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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

E-health multimedia services and applications –
Interoperability compliance testing of personal health
systems (HRN, PAN, LAN, TAN and WAN)

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN: USB host

Recommendation ITU-T H.840

ITU-T H-SERIES RECOMMENDATIONS

AUDIOVISUAL AND MULTIMEDIA SYSTEMS

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Recommendation ITU-T H.840

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN: USB host

Summary

Recommendation ITU-T H.840 is a transposition of Continua Test Tool DG2013, Test Suite Structure & Test Purposes, USB Host (Version 1.1, 2014-01-24), that was developed by the Continua Health Alliance. A number of versions of this specification existed before transposition.

This Recommendation includes an electronic attachment with the protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.840	2015-01-13	16	11.1002/1000/12257

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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11 830-en.

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Electronic attachment: Protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

Introduction

This Recommendation is a transposition of Continua Test Tool DG2013, Test Suite Structure & Test Purposes, USB Host (Version 1.1, 2014-01-24), that was developed by the Continua Health Alliance. A number of versions of this specification existed before transposition and these can be found in the table below.

Version	Date	Revision history
1.1	2012-10-05	Initial release for Test Tool DG2011. It is the same version as "TSS&TP_1.5_USBHost_v1.1.pdf" because new features included in Continua DG 2011 do not affect the test procedures specified in this document.
1.1	2013-05-24	Initial release for Test Tool DG2012. It is the same version as "TSS&TP_DG2011_USBHost_v1.1.pdf" because new features included in Continua DG 2012 do not affect the test procedures specified in this document.
1.1	2014-01-24	Initial release for Test Tool DG2013. It is the same version as "TSS&TP_DG2012_USBHost_v1.1.pdf" because the new features included in Continua DG 2013 do not affect the test procedures specified in this document.

Recommendation ITU-T H.840

Conformance of ITU-T H.810 personal health devices: PAN/LAN/TAN: USB host

1 Scope

The scope of this Recommendation[1] is to provide a test suite structure and test purposes (TSS & TP) for the USB host based on the requirements defined in the USB Personal Healthcare Device Class specification that has been selected by Continua Health Alliance for the PAN interface.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T H.810]	Recommendation ITU-T H.810 (2013), *Interoperability design guidelines for personal health systems*.
[IEEE 11073-20601A]	IEEE 11073-20601A-2010, *IEEE Health informatics – Personal health device communication Part 20601: Application profile – Optimized Exchange Protocol Amendment 1*. <http://standards.ieee.org/findstds/standard/11073-20601a-2010.html>
[USB DevClass]	USB Implementers Forum (2007-11), *Universal Serial Bus Device Class Definition for Personal Healthcare Devices*, Release 1.0, plus Errata (15 February 2008), Personal Healthcare section. <http://www.usb.org/developers/docs/devclass_docs/Personal_Healthcare_1.zip>
[USB_2.0]	USB Implementers Forum (2000), *Universal Serial Bus Specification 2.0*. <http://www.usb.org/developers/docs/usb20_docs/usb_20_112614.zip>

3 Definitions

3.1 Terms defined elsewhere

3.1.1 agent [IEEE 11073-20601A]: A node that collects and transmits personal health data to an associated manager.

3.1.2 manager [IEEE 11073-20601A]: A node receiving data from one or more agent systems. Some examples of managers include a cellular phone, health appliance, set top box, or a computer system.

3.2 Terms defined in this Recommendation

None.

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[1] This Recommendation includes an electronic attachment with the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ATS	Abstract Test Suite
DUT	Device Under Test
CDG	Continua Design Guidelines
GUI	Graphical User Interface
IUT	Implementation Under Test
MDS	Medical Device System
PAN	Personal Area Network
PCT	Protocol Conformance Testing
PCO	Point of Control and Observation
PHD	Personal Healthcare Device
PHDC	Personal Healthcare Device Class
PHM	Personal Health Manager
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation extra Information for Testing
SDP	Service Discovery Protocol
SOAP	Simple Object Access Protocol
SUT	System Under Test
TCRL	Test Case Reference List
TCWG	Test and Certification Working Group
TP	Test Purpose
TSS	Test Suite Structure
USB	Universal Serial Bus
WDM	Windows Driver Model

5 Conventions

The key words "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "MAY", "MAY NOT" in this document are to be interpreted as in [b-ETSI SR 001 262].

– SHALL is equivalent to 'must' or 'it is required to'.

– SHALL NOT is equivalent to 'must not' or 'it is not allowed'.

– SHOULD is equivalent to 'it is recommended to'.

– SHOULD NOT is equivalent to 'it is not recommended to'.

– MAY is equivalent to 'is permitted'.

– MAY NOT is equivalent to 'it is not required that'.

NOTE – The above-mentioned key words are capitalized for illustrative purposes only and they do not appear capitalized within this Recommendation.

Reference is made in the ITU-T H.800-series of Recommendations to different versions of the Continua Design Guidelines (CDG) by a specific designation. The list of terms that may be used in this Recommendation is provided in Table 1.

