message_number</code> field of the command is incorrect.
BAD_PRICE_FORMAT	0013	The value of the price field of the command is incorrect.
BAD_UA_FORMAT	0015	The value of the <code>UA</code> field of the command is incorrect.
BAD_ZIP_CODE_FORMAT	0016	The value of the zip code field of the command is incorrect.
DIFFERENT_PRODUCTS	0017	The command attempts to define a product with a <code>product_id</code> already attributed to a different product.
BAD_BROADCAST_MODE	0019	The broadcast mode is incorrect.
BAD_ADDRESS_TYPE	0020	The format of the value of the <code>address_type</code> field of the command is incorrect.
BAD_MOP_PPID	0021	The <code>MOP_PPID</code> indicated in the command is not valid.
BAD_DEST_ID	0022	The <code>dest_id</code> indicated in the command is not valid.
BAD_SOURCE_ID	0023	The <code>source_id</code> indicated in the command is not valid.
BAD_COMMAND_TYPE	0024	This type of SMS command does not exist.
BAD_COMMAND_ID	0025	The command ID given in the SMS command does not exist.
BAD_NUMBER_FORMAT	0027	A non-numerical character was found in the content of a Num field.
BAD_ERROR_CODE	0032	The error code specified in the command does not exist (section 8).
BAD_ERROR_CODE_EXT	0033	The error code extension specified in the command does not exist (section 8).
BAD_SERVICE_UID_FORMAT	0040	The format of the value of a <code>service_UID</code> field of the command is incorrect.
BAD_SERVICE_NUMBER_FORMAT	0041	The format of the value of the <code>service_number</code> field of the command is incorrect.

Error code extension Name	Code	Description
BAD_NUMBER_OF_IPPV_FORMAT	0044	The format of the <code>number_of_IPPV</code> field in the command is incorrect.
BAD_IP_ADDRESS_FORMAT	0045	The format of the IP address in the command is incorrect.
EXTERNAL_SYSTEM_NOT_RESPONDING	0048	The other components of the CAS system do not respond to the gateway process.
EXTERNAL_SYSTEM_ERROR	0049	The other components of the CAS system have not successfully processed the command.
BAD_SERVICE_ID_FORMAT	0052	The format of the service ID is incorrect.
BAD_TRANSPORT_ID_FORMAT	0053	The format of the transport ID is incorrect.
BAD_NETWORK_ID_FORMAT	0054	The format of the network ID is incorrect.
BAD_LID_FORMAT	0055	The format of the lid is incorrect.
BAD_PRIORITY_FORMAT	0056	The format of the priority is incorrect.
BAD_MODE_FORMAT	0057	The format of the mode is incorrect.
LENGTH_TOO_LONG	0058	The length is out of range.
BAD_FLAG_VALUE	0059	The flag value is not recognized.
BAD_CC_PORT_FORMAT	0060	The format of the CC port is incorrect.
BAD_TRANSACTION_NUMBER_FORMAT	0061	The format of the transaction number is incorrect.
BAD_PURGE_MODE_FORMAT	0062	The format of the purge mode is incorrect.
BAD_CALLBACK_FORMAT	0063	The format of the callback type is incorrect.
BAD_TIME_FORMAT	0064	The time format is incorrect.
DATE_NOT_IN_THE_PAST	0065	This date must be set in the past.
ACCESS_ERROR	0066	Error when trying to access database.
TRANSACTION_ERROR	0067	An error occurs during a database transaction (i.e. limitation reached, overflow...).
DATA_ERROR	0068	An error related to the data contained in database occurs (i.e. expected record is missing).
TRANS_NR_ALREADY_IN_USE	0069	This transaction number is already in use within the system.
COMMUNICATION_ERROR	0070	Communication error between components within the system.
INTERNAL_ERROR	0071	System internal error.
SOURCE_NOT_AUTHORIZED	0072	Use of this source identifier is not allowed.
SOURCE_ALREADY_IN_USE	0073	This source identifier is already used by another source.
DEST_NOT_AUTHORIZED	0074	Use of this destination identifier is not allowed.
MOP_NOT_AUTHORIZED	0075	Use of this MOP PPID is not allowed.
DATE_IN_THE_FUTURE	0076	This date must be set in the present or in the past.
CANCELLED_PRODUCT	0077	The product has been cancelled.
SUSPENDED_PRODUCT	0078	The product has been suspended.
INVALID_PURCHASE_DATE	0079	The purchase date is invalid.
DRAFT_PRODUCT	0080	The product is a draft.
PPV_PRODUCT	0081	The product is a PPV.



