Car Connectivity Consortium

MirrorLink®

Device Attestation Protocol Test Specification

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TERMS AND ABBREVIATIONS

DAP	Device Attestation Protocol
UPnP	Universal Plug and Play

1 ABOUT

This document specifies all MirrorLink protocol conformance test cases for the MirrorLink Device Attestation Protocol [2].

The specification lists a series of requirements, either explicitly or within the text, which are mandatory elements for a compliant solutions. Recommendations are given, to ensure optimal usage and to provide suitable performance. All recommendations are optional.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are following the notation as described in RFC 2119 [1].

1. MUST: This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.
2. MUST NOT: This phrase, or the phrase "SHALL NOT", mean that the definition is an absolute prohibition of the specification.
3. SHOULD: This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
4. SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
5. MAY: This word, or the adjective "OPTIONAL", means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option MUST be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option MUST be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides.)

2 DEFINITIONS

2.1 Execution of Test Cases

Every test case is uniquely identified by an identifier.

- A MirrorLink server MUST pass all test cases, starting with SR.
- A MirrorLink client MUST pass all test cases, starting with CL

Every test case description includes an entry, whether the test cases is considered mandatory or not.

- Test cases marked as MANDATORY, MUST be executed.
- Test cases marked as CONDITIONAL, MUST be executed if the given condition is met.
- Test cases marked as CONDITIONAL, MUST NOT be executed if the given condition is not met.
- Test cases marked as NONE, MUST NOT be executed

2.2 Server Definitions

The following definitions are frequently used in different server test cases. Usage is indicated by the given designator name.

2.2.1 DAP Server Launch

Launch the DAP Server on the MirrorLink Server.

Step	Name	Description	Expected Result
1	UPnP Connect	Prepare the UPnP connection by making an initialization, registering the client and waiting for the device to announce itself.	• The device does announce itself.
2	UPnP Device Description	Read the server's device description from the announced URL.	• Device description can be parsed • Support for TmApplicationServer:1 service • Support for TmClientProfile:1 service
3	UPnP Application Listing	Call UPnP ApplicationServer:1 GetApplicationList action and receive server's application list	• Device responds to GetApplicationList action
4	DAP identification	Identify the DAP server, checking for DAP protocolID	• Successful identification of DAP server • Only 1 DAP server provided
5	UPnP Launch Application	Call UPnP ApplicationServer:1 LaunchApplication action and receive the DAP server's URL.	• Receive URL, without getting an error message or a timeout.

2.3 Client Definitions

The following definitions are frequently used in different client test cases. Usage is indicated by the given designator name.

2.3.1 DAP Client Launch

Launch the DAP Client on the MirrorLink Client. The DAP client test cases are executed with the MirrorLink Client device being set to Drive Mode, as DAP may not be enforced in Park Mode.

Step	Name	Description	Expected Result
1	UPnP Connect	Announce the device to the client. Note: Send UPnP Bye-Bye message, prior UPnP connect, if UPnP Server is still operational. Test Engineer sets the DUT into Drive mode (if supported)	• UPnP announcement broadcast is read • UPnP control point requests the server's device description from provided URL
2	UPnP Device Description	Receive request to provide the server device description. Include TmApplicationServer:1 service into the response.	
3	DAP Session Launch Trigger	Test Engineer is asked to executed the known steps (PIXIT) to launch the DAP session on the DUT. Note: Session launch may happen automatically.	• Client sends UPnP ApplicationServer:1 GetApplicationList action
4	DAP identification	Receive UPnP ApplicationServer:1 GetApplicationList action. Include a DAP server into the response.	• Client sends UPnP ApplicationServer:1 LaunchApplication action • The appID is identical to the DAP server
5	DAP Launch	Receive UPnP ApplicationServer:1 LaunchApplication action. Provide URL	• DAP client makes a TCP connection to the DAP server

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3 SERVER FEATURE TEST CASES

3.1 UPnP Operation

3.1.1 SR/DAP/UPNP/Announcement

Requirement: MANDATORY

Condition: None

This tests checks the UPnP announcements, whether a DAP server is available.