Table 1 – List of designations associated to the various versions of the CDG

CDG name	Transposed as	Version	Description	Designation
2013 plus errata	ITU-T H.810	4.1	CDG 2013 plus errata noting all ratified bugs.	-
2013	–	4.0	Release 2013 of the CDG including maintenance updates of CDG 2012 and additional guidelines that cover new functionalities.	Endorphin
2012 plus errata	–	3.1	CDG 2012 plus errata noting all ratified bugs [b-CDG 2012].	-
2012	–	3.0	Release 2012 of the CDG including maintenance updates of CDG 2011 and additional guidelines that cover new functionalities.	Catalyst
2011 plus errata	–	2.1	CDG 2011 integrated with identified errata.	-
2011	–	2.0	Release 2011 of the CDG including maintenance updates of CDG 2010 and additional guidelines that cover new functionalities [b-CDG 2011].	Adrenaline
2010 plus errata	–	1.6	CDG 2010 integrated with identified errata.	-
2010	–	1.5	Release 2010 of the CDG with maintenance updates of CDG Version 1 and additional guidelines that cover new functionalities [b-CDG 2010].	1.5
1.0	–	1.0	First released version of the CDG [b-CDG 1.0].	-

6 Test suite structure (TSS)

The test purposes (TP) of this Recommendation are found in Annex A and have been divided into two main groups:

– **Group 1:** Descriptors (DESC)
– **Group 2:** Metadata message preamble (MDMP)

  • **Subgroup 2.1:** Metadata message preamble feature (FEAT)
  • **Subgroup 2.2:** Get data status before setting/clearing metadata message preamble feature (GDS)
  • **Subgroup 2.3:** Set/Clear Metadata message preamble feature (SC)
  • **Subgroup 2.4:** Metadata message preamble transfer (TRANS)
  • **Subgroup 2.5:** Metadata message preamble feature error conditions (ERR)

7 Electronic attachment

The protocol implementation conformance statements (PICS) and the protocol implementation extra information for testing (PIXIT) required for the implementation of Annex A can be downloaded from http://handle.itu.int/11.1002/2000/12067.

In the electronic attachment, letters "C" and "I" in the column labelled "Mandatory" are used to distinguish between "PICS" and "PIXIT" respectively during testing. If the cell is empty, the corresponding PICS is "independent". If the field contains a "C", the corresponding PICS is dependent on other PICS, and the logical expression is detailed in the "SCR_Expression" field. The static conformance review (SCR) is used in the test tool to assert whether the PICS selection is consistent.

Annex A

Test purposes (TP)

(This annex forms an integral part of this Recommendation.)

A.1 TP definition conventions

The test purposes (TP) are defined according to the following rules:

– **TP Id**: This is a unique identifier (TP/<TT>/<DUT>/<GR>/<SGR>/<XX> – <NNN>). It is specified according to the naming convention defined below:
  • Each test purpose identifier is introduced by the prefix "TP".
  • <TT>: This is the test tool that will be used in the test case.
    ○ PHDC: USB host personal health device class
  • <DUT>: This is the device under test.
    ○ HOS: PHDC host
    ○ DEV: PHDC device (not used because it is out of the scope of the developed test tool)
  • <GR>: This identifies a group of test cases.
  • <SGR>: This identifies a subgroup of test cases.
  • <XX>: This identifies the type of testing.
    ○ BV: valid behaviour test
    ○ BI: invalid behaviour test
  • <NNN>: This is a sequential number that identifies the test purpose.
– **TP label**: This is the TP's title.
– **Coverage**: This contains the specification reference and clause to be checked by the TP.
  • Spec: This indicates the earliest version of the specification from which the testable items to be checked by the TP were included.
  • Testable Item: This contains testable items to be checked by the TP.
– **Test purpose**: This is a description of the requirements to be tested.
– **Applicability**: This contains the PICS items that define if the test case is applicable or not for a specific device. When a TP contains an "ALL" in this field it means that it applies to the device under test within that scope of the test (specialization, transport used, etc.).
– **Initial condition**: This indicates the state to which the DUT needs to be moved at the beginning of TC execution.
– **Test procedure**: This describes the steps to be followed in order to execute the test case.
– **Pass/Fail criteria**: This provides criteria to decide whether the DUT passes or fails the test case.

A.2 Group 1: Descriptors (DESC)

TP Id		TP/PHDC/HOS/DESC/BV-000_A		
TP label		Device class in interface descriptor		
Coverage	Spec	[USB DevClass]		
	Testable items	DeviceDesc 1; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device the **bDeviceClass** field of the device descriptor is set to 00h and **bInterfaceClass** of the interface descriptor is set to 0Fh. 2. The simulated device issues an "**Association Request**" message to the host under test. 3. The host under test shall reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message.		
Pass/Fail criteria		In step 3, the host under test replies with an "Association Response"(accepted, accepted-unknown-config or rejected) or an "Association Abort" message.		
Notes				

