
Car Connectivity Consortium

MirrorLink®

VNC based Display and Control Test Specification

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1 TERMS AND ABBREVIATIONS

2 VNC Virtual Networking Computing

3

4 Mirror Link is a trademark of the Car Connectivity Consortium LLC.

5 Bluetooth is a registered trademark of Bluetooth SIG Inc.

6 RFB and VNC are registered trademarks of RealVNC Ltd.

7 UPnP is a registered trademark of UPnP Forum.

8 Other names or abbreviations used in this document may be trademarks of their respective owners.

Approved

1 ABOUT

This document specifies all MirrorLink protocol conformance test cases for the VNC based Display and Control specification [3].

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 [4].

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.)

1 2 DEFINITIONS

2 2.1 Execution of Test Cases

3 Every test case is uniquely identified by an identifier.

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

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

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

11 During the execution of some Server test cases, the test engineer is asked to validate, that the received VNC
12 Framebuffer content is replicating the MirrorLink Server's framebuffer, meant as a visual confirmation. In
13 case the MirrorLink Server is implementing a virtual framebuffer, the transmitted content is not visible on
14 the Server's display. In that case, the framebuffer content MUST be provided from the device manufacturer
15 as images and/or video clips.

16 There are no requirements for the order of the test cases within a test run. Individual test cases MUST NOT
17 fail, when being executed within a test run containing multiple test cases, unless specifically stated. The
18 physical connection (e.g. the USB cable) MUST NOT be disconnected and reconnected in between test cases
19 within a test session, unless specifically stated. Neither the MirrorLink Server nor Client MUST crash during
20 a test run.

21 2.2 Server Definitions

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

24 2.2.1.1 VNC Server Launch

25 This definition contains all necessary steps, which does launch a VNC server on the MirrorLink server. The
26 VNC server is waiting for the VNC client to connect via a TCP socket.

Step	Name	Description	Expected Result
1	UPnP Connect	Preparing the UPnP connection by making an initialization, registering the client and waiting for the device to announce itself.	<ul style="list-style-type: none">• Device announce itself in time
2	UPnP Device Description	Test the service description for parseable XML formatting and availability of service types and their control and event URLs.	<ul style="list-style-type: none">• the device description can be parsed• it indicates support for TmApplicationServer:1 service• it indicates support for TmClientProfile:1 service
3	UPnP Action GetMaxNum Profiles	Received the number of supported client profiles	<ul style="list-style-type: none">• UPnP action returns successfully with maxNumProfiles
4	UPnP Action SetClientProfile	Set client profile id to a number out of [0; maxNumProfiles-1]	<ul style="list-style-type: none">• UPnP action returns successfully with resulted client profile

		This test step MUST be skipped, if the maxNumProfiles is 1. ¹	
5	UPnP Action LaunchApplication	<p>Launch any of the advertised VNC based applications on the MirrorLink server device.</p> <p>Note: Some test cases define a particular application to be launched.</p>	<ul style="list-style-type: none"> • UPnP action returns successfully with valid URL

1 Table 1: VNC Server Launch – Test Steps

2 **Note:** If the MirrorLink server supports more than one Client Profile, all tests SHOULD be conducted for
 3 all supported client profiles individually.

4 **Note:** The CTS tool MAY skip steps 1-4, once an UPnP connection has been established.

5 2.2.1.2 VNC Server Handshake

6 This definition contains all necessary steps to complete the VNC Server handshaking. It is based on successful
 7 completion of the VNC Server Launch.

Step	Name	Description	Expected Result
1	VNC TCP Connect	Testing if the server device accepts incoming TCP connections on the announced VNC server port. TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.	<ul style="list-style-type: none"> • TCP connection can be established
2	VNC Valid Version	Test if the VNC server sends a valid ProtocolVersion message as begin of the handshaking phase	<ul style="list-style-type: none"> • Valid Server Protocol Version message received • Version is 3.8
3	VNC Security Type Support	Testing if the VNC server answers upon a ClientProtocolVersion with a SecurityTypeSupport message.	<ul style="list-style-type: none"> • The server sends a Security Type Supported message, including security type 1
4	VNC Security Type Result	Testing if the VNC server answers upon a SecurityTypeSelection message with a SecurityResult message. The selected security type is 1 (i.e. None).	<ul style="list-style-type: none"> • SecurityResult message with Ok response is received

8 Table 2: VNC Server Handshake – Test Steps

9 2.2.1.3 VNC Server Configuration

10 This definition contains all necessary steps to complete the VNC Server Configuration. It is based on successful
 11 completion of the VNC Server Handshake.

Step	Name	Description	Expected Result
1	VNC Init Server	Send Client Init message. The server MUST answer with a Server Init message.	<ul style="list-style-type: none"> • Valid Server Init message arrives
2	Server Display Configuration	Sends a Set Encoding message containing the encoding types 0, -223, -523, -524, and -525.	<ul style="list-style-type: none"> • Valid Server Display Configuration message arrives • The MirrorLink version is 1.0 or 1.1

¹ Set client Profile is tested separately.

Step	Name	Description	Expected Result
		A Server Display Configuration message is expected.	<ul style="list-style-type: none"> • There is support for ARGB888 and RGB565
3	Server Event Configuration	Send Client Display Configuration message <ul style="list-style-type: none"> - Client Width = Server framebuffer width - Client Height = Server framebuffer height A Server Event Configuration message is expected from the server.	<ul style="list-style-type: none"> • Valid Server Event Configuration message arrives • Support for Pointer events • Support for the following knob events <ul style="list-style-type: none"> ○ Knob_2D_shift_push, ○ Knob_2D_0_shift_right, ○ Knob_2D_0_shift_left, ○ Knob_2D_0_shift_up, ○ Knob_2D_0_shift_down, ○ Knob_2D_0_rotate_z, ○ Knob_2D_0_rotate_Z
4	Client Event Configuration	Send Client Event Configuration, which is identical to the Server Event Configuration received from the server before.	<ul style="list-style-type: none"> • No disconnection of the VNC session

Table 3: VNC Server Configuration

2.2.1.4 VNC Server Start Operation

3 This definition contains all necessary steps to start VNC framebuffer updates. It is based on successful completion of the VNC Server Configuration.

Step	Name	Description	Expected Result
1	Set Pixel Format	Send Set Pixel Configuration message for ARGB 888	
2	VNC Framebuffer Updates	Send non-incremental, full framebuffer update request message.	<ul style="list-style-type: none"> • No FB Update message received prior sending the initial FB Update Request message. • Valid Framebuffer Update messages arrive • Message contains Context Information for entire framebuffer, when needed • Message MUST NOT contain any FB encoding, not included in the SetEncodings message. • Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer) • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message
3	VNC Incremental Framebuffer Updates	Send incremental, full framebuffer update request messages (if necessary for the test case for presenting visual information) Wait with any Framebuffer Update Request message, until a potential Desktop Size Pseudo	<ul style="list-style-type: none"> • Valid Framebuffer Update message arrives • Framebuffer data within requested area • Message MUST NOT contain any FB encoding, not included in the SetEncodings message.

Step	Name	Description	Expected Result
		Encoding rectangle has been decoded.	<ul style="list-style-type: none">Framebuffer content is replicating server's framebuffer

1 Table 4: VNC Server Operation

2 **2.2.1.5 Intentional VNC Server Clean Up**

3 This definition contains all necessary steps to intentionally terminate the VNC server.

Step	Name	Description	Expected Result
1	VNC Bye-Bye	Send VNC ByeBye message	<ul style="list-style-type: none">Receive VNC ByeBye message
2	VNC TCP Disconnect	Disconnect the TCP socket	
3	VNC Client Termination	Terminate the Client	

4 Table 5: Intentional VNC Server Cleanup – Test Steps

5 **2.2.1.6 Unintentional VNC Server Cleanup**

6 This definition contains all necessary steps to unintentionally terminate the VNC server.

Step	Name	Description	Expected Result
1	VNC TCP Disconnect	Disconnect the TCP socket	
2	VNC Client Termination	Terminate the VNC Client	

7 Table 6: Unintentional VNC Server Cleanup – Test Steps

1 2.3 Client Definitions

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

4 2.3.1 VNC Client Launch

5 This definition contains all necessary steps, which does launch a VNC client on the MirrorLink client. The
 6 VNC client is making the connection to the VNC server via a TCP socket.

Step	Name	Description	Expected Result
1	UPnP Connect	Announce the device to the client.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Client sends UPnP ApplicationServer:1 GetApplicationList action
3	VNC based application identification	Receive UPnP ApplicationServer:1 GetApplicationList action. Include a VNC based application into the response.	<ul style="list-style-type: none"> • Client sends UPnP ApplicationServer:1 LaunchApplication action
4	VNC based application Launch	Receive UPnP ApplicationServer:1 LaunchApplication action. Provide URL	

7 Table 7: Launch VNC Server – Test Steps

8 **Note:** The VNC Client MAY immediate launch an application, skipping step 1 and 2, if the UPnP Server
 9 has not been terminated in between VNC test cases.

10 **Note:** The CTS tool MAY skip steps 1-3, once an UPnP connection has been established.

11 2.3.2 VNC Client Handshake

12 This definition contains all necessary steps to complete the VNC Client handshaking. It is based on successful
 13 completion of the VNC Client Launch.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none"> • A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version - RFB version 3.8	<ul style="list-style-type: none"> • A valid Client Protocol Version message is received • Support for RFB 3.8
3	VNC Security Type Selection	Send Security Type Supported message, only including security type None (1).	<ul style="list-style-type: none"> • A correct Client Security Type Selection message arrives. • Client selects security type None
5	VNC Security Type Selection	Send Security Type Result message	<ul style="list-style-type: none"> • Receive valid Client Init message.

14

Table 8: VNC Handshake – Test Steps

1 2.3.3 VNC Client Configuration

2 This definition contains all necessary steps to complete the VNC Client Configuration. It is based on successful completion of the VNC Client Handshake.

