



**Digital Video Broadcasting (DVB);
Second Generation Common Interface (CI);
Part 2: Extensions to the CI Plus Specification
(CI Plus 2.0)**

DVB Document A173-2

June 2015



Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology	5
Introduction	5
1 Scope.....	6
2 References	7
2.1 Normative references	7
3 Abbreviations	7
4 Extensions to the Application Information resource	7
4.1 APDU extensions.....	8
4.1.1 Host diagnostic screen APDUs	8
4.1.1.1 HDS request APDU	8
4.1.1.2 HDS confirmation APDU.....	9
4.1.2 Power down APDUs	9
4.1.2.1 Power down notice APDU	9
4.1.2.2 Power down OK APDU	10
5 Extensions to the Content Control (CC) resource	11
5.1 Protocol extensions	11
5.1.1 Usage Rules Information (URI) version 4.....	11
5.1.2 Output control protocol	12
Annex A (normative): Summary of CI Plus resources.....	14
Annex B (normative) Summary of parameters exchanged in APDUs.....	21
Annex (informative): Change History	24
History	25

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Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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The Digital Video Broadcasting Project (DVB) is an industry-led consortium of broadcasters, manufacturers, network operators, software developers, regulatory bodies, content owners and others committed to designing global standards for the delivery of digital television and data services. DVB fosters market driven solutions that meet the needs and economic circumstances of broadcast industry stakeholders and consumers. DVB standards cover all aspects of digital television from transmission through interfacing, conditional access and interactivity for digital video, audio and data. The consortium came together in 1993 to provide global standardization, interoperability and future proof specifications.

The present document is part 2 of a multi-part deliverable covering the Digital Video Broadcasting (DVB); Second Generation Common Interface (CI), as identified below:

- Part 1: "Implementation Using the Universal Serial Bus (USB)";
- **Part 2: "Extensions to the CI Plus Specification".**

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The DVB Common Interface specifications EN 50221 [1] and TS 101 699 [2] describe a system whereby a removable Conditional Access CICAM, given the appropriate rights, unscrambles protected content and routes it back to the Host over the same interface. The DVB Common Interface specifications were extended by the CI Plus specification [3], developed by CI Plus LLP, which provides common methods (i.e. methods that are independent of the up-stream CA system) for mutual authentication of the CICAM and Host, and link encryption over the return interface from the CICAM to the Host. Then DVB defined further extensions to the CI Plus specification with TS 103 205 [4] by adding multi-stream processing, MPEG DASH support, and broadband delivered content.

The present document adds further extensions for enhancing the interaction between CICAM and host, and to enable new ways of controlling content.

1 Scope

The present document specifies additional extensions to the DVB Extensions to the CI Plus Specification TS 103 205 [4].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] CENELEC EN 50221: "Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications".
- [2] ETSI TS 101 699: "Digital Video Broadcasting (DVB); Extensions to the Common Interface Specification".
- [3] CI Plus specification v1.3.1: "Content Security Extensions to the Common Interface".

NOTE: Available from http://www.ci-plus.com/data/ci-plus_specification_v1.3.1.pdf

- [4] ETSI TS 103 205: "Digital Video Broadcasting (DVB); Extensions to the CI Plus Specification"
- [5] High-bandwidth Digital Content Protection System, Interface Independent Adaptation.

NOTE: Available from: http://www.digital-cp.com/hdcp_specifications

- [6] Digital Transmission Content Protection Specification Volume 1 (Informational Version).

NOTE: Available from: <http://www.dtcp.com/specifications.aspx>

3 Abbreviations

For the purposes of the present document, the abbreviations given in [1], [2], [3], [4], and the following apply:

HDS	host diagnostic screen
-----	------------------------

4 Extensions to the Application Information resource

Version 1 of this resource with the resource type 0x00020041 is defined in clause 8.4.2 of EN 50221 [1].

Version 2 of this resource with the resource type 0x00020042 is defined in clause 5 of TS 101 699 [2].

Version 3 of this resource with the resource type 0x00020043 is defined in clause 11.1 of CI Plus [3].

Version 4 of this resource with the resource type 0x00020044 is defined in clause 14.2 of TS 103 205 [4].

The present document defines version 5 of this resource with the resource type 0x00020045. Clause 4.1 defines new APDUs

4.1 APDU extensions

Table 1: Application information resource summary

Name	Resource			Application Object		Direction	
	Resource Identifier	Class	Type	Version	APDU Tag	Tag value	Host CICAM
Application Information	00 02 00 45	2	1	5	application_info_enq	9F 80 20	➤
					application_info	9F 80 21	◀
					enter_menu	9F 80 22	➤
					request_CICAM_reset	9F 80 23	◀
					data_rate_info	9F 80 24	➤
					enter_cicam_channel	9F 80 25	➤
					hds_request	9F 80 26	◀
					hds_confirm	9F 80 27	➤
					power_down_notice	9F 80 28	➤
power_down_ok	9F 80 29	◀					

4.1.1 Host diagnostic screen APDUs

The Host Diagnostic Screen APDUs are used to request the host to display a diagnostic screen about itself to the viewer. This information can be useful to the viewer when troubleshooting viewing of controlled content, for example by reading the information to a customer support agent on the phone. Since not all hosts implement a diagnostic screen, or it may not be possible for the host to display it at all times, a status confirmation is defined to inform the CICAM about the action performed.