Error code extension Name	Code	Description
DATE_IN_THE_PAST	0082	This date must be set in the present or in the future.
ADDRESS_TYPE_NOT_AUTHORIZED	0083	This type of address is not allowed for this command.
ISD_MOP_NOT_FOUND	0084	The MOP record does not exist for this UA.
BAD_DATA_FORMAT	0085	The format of the data is invalid.
REGULAR_PRODUCT	0086	This product is a regular (subscription) product.
INVALID_CATEGORY	0087	The category requested is not defined in the CAS.
CORBA_EXCEPTION	0088	Low level system error
RENTAL_PRODUCT	0089	Operation not allowed with a rental product
FREE_RENTAL_PRODUCT	0090	Operation not allowed with a Free Rental product
VOD_RENTAL_PPV	0091	Operation not allowed with a VOD Rental product
PPT_PRODUCT	0092	Operation not allowed with a Pay Per Time product
BAD_SECRET_CODE	0093	The secret code is incorrect
BAD_VERIFICATION_CODE	0094	The verification code is incorrect
BAD_THIRD_PARTY	0095	The third party is unknown
BAD_PARAM_IN_CASDB	0096	SAS is wrongly configured and cannot properly handle the SMS command for the specified UA.
BAD_CATEGORY_FORMAT	0097	The format of the category is incorrect
BAD_SUBCATEGORY_FORMAT	0098	The format of the subcategory is incorrect
BAD_FREE_PRODUCT_MODE	0099	The free product mode contains an unauthorized value
BAD_PRODUCT_CAT_FORMAT	0100	The format of the product category is incorrect
BAD_NB_FREE_PROD_FORMAT	0101	The format of the number of free product is incorrect
BAD_NETWORK_FORMAT	0102	The format of the network ID is incorrect
BAD_STB_CONTEXT_FORMAT	0103	The format of the STB context is incorrect
BAD_PURCHASE_MODE	0104	The purchase mode contains an unauthorized value
BAD_CONDITIONAL_ID_FORMAT	0105	The format of the conditional ID is incorrect
BAD_ONLINE_PURCHASE_MODE	0106	The online purchase mode contains an unauthorized value
BAD_SYNCHRO_TYPE	0108	The format of the <code>synchro_type</code> field is incorrect.
CIPHERING_ERROR	0109	The CAS is not able to cipher the request.
PRODUCT_NOT_AUTHORIZED	0110	This product is not allowed for this SMS source.
BAD_CHIPSET_ID_FORMAT	0113	The format of the chipset ID specified in the command is incorrect.
ASP_PROFILE_ID_NOT_AUTHORIZED	0115	The ASP profile ID is not authorized according to CAS configuration

Error code extension Name	Code	Description
ALREADY_PAIRING_WITH_STB	0116	The smart card is already paired with the given STB on another slot.

Table 5-2: Error code extensions

## 6. UA and CA-S/N checksum

This chapter describes the procedure to manage UAs (unique addresses) and CA-S/Ns (conditional access serial numbers) at the customer site.