Step	Name	Description	Expected Result
1	VNC Set Encodings	Send Server Init message <ul style="list-style-type: none"> - Pixel format ARGB 888 - FB size WVGA (800 x 480) The test fails if no Set Encodings could be received.	<ul style="list-style-type: none"> • A valid Set Encodings message is received • Set Pixel Format message MAY come in between • Set Encodings includes MirrorLink Pseudo Encoding and Context Information Pseudo Encoding
2	VNC Client Display Configuration	Send VNC Server Display Configuration message. Enable support for all Pixel Formats Checks, if a Client Display Configuration has been received as an answer.	<ul style="list-style-type: none"> • Valid Client Display Configuration message arrives. •
3	VNC Client Event Configuration	Send VNC Server Event Configuration message Checks, if Client Event Configuration has been received as an answer.	<ul style="list-style-type: none"> • Valid Client Event Configuration is received arrives. If DUT supports MirrorLink-Certified Applications, the following checks MUST pass: <ul style="list-style-type: none"> • Support for Pointer events OR • Support for the knob event Knob_2D_shift_push AND the following knob event combinations: <ul style="list-style-type: none"> • Knob_2D_0_shift_right, Knob_2D_0_shift_left • Knob_2D_0_shift_up, Knob_2D_0_shift_down • Knob_2D_0_rotate_z, Knob_2D_0_rotate_Z
5	VNC Set Pixel Format	Wait for Framebuffer Update Request message Message MAY not arrive, if VNC Client is ok with ARGB 888. VNC Client MAY send the message anyway though.	<ul style="list-style-type: none"> • Set Pixel Format message MAY arrive

4 Table 9: VNC Client Configuration – Test Steps

5 2.3.4 VNC Client Start Operation

6 This definition contains all necessary steps to start VNC framebuffer updates. It is based on successful completion of the VNC Client Configuration.

Step	Name	Description	Expected Result
1	VNC Full Framebuffer Update Request	Wait for initial full Framebuffer Update Request message	<ul style="list-style-type: none"> • Framebuffer Update Request message arrives • Non-incremental • Requests full framebuffer

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Requested framebuffer update area within the VNC Server's framebuffer as provided in VNC Server Init. Requested Framebuffer Update area within the VNC Client's max. supported framebuffer resolution as provided through PIXIT information. Client does not use clipping and/or panning to show the entire screen (whole screen visible)
2	VNC Operation	Continue to provide Framebuffer Update (following the incremental flag) Change Pixel format on request.	<ul style="list-style-type: none"> Framebuffer Update Request messages arrive Requested framebuffer update area within the VNC Server's framebuffer as provided in VNC Server Init, or updated via Desktop Size Pseudo Encoding. Requested Framebuffer Update area within the VNC Client's max. supported framebuffer resolution as provided through PIXIT information. Client does not use clipping and/or panning to show the entire screen (whole screen visible) Set Pixel Format MAY only arrive with no outstanding framebuffer update request.

1 Table 10: VNC Client Start Operation – Test Steps

2 **2.3.5 Intentional VNC Client Clean Up**

3 This definition contains all necessary steps to intentionally terminate the VNC client.

Step	Name	Description	Expected Result
1	VNC Bye-Bye	Send VNC ByeBye message	<ul style="list-style-type: none"> VNC client disconnects the TCP socket
2	VNC TCP Disconnect	Disconnect the TCP socket	
3	VNC Server Termination	Terminate the VNC Server	
4	UPnP Disconnect	Send SSDP:ByeBye message	

4 Table 11: Intentional VNC Client Cleanup – Test Steps

5 **2.3.6 Unintentional VNC Client Cleanup**

6 This definition contains all necessary steps to unintentionally terminate the VNC client.

Step	Name	Description	Expected Result
1	VNC TCP Disconnect	Disconnect the TCP socket	
2	VNC Server Termination	Terminate the VNC Server	
3	UPnP Disconnect	Send SSDP:ByeBye message	

Table 12: Unintentional VNC Client Cleanup – Test Steps

1
2

1 3 SERVER FEATURE TEST CASES

2 3.1 VNC Handshaking Phase

3 3.1.1 SR/VNC/HS/TcpConnect

4 Requirement: MANDATORY

5 Condition: None

6 Testing if the server device accepts incoming TCP connections on the UPnP announced VNC server port. In
7 this step there is no check whether the server really is a VNC server, but only if a TCP connection can be
8 established.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Make TCP connection to the URI provided from the UPnP LaunchApplication response. In this step there is no check whether the server really is a VNC server.	<ul style="list-style-type: none">• TCP connection is established
3	Unintentional VNC Server Cleanup	See Definitions	

9 Table 13: VNC TCP Connect – Test Steps

10 3.1.2 SR/VNC/HS/TcpReconnect

11 Requirement: MANDATORY

12 Condition: None

13 Testing if the server device accepts incoming TCP connections on the UPnP announced VNC server port after a previous connection to the same port has been closed. In this step there is no check whether the server really is a VNC server, but only if a TCP connection can be established.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Make TCP connection to the URI provided from the UPnP LaunchApplication response. In this step there is no check whether the server really is a VNC server.	<ul style="list-style-type: none">• TCP connection established
3	VNC TCP Disconnect	Disconnect the TCP socket	
4	UPnP Action LaunchApplication	Launch the same application again	<ul style="list-style-type: none">• UPnP action returns successfully with valid URL
3	VNC TCP Re-connect	Make TCP connection to the URI provided from the UPnP LaunchApplication response.	<ul style="list-style-type: none">• TCP connection established

Step	Name	Description	Expected Result
		In this step there is no check whether the server really is a VNC server.	
4	Server VNC Cleanup	See Definitions	

1 Table 14: VNC TCP Reconnect – Test Steps

2 **3.1.3 SR/VNC/HS/ValidVersion**

3 Requirement: MANDATORY

4 Condition: None

5 Test if the VNC server sends a valid Protocol Version message as begin of the handshaking phase. The RFB version MUST be at least 3.8.
 6

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Testing if the server device accepts incoming TCP connections on the announced VNC server port. TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.	<ul style="list-style-type: none"> • TCP connection can be established
3	VNC Valid Version	Test if the VNC server sends a valid ProtocolVersion message as begin of the handshaking phase	<ul style="list-style-type: none"> • Valid Server Protocol Version message received • Version is at least 3.8
4	Unintentional VNC Server Cleanup	See Definitions	

7 Table 15: VNC Valid Version – Test Steps

8 **3.1.4 SR/VNC/HS/SecurityTypeSupport**

9 Requirement: MANDATORY

10 Condition: None

11 Test if the VNC server answers upon a ClientProtocolVersion with a SecurityTypeSupport message. The VNC server MUST at least be able to use the security type 1 (i.e. no security).
 12

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Testing if the server device accepts incoming TCP connections on the announced VNC server port. TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.	
3	VNC Valid Version	Test if the VNC server sends a valid Protocol Version message as begin of the handshaking phase.	<ul style="list-style-type: none"> • Valid Server Protocol Version message received

Step	Name	Description	Expected Result
4	VNC Security Type Support	<p>Send VNC Client Protocol Version message</p> <p>Testing if the VNC server answers upon a Client Protocol Version with a Security Type Support message.</p> <p>The VNC server MUST at least be able to use the security type 1 (None).</p>	<ul style="list-style-type: none"> • Version is 3.8 • Receive VNC Security Type Support message • Server does support security type 1 (None)
5	Unintentional VNC Server Cleanup	See Definitions	

Table 16: VNC Security Type Support – Test Steps

3.1.5 SR/VNC/HS/*SecurityTypeResult*

Requirement: MANDATORY

Condition: None

Test if the VNC server answers upon a Security Type Selection message with a Security Result message. The selected security type is 1 (i.e. None).

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	<p>Testing if the server device accepts incoming TCP connections on the announced VNC server port.</p> <p>TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.</p>	<ul style="list-style-type: none"> • TCP connection can be established
3	VNC Valid Version	Test if the VNC server sends a valid Protocol Version message as begin of the handshaking phase.	<ul style="list-style-type: none"> • Valid Server Protocol Version message received • Version is 3.8
4	VNC Security Type Support	Send VNC Client Protocol Version message	<ul style="list-style-type: none"> • Receive VNC Security Type Support message • Server does support security type 1 (None)
5	VNC Security Type Result	<p>Send VNC Security Type Selection message with Security Type 1 (None).</p> <p>Test if VNC server responds with a Security Result message.</p>	<ul style="list-style-type: none"> • VNC Security Result message arrives • A ok response is being signaled by the server
6	Unintentional VNC Server Cleanup	See Definitions	

Table 17: VNC Security Type Selection – Test Steps

1 **3.1.6 SR/VNC/HS/InvalidVersion**

2 Requirement: MANDATORY

3 Condition: None

4 Connecting a VNC client with an invalid RFB version MUST fail. In this case a 0 is to be sent by the server,
 5 followed by a reason string.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Testing if the server device accepts incoming TCP connections on the announced VNC server port. TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.	
3	VNC Valid Version	Test if the VNC server sends a valid Protocol Version message as begin of the handshaking phase.	<ul style="list-style-type: none"> • Valid Server Protocol Version message received • Version is 3.8
4	VNC Check Version	Send invalid Client Protocol Version In this case a 0 is to be sent by the server, followed by a reason string.	<ul style="list-style-type: none"> • Receive VNC Security Type Support message • Number of supported security types is zero • Receive valid security failure reason • VNC server disconnects TCP socket • Note: It is ok for the VNC Server to immediately disconnect the TCP socket.
5	VNC Server Cleanup	See Definitions	

6 Table 18: VNC Check Version 3.8 – Test Steps

7 **3.1.7 SR/VNC/HS/RejectUnsupportedSecurityType**

8 Requirement: MANDATORY

9 Condition: None

10 Test if the VNC server answers upon a Security Type Selection message requesting an unsupported security type with a failure message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Testing if the server device accepts incoming TCP connections on the announced VNC server port. TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.	<ul style="list-style-type: none"> • TCP connection can be established