Step	Name	Description	Expected Result
1	UPnP Connect	Prepare the UPnP connection by making an initialization, registering the client and waiting for the device to announce itself.	• The device does announce itself.
2	UPnP Device Description	Read the server's device description from the announced URL.	• Device description can be parsed • Support for TmApplicationServer:1 service • Support for TmClientProfile:1 service
3	UPnP Application Listing	Call UPnP ApplicationServer:1 GetApplicationList action and receive server's application list	• Device responds to GetApplicationList action
4	DAP identification	Identify the DAP server, checking for DAP protocolID	• Successful identification of DAP server • Only 1 DAP server provide

Table 1: DAP Server UPnP Announcement

3.1.2 SR/DAP/UPNP/Launch

Requirement: MANDATORY

Condition: None

This tests checks, whether the DAP server can be launched from the MirrorLink client and whether the DAP server returns a valid URL.

Step	Name	Description	Expected Result
1	UPnP Connect	Prepare the UPnP connection by making an initialization, registering the client and waiting for the device to announce itself.	• The device does announce itself.
2	UPnP Device Description	Read the server's device description from the announced URL.	• Device description can be parsed • Support for TmApplicationServer:1 service • Support for TmClientProfile:1 service
3	UPnP Application Listing	Call UPnP ApplicationServer:1 GetApplicationList action and receive server's application list	• Device responds to GetApplicationList action

Step	Name	Description	Expected Result
4	DAP identification	Identify the DAP server, checking for DAP protocolID	• Successful identification of DAP server • Only 1 DAP server provide
5	UPnP Launch Application	Call UPnP ApplicationServer:1 LaunchApplication action and receive the DAP server's URL.	• Receive URL, without getting an error message or a timeout.
6	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 2: DAP Server Launch

3.2 Protocol Operation

3.2.1 SR/DAP/MSG/AttestationRequest

Requirement: MANDATORY

Condition: None

This test checks, whether the DAP server can attest the different MirrorLink components, i.e. whether the server responds with a Device Attestation Response message to a Device Attestation Request message. This test case does not verify the content of the response.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the { VNC Server, UPnP Server, RTP Server, RTP Client, CDB Endpoint, Device } Use CCC trust root.	• Receive Device Attestation Response • DAP response with Error Value "1" for components, which cannot be attested (or are not implemented).
3	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 3: DAP Server Attestation Request

3.2.2 SR/DAP/MSG/AttestationRequest10sDelay

Requirement: MANDATORY

Condition: None

This test checks, whether the DAP server is waiting at 10s for the MirrorLink Client to connect to the advertised TCP port.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	Wait for TCP connect	Establish a TCP connection to the DUT, 10s after the URL has been received	• TCP connection succeeds
2	DAP Attestation Request	Request device attestation for the * (Wildcard) Use CCC trust root.	• Receive Device Attestation Response within 10s. • DAP response with Error Value "1" for components, which cannot be attested (or are not implemented).
3	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 4: DAP Server Attestation Request with 10s delay

3.2.3 SR/DAP/MSG/AttestationResponse

Requirement: MANDATORY

Condition: None

This test checks and verifies the DAP server's response to a DAP client's request. The test case verifies all certificates and signatures provided.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the { VNC Server, UPnP Server, RTP Server, RTP Client, CDB Endpoint, Device } Use CCC trust root.	• Receive Device Attestation Response • ComponentID includes the allowed values ("*" not allowed)
3	Verify server manufacturer certificates	Verify HASH value with known public client manufacture key	• Trust chain validated • Only RSA keys used • Key length 2048 or 4096-bit with SHA-512 • Not more than 3 certificates in chain • Correct certificate order (cert, signing the device cert first)
4	Verify server device certificate	Verify HASH value with public key from server manufacturer certificate	• Check ok • Only RSA keys used • Key length 2048-bit with SHA-256 or SHA-512
5	Verify quote signature	Verify provide quote using public key from server device certificate	• Check ok
6	Check result	Check the result field	• Successful (existing component) • Component not existing (non-existing component)
7	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 5: DAP Server Attestation Response

