OpenCable™ Guidelines

UDCP Best Practices

OC-GL-UDCP-BP-V01-070105

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1 SCOPE

1.1 Introduction and Overview

This Uni-Directional Cable Product (UDCP) Best Practices document is intended to be a practical development tool for Consumer Electronics manufacturers (CEs) looking to create products in compliance with the Joint Test Suite (JTS). It describes the background on known issues and provides either a required or desired behavior for the UDCP implementation. There are also supporting references for items that are not currently covered or may be unclear in the existing DFAST license agreement, FCC rules, JTS, or other documentation.

1.2 Purpose of document

The purpose of this document is to clarify requirements for UDCP devices (also referred to herein as "Host" devices) to ensure that the devices are interoperable across cable systems in North America. Information is presented in this document to define the "Required" and "Desired" functionality for UDCP devices to operate on North American digital cable systems.

2 REFERENCES

2.1 Normative References

[SCTE-28] ANSI/SCTE 28 2004 HOST-POD Interface Standard
http://www.scte.org/documents/pdf/ANSISCTE282004.pdf

[UNI PICS] Uni-Dir-PICS-I03-040831 Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma
http://www.cablelabs.com/udcp/downloads/UNI-DIR-PICS-I03.pdf

[PCMCIA] PC Card Standard, Volume 2 Electrical Specification, March 1997, Personal Computer Memory Card International Association, Sunnyvale, CA.

[CEA-679] CEA-679-C (Part B), July 2005 National Renewable Security Standard

[SCTE-65] ANSI/SCTE 65 2002 Service Information Delivered Out Of Band for Digital Cable Television
http://www.scte.org/documents/pdf/ANSISCTE652002DVS234.pdf

[SCTE-41] ANSI/SCTE 41 2004 POD Copy Protection System
http://www.scte.org/documents/pdf/ANSISCTE412004.pdf

[SCTE-54] ANSI/SCTE 54 2004 Digital Video Service Multiplex and Transport System Standard for Cable Television
http://www.scte.org/documents/pdf/ANSISCTE542004DVS241.pdf

[IEC 13818] ISO IEC 13818-1 (2000) Generic Coding of Moving Pictures and Associated Audio

[CEA-608] EIA/CEA-608-B Closed Captioning services or other data services embedded in line 21 of the vertical blanking interval of the NTSC video signal.

[CEA-805] CEA-805-CCEA-805-C, Data on the Component Video Interfaces

[DFAST] DFAST Technology License Agreement for Unidirectional Digital Cable Products, Cable Television Laboratories, Inc.
http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf

[ATP Macro] ATP Clarification for the Host Macrovision Test, Cable Television Laboratories.
http://www.cablelabs.com/udcp/downloads/ATP_Clarification.pdf

[UNI ATP] Uni-Dir-ATP-I05-040629 Uni-Directional Receiving Device Acceptance Test Plan, Cable Television Laboratories.
http://www.cablelabs.com/udcp/downloads/UNI-DIR-ATP-I05-040629.pdf

2.2 Informative References

[HOST2.0] OC-SP-HOST2.0-CFR-I12-070105, OpenCable Host Device 2.0 Core Functional Requirements, January 5, 2007, Cable Television Laboratories, Inc.
http://www.opencable.com/downloads/specs/OC-SP-HOST2.0-CFR-I12-070105.pdf

[CCIF2.0] OC-SP-CCIF2.0-I09-070105, CableCARD Interface 2.0 Specification, January 5, 2007, Cable Television Laboratories, Inc.
http://www.opencable.com/downloads/specs/OC-SP-CCIF2.0-I09-070105.pdf

[CCCP2.0] OC-SP-CCCP2.0-I05-070105, CableCARD Copy Protection 2.0 Specification, January 5, 2007, Cable Television Laboratories, Inc.
http://www.opencable.com/downloads/specs/OC-SP-CCCP2.0-I05-070105.pdf