### 6.1 Definitions

The mandatory information to allow a CAS to fully recognize an individual customer is:

UA	Unique address of the smart card. This is a 12-digits long number that uniquely identifies the smart card. The first 10 digits represent the address itself; the last 2 digits are a checksum allowing the SMS to verify the number given by the customer. The preferred (but not mandatory) format is:
nn nnnn nnnn cc	This number is printed and bar-coded on the smart card and is normally accessible through a set-top box menu on the TV screen.
CA-S/N	Conditional access serial number. This is a 12-digits long number that uniquely identifies the set-top box for the conditional access system. The first 10 digits represent the serial number; the last 2 digits are a checksum allowing the SMS to verify the number given by the customer. The preferred (but not mandatory) format is:
nn nnnn nnnn cc	This number may be printed (and possibly bar-coded) on a sticker on the set-top box and is normally accessible through a set-top box menu on the TV screen.  This number may differ (and usually differs) from the manufacturing S/N, which identifies the set-top box for the manufacturer himself. We had to use a common format throughout the system and different numbers for all set-top boxes whatever the format chosen by the manufacturer.

### 6.2 Pairing operation

The pairing only applies to STBs with a Nagravision CAK. Therefore, it does not apply to STBs with a MediaGuard CAK (this could change in the future).

The pairing operation links a smart card with a set-top box. The pairing operation is mandatory. Without the pairing operation, the end user's STB does not work and IRD commands cannot be forwarded by the smart card to the STB.

There are two types of pairing:

- Secure channel (no pairing command needs to be sent, global operator pairing).
- Strong pairing:
  - With soft hardware pairing,
  - With chipset hardware pairing.

For strong pairing:

- The end user will communicate his UA and his CA-S/N (and optionally his chipset ID, in cases where there is chipset hardware pairing and where the CAS cannot retrieve the accurate value) to the SMS during the installation process. Those numbers may be filled in the contract or in any place the customer finds suitable for this purpose.

The pairing key(s), which is used to effectively prevent the use of a smart card in another set-top box, is provided in the Nagravision system.

### 6.3 Data files

Nagravision usually provides the customer with files containing the list of the smart cards produced. Those files contain a list of UA. They are given by production box (250 smart cards) and/or by production batch (indeterminate number of boxes in one file).

On the other hand, the set-top box manufacturer has the responsibility to provide files containing the list of set-top boxes effectively produced. Those files must contain a list or range of CAS/N. If needed by the customer, those files may provide a link between the CAS/N and the manufacturing S/N for each box, but this is not requested by the Nagravision system.

Nagravision may possibly provide the range of CAS/N allocated for each manufacturer but has no view on what is effectively produced.

### 6.4 CA-S/N – Pairing keys

The CA-S/N is chosen by Nagravision and provided to the set-top box manufacturer, each of them associated with a pairing key. This pairing key is a system security element and must not be known by the end user, by the customer, or by any unauthorized people at the manufacturing site. Thus this pairing key must not appear on any support (label, screen, paper, accessible memory, file...). A violation of this rule is a severe security breach and may induce Nagravision into litigation actions.

### 6.5 Checksum algorithm

The following C routine describes the formula used for the computation of the checksum:

```
unsigned char calcChecksum (unsigned long SN)
{
    return ((6*(SN/100000000L)+19*(SN/10000000L%10)+
            8*(SN/10000L%1000)+(SN/100L%100))%23+
            (SN%100))%100;
}
```

## 7. ASCII Table

Decimal	Hex	Binary	Value
00	00	00000000	NUL (Null char.)
32	20	00100000	SP (space)
33	21	00100001	! (exclamation mark)
34	22	00100010	" (double quote)
35	23	00100011	# (number sign)
36	24	00100100	\$ (dollar sign)
37	25	00100101	% (percent)
38	26	00100110	& (ampersand)
39	27	00100111	' (single quote)
40	28	00101000	( (left/opening parenthesis)
41	29	00101001	) (right/closing parenthesis)
42	2A	00101010	* (asterisk)
43	2B	00101011	+ (plus)
44	2C	00101100	, (comma)
45	2D	00101101	- (minus or dash)
46	2E	00101110	. (dot)
47	2F	00101111	/ (forward slash)
48	30	00110000	0
49	31	00110001	1
50	32	00110010	2
51	33	00110011	3
52	34	00110100	4
53	35	00110101	5
54	36	00110110	6
55	37	00110111	7
56	38	00111000	8
57	39	00111001	9
58	3A	00111010	: (colon)
59	3B	00111011	; (semi-colon)
60	3C	00111100	< (less than)
61	3D	00111101	= (equal sign)
62	3E	00111110	> (greater than)
63	3F	00111111	? (question mark)
64	40	01000000	@ (AT symbol)
65	41	01000001	A
66	42	01000010	B
67	43	01000011	C
68	44	01000100	D
69	45	01000101	E
70	46	01000110	F
71	47	01000111	G
72	48	01001000	H