TP Id		TP/PHDC/HOS/DESC/BV-000_B		
TP label		Device class in device descriptor		
Coverage	Spec	[USB DevClass]		
	Testable items	DeviceDesc 1; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device the **bDeviceClass** field of the device descriptor is set to 0Fh and **bInterfaceClass** of the interface descriptor is set to 00h. 2. The simulated device issues an "**Association Request**" message to the host under test. 3. The host under test shall reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message.		
Pass/Fail criteria		In step 3, the host under test replies with an "Association Response" (accepted, accepted-unknown-config or rejected) or an "Association Abort" message.		
Notes				

TP Id		TP/PHDC/HOS/DESC/BV-001_A		
TP label		Verify class-defined USB descriptors (no PHDC metadata descriptor, data format code defined by vendor)		
Coverage	Spec	[USB DevClass]		
	Testable items	ClassFunDesc 1; M	ClassFunDesc 2; M	ClassFunDesc 3; M
		ClassFunDesc 4; M	ClassFunDesc 6; M	ClassFunExtDesc 1; M
		ClassFunExtDesc 3; M	ClassFunExtDesc 4; M	ClassFunExtDesc 5; M
		ClassFunExtDesc 7; M	ClassFunExtDesc 8; M	ClassFunExtDesc 9; M
		MetaDataDesc 1; M	MetaDataDesc 2; M	MetaDataDesc 3; M
		MetaDataDesc 4; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device the PHDC Metadata descriptor will **not be included** because it is optional and the **bPHDCDataCode** field of the PHDC class function descriptor will be set to 01h (PHDC_VENDOR). 2. The test tool shows a pop-up message asking the test operator to verify that the host continues to function normally (i.e., keyboard and mouse still function, system still up and running).		
Pass/Fail criteria		In step 2, the host does not shut down or stop accepting input from other USB devices (keyboard, mouse).		
Notes				

TP Id		TP/PHDC/HOS/DESC/BV-001_B		
TP label		Verify class-defined USB descriptors (PHDC Metadata descriptor, data format code following ISO/IEEE 11073-20601)		
Coverage	Spec	[USB DevClass]		
	Testable items	ClassFunDesc 1; M	ClassFunDesc 2; M	ClassFunDesc 3; M
		ClassFunDesc 4; M	ClassFunDesc 6; M	ClassFunExtDesc 1; M
		ClassFunExtDesc 3; M	ClassFunExtDesc 4; M	ClassFunExtDesc 5; M
		ClassFunExtDesc 7; M	ClassFunExtDesc 8; M	ClassFunExtDesc 9; M
		MetaDataDesc 1; M	MetaDataDesc 2; M	MetaDataDesc 3; M
		MetaDataDesc 4; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		

Test procedure	1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device the PHDC Metadata descriptor **will be included** because it is optional and the **bPHDCDataCode** field of the PHDC class function descriptor will be set to 02h (PHDC_11073_20601).
	2. The simulated device issues an "**Association Request**" message to the host under test.
	3. The host under test shall reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message.
Pass/Fail criteria	In step 3, the host under test replies with an "Association Response" (accepted, accepted-unknown-config or rejected) or an "Association Abort" message.
Notes	

TP Id		TP/PHDC/HOS/DESC/BV-001_C		
TP label		Verify class-defined USB descriptors (no PHDC Metadata descriptor, data format code following ISO/IEEE 11073-20601)		
Coverage	Spec	[USB DevClass]		
	Testable items	ClassFunDesc 1; M	ClassFunDesc 2; M	ClassFunDesc 3; M
		ClassFunDesc 4; M	ClassFunDesc 6; M	ClassFunExtDesc 1; M
		ClassFunExtDesc 3; M	ClassFunExtDesc 4; M	ClassFunExtDesc 5; M
		ClassFunExtDesc 7; M	ClassFunExtDesc 8; M	ClassFunExtDesc 9; M
		MetaDataDesc 1; M	MetaDataDesc 2; M	MetaDataDesc 3; M
		MetaDataDesc 4; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device the PHDC Metadata descriptor **will not be included** because it is optional and the **bPHDCDataCode** field of the PHDC class function descriptor will be set to 02h (PHDC_11073_20601).		
		2. The simulated device issues an "**Association Request**" message to the host under test.		
		3. The host under test shall reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message.		
Pass/Fail criteria		In step 3, the host under test replies with an "Association Response" (accepted, accepted-unknown-config or rejected) or an "Association Abort" message.		
Notes				

TP Id		TP/PHDC/HOS/DESC/BV-002		
TP label		Verify Valid bQoSEncoding Version		
Coverage	Spec	[USB DevClass]		
	Testable items	QoSDesc 1; M	QoSDesc 2; M	QoSDesc 3; M
		QoSDesc 4; M	QoSDesc 5; M	QoSDesc 6; M
		QoSDesc 7; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		

Test procedure	1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device there will be one QoS descriptor with **bQosEncodiingVersion=02h**. The host under test shall ignore the descriptor.
	2. The simulated device issues an "**Association Request**" message to the host under test.
	3. The host under test shall reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message.
Pass/Fail criteria	In step 3, the host under test replies with an "Association Response" (accepted, accepted-unknown-config or rejected) or an "Association Abort" message.
	If there are issues when running this test procedure, see bugzilla 55 and potentially issue a waiver. http://continua.plugfests.com/show_bug.cgi?id=55.
Notes	