Step	Name	Description	Expected Result
3	VNC Valid Version	Test if the VNC server sends a valid Protocol Version message as begin of the handshaking phase.	<ul style="list-style-type: none"> • Valid Server Protocol Version message received • Version is 3.8
3	VNC Security Type Support	Send VNC Client Protocol Version message	<ul style="list-style-type: none"> • Receive VNC Security Type Support message • Server does support security type 1 (None)
4	VNC Reject Unsupported Security Type	Send VNC Security Type Selection message with an unsupported Security Type. Test if the VNC server answers upon a Security Type Selection message requesting an unsupported security type with a failure message.	<ul style="list-style-type: none"> • VNC server disconnects • VNC server MAY send Security Result failure message followed by a Security Failure Reason message, prior disconnecting.
5	Unintentional VNC Server Cleanup	See Definitions	

1 Table 19: VNC Reject Unsupported Security Type – Test Steps

2 **3.1.8 SR/VNC/HS/RfbVersion3.7**

3 Requirement: MANDATORY

4 Condition: None

5 Test if the VNC server supports RFB version 3.7.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC TCP Connect	Testing if the server device accepts incoming TCP connections on the announced VNC server port. TCP socket MUST be established using SO_REUSEADDR flags or similar mechanism.	<ul style="list-style-type: none"> • TCP connection can be established
3	VNC Valid Version	Test if the VNC server sends a valid Protocol Version message as begin of the handshaking phase.	<ul style="list-style-type: none"> • Valid Server Protocol Version message received • Version is 3.8
4	VNC Security Type Support	Send VNC Client Protocol Version message with Version 3.7	<ul style="list-style-type: none"> • Receive VNC Security Type Support message • Server does support security type 1 (None)
5	Unintentional VNC Server Cleanup	See Definitions	

6 Table 20: VNC Server support of RFB 3.7

7

1 3.2 VNC Initialization

2 3.2.1 SR/VNC/INIT/InitServer

3 Requirement: MANDATORY

4 Condition: None

5 The server MUST answer upon a Client Init message correctly with a ServerInit message. If no ServerInit message is received at all, it is assumed, that the server didn't understand the client init message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Init Server	Send Client Init message. The server MUST respond with a Server Init message.	<ul style="list-style-type: none">• Valid ServerInit message arrives
4	Unintentional VNC Server Cleanup	See Definitions	

7 Table 21: VNC Init Server – Test Steps

8 3.2.2 SR/VNC/INIT/ServerDisplayConfiguration

9 Requirement: MANDATORY

10 Condition: None

11 Test if the VNC server sends a Server Display Configuration message upon a Set Encodings message including the MirrorLink Pseudo Encoding..

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Init Server	Send Client Init message The server MUST answer with a ServerInit message.	<ul style="list-style-type: none">• Valid Server Init message arrives
4	Default Display Configuration	Sends a SetEncoding message to containing the encoding types 0, -223, -523, -524, and -525. A Server Display Configuration message is expected	<ul style="list-style-type: none">• Valid Server Display Configuration message arrives• The MirrorLink version is 1.0 or 1.1• There is support for ARGB888 and RGB565
5	Intentional VNC Server Cleanup	See Definitions	

13 Table 22: Default Display Configuration – Test Steps

14 3.2.3 SR/VNC/INIT/ServerEventConfiguration

15 Requirement: MANDATORY

16 Condition: None

- 1 Test if the VNC server sends a Server Event Configuration message after having sent the Server Display Configuration message. The Server Event Configuration message MAY arrive directly after the Server Display Configuration message prior the Client Display Configuration message has been sent.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Init Server	Send Client Init message. The server MUST answer with a Server Init message. If no ServerInit message is	<ul style="list-style-type: none"> • Valid Server Init message arrives
4	Server Display Configuration	Sends a Set Encoding message containing the encoding types 0, -223, -523, -524, and -525. A Server Display Configuration message is expected.	<ul style="list-style-type: none"> • Valid Server Display Configuration message arrives • The MirrorLink version is 1.0 or 1.1 • There is support for ARGB888 and RGB565
5	Server Event Configuration	Send Client Display Configuration message A Server Event Configuration message is expected from the server.	<ul style="list-style-type: none"> • Valid Server Event Configuration message arrives • Support for Pointer events • Support for the following knob events <ul style="list-style-type: none"> ○ Knob_2D_shift_push, ○ Knob_2D_0_shift_right, ○ Knob_2D_0_shift_left, ○ Knob_2D_0_shift_up, ○ Knob_2D_0_shift_down, ○ Knob_2D_0_rotate_z, ○ Knob_2D_0_rotate_Z
6	Intentional VNC Server Cleanup	See Definitions	

4 Table 23: Support for Client Event Configuration – Test Steps

5 **3.2.4 SR/VNC/INIT/ServerMirrorLinkInitialization**

6 Requirement: MANDATORY

7 Condition: None

8 Send a Framebuffer Update Request message after the MirrorLink initialization (Display and Event Configuration messages) has been completed. Test if the VNC server responds to the first non-incremental, full framebuffer update request.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Init Server	Send Client Init message. The server MUST answer with a Server Init message. If no ServerInit message is	<ul style="list-style-type: none"> • Valid Server Init message arrives

Step	Name	Description	Expected Result
4	Server Display Configuration	Sends a Set Encoding message containing the encoding types 0, -223, -523, -524, and -525. A Server Display Configuration message is expected.	<ul style="list-style-type: none"> • Valid Server Display Configuration message arrives • The MirrorLink version is 1.0 or 1.1 • There is support for ARGB888 and RGB565
5	Server Event Configuration	Send Client Display Configuration message A Server Event Configuration message is expected from the server.	<ul style="list-style-type: none"> • Valid Server Event Configuration message arrives • Support for Pointer events • Support for the following knob events <ul style="list-style-type: none"> ○ Knob_2D_shift_push, ○ Knob_2D_0_shift_right, ○ Knob_2D_0_shift_left, ○ Knob_2D_0_shift_up, ○ Knob_2D_0_shift_down, ○ Knob_2D_0_rotate_z, ○ Knob_2D_0_rotate_Z
6	MirrorLink Configuration completed	Send Client Event Configuration message, which is identical to the Server Event Configuration received from the server before. Send Set Pixel Configuration message for ARGB888, if VNC server is not supporting ARGB888 natively. Send Framebuffer Update Request message (non-incremental, full update) MirrorLink Initialization completed	<ul style="list-style-type: none"> • Framebuffer Update message received • Message contains Context Information for entire framebuffer • Message contains update for entire framebuffer
7	Intentional VNC Server Cleanup	See Definitions	

1

Table 24: VNC Server MirrorLink Initialization – Test Steps

1 3.3 VNC Basic Operation

2 3.3.1 SR/VNC/BASIC/NonIncrementalFullFbUpdate

3 Requirement: MANDATORY

4 Condition: None

5 The server MUST answer upon a non-incremental, full Framebuffer Update Request message with a Framebuffer Update. The VNC server is expected to send a Framebuffer Update immediately. The test case specifies a timeout period of 5 sec though.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	Set Pixel Format	Send Set Pixel Configuration message for ARGB 888	
5	Non-incremental, full VNC Framebuffer Update	Send non-incremental, full framebuffer update request message. After reception of framebuffer update response, send next non-incremental, full framebuffer update request message. At least 10 iterations. Wait with any Framebuffer Update Request message, until a potential Desktop Size Pseudo Encoding rectangle has been decoded.	<ul style="list-style-type: none">No FB Update message received prior sending the initial FB Update Request message.Valid Framebuffer Update messages arriveMessage contains Context Information for entire framebufferMessage MUST NOT contain any FB encoding, not included in the SetEncodings message.Framebuffer Update received within 5sFramebuffer content is replicating server's framebuffer (visual confirmation from test engineer)Framebuffer update area is identical to requested areaNote: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message
6	Intentional VNC Server Cleanup	See Definitions	

8 Table 25: Non-incremental, Full VNC Framebuffer Update

9 If this test does not fail, the following test cases MUST be considered passed:

- 10
 - SR/VNC/HS/ValidVersion
 - SR/VNC/HS/SecurityTypeSupport
 - SR/VNC/HS/SecurityTypeSelection
 - SR/VNC/INIT/InitServer
 - SR/VNC/INIT/ServerDisplayConfiguration

- 1 • SR/VNC/INIT/ServerEventConfiguration
2 • SR/VNC/INIT/ServerMirrorLinkInitialization

3 **3.3.2 SR/VNC/BASIC/NonIncrementalPartialFbUpdate**

4 Requirement: MANDATORY

5 Condition: None

6 The server MUST answer upon a non-incremental, partial Framebuffer Update Request message with a
7 Framebuffer Update. The VNC server is expected to send a Framebuffer Update immediately. The test case
8 specifies a timeout period of 5 sec though.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	Set Pixel Format	Send Set Pixel Configuration message for ARGB 888	
5	Non-incremental, partial VNC Framebuffer Update	Send non-incremental, partial framebuffer update request message (Upper-left quarter of native framebuffer). After reception of framebuffer update response, send next non-incremental, full framebuffer update request message Rotate requested framebuffer area clockwise for each iteration. At least 10 iterations. Note: The test system SHOULD iterate automatically, with <1 iteration/3 s. The entire screen SHOULD be cleared, prior updating. Wait with any Framebuffer Update Request message, until a potential Desktop Size Pseudo Encoding rectangle has been decoded.	<ul style="list-style-type: none">• No FB Update message received prior sending the initial FB Update Request message.• Valid Framebuffer Update messages arrive• Message MUST NOT contain any FB encoding, not included in the SetEncodings message.• Contained pixel data does not cover non-requested area• Framebuffer Update received within 5s• Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)• Framebuffer update area is identical to requested area• Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message
6	Intentional VNC Server Cleanup	See Definitions	

10 Table 26: Non-incremental, Partial VNC Framebuffer Update

11 **3.3.3 SR/VNC/BASIC/IncrementalFbUpdate**

12 Requirement: MANDATORY

13 Condition: None

14 The server MUST answer upon an incremental Framebuffer Update Request message with a Framebuffer
15 Update. According to the specification the server is allowed to take an unlimited time to answer the update
16 request.