4.1.1.1 HDS request APDU

Table 2: hds_request APDU syntax

Syntax	No. of bits	Mnemonic
<pre>hds_request() { hds_req_tag length_field() reserved_future_use hds_command }</pre>	24 variable 7 1	uimbsf [1] clause 7 bslbf uimbsf

hds_req_tag: This 24-bit field indicates the type of APDU message, and shall be coded according to Table 1.

hds_command: This 1-bit field indicates the requested action. It shall be coded according to Table 3.

Table 3: hds_command coding

hds_command	Description
0	Display a diagnostic screen
1	Stop displaying any diagnostic screen

4.1.1.2 HDS confirmation APDU

Table 4: hds_confirm APDU syntax

Syntax	No. of bits	Mnemonic
<pre> hds_confirm() { hds_cnf_tag length_field() reserved_future_use hds_status } </pre>	24 variable 6 2	uimbsf [1] clause 7 bslbf uimbsf

hds_cnf_tag: This 24-bit field indicates the type of APDU message, and shall be coded according to Table 1.

hds_status: This 2-bit field indicates the current state of the diagnostic screen. It shall be coded according to Table 5.

Table 5: hds_status coding

hds_status	Description
0	The host is showing a diagnostic screen
1	The host is not showing a diagnostic screen
2	The host does not implement a diagnostic screen
3	reserved for future use

This means that after a successful `hds_request` with `hds_command=0`, the host shall send a `hds_confirm` with `hds_status=0`, and that after a successful `hds_request` with `hds_command=1`, the host shall send a `hds_confirm` with `hds_status=1`.

When the user terminates the display of the diagnostic screen, the host shall send this APDU to the CICAM with the `hds_status` set to 1.

4.1.2 Power down APDUs

The `power_down_notice` APDU is used to announce to the CICAM that the host intends to remove power from the CICAM soon. The CICAM is given a grace period. If the CICAM does not wish to use the grace period, it can inform the host by using the `power_down_ok` APDU so that power can be removed immediately.

4.1.2.1 Power down notice APDU

This APDU shall be sent by the host before entering a power mode where the CICAM will be powered down. Host shall give a minimum of 30 seconds notice before powering down the

CICAM. This is allowing the CICAM to perform operations which should not be delayed like e.g. a firmware update or a channel map update.

During the 30 second period, the CICAM may request sessions with resources. Unless a session is open with a resource whose definition provides for preventing the host from powering off the CICAM, the CICAM will unconditionally be powered off at the end of the 30 second period.

Since the Host may already be in the process of entering a standby mode when sending this APDU, the CICAM can not expect to be able to interact with the user after this message. Requests to open a session to any MMI resources may hence result in “resource busy” responses during the grace period.

The scheduled entitlement update already implies a 30 second period at the end of the operation (see clause 14.7.4.4.3 of CI Plus [3]). Hence, the CICAM shall not rely on receiving a power down notice APDU during that operation.

Since it may not always be possible for the host to give the CICAM an early notice of being powered down (e.g. when mains power of the host is unplugged), or there may be situations in which the host powers down the CICAM without changing its own power mode (e.g. when resetting the CICAM), the CICAM shall expect to be powered down at any time without prior notice.

Table 6: power_down_notice APDU syntax

Syntax	No. of bits	Mnemonic
<pre>power_down_notice() { power_down_notice_tag length_field() }</pre>	24 variable	uimsbf

power_down_notice_tag: This 24-bit field indicates the type of APDU message, and shall be coded according to Table 1.

4.1.2.2 Power down OK APDU

This APDU shall be sent by the CICAM after receiving a power_down_notice APDU to signal the host that CICAM does not have any more pending operation to perform and that the host may power it down immediately. This message should be sent as early as possible to reduce power consumption of the system.

Table 7: power_down_ok APDU syntax

Syntax	No. of bits	Mnemonic
<pre>power_down_ok() { power_down_ok_tag length_field() }</pre>	24 variable	uimsbf

power_down_ok_tag: This 24-bit field indicates the type of APDU message, and shall be coded according to Table 1.

5 Extensions to the Content Control (CC) resource

Version 1 of this resource with the resource type 0x008C1001 is defined in clause 11.3 of CI Plus [3].

Version 2 of this resource with the resource type 0x008C1002 is defined in clause 11.3 of CI Plus [3].

Version 3 of this resource with the resource type 0x008C1003 is defined in clause 11 of TS 103 205 [4].

Clause 6.4.3 of TS 103 205 [4] further extends this resource by defining a new resource type of 0x008C1041 and 0x008C1003.

The present document defines version 2 of this resource with the resource type 0x008C1042 for multi stream, and version 4 of this resource with the resource type 0x008C1004 for single stream. Clause 5.1 defines new messages for the SAC.

5.1 Protocol extensions

5.1.1 Usage Rules Information (URI) version 4

Versions 1 and 2 of this message are defined in clause 5.7.1 of CI Plus [3]. Version 3 of this message is defined in clause 11 of TS 103 205 [4]. The present document specifies an extension to the CI Plus Usage Rules Information (URI) by defining version 4 of the CI Plus URI.