TP Id		TP/PHDC/HOS/DESC/BV-003		
TP label		Verify communication on bulk endpoints		
Coverage	Spec	[USB DevClass]		
	Testable items	Arch 1; M	Arch 2; M	Arch 4; M
		Arch 5; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device there will be 3 endpoint descriptors: **BULK IN**, **BULK OUT** and **INTERRUPT IN**.		
		2. The simulated device issues an "**Association Request**" message to the host under test via the **BULK IN** endpoint.		
		3. The host under test shall reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message over the **BULK OUT** endpoint.		
Pass/Fail criteria		In step 3, the host under test replies with an "Association Response" (accepted, accepted-unknown-config or rejected) or an "Association Abort" in BULK OUT endpoint number.		
Notes				

TP Id		TP/PHDC/HOS/DESC/BV-004		
TP label		Agent with two interfaces. Connect it after Manager application is running and USB Transport is activated		
Coverage	Spec	[USB DevClass]		
	Testable items	DeviceDesc 2; M		
	Spec	[b-CDG 2012]		
	Testable items	Wired_PAN_USB_USB_2.0		
	Spec	[USB_2.0]		
	Testable items	USB 2.0 ch 9.2.1		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		

Initial condition	The manager under test application has just been restarted (computer rebooted or application exited and opened) and USB Transport is activated.
	The simulated device is *not* plugged into the manager under test.
Test procedure	1. Connect the host under test and simulated device, then the enumeration process shall start automatically. During this process the host will issue a **GetDescriptor()** request to the test tool device. On the test tool device the **bNumInterfaces** field of the configuration descriptor is set to 02h; two interface descriptors will be sent: PHDC and HID, where the HID interface is sent first.
	2. The simulated device issues an "**Association Request**" message to the host under test.
	3. The host under test shall reply with an "**Association Response**" message if it recognizes the PHDC interface.
Pass/Fail criteria	In step 3, the host under test replies with an "Association Response" or another valid response to an "Association Request" message.
Notes	Due to CESL restrictions, this test case has to be executed manually using a real agent with 2 interfaces.

TP Id		TP/PHDC/HOS/DESC/BV-005		
TP label		Agent with two interfaces. Connect it before Manager application is running and USB Transport is activated		
Coverage	Spec	[USB DevClass]		
	Testable items	DeviceDesc 2; M		
	Spec	[b-CDG 2012]		
	Testable items	Wired_PAN_USB_USB_2.0		
	Spec	[USB_2.0]		
	Testable items	USB 2.0 ch 9.2.1		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The manager under test application is stopped and USB Transport is deactivated.		
		The simulated device is *not* plugged into the manager under test.		
Test procedure		1. Plug simulated device into the manager under test. The enumeration process should start automatically. The host should issue a **GetDescriptor()** request to the test tool device. On the test tool device the **bNumInterfaces** field of configuration descriptor is set to 02h; two interface descriptors will be sent: PHDC and HID, where the HID interface is sent first.		
		2. Start the manager under test application and activate USB Transport.		
		3. The simulated device issues an "**Association Request**" message to the host under test.		
		4. The host under test shall reply with an "**Association Response**" message if it recognizes the PHDC interface.		
Pass/Fail criteria		In step 4, the host under test replies with an "Association Response" or another valid response to an "Association Request" message.		
Notes		Due to CESL restrictions, this test case has to be executed manually using a real agent with 2 interfaces.		

A.3 Subgroup 2.1: Metadata message preamble feature (FEAT)

TP Id		TP/PHDC/HOS/MDMP/FEAT/BV-000		
TP label		Metadata Message Preamble feature is supported and it shall initially be disabled.		
Coverage	**Spec**	[USB DevClass]		
	Testable items	SendMetaData 1; M	SendMetaData 2; M	DetQoS 1; M
		ReqMetaDataPream 3; M		
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. The simulated device will inform the host under test that it supports the Metadata message preamble feature setting bit0 of the **bmCapability** field of the PHDC class function descriptor to 1.		
		2. Upon the reception and confirmation of descriptors, if the host under test recognizes the PHDC device class, it shall send a **SET_CONFIGURATION** request to the simulated device as the last step of the enumeration process.		
		3. The simulated device issues an "**Association Request**" without a preceding Metadata message preamble to the host under test.		
		4. The host under test could reply with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message without a preceding Metadata message preamble or with a SET_FEATURE(METADATA); it will mean that the Metadata message preamble is not yet enabled.		
Pass/Fail criteria		In step 4, the host under test replies with an "Association Response" (accepted, accepted-unknown-config or rejected) or an "Association Abort" message without a preceding Metadata message preamble or a SET_FEATURE(METADATA).		
Notes				

A.4 Subgroup 2.2: Get Data Status before setting / clearing (GDS)