[SCTE 105] ANSI/SCTE 105 2005 Uni-Directional Receiving Device Standard for Digital Cable
http://www.scte.org/documents/standards/approved/ANSI_SCTE 105 2005.pdf

[CHILA] CableCARD-Host Interface License Agreement, Cable Television Laboratories, Inc.
http://www.opencable.com/downloads/CHILA.pdf

[FCC 76] FCC Encoding Rules Part 76 Subpart-W Section 76.1904

[CEA TVS] CEA-TVSB5 - Revision: 85, Date: 12/00/05 Multi-Channel TV Sound System BTSC System Recommended Practices. Consumer Electronics Association.
http://www.ce.org/Standards/StandardDetails.aspx?Id=2269&number=CEA-TVSB5-R-2005

2.3 Specification Reference Acquisition

- American National Standards Institute (ANSI), 1819 L Street, NW, Suite 600, Washington, DC 20036, Telephone +1 (202) 293-8020, http://webstore.ansi.org/ansidocstore/default.asp/
- Cable Television Laboratories, Inc., 858 Coal Creek Circle, Louisville, CO 80027; Phone 303-661-9100; Fax 303-661-9199; Internet: http://www.cablelabs.com /
- European Telecommunications Standards Institute (ETSI), ETSI Secretariat, 650, route des Lucioles, 06921 Sophia-Antipolis Cedex, FRANCE, Tel.: +33 (0)4 92 94 42 00, Fax +33 (0)4 93 65 47 16, http://www.etsi.org/services_products/e-shop/home.htm
- Internet Engineering Task Force (IETF), Internet: http://www.ietf.org
- ITU Telecommunication Standardization Sector (ITU-T), International Telecommunication Union, Telecommunication Standardization Bureau, Place des Nations, CH-1211 Geneva 20, Tel. +41 22 730 5852, Fax +41 22 730 5853\

3 ABBREVIATIONS AND ACRONYMS

This document uses the following abbreviations and acronyms:

BER Bit Error Rate

CE Consumer Electronics manufacturers

CCI Copy Control Information

CHILA CableCARD-Host Interface License Agreement

COR Configuration Option Register

CGMS-A Copy Generation Management System for Analog

DFAST Dynamic Feedback Arrangement Scrambling Technique or DFAST Technology License Agreement for Unidirectional Digital Cable Products

DVR Digital Video Recorder

FCC Federal Communication Commission

FDC Forward Data Channel

JTS Joint Test Suite

NTSC National Television Systems Committee

OOB Out of Band

PCMCIA Personal Computer Memory Card International Association (presently referred to as PC Card)

POD Point of Deployment (presently referred to as CableCARD)

QAM Quadrature Amplitude Modulation

QPSK Quadrature Phase-Shift Keying

SAP Secondary Audio Program

STT System Time Table

URL Uniform Resource Locator

UDCP Uni-Directional Cable Product

4 UDCP BEST PRACTICES

4.1 PCMCIA Reset Issue

4.1.1 Background

Appendix E of [SCTE-28] contains a table of CableCARD and Host error handling requirements, to define how to detect errors on the CableCARD/Host interface, and how to recover from them. Some entries in that table have minimum requirements that did not fully exercise the CableCARD or Host's capabilities to recover from errors, and resume normal operation. Certain UDCP Implementations have been identified that do not issue a PCMCIA reset when the CableCARD fails to set the Free (FR) bit in the Status Register within five seconds. A clarification of this behavior has been added to the OpenCable specifications through the ECN process and has been included in an amendment to later versions of [SCTE-28].

4.1.2 Required Host Operation

CableCARDs are now required to respond to transport layer polls within five seconds, even while they are performing firmware upgrades. UDCP Implementations SHALL perform a PCMCIA reset on the card if it does not respond to a transport layer poll within five seconds.