Table 8: URI version 4 message syntax

Syntax	No. of bits	Mnemonic
uri_message() {		
protocol_version	8	uimsbf
aps_copy_control_info	2	uimsbf
emi_copy_control_info	2	uimsbf
ict_copy_control_info	1	uimsbf
if (emi_copy_control_info == 00) {		
rct_copy_control_info	1	uimsbf
}		
else {		
reserved = 0	1	bslbf
}		
reserved_future_use	1	bslbf
if (emi_copy_control_info == 11		
emi_copy_control_info == 10) {		
dot_copy_control_info	1	uimsbf
else {		
reserved = 0	1	bslbf
}		
if (emi_copy_control_info == 11) {		
rl_copy_control_info	10	uimsbf
}		
else {		
reserved = 0	10	bslbf
}		
if (emi_copy_control_info == 10) {		
trick_mode_control_info	1	uimsbf
}		
else {		
reserved = 0	1	bslbf
}		
reserved_future_use	37	bslbf
}		

protocol_version: This 8-bit field indicates the version of the URI definition. It shall be set to 0x04. A device made according to this version of the CI Plus specification shall understand values 0x01 to 0x04, and ignore URI messages that have a protocol_version value that it does not support.

aps_copy_control_info: This 2-bit field shall be coded according to clause 5.7.5.3 of CI Plus [3].

emi_copy_control_info: This 2-bit field shall be coded according to clause 5.7.5.3 of CI Plus [3].

ict_copy_control_info: This 1-bit field shall be coded according to clause 5.7.5.3 of CI Plus [3].

rct_copy_control_info: This 1-bit field shall be coded according to clause 5.7.5.3 of CI Plus [3].

dot_copy_control_info: This 1-bit field shall be coded according to clause 5.7.5.3 of CI Plus [3].

rl_copy_control_info: This 10-bit field describes the retention limit of the recording and/or time-shift of content from the time that it is retained. It shall be coded according to Table 9.

Table 9: rl_copy_control_info coding

rl_copy_control_info	Description
0x000	90 minutes
0x001	6 hours
0x002	12 hours
0x003 to 0x3FE	1 to 1 020 units of 24 hours
0x3FF	unlimited

EXAMPLE: A rl_copy_control_info value of 0x3FE indicates a retention limit of 1 020 units of 24 hours, totalling 24 480 hours, or 2 years and 290 days.

trick_mode_control_info: This 1-bit field shall be coded according to clause 11 of TS 103 205 [4].

5.1.2 Output control protocol

Table 10 shows the output control protocol for use with version 2 of this resource with the resource type 0x008C1042 for multi stream. The output_num parameter indicates the number of simultaneous outputs of different CI Plus controlled content received from a CICAM, which the host is allowed to output to client devices via trusted protection systems.

Table 10: Output control protocol

Step	Action	APDU	Content		
1	CICAM informs the host about allowed number of outputs	cc_sac_data_req	send_datatype_nbr=1		
			index	datatype_id	datatype_len
			0	51 (output_num)	8 bits
			request_datatype_nbr=1		
2	Host sends acknowledgement to the CICAM	cc_sac_data_cnf	index	datatype_id	
			0	51 (output_num)	
2	Host sends acknowledgement to the CICAM	cc_sac_data_cnf	send_datatype_nbr=1		
			index	datatype_id	datatype_len
			0	51 (output_num)	8 bits

The CICAM shall wait for the acknowledgement from the Host before sending any further Output Control protocol message. The CICAM may only run this protocol at power-up after the URI version negotiation, and only again when the number of permitted outputs has actually changed, i.e. when the output_num parameter has a different value than in the last Output Control protocol message from the CICAM that the host has acknowledged.

Upon receiving an Output Control protocol message from the CICAM, the host shall apply the new limit as soon as possible. To acknowledge that the new limit is in effect, the host shall send a confirmation Output Control protocol message with the `output_num` parameter set to the new limit value.

Until the CICAM runs this protocol for the first time, no restriction on the number of additional outputs is implied for the host.

NOTE: This default behaviour is identical with prior versions of this resource, which did not impose any limit.

NOTE: To preserve the output control state per CICAM after the protocol has been run for the first time, the host may need to persistently store it across power cycles, removal of the CICAM, and similar events for as long as recordings made with a particular CICAM are available.

The following rules shall apply:

- a) Host internal rendering of a single CI Plus controlled content shall always be possible, and shall not count as an output. The output of the same CI Plus controlled content that the host is internally rendering shall also not count as an output.

NOTE: On a host device with no integrated display, as for example a set-top box, the content sent on the connection to the display device (for example via HDMI to a TV set), is considered as internal rendering.

- b) Host internal rendering of additional CI Plus controlled content as picture-in-picture shall always be possible, and shall not count as an output.
- c) Host internal and host controlled recordings (according to URI settings) shall always be possible and shall not count as an output. Host internal rendering of a single CI Plus protected recording shall not count as an output.
- d) Playback of CI Plus protected recordings without internal rendering shall count as an output.

The following examples illustrate some of the above rules.

EXAMPLE: A TV set is receiving CI Plus controlled broadcast services. It is also connected via the in-home network to a tablet device that implements a trusted protection system. If the `output_num` parameter is set to zero, the TV set may only output to the tablet the CI Plus controlled content it is displaying. If the `output_num` parameter is set to one, the TV set may output to the tablet a different CI Plus controlled service that is not currently displaying on the TV.