3.2.4 SR/DAP/MSG/VersionSupport

Requirement: MANDATORY

Condition: None

This test checks, whether the DAP server can handle different DAP versions.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation providing following DAP versions: • 1.0 • 1.1 • 3 random versions > 1.1 Use a component, which is known to be attestable. Use CCC trust root.	• Receive Device Attestation Response • ComponentID includes the allowed values ("*" not allowed)
3	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 6: DAP Server Attestation Request

3.2.5 SR/DAP/MSG/AttestationWildcard

Requirement: MANDATORY

Condition: None

This test checks, whether the DAP server can attest all components at once, i.e. whether the server responds with a Device Attestation Response message to a Device Attestation Request message, using the wildcard component identifier. The test case verifies all certificates and signatures provided.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the * (Wildcard) Use CCC trust root.	• Receive single Device Attestation Response • ComponentID includes the allowed values ("*" not allowed) • DAP response includes "MirrorLink:Device" and "TerminalMode:UPnP-Server" components • TerminalMode:UPnP-Server components includes an applicationPublicKey. • DAP response does not include components, which cannot be attested from the MirrorLink Server.
3	Wildcard received	Receive and verify DAP Server Attestation Response message, containing all attested components.	• Check ok • Trust chain validated
4	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 7: DAP Server Attestation Wildcard

3.2.6 SR/DAP/MSG/PortBinding

Requirement: MANDATORY

Condition: None

This test checks, if each attested component is using the correct port bindings, as given in the Device Attestation Response message.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the { VNC Server, UPnP Server, RTP Server, RTP Client, CDB endpoint, Device } Use CCC trust root.	• Receive Device Attestation Response • ComponentID includes the allowed values ("*" not allowed)
3	DAP Attestation Response	Receive and verify DAP Server Attestation Response message	• Check ok • Trust chain validated

Step	Name	Description	Expected Result
		Note: DUT may not attest VNC Server, RTP Server, RTP Client and CDB Endpoint.	
4	UPnP Launch Components	Call UPnP ApplicationServer:1 LaunchApplication action for attested components For UPnP Server: No launch required. For VNC Server: It is ok to launch any VNC based application.	• Receive URL, without getting an error message or a timeout. • URL is identical to port binding
5	UPnP Terminal Application	Call UPnP ApplicationServer:1 TerminateApplication action for launch attested component	• Receive TRUE response
6	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 8: DAP Server Attestation Port Binding

3.2.7 SR/DAP/MSG/TestCertificate

Requirement: MANDATORY

Condition: None

This test checks and verifies the DAP server's response to a DAP client's request using the CTS root. The MirrorLink Server is expected to return with an Error Code.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for "*" using the CTS trust root.	• Receive Device Attestation Response • Result Value is "3"
3	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 9: DAP Server Attestation Response for Test Certificate

3.3 Backward Compatibility

3.3.1 SR/DAP/COMP/11_10/AttestationWildcard

Requirement: CONDITIONAL

Condition: DUT implements MirrorLink 1.1

This test checks, whether the DAP server excludes ML 1.1 components, when connected to a ML 1.0 client.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the * (Wildcard) • Set version to 1.0 • Use CCC trust root.	• Receive single Device Attestation Response

Step	Name	Description	Expected Result
			• DAP response includes "TerminalMode:UPnP-Server" with an applicationPublicKey • DAP response does not include o "*" o "MirrorLink:Device" o Other components unknown in MirrorLink 1.0
3	Wildcard received	Receive and verify DAP Server Attestation Response message, containing all attested components.	• Check ok • Trust chain validated
4	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 10: DAP Server Attestation Wildcard – MirrorLink 1.0 Backward Compatibility