4.1.3 Supporting References

[SCTE-28], Section 8.13.2.3

[CCIF2.0], Annex B "Error Handling" (errors 4 & 5)

[CCIF2.0], Section 9.18.3

4.2 Host Not Waiting Five Seconds

4.2.1 Background

Upon initialization, a CableCARD has up to five seconds to bring the READY signal active. Certain UDCP implementations have been identified that do not wait a full five seconds before they initiate a PCMCIA reset on the CableCARD.

4.2.2 Required Host Operation

A UDCP implementation SHALL wait the full five seconds before performing a PCMCIA reset on the CableCARD. If the CableCARD does not bring the READY signal active within five seconds, then the UCDP SHALL perform a PCMCIA reset on the CableCARD.

4.2.3 Supporting References

[SCTE-28], Section 6.7.5

4.3 POD Reset Issue

4.3.1 Background

Certain UDCP Implementations have been found to issue a PCMCIA reset instead of a Card reset when the CableCARD sets the IIR bit in the Status Register. The operation of such sets is incorrect, and will cause longer service interruptions.

4.3.2 Required Host Operation

The UDCP Device SHALL initiate a Card reset procedure when it detects that the IIR bit in Status Register is set.

4.3.3 Supporting References

[UNI PICS], Item ExchP.4

[SCTE-28], Sections 6.5.2, 6.7.1.3.3

4.4 Host displays error on card reset

4.4.1 Background

When a CableCARD is reset, some UDCP devices are displaying an error message during the interval that the CableCARD is resetting. This is causing a problem in the field because there are technicians that see this message, think that there is something wrong with the CableCARD, and replace the card as a corrective measure.

4.4.2 Desired Host Operation

A UDCP implementation should not display an error message while the CableCARD is being reset.

4.5 COR Write Hold Time Issue

4.5.1 Background

A UDCP Implementation must write to the Configuration Option Register (COR) of the PCMCIA card to change the personality into a CableCARD module. During the process of writing to the COR, some UDCP Implementations are not holding the address line valid for a sufficient length of time. This results in a COR write failure, and a personality change does not occur.

4.5.2 Required Host Operation

The UDCP Implementation SHALL hold the address lines in a valid state for a minimum of 70 ns after the write enable line has been de-asserted. This is represented in the PC CARD STANDARD Electrical Specification trace as Write Recover Time "t_{rec}(WE)" in Table 4-12 of the PCMCIA PC Card Standard.

4.5.3 Supporting References

[UNI PICS], Item HPPh.29

[PCMCIA], Section 4.6.2

4.6 Host Initialization Issue (FR and HC Sequence)

4.6.1 Background

Several brands of UDCP devices are not setting the Host Control (HC) bit in the Command Register before they poll the Free (FR) bit in the Status Register. This adversely affects the ability of the Host to transfer data on the Data Channel and keeps the CableCARD and Host from completing initialization.

4.6.2 Required Host Operation

When a UDCP is transferring data across the Data Channel, the UDCP SHALL set the Host Control (HC) bit in the Command Register prior to polling the Free (FR) bit in the Status Register.

4.6.3 Supporting References

[UNI PICS], Items EXCHp.5 and EXCHp.13

[CEA-679], Section A.2.2.1

4.7 161-4 Error on Initialization with CableCARD

4.7.1 Background

The CableCARD-Host Interface specification lists three options for dealing with a 161-4 error condition. A 161-4 error condition occurs when a Host sets the data channel RS bit and the CableCARD fails to set the FR bit within five seconds.

4.7.2 Desired Host Operation

When a UDCP Implementation encounters this error condition, it should implement option 2 of 161-4 error recovery. Option 2 calls for the Host to perform a PCMCIA reset up to two times and then report the 161-4 error through an onscreen message.

4.7.3 Supporting References

[SCTE-28], Appendix E

4.8 Host Hangs After Failing Pairing Process

4.8.1 Background

UDCP implementations stop operating after they fail to complete the copy protection binding with a CableCARD.