TP Id		TP/PHDC/HOS/MDMP/GDS/BV-000	
TP label		USB Host supports the class-defined Get Data Status Request	
Coverage	**Spec**	[USB DevClass]	
	Testable items	ReqGetDataStatus 1; M	ReqGetDataStatus 2; M
Applicability		C_HOST_PHDC_002 AND C_MAN_OXP_038 AND C_MAN_OXP_000	
Initial condition		The simulated device is plugged into the host under test.	
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. The simulated device will inform the host under test that it supports the Metadata message preamble feature setting bit0 of the **bmCapability** field of the PHDC class function descriptor to 1. 2. Upon the reception and confirmation of descriptors, if the host under test recognizes the PHDC device class, it shall send a **SET_CONFIGURATION** request to the simulated device as the last step of the enumeration process. 3. Follow the instructions given by the vendor in PIXIT I_HOST_PHDC_003 to cause the SUT to send a Get Data Status request. 4. The host under test shall send a Get Data Status request. 5. The simulated device responds with the correct status.	
Pass/Fail criteria		In step 4, the host under test replies with a Get Data Status message with the right syntax fields of the Get Data Status message, which will be listed as bmRequestType (A1h), bRequest (00h), wValue (0000h), wIndex (PHDC Interface), wLength (0002h).	
Notes			

A.5 Subgroup 2.3: Set/Clear Metadata message preamble feature (SC)

TP Id		TP/PHDC/HOS/MDMP/SC/BV-000		
TP label		Enabling/Disabling Metadata Message Preamble. Syntax of SET_FEATURE and CLEAR_FEATURE		
Coverage	**Spec**	[USB DevClass]		
	Testable items	SendMetaData 3; M	ReqMetaDataPream 1; M	ReqMetaDataPream 4; M
		ReqMetaDataPream 6; M	ReqMetaDataPream10; M	FeatTypes 1; M
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. The simulated device will inform the host under test that it supports the Metadata message preamble feature setting bit0 of the **bmCapability** field of the PHDC class function descriptor to 1. 2. Upon the reception and confirmation of descriptors, if the host under test recognizes the PHDC device class, it shall send a **SET_CONFIGURATION** request to the simulated device as the last step of the enumeration process. 3. Perform an action on the host that enables the Metadata message preamble feature (as defined in the PIXIT I_HOST_PHDC_001). 4. The simulated device issues an "**Association Request**" without a preceding Metadata message preamble to the host under test. 5. The host under test will send a **SET_FEATURE(METADATA)** message. The syntax will be verified. 6. The host under test will send a Metadata message preamble because this feature has been enabled. 7. After this, the host under test will send an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message. 8. The tester inquires operator whether it is possible to disable the Metadata message preamble feature (as defined in the PIXIT I_HOST_PHDC_002). 9. The simulated device will send an "**Association Abort**" message in order to move the host under test to the Unassociated State. 10. If the host under test chooses to disable the Metadata message preamble feature, it will send a **CLEAR_FEATURE(METADATA)** message. The syntax will be verified.		
Pass/Fail criteria		▪ In step 5, the host under test sends a SET_FEATURE(METADATA) message with the right syntax in order to enable the Metadata message preamble feature. Fields of this message will be listed as : • bmRequestType =21 • bRequest = 03 • wValue = 0101 • wIndex = PHDC interface • wLength=0000 ▪ In step 6, the host under test sends a Metadata message preamble; it proves that the feature has been enabled. ▪ In step 10, if the host under test chooses to disable the Metadata message preamble, it shall send a CLEAR_FEATURE(METADATA) message with the right syntax. Fields of this message will be listed as: • bmRequestType = 21 • bRequest = 01 • wValue = 0001 • wIndex = PHDC interface • wLength = 0000		
Notes				

TP Id		TP/PHDC/HOS/MDMP/SC/BV-001
TP label		If Metadata Preamble Feature is not supported by an agent, manager shall not try to enable or disable the feature
Coverage	**Spec**	[USB DevClass]
	Testable items	ReqMetaDataPream 2; M
Applicability		C_MAN_OXP_038 AND C_MAN_OXP_000
Initial condition		The simulated device is plugged into the host under test.
Test procedure		1. Connect the host under test and simulated device, then the enumeration process shall start automatically. The simulated device will inform the host under test that it does not support the Metadata message preamble feature setting bit0 of the **bmCapability** field of the PHDC class function descriptor to 0.
		2. Upon the reception and confirmation of descriptors, if the host under test recognizes the PHDC device class, it shall send a **SET_CONFIGURATION** request to the simulated device as the last step of the enumeration process.
		3. The simulated device issues an "**Association Request**" without a preceding Metadata message preamble to the host under test.
		4. The host under test will respond with an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "Association Abort". It shall be verified that the host does not send either the **SET_FEATURE(METADATA)** message or the Metadata message preamble before.
		5. The simulated device will send an "**Association Abort**" message in order to move the host under test to the Unassociated State.
		6. After this, it shall be verified that the host under test does not send a **CLEAR_FEATURE (METADATA)** message.
Pass/Fail criteria		▪ In step 4, the host under test sends an "Association Response" after receiving the "Association Request".
		▪ In step 6, the host under test does not send a CLEAR_FEATURE(METADATA) message.
Notes		