EXAMPLE: Extending from the previous example, if the `output_num` parameter is set to zero, but two tablet devices that implements a trusted protection system are connected to the TV set via the in-home network, the TV set may output to both tablets the CI Plus controlled content it is displaying.

Annex A (normative): Summary of CI Plus resources

Table A.1 summarizes the complete set of resources for the present document, consisting of resources defined in previous specifications, and the new resources and resource types that are defined in the present document.

Table A.1: Summary of CI Plus resources

Name	Resource				Application Object		Direction	Defined in
	Resource Identifier	Class	Type	Version	APDU Tag	Tag value		
Resource Manager	00 01 00 41	1	1	1	profile_enq profile profile_change	9F 80 10 9F 80 11 9F 80 12	◀ ▶ ◀ ▶ ◀ ▶	EN 50221 [1] clause 8.4.1
	00 01 00 42	1	1	2	profile_enq profile profile_change CICAM_id_send CICAM_id_command	9F 80 10 9F 80 11 9F 80 12 9F 80 13 9F 80 14	◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶	TS 101 699 [2] clause 4.2.1
Application Information	00 02 00 41	2	1	1	application_info_enq application_info enter_menu	9F 80 20 9F 80 21 9F 80 22	▶ ◀ ▶	EN 50221 [1] clause 8.4.2
	00 02 00 42	2	1	2	application_info_enq application_info enter_menu	9F 80 20 9F 80 21 9F 80 22	▶ ◀ ▶	TS 101 699 [2] clause 5.1
	00 02 00 43	2	1	3	application_info_enq application_info enter_menu request_CICAM_reset data_rate_info	9F 80 20 9F 80 21 9F 80 22 9F 80 23 9F 80 24	▶ ◀ ▶ ◀ ▶	CI Plus [3] clause 11.1
	00 02 00 44	2	1	4	application_info_enq application_info enter_menu request_CICAM_reset data_rate_info enter_cicam_channel	9F 80 20 9F 80 21 9F 80 22 9F 80 23 9F 80 24 9F 80 25	▶ ◀ ▶ ◀ ▶ ▶	TS 103 205 [4] clause 14.2
	00 02 00 45	2	1	5	application_info_enq application_info enter_menu request_CICAM_reset data_rate_info enter_cicam_channel hds_request hds_confirm power_down_notice power_down_ok	9F 80 20 9F 80 21 9F 80 22 9F 80 23 9F 80 24 9F 80 25 9F 80 26 9F 80 27 9F 80 28 9F 80 29	▶ ◀ ▶ ◀ ▶ ▶ ◀ ▶ ▶ ◀	clause 4.1
Conditional Access Support	00 03 00 41	3	1	1	ca_info_enq ca_info ca_pmt ca_pmt_reply	9F 80 30 9F 80 31 9F 80 32 9F 80 33	▶ ◀ ▶ ◀	EN 50221 [1] clause 8.4.3
	00 03 00 81	3	2	1	ca_info_enq ca_info ca_pmt ca_pmt_reply	9F 80 30 9F 80 31 9F 80 32 9F 80 33	▶ ◀ ▶ ◀	TS 103 205 [4] clause 6.4.4
Host Control	00 20 00 41	32	1	1	tune replace clear_replace ask_release	9F 84 00 9F 84 01 9F 84 02 9F 84 03	◀ ◀ ◀ ▶	EN 50221 [1] clause 8.5.1
	00 20 00 42	32	1	2	tune replace clear_replace ask_release tune_broadcast_req tune_reply ask_release_reply	9F 84 00 9F 84 01 9F 84 02 9F 84 03 9F 84 04 9F 84 05 9F 84 06	◀ ◀ ◀ ▶ ◀ ▶ ◀	CI Plus [3] clause 14.6
	00 20 00 43	32	1	3	tune replace clear_replace ask_release	9F 84 00 9F 84 01 9F 84 02 9F 84 03	◀ ◀ ◀ ▶	TS 103 205 [4] clause 13