4.8.2 Required Host Operation

A UDCP Implementation SHALL continue to operate normally on the unencrypted channels even if the host fails to complete the copy protection binding operation with the CableCARD. If the pairing fails, the UDCP Implementation should report the error but continue to allow the user to view unencrypted channels. In the event that the UDCP and CableCARD have not completed copy protection binding, the UDCP SHALL request a copy protection message screen, and the CableCARD is required to display a message indicating it is not available, for example:

Information Not Available

4.8.3 Supporting References

[SCTE-41], Section 3.2.5.2

4.9 UDCP Reports "CableCARD Invalid" Error

4.9.1 Background

An Engineering Change Notice, CCCP-IF-N-04.0573-3, has been incorporated into [CCCP2.0] that describes the use of system time to complete the copy protection binding process. UDCP devices are not required to use system time to complete the copy protection binding process. However if a UDCP implementation does use system time when performing the copy protection binding process then the system time value needs to be valid. If the UDCP Implementation does not have a valid time (STT) entry, the copy protection binding process has the potential to fail.

4.9.2 Desired Host Operation

UDCP Implementations should keep a valid time value in non-volatile memory so that the copy protection binding process can complete even if a system time value has not been acquired yet. The stored time value should be a valid date, not a null value or all zeros. The initial date and time value is recommended to be set to January 1, 2006, 12:00:00. This time value could then be accessed through the system time resource and subsequently used in the Host/CableCARD copy protection binding process.

4.9.3 Supporting References

[CCCP2.0], Section 3.2.2

4.10 Host Won't Lock to OOB (no FDC lock)

4.10.1 Background

Some UDCP implementations have been built with 6 MHz IF filters on the Out Of Band tuner. This results in poor selectivity and poor adjacent channel interference performance. In certain field situations where adjacent OOB carriers are used, these receivers are unable to recover the OOB data.

4.10.2 Required Host Operation

UDCP devices SHALL be able to operate with adjacent OOB carriers with no guard bands provided. The UDCP SHALL be capable of receiving digital QPSK FDC signals at a level of -7 dBmV with "worst case" adjacent channel performance of:

Undesired	D/U Ratio
Analog NTSC	-22.0 dB
64-QAM	-17.0dB
256-QAM	-22.0dB
QPSK FDC	-6.0 dB

For digital QPSK FDC signals, "capable of receiving" is defined as producing a digital stream with a bit error rate (BER) of 2.5e-06 or less.

Note: "Adjacent Channel" in this case means that there is no guard band between the QPSK FDC signal and the undesired signal. Also, the undesired signal may be 6 MHz in bandwidth, while the QPSK FDC signal is expected to be narrower than 6 MHz in bandwidth.

4.10.3 Supporting References

[SCTE 105], Requirement 53

4.11 Hosts not sending ca_pmt descramble

4.11.1 Background

When a UDCP device changes channels, it sends a ca_pmt_query messages to the CableCARD. The CableCARD replies with descrambling possible. At this point the UDCP device should send a ca_pmt message with "ok_descramble". Some UDCP implementations don't do this. It appears that they are sending a ca_pmt messages with "query" instead of "ok_descramble". If the UDCP doesn't send the "ok_descramble" message, CA decryption on the CableCARD will not be enabled, and the user will not be able to watch encrypted channels for which they are authorized.

4.11.2 Required Host Operation

The UDCP Implementation SHALL send a ca_pmt APDU with "ok_descramble" to enable the CableCARD to start decrypting an encrypted channel.

4.11.3 Supporting References

[UNI PICS], Item DApCa.12

[CEA-679], Section 8.4.3.4

4.12 Maximum Number of Channels in a Multiplex

4.12.1 Background

UDCP implementations exist that are capable of only handling a maximum number of 8 or 22 channels in one multiplex. This poses a problem where content providers such as Music Choice can contain considerably more than 22 channels in a multiplex.

4.12.2 Required Host Operation

UDCP implementations should not have a hard-coded array size that would limit the number of channels that could exist in a single multiplex. UDCP implementations SHALL read the channel table information provided in the SI stream to determine how many channels exist on each multiplex and update its channel map array accordingly.