TP Id		TP/PHDC/HOS/MDMP/SC/BV-002		
TP label		Manager only supports bQoSEncodingVersion=01h		
Coverage	**Spec**	[USB DevClass]		
	Testable items	ReqMetaDataPream 7; M	ReqMetaDataPream 8; M	
Applicability		C_HOST_PHDC_001 AND C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		

Test procedure		1.	Connect the host under test and simulated device, then the enumeration process shall start automatically. The simulated device will inform the host under test that it supports the Metadata message preamble feature setting bit0 of the **bmCapability** field of the PHDC class function descriptor to 1. Furthermore, it will send one **BULK IN** endpoint descriptor, followed by a QoS descriptor (field **bQoSEncodingVersion=02h**).
		2.	Upon the reception and confirmation of descriptors, if the host under test recognizes the PHDC device class, it shall send a **SET_CONFIGURATION** request to the simulated device as the last step of the enumeration process.
		3.	Perform an action on the host that enables the Metadata message preamble feature (as defined in the PIXIT I_HOST_PHDC_001).
		4.	The simulated device issues an "**Association Request**" without a preceding Metadata message preamble to the host under test.
		5.	The host under test will send a **SET_FEATURE(METADATA)** message. It will be verified that the high-order byte of the wValue field of the SET_FEATURE message is set to 01h.
Pass/Fail criteria		▪	In step 5, wValue field of the SET_FEATURE(METADATA) message is checked:
			• bmRequestType = 21
			• bRequest = 03
			• wValue = **01**01
			• wIndex = PHDC interface
			• wLength = 0000
Notes			

TP Id		TP/PHDC/HOS/MDMP/SC/BV-003		
TP label		Agent only supports bQoSEncodingVersion=01h		
Coverage	Spec	[USB DevClass]		
	Testable items	ReqMetaDataPream 9; M		
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1.	Connect the host under test, simulated device, then the enumeration process shall start automatically. The simulated device will inform the host under test that it supports the Metadata message preamble feature setting bit0 of the **bmCapability** field of the PHDC class function descriptor to 1. Furthermore, the field **bQoSEncodingVersion** of the PHDC QoS descriptor will be set to 01h.	
		2.	Upon the reception and confirmation of descriptors, if the host under test recognizes the PHDC device class, it shall send a **SET_CONFIGURATION** request to the simulated device as the last step of the enumeration process.	
		3.	Perform an action on the host that enables the Metadata message preamble feature (as defined in the PIXIT I_HOST_PHDC_001).	
		4.	The simulated device issues an "**Association Request**" without a preceding Metadata message preamble to the host under test.	
		5.	The host under test will send a **SET_FEATURE(METADATA)** message. It will be verified that the high-order byte of the wValue field of the SET_FEATURE message is set to 01h.	

Pass/Fail criteria	▪ In step 5, check that the wValue field of the SET_FEATURE(METADATA) message is as specified in the test procedure.
	• bmRequestType = 21
	• bRequest = 03
	• wValue = **01**01
	• wIndex = PHDC interface
	• wLength = 0000
Notes	

A.6   Subgroup 2.4: Metadata message preamble transfer (TRANS)

TP Id		TP/PHDC/HOS/MDMP/TRANS/BV-000_A		
TP label		Number of transfers after a Metadata Message Preamble (manager to agent)		
Coverage	Spec	[USB DevClass]		
	Testable items	SendMetaData 4; M	MetaDataPream 1; M	MetaDataPream 2; M
		MetaDataPream 3; M	MetaDataPream 4; M	MetaDataPream 5; M
		MetaDataPream 6; M	MetaDataPream 7; M	MetaDataPream 8; M
		MetaDataPream 9; M		
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Wait until the Metadata message preamble feature is enabled.		
		a. Connect the host under test and simulated device.		
		b. Wait until the end of the enumeration process.		
		c. Perform an action on the host that enables the Metadata message preamble feature as defined in the PIXIT I_HOST_PHDC_001.		
		d. The simulated device sends an "**Association Request**"; it includes a standard configuration supported by the manager under test (in case of TH, PO, GM, BPM, WS, AM, IP or PF specializations) or an extended configuration with one optional object (in case of HUB, ST or CV specializations)		
		e. The host under test sends a **SET_FEATURE(METADATA)** in order to enable the Metadata message preamble feature.		
		2. The host under test will send an "**Association Response**" preceded by a Metadata message preamble (the value of the bNumTransfers field is captured).		
		a. If the manager under test replies with an **Association Response** (accepted), the simulated agent will start the confirmed data sending. The quantity of confirmed data transfers will be equal to the **bNumTransfers** field of the Metadata message preamble that the manager under test sent.		
		b. If the manager under test replies with an **Association Response** (accepted-unknown-config), the simulated agent will send the configuration. This configuration should be accepted by the manager, and the simulated agent will start the confirmed data sending. The quantity of confirmed data transfers will be equal to the **bNumTransfers** field of the Metadata message preamble that the manager under test sent –1.		
		3. The manager under test acknowledges each simulated agent message by sending a rors-cmip-confirmed-event-report (in case 2.a) or a result = accepted-unknown-config message plus bNumTransfers-1 rors-cmip-confirmed-event-reports (in case 2.b).		
		4. The acknowledging of the last confirmed data will be preceded by a new Metadata message preamble.		