Name	Resource				Application Object		Direction	Defined in
	Resource Identifier	Class	Type	Version	APDU Tag	Tag value		
					tune_broadcast_req tune_reply ask_release_reply tune_lcn_req tune_ip_req tune_triplet_req tune_status_req tune_status_reply	9F 84 04 9F 84 05 9F 84 06 9F 84 07 9F 84 08 9F 84 09 9F 84 0A 9F 84 0B	◀ ▶ ◀ ◀ ◀ ◀ ◀ ▶	
	00 20 00 81	32	2	1	tune replace clear_replace ask_release tune_broadcast_req tune_reply ask_release_reply tune_lcn_req tune_ip_req tune_triplet_req tune_status_req tune_status_reply	9F 84 00 9F 84 01 9F 84 02 9F 84 03 9F 84 04 9F 84 05 9F 84 06 9F 84 07 9F 84 08 9F 84 09 9F 84 0A 9F 84 0B	◀ ◀ ◀ ▶ ▶ ◀ ◀ ◀ ◀ ◀ ◀ ▶	TS 103 205 [4] clause 6.4.5
Date and Time	00 24 00 41	36	1	1	date_time_enq date_time	9F 84 40 9F 84 41	◀ ▶	EN 50221 [1] clause 8.5.2
High-Level Man-Machine Interface	00 40 00 41	64	1	1	close_mmi display_control display_reply text_last text_more keypad_control keypress enq answ menu_last menu_more menu_answ list_last list_more subtitle_segment_last subtitle_segment_more display_message scene_end_mark scene_done scene_control subtitle_download_last subtitle_download_more flush_download download_reply	9F 88 00 9F 88 01 9F 88 02 9F 88 03 9F 88 04 9F 88 05 9F 88 06 9F 88 07 9F 88 08 9F 88 09 9F 88 0A 9F 88 0B 9F 88 0C 9F 88 0D 9F 88 0E 9F 88 0F 9F 88 10 9F 88 11 9F 88 12 9F 88 13 9F 88 14 9F 88 15 9F 88 16 9F 88 17	▶ ◀ ▶ ◀ ◀ ◀ ▶ ◀ ▶ ◀ ◀ ▶ ◀ ◀ ◀ ▶ ◀ ◀ ◀ ▶ ▶ ◀ ▶ ◀ ◀	EN 50221 [1] clause 8.6
	00 40 00 81	64	2	1	close_mmi display_control display_reply enq answ menu_last menu_more menu_answ list_last list_more	9F 88 00 9F 88 01 9F 88 02 9F 88 07 9F 88 08 9F 88 09 9F 88 0A 9F 88 0B 9F 88 0C 9F 88 0D	▶ ◀ ▶ ◀ ▶ ◀ ◀ ▶ ◀ ◀	TS 103 205 [4] clause 6.4.7
Low Speed Communications	00 60 xx x1	96	x	1	comms_cmd connection_descriptor comms_reply comms_send_last	9F 8C 00 9F 8C 01 9F 8C 02 9F 8C 03	◀ ◀ ▶ ◀	EN 50221 [1] clause 8.7.1

Name	Resource				Application Object		Direction		Defined in
	Resource Identifier	Class	Type	Version	APDU Tag	Tag value	Host	CICAM	
					comms_send_more comms_rcv_last comms_rcv_more	9F 8C 04 9F 8C 05 9F 8C 06	◀ ▶ ▶		
	00 60 xx x2	96	x	2	comms_cmd connection_descriptor comms_reply comms_send_last comms_send_more comms_rcv_last comms_rcv_more	9F 8C 00 9F 8C 01 9F 8C 02 9F 8C 03 9F 8C 04 9F 8C 05 9F 8C 06	◀ ◀ ▶ ◀ ◀ ▶ ▶		CI Plus [3] clause 14.2
	00 60 xx x3	96	x	3	comms_cmd connection_descriptor comms_reply comms_send_last comms_send_more comms_rcv_last comms_rcv_more	9F 8C 00 9F 8C 01 9F 8C 02 9F 8C 03 9F 8C 04 9F 8C 05 9F 8C 06	◀ ◀ ▶ ◀ ◀ ▶ ▶		CI Plus [3] clause 14.1
	00 60 xx x4	96	x	4	comms_cmd connection_descriptor comms_reply comms_send_last comms_send_more comms_rcv_last comms_rcv_more comms_info_req comms_info_reply comms_IP_config_req comms_IP_config_reply	9F 8C 00 9F 8C 01 9F 8C 02 9F 8C 03 9F 8C 04 9F 8C 05 9F 8C 06 9F 8C 07 9F 8C 08 9F 8C 09 9F 8C 0A	◀ ◀ ▶ ◀ ◀ ▶ ▶ ◀ ▶ ◀ ▶ ▶		TS 103 205 [4] clause 6.4.7
Content Control	00 8C 10 01	140	64	1	cc_open_req cc_open_cnf cc_data_req cc_data_cnf cc_sync_req cc_sync_cnf cc_sac_data_req cc_sac_data_cnf cc_sac_sync_req cc_sac_sync_cnf	9F 90 01 9F 90 02 9F 90 03 9F 90 04 9F 90 05 9F 90 06 9F 90 07 9F 90 08 9F 90 09 9F 90 10	◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶		CI Plus [3] clause 11.3
	00 8C 10 02	140	64	2	cc_open_req cc_open_cnf cc_data_req cc_data_cnf cc_sync_req cc_sync_cnf cc_sac_data_req cc_sac_data_cnf cc_sac_sync_req cc_sac_sync_cnf cc_PIN_capabilities_req cc_PIN_capabilities_reply cc_PIN_cmd cc_PIN_reply cc_PIN_event cc_PIN_playback cc_PIN_MMI_req	9F 90 01 9F 90 02 9F 90 03 9F 90 04 9F 90 05 9F 90 06 9F 90 07 9F 90 08 9F 90 09 9F 90 10 9F 90 11 9F 90 12 9F 90 13 9F 90 14 9F 90 15 9F 90 16 9F 90 17	◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶ ◀ ▶ ▶		CI Plus [3] clause 11.3
	00 8C 10 03	140	64	3	cc_open_req cc_open_cnf cc_data_req cc_data_cnf cc_sync_req	9F 90 01 9F 90 02 9F 90 03 9F 90 04 9F 90 05	◀ ▶ ◀ ▶ ◀		TS 103 205 [4] clause 11