Decimal	Hex	Binary	Value
73	49	01001001	I
74	4A	01001010	J
75	4B	01001011	K
76	4C	01001100	L
77	4D	01001101	M
78	4E	01001110	N
79	4F	01001111	O
80	50	01010000	P
81	51	01010001	Q
82	52	01010010	R
83	53	01010011	S
84	54	01010100	T
85	55	01010101	U
86	56	01010110	V
87	57	01010111	W
88	58	01011000	X
89	59	01011001	Y
90	5A	01011010	Z
91	5B	01011011	[ (left/opening bracket)
92	5C	01011100	\ (back slash)
93	5D	01011101	] (right/closing bracket)
94	5E	01011110	^ (caret/cirumflex)
95	5F	01011111	_ (underscore)
96	60	01100000	`
97	61	01100001	a
98	62	01100010	b
99	63	01100011	c
100	64	01100100	d
101	65	01100101	e
102	66	01100110	f
103	67	01100111	g
104	68	01101000	h
105	69	01101001	i
106	6A	01101010	j
107	6B	01101011	k
108	6C	01101100	l
109	6D	01101101	m
110	6E	01101110	n
111	6F	01101111	o
112	70	01110000	p
113	71	01110001	q
114	72	01110010	r
115	73	01110011	s
116	74	01110100	t
117	75	01110101	u

Decimal	Hex	Binary	Value
118	76	01110110	v
119	77	01110111	w
120	78	01111000	x
121	79	01111001	y
122	7A	01111010	z

Table 7-1: ASCII Table

## 8. Examples

### 8.1 Device\_IO connection establishment

The following example is a network capture of one whole Device\_IO connection process.

```

Packet #1
  Flags:      0x00
  Status:     0x01
  Packet Length: 64
  Timestamp:  18:04:12.473073 10/09/2001
  Ethernet Header
    Destination: 08:00:2B:C5:7E:2A
    Source:      00:C0:F0:3D:7F:9D
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 44
    Identifier: 63087
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 128
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0x82E9
    Source IP Address: 192.168.0.31
    Dest. IP Address: 192.168.0.3
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 1090 ff-fms
    Destination Port: 20000 sms_gateway
    Sequence Number: 55594
    Ack Number: 0
    Offset: 6 (24 bytes)
    Reserved: %000000
    Code: %000010 Synch
    Window: 8192
    Checksum: 0xCB26
    Urgent Pointer: 0
  TCP Options:
    Option Type: 2 Maximum Segment Size
    Length: 4
    MSS: 1460
    TCP Data Area: No more data.
  Extra bytes (Padding): .. 00 00
  FCS - Frame Check Sequence
    FCS (Calculated): 0x5FAFB276
  