3.3.2 SR/DAP/COMP/12_11/AttestationWildcard

Requirement: CONDITIONAL

Condition: DUT implements MirrorLink 1.2

This test checks, whether the DAP server excludes ML 1.2 components, when connected to a ML 1.1 client.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions CTS advertises itself as a MirrorLink 1.1 compliant device.	
2	DAP Attestation Request	Request device attestation for the * (Wildcard) • Set version to 1.1 • Use CCC trust root.	• Receive single Device Attestation Response • DAP response includes "TerminalMode:UPnP-Server" with an applicationPublicKey • DAP response includes "MirrorLink:Device" • DAP response does not include o "*" o "MirrorLink:HSML" o "MirrorLink:WFD:RTSP" o Other components unknown in MirrorLink 1.1
3	Wildcard received	Receive and verify DAP Server Attestation Response message, containing all attested components.	• Check ok • Trust chain validated
4	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 11: DAP Server Attestation Wildcard – MirrorLink 1.2 to 1.1 Backward Compatibility

3.3.3 SR/DAP/COMP/12_10/AttestationWildcard

Requirement: CONDITIONAL

Condition: DUT implements MirrorLink 1.2

This test checks, whether the DAP server excludes ML 1.2 components, when connected to a ML 1.0 client.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions CTS advertises itself as a MirrorLink 1.0 compliant device.	
2	DAP Attestation Request	Request device attestation for the * (Wildcard) • Set version to 1.0 • Use CCC trust root.	• Receive single Device Attestation Response • DAP response includes "TerminalMode:UPnP-Server" with an applicationPublicKey • DAP response does not include o "*" o "MirrorLink:Device" o "MirrorLink:HSML" o "MirrorLink:WFD:RTSP" o Other components unknown in MirrorLink 1.0
3	Wildcard received	Receive and verify DAP Server Attestation Response message, containing all attested components.	• Check ok • Trust chain validated
4	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 12: DAP Server Attestation Wildcard – MirrorLink 1.2 to 1.0 Backward Compatibility

3.3.4 SR/DAP/COMP/UnknownComponentID

Requirement: MANDATORY

Condition: None

This test checks, whether the DAP server can handle unknown component identifier in the Device Attestation Request and correctly responds to it.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the "MirrorLink:ABCD" • Set version to 1.0 • Use CCC trust root.	• Receive single Device Attestation Response • Error Response with "Unknown Component ID" flag enabled
3	DAP Attestation Request	Request device attestation for the "TerminalMode:ABCD" • Set version to 1.1 • Use CCC trust root.	• Receive single Device Attestation Response • Error Response with "Unknown Component ID" flag enabled
4	DAP Attestation Request	Request device attestation for the "ABCD" • Set version to 1.2 • Use CCC trust root.	• Receive single Device Attestation Response • Error Response with "Unknown Component ID" flag enabled
5	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	• Receive TRUE response.

Table 13: DAP Server Attestation Wildcard – Unknown Components

3.4 PICS Validation

The PICS validation test cases will independently detect the existence of MirrorLink features in the DUT. All features, which are detectable, could in practice be used from a connected MirrorLink device, and are therefore subject to validation in the certification program through other test cases. Hence the objective of the PICS validation test cases is not to assess whether the feature is implemented correctly, but to collect supported features from the DUT and to check this against the entries made in the PICS document.

A feature, which is detected, but marked as "`not implemented`" in the PICS document will fail the test case. A feature, which is not detected, but marked as "`implemented`" in the PICS document, will fail the test case.

3.4.1 SR/DAP/PICS/Endpoint

Requirement: MANDATORY

Condition: None

This test case validates the PICS entries with respect to the DAP endpoint settings.