4.12.3 Supporting References

[UNI PICS], Item FDCP.14

[SCTE-65]

4.13 No Secondary Audio Program

4.13.1 Background

UDCPs exist that do not support secondary audio programs (SAP), which are available on programming services. This has been classified as a harm-to-service issue.

4.13.2 Desired Host Operation

All UDCP devices SHOULD support Secondary Audio Programs.

4.13.3 Supporting References

[CEA TVS]

4.14 Host Not Displaying Call Letters

4.14.1 Background

Some UDCP implementations are not displaying channel call letters, found in the Source Name Sub-Table, for high number channels. In one example, no call letters were available for channels over 755. We suspect this was a memory limitation of the UDCP. This has been classified as a harm-to-service issue.

4.14.2 Required Host Operation

A UDCP device SHALL store Source Name Sub-Table channel table information provided in the System Information stream. The UDCP SHALL be capable of displaying call letters for all MSO services.

4.14.3 Supporting References

[UNI PICS], Item FDCP.14

[SCTE-65]

4.15 Discontinuous Tuning

4.15.1 Background

Some UDCP implementations cannot consistently tune from analog to digital channels.

Certain UDCP implementations have been built with separate RF inputs for analog (NTSC) and digital (QAM). This UDCP implementation requires an external splitter to be used in order to receive both analog and digital cable services. These implementations may not support consistent tuning between analog and digital services using the channel map provided in the OOB SI [SCTE-65].

4.15.2 Required Host Operation

UDCP Hosts SHALL support tuning from the [SCTE-65] channel map regardless of RF inputs for analog (NTSC) and digital (QAM).

4.15.3 Supporting References

[UNI PICS], Item FDCP.14

4.16 Problems with Large Amounts of Channel Map Data

4.16.1 Background

In some cable systems, there is a large amount of channel map data flowing from the CableCARD to the Host until the CableCARD receives an initialization from the headend. After the initialization is received from the headend, the CableCARD is able to filter the data so that the Host only receives the channel map for its location. The OOB System Information data is passed between the CableCARD and the Host on the Extended Channel.

4.16.2 Desired Host Operation

The UDCP Implementation must be able to continue normal operation even when the CableCARD is not filtering the out-of-band data. UDCP Implementations should be able to process data on the Extended Channel at a maximum rate of 3.5 Mbps.

4.16.3 Supporting References

[CCIF2.0], Section 7.3.6.1 Item 5

4.17 Host not responding to Channel Map Updates

4.17.1 Background

Some UDCP Implementations are not responding to channel map updates that are sent via Profile-1 as defined in [SCTE-65]. Channel map changes take place when channels are added, deleted, hidden, or unhidden, or channel frequencies are changed. These changes can take place at any time.

Cable operator feedback: This can't be stressed enough. Every time a channel map is changed, a subset of UDCP installations require a service call, including a truck roll, to correct for this problem. Soon, channel map changes will be used to implement "Split Channels", where one service, say 4Kids TV, will occupy a channel from 8 a.m. to 8 p.m. and another service, say HBO, will occupy the channel from 8 p.m. to 8 a.m. This means the channel map will change twice a day (730 times per year).

4.17.2 Required Host Operation

There are several circumstances where the channel map can change after a UDCP Implementation initially acquires it. A UDCP Implementation SHALL monitor the Extended Data channel information sent to it by the CableCARD to detect channel map changes in accordance with [SCTE-65] and update its channel map accordingly. This will ensure that it is up to date with the most recent channel map.

4.17.3 Supporting References

[SCTE-65], Section 5.3 and Annex A

4.18 Improper response to Path Select bit

4.18.1 Background

Channel maps can contain path select bits that are used to indicate on which cable a virtual channel can be found in dual-cable feed systems (A-B systems). A channel map can have two virtual channels, 510 and 615 for example, that are on the same RF frequency, where one channel has the path select bit set to 0 indicating it is fed on path 1 (cable plant A) and the other has the path select bit set to 1 indicating it is fed on path 2 (cable plant B). Some UDCP implementations are not properly handling these bits, resulting in missing channels.