1 Thus the test engineer is asked to open an application, which does show varying content, or to switch between
 2 different screens. The server is expected to send a Framebuffer Update within a second timeout period on
 3 display changes.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	Set Pixel Format	Send Set Pixel Configuration message for ARGB 888	
5	Incremental, full VNC Frame Buffer Update	Send incremental, full framebuffer update request message. After reception of framebuffer update response, send next incremental, full framebuffer update request message. At least 10 iterations. Wait with any Framebuffer Update Request message, until a potential Desktop Size Pseudo Encoding rectangle has been decoded.	<ul style="list-style-type: none"> No FB Update message received prior sending the initial FB Update Request message. Valid Framebuffer Update message arrives Message MUST NOT contain any FB encoding, not included in the SetEncodings message. Framebuffer data within requested area Framebuffer content is replicating server's framebuffer
6	Server VNC Cleanup	See Definitions	

4 Table 27: Incremental VNC Framebuffer Update

5 3.3.4 SR/VNC/BASIC/ContextInformationPseudoEncoding

6 Requirement: MANDATORY

7 Condition: None

8 The test engineer is asked to launch all applications available from the phone, one-by-one. The VNC server
 9 is expected to answer the initial full Framebuffer Update Request message with a Framebuffer Update within
 10 1 s. The framebuffer update MUST contain context information within rectangles of encoding type -524. The
 11 contained values are being check for validity and compared with the values provided in the UPnP application
 12 listing.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch a VNC application from the UPnP getApplicationList	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Context Information Pseudo Encoding	Send non-incremental, full framebuffer update request Launch the next VNC based application. Send non-incremental, full framebuffer update request	<ul style="list-style-type: none"> Context information is in the beginning of the Framebuffer Update message Encoding type is -524 Application ID is identical to UPnP value

Step	Name	Description	Expected Result
		Continue, until all applications have been launched Wait with any Framebuffer Update Request message, until a potential Desktop Size Pseudo Encoding rectangle has been decoded.	<ul style="list-style-type: none"> • Trust levels are valid and identical to UPnP values • Content Category is valid and identical to UPnP value • Application Category is valid and identical to UPnP value • Context information contains information for the whole framebuffer • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message
6	Server VNC Cleanup	See Definitions	

Table 28: Supports Context Information Pseudo Encoding – Test Steps

3.3.5 SR/VNC/BASIC/ClientCutText

Requirement: MANDATORY

Condition: None

A Client Cut Text message is sent to the VNC server. If no framebuffer update message is sent as reply to the following framebuffer update request, it is assumed, that the server didn't interpret the client cut text message correctly.

Note, that it is not evaluated if the server interprets the message properly, but only if the server still answers the Framebuffer Update Request.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Client Cut Text	Send Client Cut Text message with medium sized text (20-100 bytes). Send non-incremental, full framebuffer update request. Send Client Cut Text message with empty text (0 bytes). Send non-incremental, full framebuffer update request. Send Client Cut Text message with large text (>32kByte bytes).	<ul style="list-style-type: none"> • Valid Framebuffer Update arrives on each framebuffer update request • Server MAY indicate received Client Cut Text • Framebuffer update area is within the requested Framebuffer area
6	Intentional VNC Server Cleanup	See Definitions	

1 **3.3.6 SR/VNC/BASIC/PointerEvents**

2 Requirement: MANDATORY

3 Condition: None

4 Mouse events for left mouse button are being sent to the VNC server (other mouse buttons are not tested, or
5 MUST be tested via IOP if supported).

6 This test requires a Drawing Test Application available on the MirrorLink server and supported from the
7 MirrorLink Client. The Drawing Test Application will need to have the following functionality:

- 8 - Single press followed by single release event at same position: Draw a single point
9 - Multiple press followed by single release event at different positions: Draw a single line from first
10 press to release position.
11 - Multiple release events, without previous press event: No line, no point.

12 If a Drawing Test Application is not available, Pointer Events MUST be tested through IOP test cases.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch Drawing Test Application	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Pointer events supported in Server Event Configuration message
4	VNC Server Start Operation	See Definitions	
5	Pointer Events	Send a series of pointer events with w = server's framebuffer width, h = server's framebuffer height: <ul style="list-style-type: none">• Press event at (w/2, h/2)• Release event at (w/2, h/2)• Continued press events from (w/2, 3h/4) to (3w/4, 3h/4)• Release at (3w/4, 3h/4)• Continued release events from (w/4, h/2) to (3w/4, h/2) Send non-incremental, full framebuffer update.	<ul style="list-style-type: none">• Valid Framebuffer Update arrives.• Framebuffer update area is within the requested Framebuffer area• Received framebuffer data shows the drawn shapes (1 single point in the middle, 1 line in 3 quarter)
6	Intentional Server VNC Cleanup	See Definitions	

13 Table 30: Pointer Events – Test Steps

14 **3.3.7 SR/VNC/BASIC/X11KeyEvents**

15 Requirement: MANDATORY

16 Condition: None

17 A number of key events are sent to the server. The test engineer is asked if the corresponding text is visible
18 on the MirrorLink server device.

19 This test requires a Text Test Application available on the MirrorLink server and supported from the Mir-
20 rorLink Client.

21 If a Text Test Application is not available, X11 Key Events MUST be tested through IOP test cases.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions Launch Text Test Application	
2	Server VNC Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check X11 Key Events	<p>Send a series of Key Press and Release events:</p> <ul style="list-style-type: none">Letters: 'a' - 'z'Letters: 'A' - 'Z'Numbers: '0' - '9'Symbols as specified: ' ', '!', "'", "#', '\$', '%', '&', "'", '(', ') ', '*', '+', ' , ',' - ', '.', '/', ' : ', ';' ', '< ', '=', '> ', '?' ', '@ ', '[' , ' \ ', ']' ', '^ ', '_ ', ' ` ', '{ ', ' ', ' } ', ' ~ ', Backspace, Return <p>Send non-incremental, full framebuffer update after each series.</p>	<ul style="list-style-type: none">Valid Framebuffer Update arrives.Received framebuffer data shows the key events.
6	Server VNC Cleanup	See Definitions	

1 Table 31: Check X11 Key Events – Test Steps

2 **3.3.8 SR/VNC/BASIC/IgnoreMultipleKeyUpEvents**

3 Requirement: MANDATORY

4 Condition: None

5 The server gets a sequence of three key-up events in between two sets of key-down and key-up events. The first key-down and key-up events have to result in the display of the letter 'a'. The following sequence of 6 three key-up events MUST be ignored. The last key-down, key-up pair of events has again to result in the 7 display of the letter 'c'.
8

9 This test requires a Text Test Application available on the MirrorLink server and supported from the 10 MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	

Step	Name	Description	Expected Result
5	Ignoring multiple key up events	Send a series of key events: 1. Key down 'a' 2. Key up 'a' 3. Key up 'b' 4. Key up 'b' 5. Key up 'b' 6. Key down 'c' 7. Key up 'c' Send non-incremental, full framebuffer update.	<ul style="list-style-type: none"> Received framebuffer data shows two characters: 'a' and 'c'. Framebuffer update area is within the requested Framebuffer area
6	Intentional VNC Server Cleanup	See Definitions	

1 Table 32: Ignoring multiple key up events – Test Steps

2 **3.3.9 SR/VNC/BASIC/KeyPressAutoClosure**

3 Requirement: CONDITIONAL

4 Condition: Support for Long Key Press events

5 This test requires a Text Test Application available on the MirrorLink server and supported from the MirrorLink Client.

7 The test engineer is asked to use the Text Test Application. A single key event is sent to the server and left open. The server is expected to interpret this as a long key press event and e.g. might continuously append the corresponding character to the input text. After 5 seconds the server MUST have automatically closed the open key press. Thus the event is no longer regarded as a long press and no further characters appear in the input box. The test engineer is asked to verify this.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch Text Test Application	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Regular Key Press Event	Send single key down and up event for letter 'A'	<ul style="list-style-type: none"> Valid Framebuffer Update arrives. Framebuffer update area is within the requested Framebuffer area Received framebuffer data shows the letter 'A'.
4	Long key press	Send single key down event for letter 'A' (no up event). The server is expected to interpret this as a long key press event and might continuously append the corresponding character to the input text.	<ul style="list-style-type: none"> Valid Framebuffer Updates arrive Framebuffer update area is within the requested Framebuffer area Received framebuffer data shows new letter 'A' Received framebuffer data MAY show more letter 'A' being added

Step	Name	Description	Expected Result
5	Wait for auto-closure	Wait for at least 10s After 5 seconds the server MUST have automatically closed the open key press.	<ul style="list-style-type: none"> No more letters 'A' are added after 5s
6	Regular key press event	Send single key down and up event for letter 'A'	<ul style="list-style-type: none"> Valid Framebuffer Updates arrive Framebuffer update area is within the requested Framebuffer area Received framebuffer data shows new letter 'A'
7	Server VNC Cleanup	See Definitions	

Table 33: Key Press Auto-Closure

3.3.10 SR/VNC/BASIC/UnicodeLatin1KeyEvents

Requirement: CONDITIONAL

Condition: Support Unicode

A number of Unicode encoded key events are sent to the server. The test engineer is asked if the corresponding text is visible on the MirrorLink server device. This test requires a Text Test Application available on the MirrorLink server and supported from the MirrorLink Client.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions Launch Text Test Application	
2	Server VNC Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check X11 Key Events	Send a series of Key Press and Release events (use the Unicode variants of the following events): <ul style="list-style-type: none"> Letters: 'a' - 'z' Letters: 'A' - 'Z' Numbers: '0' - '9' Symbols as specified: '!' , '!', '\"' , '\"' , '#' , '\$' , '%' , '&' , '*' , '+' , '(' , ')' , '*' , '/' , '.' , '-' , '.' , '/' , ':' , ';' , '<' , '=' , '>' , '?' , '@' , '[' , '\'' , ']' , '^' , '-' , '`' , '{' , ' ' , '}' , '~' 	<ul style="list-style-type: none"> Valid Framebuffer Update arrives. Received framebuffer data shows the correctly mapped key events.