Step	Name	Description	Expected Result
1	UPnP Connect	Prepare the UPnP connection by making an initialization, registering the client and waiting for the device to announce itself.	The device does announce itself.
2	UPnP Device Description	Read the server's device description.	
3	UPnP Application Listing	Call UPnP ApplicationServer:1 GetApplicationList action.	• Receive Application listing
4	Check PICS feature	FEAT_SERVER_DAP_Device_Attestation	• Application listing includes DAP with appCategory "`0xF0000001`"

Table 14: MirrorLink Server DAP endpoint settings PICS Checkup

3.4.2 SR/DAP/PICS/Components

Requirement: MANDATORY

Condition: None

This test case validates the PICS entries with respect to the DAP components settings.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions	
2	DAP Attestation Request	Request device attestation for the * (Wildcard) Use CCC trust root.	• Receive single Device Attestation Response
4	Check PICS feature	FEAT_SERVER_DAP_VNC	• DAP response includes "`TerminalMode:VNC-Server`"
5	Check PICS feature	FEAT_SERVER_DAP_UPNP	• DAP response includes "`TerminalMode:UPnP-Server`"
6	Check PICS feature	FEAT_SERVER_DAP_RTP_Server	• DAP response includes "`TerminalMode:RTP-Server`"

Step	Name	Description	Expected Result
7	Check PICS feature	FEAT_SERVER_DAP_RTP_Client	• DAP response includes "TerminalMode:RTP-Client"
8	Check PICS feature	FEAT_SERVER_DAP_CDB	• DAP response includes "MirrorLink:CDB-Endpoint"
9	Check PICS feature	FEAT_SERVER_DAP_Device	• DAP response includes "MirrorLink:Device"

Table 15: MirrorLink Server DAP components settings PICS Checkup

4 CLIENT FEATURE TEST CASES

4.1 UPnP Operation

4.1.1 CL/DAP/UPNP/Identification

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client identifies the DAP server from the application listing and launches it.

Step	Name	Description	Expected Result
1	UPnP Connect	Announce the device to the client. Note: Send UPnP Bye-Bye message, prior UPnP connect, if UPnP Server is still operational. Test Engineer sets the DUT into Drive mode (if supported)	• UPnP announcement broadcast is read • UPnP control point requests the server's device description from provided URL
2	UPnP Device Description	Receive request to provide the server device description. Include TmApplicationServer:1 service into the response.	
3	DAP Session Launch Trigger	Test Engineer is asked to executed the known steps (PIXIT) to launch the DAP session on the DUT. Note: Session launch may happen automatically.	• Client sends UPnP ApplicationServer:1 GetApplicationList action
4	DAP identification	Receive UPnP ApplicationServer:1 GetApplicationList action. Include a DAP server into the response.	• Client sends UPnP ApplicationServer:1 LaunchApplication action • The appID is identical to the DAP server

Table 16: DAP Client UPnP Identification

4.1.2 CL/DAP/UPNP/Launch

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client launches the DAP client.

Step	Name	Description	Expected Result
1	UPnP Connect	Announce the device to the client. Note: Send UPnP Bye-Bye message, prior UPnP connect, if UPnP Server is still operational. Test Engineer sets the DUT into Drive mode (if supported)	• UPnP announcement broadcast is read • UPnP control point requests the server's device description from provided URL

Step	Name	Description	Expected Result
2	UPnP Device Description	Receive request to provide the server device description. Include TmApplicationServer:1 service into the response.	
3	DAP Session Launch Trigger	Test Engineer is asked to executed the known steps (PIXIT) to launch the DAP session on the DUT. Note: Session launch may happen automatically.	• Client sends UPnP ApplicationServer:1 GetApplicationList action
3	DAP identification	Receive UPnP ApplicationServer:1 GetApplicationList action. Include a DAP server into the response.	• Client sends UPnP ApplicationServer:1 LaunchApplication action • The appID is identical to the DAP server
4	DAP Launch	Receive UPnP ApplicationServer:1 LaunchApplication action. Provide URL	• DAP client makes a TCP connection to the DAP server
5	DAP disconnect	Disconnect TCP socket	• Disconnect TCP socket