Pass/Fail criteria	▪	In step 2, the Metadata message preamble has been sent and the syntax of the Metadata message preamble fulfils the spec:
		• aSignature field: "PhdcQoSSignature" (50 68 64 63 51 6F 53 53 69 67 6E 61 74 75 72 65 in hexadecimal)
		• bNumtransfers>0
		• bQoSEncodingVersion=01h
		• bmLatencyReliability contains 8 (medium.best) since medium.best is required for all transfers from a manager to an agent.
		• bOpaqueDataSize between 0 and EP max packet size minus 21)
	▪	In step 4, a new Metadata message preamble is detected after "bNumTransfers" messages are sent by the host.
Notes		

TP Id		TP/PHDC/HOS/MDMP/TRANS/BV-000_B		
TP label		Number of transfers after a Metadata Message Preamble (agent to manager)		
Coverage	Spec	[USB DevClass]		
	Testable items	SendMetaData 4; M	MetaDataPream 8; M	MetaDataPream 9; M
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		
Test procedure		1. Wait until the Metadata message preamble feature is enabled		
		a. Connect the host under test and simulated device.		
		b. Wait until the end of the enumeration process.		
		c. Perform an action on the host that enables the Metadata message preamble feature as defined in the PIXIT I_HOST_PHDC_001.		
		d. The simulated device sends an "**Association Request**". It includes a standard configuration supported by the manager under test (in case of TH, PO, GM, BPM, WS, AM, IP or PF specializations) or an extended configuration with one optional object (in case of HUB, ST or CV specializations).		
		e. The host under test sends a **SET_FEATURE(METADATA)** in order to enable the Metadata message preamble feature.		
		2. The host under test will send an "**Association Response**" preceded by a Metadata message preamble.		
		a. If the manager under test replies with an Association Response (accepted), the simulated agent will start the confirmed data sending. The first data will be preceded by a Metadata message preamble with **bNumTransfers=5**.		
		b. If the manager under test replies with an Association Response (accepted-unknown-config), the simulated agent will send the configuration preceded by a Metadata message preamble with **bNumTransfers=5**. This configuration should be accepted by the manager and the simulated agent will start the confirmed data sending.		
		3. The manager under test acknowledges each simulated agent message by sending a rors-cmip-confirmed-event-report (in cases 2.a and 2.b) or a result = accepted-unknown-config message in case 2.b).		
		4. After the simulated agent has sent five transfers (i.e., five confirmed data messages (2a) or one configuration plus four confirmed data messages (2b)), the simulated agent will send a Metadata preamble followed by another confirmed data message.		
		5. The manager under test shall acknowledge this last confirmed data message that is preceded by a Metadata message preamble by sending a rors-cmip-confirmed-event-report preceded by a Metadata preamble (if bNumTransfers have already been sent by the manager).		

Pass/Fail criteria	▪ In step 3, the manager under test acknowledges each simulated agent message.
	▪ In step 5, the manager under test acknowledges the last message sent by the simulated agent that is preceded by a Metadata message preamble.
Notes	

A.7 Subgroup 2.5: Metadata message preamble feature error conditions (ERR)

TP Id		TP/PHDC/HOS/MDMP/ERR/BV-000		
TP label		Metadata Message Preamble expected but not received		
Coverage	Spec	[USB DevClass]		
	Testable items	MetaDataPreamError 2; M	MetaDataPreamError 5; M	MetaDataPreamError 6; M
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		

Test procedure		1. Wait until the Metadata message preamble feature is enabled.
		
		    a. Connect the host under test and simulated device.
		
		    b. Wait until the end of the enumeration process.
		
		    c. Perform an action on the Host that enables the Metadata message preamble feature as defined in the PIXIT I_HOST_PHDC_001.
		
		    d. The simulated device sends an "**Association Request**".
		
		    e. The host under test sends a **SET_FEATURE(METADATA)** in order to enable the Metadata message preamble.
		
		2. The host under test will send an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message preceded by a Metadata message preamble.
		
		3. The simulated device will send a message to the host under test. This message should be preceded by a Metadata message preamble, but it will be omitted in order to check the response of the host. The type of message will depend on the Association Response sent by the host:
		
		    a. If the host under test sends an "**Association Response (accepted)**", then the simulated device will send confirmed data.
		
		    b. If the host under test sends an "**Association Response (accepted-unknown-config)**", then the simulated device will send a configuration.
		
		4. As the host expects to receive a Metadata message preamble, it shall send 2 messages: **SET_FEATURE ENDPOINT_HALT** and **CLEAR_FEATURE ENDPOINT_HALT.**
		
		5. Now, the simulated agent will send a valid Metadata message preamble that precedes confirmed data (if the manager under test sent an Association Response (accepted) in step 2) or a configuration (if the manager under test sent an Association Response (accepted-unknown-config) in step 2).
		