```

Listing 8-1: Device\_IO connection



```

Packet #2
  Flags:      0x00
  Status:     0x01
  Packet Length: 64
  Timestamp:  18:04:12.473409 10/09/2001
  Ethernet Header
    Destination: 00:C0:F0:3D:7F:9D
    Source:      08:00:2B:C5:7E:2A
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 44
    Identifier: 56682
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 60
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0xDFEE
    Source IP Address: 192.168.0.3
    Dest. IP Address: 192.168.0.31
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 20000 sms_gateway
    Destination Port: 1090 ff-fms
    Sequence Number: 1524200406
    Ack Number: 55595
    Offset: 6 (24 bytes)
    Reserved: %000000
    Code: %010010 Ack Synch
    Window: 33580
    Checksum: 0x9939
    Urgent Pointer: 0
  TCP Options:
    Option Type: 2 Maximum Segment Size
    Length: 4
    MSS: 1460

    TCP Data Area: No more data.
  Extra bytes (Padding):
    .. 00 00
  FCS - Frame Check Sequence
    FCS (Calculated): 0x36B97026

Packet #3
  Flags:      0x00
  Status:     0x01
  Packet Length: 64
  Timestamp:  18:04:12.473450 10/09/2001
  Ethernet Header
    Destination: 08:00:2B:C5:7E:2A
    Source:      00:C0:F0:3D:7F:9D
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 40
    Identifier: 63343
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 128
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0x81ED
    Source IP Address: 192.168.0.31
    Dest. IP Address: 192.168.0.3
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 1090 ff-fms
    Destination Port: 20000 sms_gateway
    Sequence Number: 55595
    Ack Number: 1524200407
    Offset: 5 (20 bytes)
    Reserved: %000000
    Code: %010000 Ack
    Window: 8760
    Checksum: 0x11EB
    Urgent Pointer: 0
    No TCP Options
    TCP Data Area: No more data.
  Extra bytes (Padding):
    ..... 00 00 00 00 00 00
  FCS - Frame Check Sequence
    FCS (Calculated): 0x62217FDC

```

Listing 8-1 Device\_IO connection (cont.)

```

Packet #4
  Flags:      0x00
  Status:     0x01
  Packet Length: 69
  Timestamp:  18:04:12.485934 10/09/2001
  Ethernet Header
    Destination: 08:00:2B:C5:7E:2A
    Source:      00:C0:F0:3D:7F:9D
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 51
    Identifier: 63599
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 128
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0x80E2
    Source IP Address: 192.168.0.31
    Dest. IP Address: 192.168.0.3
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 1090 ff-fms
    Destination Port: 20000 sms_gateway
    Sequence Number: 55595
    Ack Number: 1524200407
    Offset: 5 (20 bytes)
    Reserved: %000000
    Code: %011000 Ack Push
    Window: 8760
    Checksum: 0xC9C3
    Urgent Pointer: 0
    No TCP Options
  SMSgateway spec. 2.6.2 - decoder v.0.8
  DeviceIO: message_1
    len: 9
    op_mode: 1 Fast data transfer (do not allow tracing)
    ob_name_len: 7
    ob_name: SMS_GWY
  FCS - Frame Check Sequence
    FCS (Calculated): 0xC6762DDA

Packet #5
  Flags:      0x00
  Status:     0x01
  Packet Length: 64
  Timestamp:  18:04:12.486303 10/09/2001
  Ethernet Header
    Destination: 00:C0:F0:3D:7F:9D
    Source:      08:00:2B:C5:7E:2A
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 43
    Identifier: 56683
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 60
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0xDFEE
    Source IP Address: 192.168.0.3
    Dest. IP Address: 192.168.0.31
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 20000 sms_gateway
    Destination Port: 1090 ff-fms
    Sequence Number: 1524200407
    Ack Number: 55606
    Offset: 5 (20 bytes)
    Reserved: %000000
    Code: %011000 Ack Push
    Window: 33580
    Checksum: 0xAADF
    Urgent Pointer: 0
    No TCP Options
  SMSgateway spec. 2.6.2 - decoder v.0.8
  DeviceIO: message_2
    len: 1
    value: 6
  Extra bytes (Padding):
    ... 00 00 00
  FCS - Frame Check Sequence
    FCS (Calculated): 0xBDB648A1