Table 17: DAP Client Launch

4.2 Protocol Operation

4.2.1 CL/DAP/MSG/AttestationRequest

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client sends an attestation request message.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root

Table 18: DAP Client Attestation Request

4.2.2 CL/DAP/MSG/AttestationSuccess10sDelay

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client waits at least 10s to receive an attestation response.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root • TCP connection established within 10s • DAP Attestation Request message received within 10s
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures for all received attestation requests. Wait with response for 10s after the DAP Attestation Request message has been received.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 19: DAP Client Attestation Success – 10s Delay

4.2.3 CL/DAP/MSG/AttestationSuccess2048Bit

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can verify the certificates.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures for all received attestation requests. DAP response is using SizeOfSelect of 3 (three) 2048-bit Manufacturer Certificate and a 2048-bit intermediate certificate Test engineer is asked to launch any VNC based application.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 20: DAP Client Attestation Success – 2048 bit

4.2.4 CL/DAP/MSG/AttestationSuccess4096Bit

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can verify the certificates.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures for all received attestation requests. 4096-bit Manufacturer Certificate and a 4096-bit intermediate certificate Test engineer is asked to launch any VNC based application.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 21: DAP Client Attestation Success – 4096 bit

4.2.5 CL/DAP/MSG/AttestationSuccessTripleCerts

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can verify the certificates.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures for all received attestation requests. Manufacturer Certificate chain with 3 certificates with 4096-bit key length Test engineer is asked to launch any VNC based application.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 22: DAP Client Attestation Success – Triple Certs

4.2.6 CL/DAP/MSG/AttestationSuccessSizeOfSelect2

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can verify the certificates.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures for all received attestation requests. DAP response is using SizeOfSelect of 2 (two) Test engineer is asked to launch any VNC based application.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 23: DAP Client Attestation Success – Size of Select of 2

4.2.7 CL/DAP/MSG/AttestationSuccessSizeOfSelect4

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can verify the certificates.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures for all received attestation requests. DAP response is using SizeOfSelect of 4 (four) Test engineer is asked to launch any VNC based application.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 24: DAP Client Attestation Success – Size of Select of 4

4.2.8 CL/DAP/MSG/AttestationSuccessMinFeatureSet

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can verify the certificates.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with valid certificates and signatures only for the following components: • `MirrorLink:Device` • `TerminalMode:UPnP-Server` with `URL` and `applicationPublicKey` If the Client requests attestation of other components individually, the CTS will respond with "`Component not existing`". Test engineer is asked to launch any VNC based application in Drive Mode.	• Success full launch of any VNC application • VNC connection established. • Audio connection established (if supported from client)

Table 25: DAP Client Attestation Success – Minimum Feature Set

4.2.9 CL/DAP/MSG/AttestationFailureInvalidTrustRoot

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives a attestation response, and can detect invalid content.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide a DAP Attestation Response message with a certificate chain not pointing to the CTS root certificate.	
4	DAP Attestation failure	Client stops operation	• No further interaction (no connection is established for any invalid components)

Table 26: DAP Client Attestation Failure – Invalid Trust Root

4.2.10 CL/DAP/MSG/AttestationFailureInvalidManufacturerCertificate

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives a attestation response, and can detect invalid content.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with invalid manufacturer certificate.	
4	DAP Attestation failure	Client stops operation	• No further interaction (no connection is established for any invalid components)

Table 27: DAP Client Attestation Failure – Invalid Manufacturer Certificate

4.2.11 CL/DAP/MSG/AttestationFailureInvalidDeviceCertificate

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can detect invalid content.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root