Step	Name	Description	Expected Result
		Send non-incremental, full framebuffer update after each series.	
6	Server VNC Cleanup	See Definitions	

1 Table 34: Unicode Latin1 Key Events – Test Steps

2 **3.3.11 SR/VNC/BASIC/UniCodeClientCutText**

3 Requirement: CONDITIONAL

4 Condition: Support Unicode in Client Cut Text message

5 A Client Cut Text message is sent to the VNC server, containing Unicode text elements. If no framebuffer update message is sent as reply to the following framebuffer update request, it is assumed, that the server didn't interpret the client cut text message correctly.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Test Engineer is asked to launch an application, which can handle UniCode text from Client Cut Text messages.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Client Cut Text	Send Client Cut Text message, containing the following elements, within a Single message (without the quotation marks): <ul style="list-style-type: none"> • "This is Latin-1 text" • 0x1B 0x25 0x67 • "This is Unicode text" • 0x03 0xA3 (Greek Σ) • 0x03 0xBC (Greek μ) • 0x00 0x1B 0x00 0x25 0x00 0x40 • "This is Latin-1 text" Continue sending non-incremental, full framebuffer update request.	<ul style="list-style-type: none"> • Valid Framebuffer Update arrives on each framebuffer update request • Server shows correct received Client Cut Text
6	Intentional VNC Server Cleanup	See Definitions	

8 Table 35: Unicode Client Cut Text – Test Steps

9 **3.3.12 SR/VNC/BASIC/UnknownMirrorLinkExtension Message**

10 Requirement: MANDATORY

11 Condition: None

- 1 A VNC message with the message type 128 (i.e. MirrorLink extension) and the unknown extension type 255
 2 is sent to the server. The server is expected to ignore the message and answer a succeeding Device Status
 3 Request with the appropriate answer.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definition	
5	Handling of unknown MirrorLink extension message	Send VNC message with the message type 128 and the unknown extension type 255.	<ul style="list-style-type: none"> The VNC server does not disconnect (either intentional or unintentional)
6	Send Device Status message	Send VNC Device Status Request message with some bytes padding is being sent. The server is expected to answer the message correctly.	<ul style="list-style-type: none"> Valid Device Status message arrives
7	Server VNC Cleanup	See Definitions	

4 Table 36: Handling of unknown MirrorLink extensions – Test Steps

5 3.3.13 SR/VNC/BASIC/*UnknownMirrorLinkExtensionMessageSize*

6 Requirement: MANDATORY

7 Condition: None

- 8 A VNC Device Status Request message with some bytes padding is being sent. The server is expected to
 9 answer the message correctly.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definition	
5	Handling of unknown MirrorLink extension sizes	Send VNC Device Status Request message with some bytes padding is being sent. The server is expected to answer the message correctly.	<ul style="list-style-type: none"> The VNC server does not disconnect (either intentional or unintentional) Valid Device Status message arrives
6	Intentional VNC Server Cleanup	See Definitions	

10 Table 37: Handling of Unknown MirrorLink Extension Message Sizes

11 3.3.14 SR/VNC/BASIC/*ByeBye*

12 Requirement: MANDATORY

- 1 Condition: None
- 2 The server MUST answer upon a VNC byebye message with its own byebye message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definition	
5	VNC ByeBye	Send VNC ByeBye message	<ul style="list-style-type: none">• Receive VNC ByeBye message within 5s
6	Unintentional VNC Server Cleanup	See Definitions	

3 Table 38: VNC ByeBye

4 **3.3.15 SR/VNC/BASIC/ByeByeTimeOut**

5 Requirement: MANDATORY

6 Condition: None

- 7 The server MUST answer upon a VNC byebye message with its own byebye message. VNC Sever MUST disconnect TCP socket after 5s.
- 8

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definition	
5	VNC ByeBye	Send VNC ByeBye message	<ul style="list-style-type: none">• Receive VNC ByeBye message within 5s
6	TCP disconnect timeout	Wait for TCP disconnect timeout	<ul style="list-style-type: none">• VNC Server disconnects TCP socket 5s after sending the VNC ByeBye message
7	Unintentional VNC Server Cleanup	See Definitions	

9 Table 39: VNC ByeBye with TCP timeout

10 **3.3.16 SR/VNC/BASIC/Reconnect**

11 Requirement: MANDATORY

12 Condition: None

- 1 Testing if the server device allows reconnect after an unintentional disconnect. The test case validates correct
2 DUT behavior, in case the CTS does an unintentional disconnect in the middle of the VNC session. The DUT
3 is expected to allow reestablishment of the VNC Session.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definition	<ul style="list-style-type: none">• Framebuffer updates received.
5	VNC TCP Disconnect	Disconnect the TCP socket. No ByeBye message sent.	
6	VNC Server Launch	See Definitions CTS launches the same application again.	
7	VNC Server Handshake	See Definitions	
8	VNC Server Configuration	See Definitions	
9	VNC Server Start Operation	See Definition	<ul style="list-style-type: none">• Framebuffer update received.
10	Intentional VNC Client Cleanup	See Definitions	

4

Table 40: VNC Reconnect

1 **3.4 VNC Pixel Format Support**

2 These test cases verify the support for the different pixel formats as advertised from the VNC Server within
3 the Server Display Configuration message. These tests MUST be executed individually for every supported
4 framebuffer encoding.

5 The following framebuffer encodings MUST be validated:

- 6 • RAW encoding MANDATORY
7 • Run-length encoding CONDITIONAL If VNC Server supports run-length encoding
8 • Transform encoding CONDITIONAL If VNC Server supports transform encoding

9 The test engineer MAY be asked to launch an application, which is supporting the target framebuffer encoding.
10

11 A test case passes only, if the targeted framebuffer encoding is given in the Framebuffer Update message.

12 **3.4.1 SR/VNC/PIXEL/RGB343LittleEndianRAW**

13 Requirement: CONDITIONAL

14 Condition: Server support RGB 343

15 If the MirrorLink VNC server announced to support the RGB343 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 343 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.
20

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW)	<ul style="list-style-type: none">• Server announces support for RGB 343 in the Server Display Configuration message
4	RGB 343 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 343 (little endian) Some full, non-incremental Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none">• Valid Framebuffer Update messages arrive• Framebuffer update area is identical to requested area• Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message• Message contains Context Information for entire framebuffer• Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 3.4.2 SR/VNC/PIXEL/RGB343BigEndianRAW

2 Requirement: CONDITIONAL

3 Condition: Server support RGB 343

4 If the MirrorLink VNC server announced to support the RGB343 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 343 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW)	<ul style="list-style-type: none"> • Server announces support for RGB 343 in the Server Display Configuration message
4	RGB 343 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 343 (big endian) Some full, non-incremental Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

10 Table 42: RGB 343 Pixel Format using big endian byte order – RAW

11 3.4.3 SR/VNC/PIXEL/RGB343LittleEndianRLE

12 Requirement: CONDITIONAL

13 Condition: Server support RGB 343 AND

14 Server supports RLE encoding

15 If the MirrorLink VNC server announced to support the RGB343 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 343 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE)	<ul style="list-style-type: none"> • Server announces support for RGB 343 in the Server Display Configuration message
4	RGB 343 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 343 (little endian) Some full, non-incremental Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 43: RGB 343 Pixel Format using little endian byte order – RLE

2 **3.4.4 SR/VNC/PIXEL/RGB343BigEndianRLE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 343 AND

5 Server supports RLE encoding

6 If the MirrorLink VNC server announced to support the RGB343 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 343 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE)	<ul style="list-style-type: none"> • Server announces support for RGB 343 in the Server Display Configuration message
4	RGB 343 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 343 (big endian) Some full, non-incremental Framebuffer Update Request messages	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped

Step	Name	Description	Expected Result
		are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 44: RGB 343 Pixel Format using big endian byte order – RLE

2 **3.4.5 SR/VNC/PIXEL/RGB343LittleEndianTE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 343 AND

5 Server supports Transform encoding

6 If the MirrorLink VNC server announced to support the RGB343 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 343 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE) Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for RGB 343 in the Server Display Configuration message
4	RGB 343 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 343 (little endian) Some full, non-incremental Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

12 Table 45: RGB 343 Pixel Format using little endian byte order – TE

1 **3.4.6 SR/VNC/PIXEL/RGB343BigEndianTE**

2 Requirement: CONDITIONAL

3 Condition: Server support RGB 343 AND

4 Server supports Transform encoding

5 If the MirrorLink VNC server announced to support the RGB343 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 343 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE) Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> • Server announces support for RGB 343 in the Server Display Configuration message
4	RGB 343 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 343 (big endian) Some full, non-incremental Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

11 Table 46: RGB 343 Pixel Format using big endian byte order – TE

12 **3.4.7 SR/VNC/PIXEL/ARGB555LittleEndianRAW**

13 Requirement: CONDITIONAL

14 Condition: Server support RGB 555

15 If the MirrorLink VNC server announced to support the ARGB 555 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB 555 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW)	<ul style="list-style-type: none"> • Server announces support for ARGB 555 in the Server Display Configuration message
4	ARGB 555 Pixel Format using little endian byte order	Send Set Pixel Configuration message for ARGB 555 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

Table 47: ARGB 555 Pixel Format using little endian byte order – RAW

3.4.8 SR/VNC/PIXEL/ARGB555BigEndianRAW

Requirement: CONDITIONAL

Condition: Server support RGB 555

If the MirrorLink VNC server announced to support the ARGB 555 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB555 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW)	<ul style="list-style-type: none"> • Server announces support for ARGB 555 in the Server Display Configuration message
4	ARGB 555 Pixel Format using big endian byte order	Send Set Pixel Configuration message for ARGB 555 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 48: ARGB 555 Pixel Format using big endian byte order– RAW

2 **3.4.9 SR/VNC/PIXEL/ARGB555LittleEndianRLE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 555 AND