```

Listing 8-1 Device\_IO connection (cont.)

```

Packet #6
  Flags:      0x00
  Status:     0x01
  Packet Length: 64
  Timestamp:  18:04:12.640961 10/09/2001
  Ethernet Header
    Destination: 08:00:2B:C5:7E:2A
    Source:      00:C0:F0:3D:7F:9D
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 40
    Identifier: 63855
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 128
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0x7FED
    Source IP Address: 192.168.0.31
    Dest. IP Address: 192.168.0.3
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 1090 ff-fms
    Destination Port: 20000 sms_gateway
    Sequence Number: 55606
    Ack Number: 1524200410
    Offset: 5 (20 bytes)
    Reserved: %000000
    Code: %010000 Ack
    Window: 8757
    Checksum: 0x11E0
    Urgent Pointer: 0
    No TCP Options
    TCP Data Area: No more data.
  Extra bytes (Padding):
    ..... 00 00 00 00 00 00
  FCS - Frame Check Sequence
    FCS (Calculated): 0xB161CF21

Packet #7
  Flags:      0x00
  Status:     0x01
  Packet Length: 64
  Timestamp:  18:04:12.641152 10/09/2001
  Ethernet Header
    Destination: 00:C0:F0:3D:7F:9D
    Source:      08:00:2B:C5:7E:2A
    Protocol Type: 0x0800 IP
  IP Header - Internet Protocol Datagram
    Version: 4
    Header Length: 5 (20 bytes)
    Type of Service: %00000000
    Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
    Total Length: 43
    Identifier: 56686
    Fragmentation Flags: %010 Do Not Fragment Last Fragment
    Fragment Offset: 0 (0 bytes)
    Time To Live: 60
    Protocol: 6 TCP - Transmission Control Protocol
    Header Checksum: 0xDFEB
    Source IP Address: 192.168.0.3
    Dest. IP Address: 192.168.0.31
    No IP Options
  TCP - Transport Control Protocol
    Source Port: 20000 sms_gateway
    Destination Port: 1090 ff-fms
    Sequence Number: 1524200410
    Ack Number: 55606
    Offset: 5 (20 bytes)
    Reserved: %000000
    Code: %011000 Ack Push
    Window: 33580
    Checksum: 0xB0DC
    Urgent Pointer: 0
    No TCP Options
  SMSgateway spec. 2.6.2 - decoder v.0.8
  DeviceIO: message_3
    len: 1
    value: 0
  Extra bytes (Padding):
    ... 00 00 00
  FCS - Frame Check Sequence
    FCS (Calculated): 0x77CEA603

```

Listing 8-1 Device\_IO connection (cont.)

```

Packet #14
Flags:      0x00
Status:     0x01
Packet Length: 64
Timestamp:  18:04:12.841621 10/09/2001
Ethernet Header
Destination: 08:00:2B:C5:7E:2A
Source:      00:C0:F0:3D:7F:9D
Protocol Type: 0x0800 IP
IP Header - Internet Protocol Datagram
Version:     4
Header Length: 5 (20 bytes)
Type of Service: %00000000
Precedence: Routine, Normal Delay, Normal Throughput, Normal Reliability
Total Length: 40
Identifier:   65135
Fragmentation Flags: %010 Do Not Fragment Last Fragment
Fragment Offset: 0 (0 bytes)
Time To Live: 128
Protocol:     6 TCP - Transmission Control Protocol
Header Checksum: 0x7AED
Source IP Address: 192.168.0.31
Dest. IP Address: 192.168.0.3
No IP Options
TCP - Transport Control Protocol
Source Port: 1090 ff-fms
Destination Port: 20000 sms_gateway
Sequence Number: 55606
Ack Number: 1524200413
Offset: 5 (20 bytes)
Reserved: %000000
Code: %010000 Ack
Window: 8754
Checksum: 0x11E0
Urgent Pointer: 0
No TCP Options
TCP Data Area: No more data.
Extra bytes (Padding):
..... 00 00 00 00 00 00
FCS - Frame Check Sequence
FCS (Calculated): 0x22659BEF

```

Listing 8-1 Device\_IO connection (cont.)

## 8.2 Example of command 52

Raw data:

```

0000: 08 00 2B C5 7E 2A 00 C0 F0 3D 7F 9D 08 00 45 00  ..+.*...ä=...E.
0016: 00 78 29 70 40 00 80 06 4F 9D C0 A8 00 1F C0 A8  .x)p@...0.....
0032: 00 03 04 42 4E 20 00 00 D9 78 5A D9 74 24 50 18  ...BN...x2.t$P.
0048: 21 EB 7B 6B 00 00 00 4E 30 30 30 30 30 30 30 30  !.{k...N00000000
0064: 32 30 31 30 30 30 31 30 30 30 32 30 30 32 35 37  2010001000200257
0080: 32 30 30 31 31 30 30 39 4E 32 30 30 31 31 30 30  20011009N2001100
0096: 39 32 30 30 31 31 30 30 39 55 30 30 30 30 30 30  920011009U0000000
0112: 30 30 30 31 30 30 35 32 31 32 33 34 35 36 37 38  0001005212345678
0128: 39 30 20 20 20 20 00 00 00 00 90 ....