Name	Resource				Application Object		Host	Direction	Defined in
	Resource Identifier	Class	Type	Version	APDU Tag	Tag value			
					cc_sync_cnf cc_sac_data_req cc_sac_data_cnf cc_sac_sync_req cc_sac_sync_cnf cc_PIN_capabilities_req cc_PIN_capabilities_reply cc_PIN_cmd cc_PIN_reply cc_PIN_event cc_PIN_playback cc_PIN_MMI_req	9F 90 06 9F 90 07 9F 90 08 9F 90 09 9F 90 10 9F 90 11 9F 90 12 9F 90 13 9F 90 14 9F 90 15 9F 90 16 9F 90 17	< > > < > > < > < < > >		
	00 8C 10 04	140	64	4	cc_open_req cc_open_cnf cc_data_req cc_data_cnf cc_sync_req cc_sync_cnf cc_sac_data_req cc_sac_data_cnf cc_sac_sync_req cc_sac_sync_cnf cc_PIN_capabilities_req cc_PIN_capabilities_reply cc_PIN_cmd cc_PIN_reply cc_PIN_event cc_PIN_playback cc_PIN_MMI_req	9F 90 01 9F 90 02 9F 90 03 9F 90 04 9F 90 05 9F 90 06 9F 90 07 9F 90 08 9F 90 09 9F 90 10 9F 90 11 9F 90 12 9F 90 13 9F 90 14 9F 90 15 9F 90 16 9F 90 17	< > < > < > < > < > > < > < < > >	clause 5.1	
	00 8C 10 41	140	65	1	cc_open_req cc_open_cnf cc_data_req cc_data_cnf cc_sync_req cc_sync_cnf cc_sac_data_req cc_sac_data_cnf cc_sac_sync_req cc_sac_sync_cnf cc_PIN_capabilities_req cc_PIN_capabilities_reply cc_PIN_cmd cc_PIN_reply cc_PIN_event cc_PIN_playback cc_PIN_MMI_req	9F 90 01 9F 90 02 9F 90 03 9F 90 04 9F 90 05 9F 90 06 9F 90 07 9F 90 08 9F 90 09 9F 90 10 9F 90 11 9F 90 12 9F 90 13 9F 90 14 9F 90 15 9F 90 16 9F 90 17	< > < > < > < > < > > < > < < > >	TS 103 205 [4] clause 6.4.3	
	00 8C 10 42	140	65	2	cc_open_req cc_open_cnf cc_data_req cc_data_cnf cc_sync_req cc_sync_cnf cc_sac_data_req cc_sac_data_cnf cc_sac_sync_req cc_sac_sync_cnf cc_PIN_capabilities_req cc_PIN_capabilities_reply cc_PIN_cmd cc_PIN_reply cc_PIN_event	9F 90 01 9F 90 02 9F 90 03 9F 90 04 9F 90 05 9F 90 06 9F 90 07 9F 90 08 9F 90 09 9F 90 10 9F 90 11 9F 90 12 9F 90 13 9F 90 14 9F 90 15	< > < > < > < > < > > < > < <	clause 5	

Resource					Application Object		Direction	Defined in
Name	Resource Identifier	Class	Type	Version	APDU Tag	Tag value	Host CICAM	
					cc_PIN_playback cc_PIN_MMI_req	9F 90 16 9F 90 17	➤ ➤	
Host Language and Country	00 8D 10 01	141	64	1	Host_country_enq Host_country Host_language_enq Host_language	9F 81 00 9F 81 01 9F 81 10 9F 81 11	◀ ➤ ◀ ➤	CI Plus [3] clause 11.2
CAM_Upgrade	00 8E 10 01	142	64	1	cicam_firmware_upgrade cicam_firmware_upgrade_reply cicam_firmware_upgrade_progress cicam_firmware_upgrade_complete	9F 9D 01 9F 9D 02 9F 9D 03 9F 9D 04	◀ ➤ ◀ ◀	CI Plus [3] clause 14.3.5
Operator Profile	00 8F 10 01	143	64	1	operator_status_req operator_status operator_nit_req operator_nit operator_info_req operator_info operator_search_start operator_search_status operator_exit operator_tune operator_tune_status operator_entitlement_ack operator_search_cancel	9F 9C 00 9F 9C 01 9F 9C 02 9F 9C 03 9F 9C 04 9F 9C 05 9F 9C 06 9F 9C 07 9F 9C 08 9F 9C 09 9F 9C 0A 9F 9C 0B 9F 9C 0C	➤ ◀ ➤ ◀ ➤ ◀ ➤ ◀ ➤ ◀ ➤ ➤ ➤	CI Plus [3] clause 14.7.5
	00 8F 10 02	143	64	2	operator_status_req operator_status operator_nit_req operator_nit operator_info_req operator_info operator_search_start operator_search_status operator_exit operator_tune operator_tune_status operator_entitlement_ack operator_search_cancel operator_osdt_request operator_osdt_reply operator_nit_management	9F 9C 00 9F 9C 01 9F 9C 02 9F 9C 03 9F 9C 04 9F 9C 05 9F 9C 06 9F 9C 07 9F 9C 08 9F 9C 09 9F 9C 0A 9F 9C 0B 9F 9C 0C 9F 9C 0D 9F 9C 0E 9F 9C 0F	➤ ◀ ➤ ◀ ➤ ◀ ➤ ◀ ➤ ◀ ➤ ➤ ➤ ➤ ◀ ➤	TS 103 205 [4] clause 15
Specific Application Support	00 96 10 01	150	64	1	SAS_connect_rqst SAS_connect_cnf SAS_data_rqst (see note) SAS_data_av (see note) SAS_data_cnf (see note) SAS_server_query (see note) SAS_server_reply (see note) SAS_async_msg	9F 9A 00 9F 9A 01 9F 9A 02 9F 9A 03 9F 9A 04 9F 9A 05 9F 9A 06 9F 9A 07	➤ ◀ ◀ ◀ ◀ ◀ ◀ ◀	CI Plus [3] clause 11.4
Application MMI	00 41 00 41	65	1	1	RequestStart RequestStartAck FileRequest FileAcknowledge AppAbortRequest AppAbortAck	9F 80 00 9F 80 01 9F 80 02 9F 80 03 9F 80 04 9F 80 05	◀ ➤ ➤ ◀ ◀ ◀	TS 101 699 [2] clause 6.5
	00 41 00 42	65	1	2	RequestStart RequestStartAck FileRequest FileAcknowledge AppAbortRequest AppAbortAck	9F 80 00 9F 80 01 9F 80 02 9F 80 03 9F 80 04 9F 80 05	◀ ➤ ➤ ◀ ◀ ◀	CI Plus [3] clause 14.5
	00 41 00 43	65	1	3	RequestStart	9F 80 00	◀	TS 103 205 [4]