4.18.2 Required Host Operation

A UDCP Implementation SHALL process path select bits of all of the virtual channel records, to ensure the UDCP has access to all of the channels in the channel map.

4.18.3 Supporting References

[SCTE-65], Section 5.3.2

4.19 Copy Protection Authentication Failures

4.19.1 Background

On some UDCP implementations, copy protection authentication is failing because the extended channel data buffer size is being negotiated improperly. For example, some UDCP devices attempt to pass messages in a 1024-byte buffer when they only have enough memory allocated for a 256-byte buffer. This results in failed communications when large messages, such as certificate exchanges, exceed 256 bytes.

4.19.2 Required Host Operation

The minimum buffer size for a UDCP device is 256 bytes. However, the CableCARD can have buffers as small as 16 bytes. A UDCP device SHALL negotiate buffer sizes, for the data and extended data channels, according to [CEA-679] Part B Section A.2.2.1.1, to ensure proper communications. The UDCP SHALL use the smaller of its own buffer size and the CableCARD buffer size. Once the buffers have been negotiated, the UDCP SHALL tell the CableCARD the negotiated buffer sizes for both the data and extended data channels.

4.19.3 Supporting References

[UNI PICS], Items DPh.55, DPh.62, DPh.63

[SCTE-28], Section 6.7.6.1.3 and Section 6.7.6.1.4

[CEA-679] Part B Section A.2.2.1.1

4.20 Incorrect Processing of the DA bit

4.20.1 Background

UDCP implementations are not managing the card message transfer correctly on the Extended and Data Channels, as illustrated in the following examples:

Example 1: After getting a Data Available (DA) interrupt on the extended data channel, it sends a polling message on the Data channel and insists on getting a response to the poll on the Data channel. It does not read the message on the extended data channel, despite the fact that an interrupt indicating data is available is active for that channel. This causes a deadlock.

Example 2: Whenever the DA bit is set on the extended data channel, just after it sends a polling message on the Data channel, it waits for a response to the poll on the Data channel before reading the message in the extended data channel. This causes a deadlock.

4.20.2 Required Host Operation

The specifications do not require a four-buffer implementation, one each for Data and Extended Data Channel in transmit and receive mode. Therefore, the UDCP SHALL manage the data flow in a way similar to the transmit/receive requirement for a single buffer implementation, except that now this would apply to the individual channels. Specifically, the UDCP SHALL test the DA bit for both Data and Extended Data Channel and read the data for the channel that has the DA bit set. The UDCP SHALL NOT wait for data to be available in a specific channel, as this would create a deadlock. A single buffer dedicated for transmit does not allow another message to be sent until the message sitting in the buffer is read by the Host.

4.20.3 Supporting References

[UNI PICS], Item EXCHp.16

[CCIF2.0], Section 7.6.1

4.21 Host doesn't support prior resource versions

4.21.1 Background

Some UDCP implementations do not support prior resource versions, even when the resource versions are requested by a CableCARD. There is an error in CEA-679 which is incorporated by reference in [SCTE-28]. Section 7.2.6.1 of CEA-679 Part B states:

7.2.6.1 Open Session Request

"This object is issued by the module to the host in order to request the opening of a session between the module and one resource provided either by the host or by a module. The resource_identifier must match in both class and type a resource that the host has in its list of available resources. If the version field of the supplied resource identifier is zero, then the host will use the current version in its list. **If the version number in the request is less than or equal to the current version number in the host's list then the current version is used.** If the requested version number is higher than the version in the host's list, then the host will refuse the request with the appropriate return code."

The sentence in bold is in error.

4.21.2 Desired Host Operation

The versions of a resource must match between the CableCARD and the host in both class and type. If the CableCARD has version 2 and the host has version 3, the host should fall back to version 2.