```

Listing 8-2: Example of command 52

Whole network packet, interpreted:



Figure 8-1: Entire network packet

— END OF DOCUMENT —

## Glossary

Term	Definition	Description
ANI	Automatic Number Identification	Also known as caller id
CAS	Conditional Access System	A generic term for a system used in pay television.
CC	Call Collector	This is the sub-system of the CAS managing the callback coming from the STB
DVB	Digital Video Broadcasting	DVB is a family of international standards for all program delivery media: satellite, cable, terrestrial, microwave, MDS, CATV, and SMATV.
EBNF	Extended Backus-Naur Form	A formal mathematical way to describe a language
EMM	Entitlement Management Message	Carries data from the system to one or many smart cards.
ICC	Integrated Circuit Card	Smart card
IPPV	Impulse Pay Per View	A PPV event product, which can be impulsively purchased through the STB and results in the acquisition of the related entitlement needed in the SMART CARD.
ITM	Interactive Transaction Manager	This is the new name of the Call Collector
MOP	Management Operator	The operator who manages end users and entitlements.
NVOD	Near Video On Demand.	
PA	Positive Addressing	
PPV	Pay Per View	
Product	Product	A single or group of services or events that may be purchased as a single entity.
SAS	Subscriber Authorization System	This is the sub-system of the CAS that converts the SMS command to EMM
SMS	Subscriber Management System	
SMSgw	SMS Gateway	SMSgw is an application and an interface described in this document.
SOP	Smart card Operator	The operator who manages the system itself (such as the creation of new MOPs, etc.).
STB	Set-Top Box	The decoder installed at the end user's home
STU	See STB	
UA	Unique Address	This is the id or number of the smart card
UTC	Coordinated Universal Time	Formerly known as GMT (Greenwich mean time).

## Data formats

Format	Description	Samples	Data
hex	Raw hexadecimal value	19 or 13(hex) in 2 bytes 88564006 or 05476126(hex) in 4 bytes	0x00:0x13 0x05:0x47:0x61:0x26
HHMMSS	time hour-min-sec represented in ASCII	102500 (10h25 and 00 sec)	0x31:0x30:0x32:0x35:0x30:0x30
ip_num	human representation of an IP address. The length is fixed to 15 bytes (4 x 3-digit num value separated with dot characters).	As an example the IP address 1.112.25.2 must be formatted as: 001.112.025.002	0x30:0x30:0x31:0x2E:0x31:0x31:0x32:0x2E 0x30:0x32:0x35:0x2E:0x30:0x30:0x32
num	numerical value represented in ASCII.	206	0x32:0x30:0x36
num_x	hexadecimal numerical value represented in ASCII.	6A10F9	0x36:0x3A:0x31:0x30:0x3F:0x39
r_num	numerical value represented in ASCII. The range is restricted.	see num samples	
r_num_x	hexadecimal value represented in ASCII. The range is restricted.	see num_x samples	
r_p_num	numerical value represented in ASCII and padded with space characters. The range is restricted.	see p_num samples	
p_num	numerical value represented in ASCII and padded with space characters.	206__ (the value is a string of 5 digit, 3 significant digit and padded with 2 space characters)	0x32:0x30:0x36:0x20:0x20
r_text	any text represented in ASCII characters. The range is restricted.	N as No Y as Yes	0x4E 0x59
text	any text represented in ASCII characters.	SMS_GWY	0x53:0x4D:0x53:0x5F:0x47:0x57:0x59
YYYYMMDD	date year-month-day represented in ASCII.	20030518 (18 May 2003)	0x32:0x30:0x30:0x33:0x30:0x35:0x31:0x38