Name	Resource				Application Object		Direction		Defined in
	Resource Identifier	Class	Type	Version	APDU Tag	Tag value	Host	CICAM	
					RequestStartAck	9F 80 01		➤	clause 12.3
					FileRequest	9F 80 02		➤	
					FileAcknowledge	9F 80 03	◀		
					AppAbortRequest	9F 80 04	◀	➤	
					AppAbortAck	9F 80 05	◀	➤	
	00 41 00 81	65	2	1	RequestStart	9F 80 00	◀		TS 103 205 [4] clause 6.4.6
					RequestStartAck	9F 80 01		➤	
					FileRequest	9F 80 02		➤	
					FileAcknowledge	9F 80 03	◀		
					AppAbortRequest	9F 80 04	◀	➤	
					AppAbortAck	9F 80 05	◀	➤	
Multistream	00 90 00 41	144	1	1	CICAM_multistream_capability	9F 92 00	◀	➤	TS 103 205 [4] clause 6.4.2
					PID_select_req	9F 92 01	◀	➤	
					PID_select_reply	9F 92 02	◀	➤	
Auxiliary File System	00 91 00 41	145	1	1	FileSystemOffer	9F 94 00	◀		TS 103 205 [4] clause 9.6
					FileSystemAck	9F 94 01		➤	
					FileRequest	9F 94 02		➤	
					FileAcknowledge	9F 94 03	◀		
Sample Decryption	00 92 00 41	146	1	1	sd_info_req	9F 98 00		➤	TS 103 205 [4] clause 7.4
					sd_info_reply	9F 98 01	◀		
					sd_start	9F 98 02		➤	
					sd_start_reply	9F 98 03	◀		
					sd_update	9F 98 04		➤	
					sd_update_reply	9F 98 05	◀		
CICAM Player	00 93 00 41	147	1	1	CICAM_player_verify_req	9F A0 00		➤	TS 103 205 [4] clause 8.8
					CICAM_player_verify_reply	9F A0 01	◀		
					CICAM_player_capabilities_req	9F A0 02	◀		
					CICAM_player_capabilities_reply	9F A0 03		➤	
					CICAM_player_start_req	9F A0 04		➤	
					CICAM_player_start_reply	9F A0 05		➤	
					CICAM_player_play_req	9F A0 06		➤	
					CICAM_player_status_error	9F A0 07	◀		
					CICAM_player_control_req	9F A0 08		➤	
					CICAM_player_info_req	9F A0 09		➤	
					CICAM_player_info_reply	9F A0 0A	◀		
					CICAM_player_stop	9F A0 0B		➤	
					CICAM_player_session_end	9F A0 0C	◀		
					CICAM_player_asset_end	9F A0 0D	◀		

NOTE: These synchronous SAS APDUs are not used by the present document.

Annex B (normative)

Summary of parameters exchanged in APDUs

Table B.1 summarizes the complete set of APDU parameters for the present document, consisting of parameters defined in previous specifications, and the new parameters and parameter types that are defined in the present document.