Step	Name	Description	Expected Result
3	DAP Attestation Response	Provide DAP Attestation Response message with invalid device certificate.	
4	DAP Attestation failure	Client stops operation	• No further interaction (no connection is established for any invalid components)

Table 28: DAP Client Attestation Failure – Invalid Device Certificate

4.2.12 CL/DAP/MSG/AttestationFailureInvalidQuoteSignature

Requirement: CONDITIONAL

Condition: Support for DAP

This tests checks, whether the DAP client receives an attestation response, and can detect invalid content.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | UPnP Server | RTP Server | RTP Client | Device | * } • Correct CTS trust root
3	DAP Attestation Response	Provide DAP Attestation Response message with invalid quote signature.	
4	DAP Attestation failure	Client stops operation	• No further interaction (no connection is established for any invalid components)

Table 29: DAP Client Attestation Failure – Wrong Quote Signature

4.2.13 CL/DAP/MSG/UPnPPortBindingFailure

Requirement: CONDITIONAL

Condition: Support for DAP AND

Verify the URL of the attested component

This tests checks, whether the DAP client detects failure in the port bindings for the UPnP Server.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { UPnP Server | * } • Correct CTS trust root • Note: Individual attestation requests for other components must be correctly served.
3	DAP Attestation Response	Provide DAP Attestation Response message with valid manufacturer certificate, device certificate and quote signature.	

Step	Name	Description	Expected Result
4	DAP Attestation failure	Provided HTTP bindings, which are different from the one attested for the UPnP server	• No further interaction (no connection is established) • No application listing shown or otherwise available

Table 30: DAP Client UPnP Port Binding Failure

4.2.14 CL/DAP/MSG/RtpServerPortBindingFailure

Requirement: CONDITIONAL

Condition: Support for DAP AND

Verify the URL of the attested component

This tests checks, whether the DAP client detects failure in the port bindings of an RTP Server connection.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { RTP Server | * } • Correct CTS trust root • Note: Individual attestation requests for other components must be correctly served.
3	DAP Attestation Response	Provide DAP Attestation Response message with valid manufacturer certificate, device certificate and quote signature .	
4	Launch Application	Receive UPnP Application-Server:1 LaunchApplication action for RTP server; Provide non attested URL Note: Test Engineer may need to manually launch the RTP Server.	• No RTP connection is established (i.e. the RTP Client does not sent 1-byte UDP packets) • MirrorLink Client MAY terminate the RTP Server

Table 31: DAP Client RTP Server Port Binding Failure

4.2.15 CL/DAP/MSG/VncServerPortBindingFailure

Requirement: CONDITIONAL

Condition: Support for DAP AND

Verify the URL of the attested component

This tests checks, whether the DAP client detects failure in the port bindings of an VNC Server connection.

Step	Name	Description	Expected Result
1	DAP Client Launch	See Definitions	

Step	Name	Description	Expected Result
2	DAP Attestation Request	Receive DAP Attestation Request message	• Message send for { VNC Server | * } • Correct CTS trust root • Note: Individual attestation requests for other components must be correctly served.
3	DAP Attestation Response	Provide DAP Attestation Response message with valid manufacturer certificate, device certificate and quote signature.	
4	Launch Application	Receive UPnP Application-Server:1 LaunchApplication action for VNC application; Provide non attested URL Note: Test Engineer need to manually launch a VNC application	• No VNC session is established (i.e. the VNC Client does not perform any of VNC initialization steps) • MirrorLink Client MAY terminate the launched VNC application

Table 32: DAP Client VNC Server Port Binding Failure

5 REFERENCES

[1] IETF, RFC 2119, Keys words for use in RFCs to Indicate Requirement Levels, March 1997. http://www.ietf.org/rfc/rfc2119.txt

[2] Car Connectivity Consortium, "MirrorLink – Device Attestation", Version 1.1, CCC-TS-014