5 Server supports RLE encoding

6 If the MirrorLink VNC server announced to support the ARGB 555 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB 555 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE)	<ul style="list-style-type: none"> Server announces support for ARGB 555 in the Server Display Configuration message
4	ARGB 555 Pixel Format using little endian byte order	Send Set Pixel Configuration message for ARGB 555 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

12 Table 49: ARGB 555 Pixel Format using little endian byte order – RLE

13 **3.4.10 SR/VNC/PIXEL/ARGB555BigEndianRLE**

14 Requirement: CONDITIONAL

15 Condition: Server support RGB 555 AND

- 1 Server support RLE encoding
- 2 If the MirrorLink VNC server announced to support the ARGB 555 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB555 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE)	<ul style="list-style-type: none"> • Server announces support for ARGB 555 in the Server Display Configuration message
4	ARGB 555 Pixel Format using big endian byte order	Send Set Pixel Configuration message for ARGB 555 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

8 Table 50: ARGB 555 Pixel Format using big endian byte order– RLE

9 3.4.11 SR/VNC/PIXEL/ARGB555LittleEndian TE

- 10 Requirement: CONDITIONAL
- 11 Condition: Server support RGB 555 AND
- 12 Server supports Transform encoding

13 If the MirrorLink VNC server announced to support the ARGB 555 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB 555 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE)	<ul style="list-style-type: none"> • Server announces support for ARGB 555 in the Server

Step	Name	Description	Expected Result
		Support all Resize Factors and Pixel Formats	Display Configuration message
4	ARGB 555 Pixel Format using little endian byte order	Send Set Pixel Configuration message for ARGB 555 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 51: ARGB 555 Pixel Format using little endian byte order – TE

2 **3.4.12 SR/VNC/PIXEL/ARGB555BigEndianTE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 555 AND

5 Server support TE encoding

6 If the MirrorLink VNC server announced to support the ARGB 555 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB555 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE) Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for ARGB 555 in the Server Display Configuration message
4	ARGB 555 Pixel Format using big endian byte order	Send Set Pixel Configuration message for ARGB 555 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 52: ARGB 555 Pixel Format using big endian byte order– TE

2 **3.4.13 SR/VNC/PIXEL/ARGB888LittleEndianRAW**

3 Requirement: MANDATORY

4 Condition: None

5 If the MirrorLink VNC server announced to support the ARGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB 888 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> Server announces support for ARGB 888 in the Server Display Configuration message
4	ARGB 888 Pixel Format using little endian byte order	Send Set Pixel Configuration message for ARGB 888 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

11 Table 53: ARGB 888 Pixel Format using little endian byte order – RAW

12 **3.4.14 SR/VNC/PIXEL/ARGB888BigEndianRAW**

13 Requirement: MANDATORY

14 Condition: None

15 If the MirrorLink VNC server announced to support the ARGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format

1 of the framebuffer update messages into ARGB888 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed
 2 Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid
 3 pixel data format in the Framebuffer Update message is considered to be the reason.
 4

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for ARGB 888 in the Server Display Configuration message
4	ARGB 888 Pixel Format using big endian byte order	Send Set Pixel Configuration message for ARGB 888 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

5 Table 54: ARGB 888 Pixel Format using big endian byte order– RAW

6 3.4.15 SR/VNC/PIXEL/ARGB888LittleEndianRLE

7 Requirement: CONDITIONAL

8 Condition: Server supports RLE encoding

9 If the MirrorLink VNC server announced to support the ARGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB 888 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.
 10
 11
 12
 13
 14

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for ARGB 888 in the Server Display Configuration message
4	ARGB 888 Pixel Format using little	Send Set Pixel Configuration message for ARGB 888 (little endian)	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive

Step	Name	Description	Expected Result
	endian byte order	Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 55: ARGB 888 Pixel Format using little endian byte order – RLE

2 **3.4.16 SR/VNC/PIXEL/ARGB888BigEndianRLE**

3 Requirement: CONDITIONAL

4 Condition: Server supports RLE encoding

5 If the MirrorLink VNC server announced to support the ARGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB888 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for ARGB 888 in the Server Display Configuration message
4	ARGB 888 Pixel Format using big endian byte order	Send Set Pixel Configuration message for ARGB 888 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

11 Table 56: ARGB 888 Pixel Format using big endian byte order– RLE

1 **3.4.17 SR/VNC/PIXEL/ARGB888LittleEndianTE**

2 Requirement: CONDITIONAL

3 Condition: Server supports Transform encoding

4 If the MirrorLink VNC server announced to support the ARGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB 888 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none">• Server announces support for ARGB 888 in the Server Display Configuration message
4	ARGB 888 Pixel Format using little endian byte order	Send Set Pixel Configuration message for ARGB 888 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none">• Valid Framebuffer Update messages arrive• Framebuffer update area is identical to requested area• Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message• Message contains Context Information for entire framebuffer• Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

10 Table 57: ARGB 888 Pixel Format using little endian byte order – TE

11 **3.4.18 SR/VNC/PIXEL/ARGB888BigEndianTE**

12 Requirement: CONDITIONAL

13 Condition: Server supports Transform encoding

14 If the MirrorLink VNC server announced to support the ARGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into ARGB888 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> • Server announces support for ARGB 888 in the Server Display Configuration message
4	ARGB 888 Pixel Format using big endian byte order	Send Set Pixel Configuration message for ARGB 888 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 58: ARGB 888 Pixel Format using big endian byte order– TE

2 **3.4.19 SR/VNC/PIXEL/RGB565LittleEndianRAW**

3 Requirement: MANDATORY

4 Condition: None

5 If the MirrorLink VNC server announced to support the RGB565 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 565 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for RGB 565 in the Server Display Configuration message
4	RGB 565 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 565 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 59: RGB 565 Pixel Format using little endian byte order – RAW

2 **3.4.20 SR/VNC/PIXEL/RGB565BigEndianRAW**

3 Requirement: MANDATORY

4 Condition: None

5 If the MirrorLink VNC server announced to support the RGB565 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB565 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (RAW)	<ul style="list-style-type: none"> Server announces support for RGB 565 in the Server Display Configuration message
4	RGB 565 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 565 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

11 Table 60: RGB 565 Pixel Format using big endian byte order – RAW

12 **3.4.21 SR/VNC/PIXEL/RGB565LittleEndianRLE**

13 Requirement: CONDITIONAL

14 Condition: Server supports RLE encoding

15 If the MirrorLink VNC server announced to support the RGB565 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 565 using little endian byte order. Some full Framebuffer Update

- 1 Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed
 2 Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid
 3 pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for RGB 565 in the Server Display Configuration message
4	RGB 565 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 565 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

4 Table 61: RGB 565 Pixel Format using little endian byte order – RLE

5 **3.4.22 SR/VNC/PIXEL/RGB565BigEndianRLE**

6 Requirement: CONDITIONAL

7 Condition: Server supports RLE encoding

- 8 If the MirrorLink VNC server announced to support the RGB565 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB565 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (RLE)	<ul style="list-style-type: none"> • Server announces support for RGB 565 in the Server Display Configuration message
4	RGB 565 Pixel Format	Send Set Pixel Configuration message for RGB 565 (big endian) Some full Framebuffer Update Request messages are sent and the	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area

Step	Name	Description	Expected Result
	using big endian byte order	system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 62: RGB 565 Pixel Format using big endian byte order – RLE

2 **3.4.23 SR/VNC/PIXEL/RGB565LittleEndianTE**

3 Requirement: CONDITIONAL

4 Condition: Server supports Transform encoding

5 If the MirrorLink VNC server announced to support the RGB565 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 565 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for RGB 565 in the Server Display Configuration message
4	RGB 565 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 565 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

11 Table 63: RGB 565 Pixel Format using little endian byte order – TE

1 **3.4.24 SR/VNC/PIXEL/RGB565BigEndianTE**

2 Requirement: CONDITIONAL

3 Condition: Server supports Transform encoding

4 If the MirrorLink VNC server announced to support the RGB565 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB565 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (TE) Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none">• Server announces support for RGB 565 in the Server Display Configuration message
4	RGB 565 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 565 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none">• Valid Framebuffer Update messages arrive• Framebuffer update area is identical to requested area• Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message• Message contains Context Information for entire framebuffer• Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

10 Table 64: RGB 565 Pixel Format using big endian byte order – TE

11 **3.4.25 SR/VNC/PIXEL/RGB888LittleEndianRAW**

12 Requirement: CONDITIONAL

13 Condition: Server support RGB 888

14 If the MirrorLink VNC server announced to support the RGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 888 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	

Step	Name	Description	Expected Result
3	Server VNC Initialization	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for RGB 888 in the Server Display Configuration message
4	RGB 888 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 888 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

1 Table 65: RGB 888 Pixel Format using little endian byte order – RAW

2 **3.4.26 SR/VNC/PIXEL/RGB888BigEndianRAW**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 888

5 If the MirrorLink VNC server announced to support the RGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB888 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for RGB 888 in the Server Display Configuration message
4	RGB 888 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 888 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding

Step	Name	Description	Expected Result
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 66: RGB 888 Pixel Format using big endian byte order – RAW

2 **3.4.27 SR/VNC/PIXEL/RGB888LittleEndianRLE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 888 AND

5 Server supports RLE encoding

6 If the MirrorLink VNC server announced to support the RGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 888 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for RGB 888 in the Server Display Configuration message
4	RGB 888 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 888 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

12 Table 67: RGB 888 Pixel Format using little endian byte order – RLE

13 **3.4.28 SR/VNC/PIXEL/RGB888BigEndianRLE**

14 Requirement: CONDITIONAL

15 Condition: Server support RGB 888 AND

16 Server supports RLE encoding

17 If the MirrorLink VNC server announced to support the RGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB888 using big endian byte order. Some full Framebuffer Update Re-

1 request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for RGB 888 in the Server Display Configuration message
4	RGB 888 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 888 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