		6. The host under test shall acknowledge that transmission.		

Pass/Fail criteria		▪ In step 4, the host under test sends a SET_FEATURE ENDPOINT_HALT and a CLEAR_FEATURE ENDPOINT_HALT. ▪ In step 6, the host acknowledges a new Metadata message preamble after sending a CLEAR_FEATURE ENDPOINT_HALT by sending a data confirmation (if the simulated agent sent a confirmed data) or a configuration confirmation (if the agent sent its configuration).		
Notes				

TP Id		TP/PHDC/HOS/MDMP/ERR/BV-001		
TP label		Metadata Message Preamble received with invalid bmLatencyReliability value.		
Coverage	**Spec**	[USB DevClass]		
	Testab le items	MetaDataPreamError 3; M	MetaDataPreamError 5; M	MetaDataPreamError 6; M
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		

Test procedure		1. Wait until the Metadata message preamble feature is enabled.
		
		   a. Connect the host under test and simulated device.
		
		   b. Wait until the end of the enumeration process.
		
		   c. Perform an action on the host that enables the Metadata message preamble feature as defined in the PIXIT I_HOST_PHDC_001.
		
		   d. The simulated device sends an "**Association Request**".
		
		   e. The host under test sends a **SET_FEATURE(METADATA)** in order to enable the Metadata message preamble.
		
		2. The host under test will send an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message preceded by a Metadata message preamble.
		
		3. The simulated device will send a message to the host under test. This message will be preceded by a Metadata message preamble with an invalid bmLatencyReliability value (for example, bit 6 set to 1). The type of message will depend on the Association Response sent by the host:
		
		   a. If the host under test sends an "**Association Response (accepted)**", then the simulated device will send a confirmed data.
		
		   b. If the host under test sends an "**Association Response (accepted-unknown-config)**", then the simulated device will send a configuration.
		
		4. As the host has received a Metadata message preamble with an invalid bmLatencyReliability value, it shall send 2 messages: **SET_FEATURE ENDPOINT_HALT** and **CLEAR_FEATURE ENDPOINT_HALT.**
		
		5. Now, the simulated agent will send a valid Metadata message preamble that precedes confirmed data (if the manager under test sent an Association Response (accepted) in step 2) or a configuration (if the manager under test sent an Association Response (accepted-unknown-config) in step 2).
		
		6. The host under test shall acknowledge that transmission.		

Pass/Fail criteria		▪ In step 4, the host under test sends a SET_FEATURE ENDPOINT_HALT and a CLEAR_FEATURE ENDPOINT_HALT. ▪ In step 6, the host acknowledges a new Metadata message preamble after sending a CLEAR_FEATURE ENDPOINT_HALT by sending a data confirmation (if the simulated agent sent a confirmed data) or a configuration confirmation (if the agent sent its configuration).		
Notes				

TP Id		TP/PHDC/HOS/MDMP/ERR/BV-002		
TP label		Metadata Message Preamble received with invalid bNumTransfers value.		
Coverage	**Spec**	[USB DevClass]		
	Testable items	MetaDataPreamError 4; M	MetaDataPreamError 5; M	MetaDataPreamError 6; M
Applicability		C_HOST_PHDC_003 AND C_MAN_OXP_038 AND C_MAN_OXP_000		
Initial condition		The simulated device is plugged into the host under test.		

Test procedure		1. Wait until the Metadata message preamble feature is enabled.
		
		    a. Connect the host under test and simulated device.
		
		    b. Wait until the end of the enumeration process.
		
		    c. Perform an action on the host that enables the Metadata message preamble feature as defined in the PIXIT I_HOST_PHDC_001.
		
		    d. The simulated device sends an "**Association Request**".
		
		    e. The host under test sends a **SET_FEATURE(METADATA)** in order to enable the Metadata message preamble.
		
		 2. The host under test will send an "**Association Response**" (accepted, accepted-unknown-config or rejected) or an "**Association Abort**" message preceded by a Metadata message preamble.
		
		 3. The simulated device will send a message to the host under test. This message will be preceded by a Metadata message preamble with an invalid bNumTransfers value (bNumTransfers = 0). The type of message will depend on the Association Response sent by the host:
		
		    a. If the host under test sends an "**Association Response (accepted)**", then the simulated device will send a confirmed data.
		
		    b. If the host under test sends an "**Association Response (accepted-unknown-config)**", then the simulated device will send a configuration.
		
		 4. As the host has received a Metadata message preamble with an invalid bNumTransfers value, it shall send 2 messages: **SET_FEATURE ENDPOINT_HALT** and **CLEAR_FEATURE ENDPOINT_HALT.**
		
		 5. Now, the simulated agent will send a valid Metadata message preamble that precedes confirmed data (if the manager under test sent an Association Response (accepted) in step 2) or a configuration (if the manager under test sent an Association Response (accepted-unknown-config) in step 2).
		
		 6. The host under test shall acknowledge that transmission.		

Pass/Fail criteria		▪ In step 4, the host under test sends a SET_FEATURE ENDPOINT_HALT and a CLEAR_FEATURE ENDPOINT_HALT. ▪ In step 6, the host acknowledges a new Metadata message preamble after sending a CLEAR_FEATURE ENDPOINT_HALT by sending a data confirmation (if the simulated agent sent a confirmed data) or a configuration confirmation (if the agent sent its configuration).		
Notes				

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