4.21.3 Supporting References

[CCIF2.0], Section 9.1.4.1

4.22 MMI Pairing Information Displayed Excessively

4.22.1 Background

Some UDCP implementations consistently display Card/Host pairing information even on in-the-clear channels, as if to alert the viewer that the copy protection pairing has not yet been completed, or that the binding is not authorized for this content. This makes it impossible to watch in-the-clear channels, even though the pairing information should not be needed to watch these channels.

4.22.2 Desired Host Operation

A UDCP Implementation should only display pairing information when the user tunes to an encrypted channel for which they are not authorized, or for high value content. Users should be able to watch in-the-clear channels without the pairing information displaying on the screen. When a user has tuned to an encrypted channel, there should be a method to clear the pairing information so that a user can tune away from the channel.

4.22.3 Supporting References

[CCCP2.0], Section 6.1.2

"The ID Reporting Screen SHALL be displayed only if:

- The message is selected through a user menu system
- The user selects an MPEG program with CP active (non-zero EMI) before the binding is validated
- The Card initiates the message display, e.g., at the request of the CA System"

4.23 Host_ID/CableCARD_ID not available after pairing

4.23.1 Background

There are UDCP implementations that do not display the Host_ID and CableCARD_ID Copy Protection binding information on an MMI screen after the Host/CableCARD pairing process is complete.

4.23.2 Required Host Operation

Once the Host/CableCARD pairing process successfully completes, a UDCP Implementation SHALL display the Host ID and CableCARD ID Copy Protection binding information on an MMI screen. There SHOULD also be a way for the user to manually access the Copy Protection binding information, through an onscreen menu, in order to view the Host ID and CableCARD ID.

4.23.3 Supporting References

[SCTE-41], Section 3.1.4 Number 15.b

[SCTE-41], Section 3.2.5

4.24 Host has "POD" hard coded in URL

4.24.1 Background

CableCARDs send a Uniform Resource Locator (URL) as part of the open_mmi_req message to instruct the UDCP where to get the message the CableCARD would like to be displayed. There are UDCPs that have hard coded "POD" as the first part of the URLs that they are requesting. This can cause problems, as for some messages "POD//…" is not contained in the proper URL.

4.24.2 Required Host Operation

The URL for a particular MMI message will be provided to the UDCP by the CableCARD. The UDCP Implementation SHALL only use the URL that is provided by the CableCARD as part of the open_mmi_req APDU.

4.24.3 Supporting References

[UNI PICS], Item DapMi.2

[CCIF2.0], Section 9.11.1

4.25 Tuning away from Encrypted channels

4.25.1 Background

There are UDCP implementations that immediately process MMI messages for display on the TV screen and do not allow channel change input while this is happening. This behavior can lead to a user getting stuck on an encrypted channel.

4.25.2 Desired Host Operation

UDCP implementations need to allow a user to tune away from an encrypted channel, even if their CableCARD pairing information has not been entered yet. UDCP implementations can do this by allowing channel change input while MMI screens are displayed or by pausing between successive MMI displays.

4.25.3 Supporting References

There is no supporting documentation for this issue at this time; this is simply an issue that has been discovered in the field that should be accounted for in a UDCP implementation.

4.26 Analog Outputs Turned Off

4.26.1 Background

There are Host devices that turn off their analog outputs in response to APS codes. A product cannot be verified or self-verified for compliance with the JTS if the UDCP turns off or disables its analog outputs as a response to copy protection signaling or copy protection status.

4.26.2 Required Host Operation

Analog outputs are not required for a UDCP. A manufacturer may choose not to include analog outputs on its product. However, if analog outputs are included, those outputs SHALL apply Macrovision in response to the APS Codes in the digital input signal and generate the appropriate CGMS-A signals that follow [CEA-608] or [CEA-805] as applicable.