4 Table 68: RGB 888 Pixel Format using big endian byte order – RLE

5 3.4.29 SR/VNC/PIXEL/RGB888LittleEndianTE

6 Requirement: CONDITIONAL
 7 Condition: Server support RGB 888 AND
 8 Server supports Transform encoding

9 If the MirrorLink VNC server announced to support the RGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB 888 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> • Server announces support for RGB 888 in the Server Display Configuration message
4	RGB 888 Pixel Format	Send Set Pixel Configuration message for RGB 888 (little endian)	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive

Step	Name	Description	Expected Result
	using little endian byte order	Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

1 Table 69: RGB 888 Pixel Format using little endian byte order – TE

2 **3.4.30 SR/VNC/PIXEL/RGB888BigEndianTE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 888 AND

5 Server supports Transform encoding

6 If the MirrorLink VNC server announced to support the RGB 888 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB888 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> • Server announces support for RGB 888 in the Server Display Configuration message
4	RGB 888 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 888 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

12 Table 70: RGB 888 Pixel Format using big endian byte order – TE

1 **3.4.31 SR/VNC/PIXEL/RGB444LittleEndianRAW**

2 Requirement: CONDITIONAL

3 Condition: Server support RGB 444

4 If the MirrorLink VNC server announced to support the RGB444 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB444 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none">• Server announces support for RGB 444 in the Server Display Configuration message
4	RGB 444 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 444 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none">• Valid Framebuffer Update messages arrive• Framebuffer update area is identical to requested area• Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message• Message contains Context Information for entire framebuffer• Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

10 Table 71: RGB 444 Pixel Format using little endian byte order – RAW

11 **3.4.32 SR/VNC/PIXEL/RGB444BigEndianRAW**

12 Requirement: CONDITIONAL

13 Condition: Server support RGB 444

14 If the MirrorLink VNC server announced to support the RGB444 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB444 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> Server announces support for RGB 444 in the Server Display Configuration message
4	RGB 444 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 444 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

1 Table 72: RGB 444 Pixel Format using big endian byte order – RAW

2 **3.4.33 SR/VNC/PIXEL/RGB444LittleEndianRLE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 444 AND

5 Server supports RLE encoding

6 If the MirrorLink VNC server announced to support the RGB444 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB444 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> Server announces support for RGB 444 in the Server Display Configuration message
4	RGB 444 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 444 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 73: RGB 444 Pixel Format using little endian byte order – RLE

2 **3.4.34 SR/VNC/PIXEL/RGB444BigEndianRLE**

3 Requirement: CONDITIONAL

4 Condition: Server support RGB 444 AND

5 Server supports RLE encoding

6 If the MirrorLink VNC server announced to support the RGB444 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB444 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> Server announces support for RGB 444 in the Server Display Configuration message
4	RGB 444 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 444 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

12 Table 74: RGB 444 Pixel Format using big endian byte order – RLE

13 **3.4.35 SR/VNC/PIXEL/RGB444LittleEndianTE**

14 Requirement: CONDITIONAL

15 Condition: Server support RGB 444 AND

16 Server supports Transform encoding

If the MirrorLink VNC server announced to support the RGB444 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB444 using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for RGB 444 in the Server Display Configuration message
4	RGB 444 Pixel Format using little endian byte order	Send Set Pixel Configuration message for RGB 444 (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

Table 75: RGB 444 Pixel Format using little endian byte order – TE

3.4.36 SR/VNC/PIXEL/RGB444BigEndianTE

Requirement: CONDITIONAL

Condition: Server support RGB 444 AND

Server supports Transform encoding

If the MirrorLink VNC server announced to support the RGB444 pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into RGB444 using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for RGB 444 in the Server Display Configuration message

Step	Name	Description	Expected Result
4	RGB 444 Pixel Format using big endian byte order	Send Set Pixel Configuration message for RGB 444 (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

1 Table 76: RGB 444 Pixel Format using big endian byte order – TE

2 **3.4.37 SR/VNC/PIXEL/16BitGreyLittleEndianRAW**

3 Requirement: CONDITIONAL

4 Condition: Server support 16-Bit Greyscale

5 If the MirrorLink VNC server announced to support the 16-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 16-Bit Greyscale using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for 16-bit grayscale in the Server Display Configuration message
4	16-Bit Greyscale Pixel Format using little endian byte order	Send Set Pixel Configuration message for 16-Bit Greyscale (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 77: 16-Bit Greyscale Pixel Format using little endian byte order – RAW

2 **3.4.38 SR/VNC/PIXEL/16BitGreyBigEndianRAW**

3 Requirement: CONDITIONAL

4 Condition: Server support 16-Bit Greyscale

5 If the MirrorLink VNC server announced to support the 16-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 16-Bit Greyscale using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for 16-bit grayscale in the Server Display Configuration message
4	16-Bit Grey-scale Pixel Format using big endian byte order	Send Set Pixel Configuration message for 16-Bit Greyscale (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

11 Table 78: 16-Bit Greyscale Pixel Format using big endian byte order – RAW

12 **3.4.39 SR/VNC/PIXEL/16BitGreyLittleEndianRLE**

13 Requirement: CONDITIONAL

14 Condition: Server support 16-Bit Greyscale AND

15 Server supports RLE encoding

16 If the MirrorLink VNC server announced to support the 16-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 16-Bit Greyscale using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for 16-bit grayscale in the Server Display Configuration message
4	16-Bit Greyscale Pixel Format using little endian byte order	Send Set Pixel Configuration message for 16-Bit Greyscale (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

Table 79: 16-Bit Greyscale Pixel Format using little endian byte order – RLE

3.4.40 SR/VNC/PIXEL/16BitGreyBigEndianRLE

Requirement: CONDITIONAL

Condition: Server support 16-Bit Greyscale AND
Server supports RLE encoding

If the MirrorLink VNC server announced to support the 16-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 16-Bit Greyscale using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> • Server announces support for 16-bit grayscale in the Server Display Configuration message
4	16-Bit Greyscale Pixel Format using big endian byte order	Send Set Pixel Configuration message for 16-Bit Greyscale (big endian) Some full Framebuffer Update Request messages are sent and the	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped

Step	Name	Description	Expected Result
		system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 80: 16-Bit Greyscale Pixel Format using big endian byte order – RLE

2 **3.4.41 SR/VNC/PIXEL/16BitGreyLittleEndianTE**

3 Requirement: CONDITIONAL

4 Condition: Server support 16-Bit Greyscale AND

5 Server supports Transform encoding

6 If the MirrorLink VNC server announced to support the 16-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 16-Bit Greyscale using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> • Server announces support for 16-bit grayscale in the Server Display Configuration message
4	16-Bit Greyscale Pixel Format using little endian byte order	Send Set Pixel Configuration message for 16-Bit Greyscale (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

12 Table 81: 16-Bit Greyscale Pixel Format using little endian byte order – TE

3.4.42 SR/VNC/PIXEL/16BitGreyBigEndianTE

- Requirement: CONDITIONAL
- Condition: Server support 16-Bit Greyscale AND
 Server supports Transform encoding
- If the MirrorLink VNC server announced to support the 16-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 16-Bit Greyscale using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for 16-bit grayscale in the Server Display Configuration message
4	16-Bit Grey-scale Pixel Format using big endian byte order	Send Set Pixel Configuration message for 16-Bit Greyscale (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

Table 82: 16-Bit Greyscale Pixel Format using big endian byte order – TE

3.4.43 SR/VNC/PIXEL/8BitGreyLittleEndianRAW

- Requirement: CONDITIONAL
- Condition: Server support 8-Bit Greyscale
- If the MirrorLink server announced to support the 8-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 8-Bit Greyscale using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for 8-bit grayscale in the Server Display Configuration message
4	8-Bit Greyscale Pixel Format using little endian byte order	Send Set Pixel Configuration message for 8-Bit Greyscale (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

Table 83: 8-Bit Greyscale Pixel Format using little endian byte order – RAW

3.4.44 SR/VNC/PIXEL/8BitGreyBigEndianRAW

Requirement: CONDITIONAL

Condition: Server support 8-Bit Greyscale

If the MirrorLink server announced to support the 8-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 8-Bit Greyscale using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RAW).	<ul style="list-style-type: none"> • Server announces support for 8-bit grayscale in the Server Display Configuration message
4	8-Bit Greyscale Pixel Format using big endian byte order	Send Set Pixel Configuration message for 8-Bit Greyscale (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

1 Table 84: 8-Bit Greyscale Pixel Format using big endian byte order – RAW

2 **3.4.45 SR/VNC/PIXEL/8BitGreyLittleEndianRLE**

3 Requirement: CONDITIONAL
 4 Condition: Server support 8-Bit Greyscale AND
 5 Server supports RLE encoding

6 If the MirrorLink server announced to support the 8-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 8-Bit Greyscale using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> Server announces support for 8-bit grayscale in the Server Display Configuration message
4	8-Bit Greyscale Pixel Format using little endian byte order	Send Set Pixel Configuration message for 8-Bit Greyscale (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

12 Table 85: 8-Bit Greyscale Pixel Format using little endian byte order – RLE

13 **3.4.46 SR/VNC/PIXEL/8BitGreyBigEndianRLE**

14 Requirement: CONDITIONAL
 15 Condition: Server support 8-Bit Greyscale AND
 16 Server supports RLE encoding

If the MirrorLink server announced to support the 8-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 8-Bit Greyscale using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (RLE).	<ul style="list-style-type: none"> Server announces support for 8-bit grayscale in the Server Display Configuration message
4	8-Bit Grey-scale Pixel Format using big endian byte order	Send Set Pixel Configuration message for 8-Bit Greyscale (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> Valid Framebuffer Update messages arrive Framebuffer update area is identical to requested area Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message Message contains Context Information for entire framebuffer Correct framebuffer encoding
5	Intentional VNC Server Cleanup	See Definitions	

Table 86: 8-Bit Greyscale Pixel Format using big endian byte order – RLE

3.4.47 SR/VNC/PIXEL/8BitGreyLittleEndianTE

Requirement: CONDITIONAL
 Condition: Server support 8-Bit Greyscale AND
 Server supports Transform encoding

If the MirrorLink server announced to support the 8-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 8-Bit Greyscale using little endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> Server announces support for 8-bit grayscale in the Server Display Configuration message