Table B.1: Summary of APDU parameters

datatype_id	Key or variable	No. of bits	Description	Defined in
0			Reserved for future use	
1			Reserved for future use	
2			Reserved for future use	
3			Reserved for future use	
4			Reserved for future use	
5	HOST_ID	64	Generated by the ROT and included in the X.509 certificate.	CI Plus [3] clause 6.2.3.4
6	CICAM_ID	64	Generated by the ROT and included in the X.509 certificate	CI Plus [3] clause 6.2.3.4
7	Host_BrandCert	variable	Host Brand Certificate	CI Plus [3] clause 9
8	CICAM_BrandCert	variable	CICAM Brand Certificate	CI Plus [3] clause 9
9			Reserved for future use	
10			Reserved for future use	
11			Reserved for future use	
12	Kp	256	CICAM's key precursor to Host for CCK	CI Plus [3] clause 8.1.4, CI Plus [3] annex A
13	DHPH	2048	DH Public Key of the Host	CI Plus [3] clause 6.2.3.2
14	DHPM	2048	DH Public Key of the CICAM	CI Plus [3] clause 6.2.3.2
15	Host_DevCert	variable	Host Device Certificate Data	CI Plus [3] clause 9
16	CICAM_DevCert	variable	CICAM Device Certificate Data	CI Plus [3] clause 9
17	Signature_A	2048	The signature of Host DH public key	CI Plus [3] annex I
18	Signature_B	2048	The signature of CICAM DH public key	CI Plus [3] annex I
19	auth_nonce	256	Random nonce of 256 bits generated by the CICAM and transmitted by the CICAM to the Host for use in the authentication protocol	CI Plus [3] annex A
20	Ns_Host	64	Host's challenge to CICAM for SAC	CI Plus [3] clause 7.1.3, CI Plus [3] annex A
21	Ns_CICAM	64	CICAM's challenge to Host for SAC	CI Plus [3] clause 7.1.3, CI Plus [3] annex A
22	AKH	256	Authentication Key Host	CI Plus [3] clause 6.2.3.4
23	AKM	256	Authentication Key Module/CICAM	CI Plus [3] clause 6.2.3.4
24			Reserved for future use	
25	uri_message	64	Data message carrying the Usage Rules Information	CI Plus [3] clause 5.7.5.2, TS 103 205 [4] clause 11, clause 5.1.1
26	program_number	16	MPEG program number	EN 50221 [1] clause 8.4.3.4
27	uri_confirm	256	Hash on the data confirmed by the Host	CI Plus [3] clause 5.7.5
28	key register	8	Selection of the odd (1) or even (0) key register in the descrambler	CI Plus [3] clause 5.6.1
29	uri_versions	256	Bitmask expressing the URI versions that can be supported by the Host. Format is uimbf	CI Plus [3] clause 11.3.3.7
30	status_field	8	Status field in APDU confirm messages	
31	srm_data	variable	SRM for HDCP [5] (note 1)	CI Plus [3] clause 5.13, CI Plus [3] clause 11.3.5
32	srm_confirm	256	Hash on the data confirmed by the Host	CI Plus [3] clause 5.13, CI Plus [3] clause 11.3.5
33	cicam_license	variable	Licence from CICAM associated with content (note 2)	CI Plus [3] clause 11.3.4, TS 103 205 [4] clause 6.4.3.3.5
34	license_status	8	Current status of the content licence	CI Plus [3] clause 11.3.4, TS 103 205 [4] clause 6.4.3.3.5
35	license_rcvd_status	8	Status from the exchange of content licence	CI Plus [3] clause 11.3.4, TS 103 205 [4] clause 6.4.3.3.5
36	Host_license	variable	Licence for which the Host requires current status. (note 2)	CI Plus [3] clause 11.3.4

datatype_id	Key or variable	No. of bits	Description	Defined in
37	play_count	8	Remaining Play Count	CI Plus [3] clause 5.10.3
38	operating_mode	8	Record operating mode	CI Plus [3] clause 11.3.4.4
39	PINcode data	variable	CICAM PIN code one byte for each pin code digit	CI Plus [3] clause 11.3.4.4
40	record_start_status	8	CICAM status after a record_start protocol	CI Plus [3] clause 11.3.4.4, TS 103 205 [4] clause 6.4.3.3.2
41	mode_change_status	8	CICAM status after a change operating mode protocol	CI Plus [3] clause 11.3.4.5, TS 103 205 [4] clause 6.4.3.3.4
42	record_stop_status	8	CICAM status after a record_stop protocol	CI Plus [3] clause 11.3.4.6, TS 103 205 [4] clause 6.4.3.3.3
43	srm_data_dtcp	variable	SRM for DTCP [6] (see note 3)	CI Plus [3] clause 5.13, CI Plus [3] clause 11.3.5
44			Reserved for future use	
45			Reserved for future use	
46			Reserved for future use	
47			Reserved for future use	
48			Reserved for future use	
49			Reserved for future use	
50	LTS_id	8	Local Transport Stream identifier	TS 103 205 [4] clause 6.2.1 TS 103 205 [4] clause 6.4.3.3
51	output_num	8	number of additional, simultaneous outputs of CI Plus controlled content to client devices	clause 5.1.2
52 to 255			Reserved for future use	
NOTE 1: SRMs for HDCP are defined in the HDCP specification [5]. First generation SRMs do not exceed 5 kilobytes.				
NOTE 2: Licenses are not zero length, and are be padded to the next byte boundary. Licenses are no larger than 1 024 bytes.				
NOTE 3: SRMs for DTCP are defined in the DTCP specification [6]. First generation SRMs do not exceed 5 kilobytes.				

Annex (informative): Change History

Date	Version	Information about changes
<date>	1.1.1	First publication of the TS after approval by DVB TM #99 (13-14 January 2015; Geneva)

History

Document history		
<Version>	<Date>	<Milestone>