4.26.3 Supporting References

[UNI PICS], Item HACP.2

[ATP Macro]

[UNI ATP], Section 2.1.5

[CEA-608], Section 9.5.1.8

[CEA-805], Section 4.5.2

[DFAST], Section 6.1.2

4.27 No Digital Audio on S/PDIF Connector

4.27.1 Background

In some UDCP implementations, the digital audio is not present on the S/PDIF connector for certain programs. It appears that the optical digital audio output is turned off in certain UDCP models whenever the CCI value is greater than 1.

http://www.avsforum.com/avs-vb/showthread.php?t=605484

4.27.2 Desired Host Operation

The DFAST Technology License Agreement (DFAST) requires all digital outputs to include CableLabs-approved copy protection technologies (DFAST, Exhibit B, paragraph 2.4). However, with respect to digital audio-only outputs, this copy protection requirement is modified by Exhibit C, paragraph 2, which provides that "compressed audio data may be output to an external Dolby Digital decoder in the clear via the S/PDIF connector." Although the [DFAST] license does not include specific references to optical digital audio outputs, such outputs should be implemented consistent with S/PDIF audio connectors. For both S/PDIF and optical digital audio outputs, compressed audio data should be output in the clear, and such outputs should not be turned-off in response to any CCI bit settings.

The [DFAST] license states, "Compressed audio data may be output to an external Dolby Digital decoder in the clear via the S/PDIF connector." The permission granted by this "may" statement is for the general inclusion of the S/PDIF connector, not to imply the toggling of the content on such.

4.27.3 Supporting References

[DFAST], Exhibit C, paragraph 2

4.28 Host Forgets CCI status

4.28.1 Background

Some UDCP implementations forget the CCI status of a channel after tuning away from a Digital TV service or conducting other native operations. These native operations include powering off and back on (if the Card remains powered and uninformed on the interface), playing a DVR video, downloading MP3s, browsing web pages from the Internet, displaying pictures from a digital camera memory stick, or tuning to unscrambled analog channels, etc.

4.28.2 Required Host Operation

The UDCP is required to apply CableCARD-delivered CCI to associated content. Requirements to protect Controlled Content remain in force while the UDCP is ignoring a channel. If the UDCP becomes interested in that content again, perhaps by retuning to it, it must continue to protect it as specified by the Card-delivered CCI, even if that CCI value was delivered while the UDCP was ignoring it.

4.28.3 Supporting References

[CCCP2.0], Section 9.4.3

4.29 Host Keeps CCI Setting Too Long

4.29.1 Background

Some UDCP implementations go to such great lengths to not ignore a current and valid CCI while being tuned away (see 4.28) that they mistakenly apply the last valid CCI setting to non-protected services such as analog TV channels or in-the-clear (unencrypted) DTV channels. The problem is evident when a UDCP is tuned to a CA-protected service with a valid CCI greater than zero and then tunes to an off-air service that is not encrypted, yet maintains and applies the last valid CCI to the off-air service that does not have CCI.

4.29.2 Desired Host Operation

The UDCP is required to apply Card-delivered CCI only to the associated piece of content. If the UDCP loses interest in that content flow from the Card to perform some other function, including tuning to off-air analog or unencrypted digital services, the UDCP must not apply the old CCI settings to the new unassociated content. The UDCP is expected to acquire the CCI, for the new channel, in accordance with [SCTE-28].

4.29.3 Supporting References

[FCC 76], FCC Encoding Rules Part 76 Subpart-W Section 76.1904 Item (a)

4.30 Diagnostic information

4.30.1 Background

There have been UDCP devices that do not provide a method to access diagnostic information. This information is needed to debug problems in the lab and in the field.

4.30.2 Desired Host Operation

A UDCP device SHOULD be capable of displaying diagnostic information pertaining to the state of the Out-of-Band forward data channel, including tuner frequency, lock status, packet count, signal strength and signal to noise

ratio. In addition, a UDCP device SHOULD be capable of displaying the diagnostic information described in [HOST2.0].

4.30.3 Supporting References

[HOST2.0], Section 11