Step	Name	Description	Expected Result
4	8-Bit Greyscale Pixel Format using little endian byte order	Send Set Pixel Configuration message for 8-Bit Greyscale (little endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding
5	Server VNC Cleanup	See Definitions	

1 Table 87: 8-Bit Greyscale Pixel Format using little endian byte order – TE

2 **3.4.48 SR/VNC/PIXEL/8BitGreyBigEndianTE**

3 Requirement: CONDITIONAL

4 Condition: Server support 8-Bit Greyscale AND

5 Server supports Transform encoding

6 If the MirrorLink server announced to support the 8-Bit Greyscale pixel format via the Server Display Configuration message, a Set Pixel Format message is sent to the server in order to change the pixel format of the framebuffer update messages into 8-Bit Greyscale using big endian byte order. Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates. If no or malformed Framebuffer Updates arrive, or if for some other reason waiting for Framebuffer Updates fails, an invalid pixel data format in the Framebuffer Update message is considered to be the reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Encoding Message (TE). Support all Resize Factors and Pixel Formats	<ul style="list-style-type: none"> • Server announces support for 8-bit grayscale in the Server Display Configuration message
4	8-Bit Greyscale Pixel Format using big endian byte order	Send Set Pixel Configuration message for 8-Bit Greyscale (big endian) Some full Framebuffer Update Request messages are sent and the system waits for incoming Framebuffer Updates with framebuffer data rectangles.	<ul style="list-style-type: none"> • Valid Framebuffer Update messages arrive • Framebuffer update area is identical to requested area • Note: Framebuffer data rectangle MAY be skipped within Desktop Size Pseudo Encoding message • Message contains Context Information for entire framebuffer • Correct framebuffer encoding

Step	Name	Description	Expected Result
5	Intentional VNC Server Cleanup	See Definitions	

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Table 88: 8-Bit Greyscale Pixel Format using big endian byte order – TE

Approved

1 3.5 Key Event Mapping

2 3.5.1 SR/VNC/KEYMAP/KeyEventMappingSupport

3 Requirement: MANDATORY

4 Condition: None

5 Check that server announces support for Key Event Mapping.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">Event Mapping Support bit is '1'
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 89: Check Key Event Mapping Support

7 3.5.2 SR/VNC/KEYMAP/KeyEventMap

8 Requirement: MANDATORY

9 Condition: None

10 A couple of Event Mapping Request messages are sent to the server in order to retrieve the current mapping.
11 Corresponding Event Mapping messages are expected to arrive.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">Event Mapping Support bit is '1'
4	VNC Server Start Operation	See Definitions	
5	Key event mappings	Send Event Mapping Request messages for all MirrorLink key events. Server key is set to 0. Corresponding Event Mapping messages are expected to arrive.	<ul style="list-style-type: none">Valid Event Mapping messages arriveMappings for the following knob events MUST be available<ul style="list-style-type: none">Knob_2D_shift_push,Knob_2D_0_shift_right,Knob_2D_0_shift_left,Knob_2D_0_shift_up,Knob_2D_0_shift_down,Knob_2D_0_rotate_z,Knob_2D_0_rotate_Z
6	Intentional VNC Server Cleanup	See Definitions	

12 Table 90: Key Event Mapping Check – Test Steps

13 3.5.3 SR/VNC/KEYMAP/ReMapAttempt

14 Requirement: MANDATORY

- 1 Condition: None
- 2 A couple of Event Mapping Request messages are sent to the server in order to retrieve the current mapping.
- 3 Corresponding Event Mapping messages are expected to arrive.
- 4

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> • Event Mapping Support bit is '1'
4	VNC Server Start Operation	See Definitions	
5	Key event mappings	Send Event Mapping Request messages for all MirrorLink key events. Server key is set to 0. Corresponding Event Mapping messages are expected to arrive.	<ul style="list-style-type: none"> • Valid Event Mapping messages arrive • Mappings for the following knob events MUST be available <ul style="list-style-type: none"> ◦ Knob_2D_shift_push, ◦ Knob_2D_0_shift_right, ◦ Knob_2D_0_shift_left, ◦ Knob_2D_0_shift_up, ◦ Knob_2D_0_shift_down, ◦ Knob_2D_0_rotate_z, ◦ Knob_2D_0_rotate_Z
6	Key event remap attempt	Send Event Mapping Request messages for all MirrorLink key events, which have returned a mapped client key in previous stage. Server key is set to 0x041 (Letter 'A'). Corresponding Event Mapping messages are expected to arrive.	<ul style="list-style-type: none"> • Valid Event Mapping messages arrive • Server key is either returning the original value, or the requested one (0x041) • Remapping for the following knob events MUST fail (i.e. original value is returned) <ul style="list-style-type: none"> ◦ Knob_2D_shift_push, ◦ Knob_2D_0_shift_right, ◦ Knob_2D_0_shift_left, ◦ Knob_2D_0_shift_up, ◦ Knob_2D_0_shift_down, ◦ Knob_2D_0_rotate_z, ◦ Knob_2D_0_rotate_Z
7	Intentional VNC Server Cleanup	See Definitions	

5 Table 91: Key Event Re-Mapping Attempt – Test Steps

- 6 **3.5.4 SR/VNC/KEYMAP/ReMapVerification**
- 7 Requirement: MANDATORY
- 8 Condition: None
- 9 A couple of Event Mapping Request messages are sent to the server in order to retrieve the current mapping.
- 10 Corresponding Event Mapping messages are expected to arrive.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> Event Mapping Support bit is '1'
4	VNC Server Start Operation	See Definitions	
5	Key event mappings	<p>Send Event Mapping Request messages for all MirrorLink key events.</p> <p>Server key is set to 0.</p> <p>Corresponding Event Mapping messages are expected to arrive.</p>	<ul style="list-style-type: none"> Valid Event Mapping messages arrive Mappings for the following knob events MUST be available <ul style="list-style-type: none"> Knob_2D_shift_push, Knob_2D_0_shift_right, Knob_2D_0_shift_left, Knob_2D_0_shift_up, Knob_2D_0_shift_down, Knob_2D_0_rotate_z, Knob_2D_0_rotate_Z
6	Key event remap attempt	<p>Send Event Mapping Request messages for all MirrorLink key events, which have returned a mapped client key in previous stage.</p> <p>Server key is set to 0x041 (Letter 'A').</p> <p>Corresponding Event Mapping messages are expected to arrive.</p>	<ul style="list-style-type: none"> Valid Event Mapping messages arrive Server key is either returning the original value, or the requested one (0x041) Remapping for the following knob events MUST fail (i.e. original value is returned) <ul style="list-style-type: none"> Knob_2D_shift_push, Knob_2D_0_shift_right, Knob_2D_0_shift_left, Knob_2D_0_shift_up, Knob_2D_0_shift_down, Knob_2D_0_rotate_z, Knob_2D_0_rotate_Z
7	Key event remap check	<p>Send Event Mapping Request messages for all MirrorLink key events, which been successfully remapped in the previous stage.</p> <p>Server key is set to 0.</p> <p>Corresponding Event Mapping messages are expected to arrive.</p>	<ul style="list-style-type: none"> Valid Event Mapping messages arrive Server key is the requested one (0x041).
8	Intentional VNC Server Cleanup	See Definitions	

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Table 92: Key Event Re-Mapping Verification – Test Steps

1 3.6 MirrorLink Key Event

2 3.6.1 SR/VNC/KEYS/*KnobShiftRotateKeys*

3 Requirement: MANDATORY

4 Condition: None

5 The test verifies whether the indicated key events are advertised from the VNC server and whether they are mapped internally to any value.

6 The test does not verify the semantic of the knob key events.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Knob shift and rotate key configuration	The supported knob shift and rotate key configuration, received from the server, is converted to a human readable form and the test engineer is asked to verify them for the current DUT.	<ul style="list-style-type: none">• Server announces support for knob key events in the Server Display Configuration message
6	Knob shift and rotate key events	Send Key Event Mapping Request message for every supported knob key (with server key value = 0).	<ul style="list-style-type: none">• Server is returning a key event value, which is not equal to zero.
7	Intentional VNC Server Cleanup	See Definitions	

8 Table 93: Knob Shift and Rotate Key Events – Test Steps

9 3.6.2 SR/VNC/KEYS/*DeviceKeys*

10 Requirement: MANDATORY

11 Condition: None

12 The test verifies whether the indicated key events are advertised from the VNC server and whether they are mapped internally to any value.

13 The test does not verify the semantic of the device key events.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Device key configuration	The supported device key configuration, received from the server, is converted to a human	<ul style="list-style-type: none">• Server announces support for device key events in the

Step	Name	Description	Expected Result
		readable form and the test engineer is asked to verify them for the current DUT.	Server Display Configuration message.
6	Device key events	Send Key Event Mapping Request message for every supported device key (with server key value = 0).	<ul style="list-style-type: none"> Server is returning a key event value, which is not equal to zero.
7	Intentional VNC Server Cleanup	See Definitions	

Table 94: Device Key Events – Test Steps

3.6.3 SR/VNC/KEYS/MultimediaKeys

Requirement: MANDATORY

Condition: None

The test verifies whether the indicated key events are advertised from the VNC server and whether they are mapped internally to any value.

The test does not verify the semantic of the multimedia key events.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Multimedia key configuration	The supported multimedia key configuration, received from the server, is converted to a human readable form and the test engineer is asked to verify them for the current DUT.	<ul style="list-style-type: none"> Server announces support for multimedia key events in the Server Display Configuration message.
6	Multimedia key events	Send Key Event Mapping Request message for every supported multimedia key (with server key value = 0).	<ul style="list-style-type: none"> Server is returning a key event value, which is not equal to zero.
7	Intentional VNC Server Cleanup	See Definitions	

Table 95: Multimedia Key Events – Test Steps

3.6.4 SR/VNC/KEYS/FunctionKeys

Requirement: MANDATORY

Condition: None

The test verifies whether the indicated key events are advertised from the VNC server and whether they are mapped internally to any value.

The test does not verify the semantic of the function key events.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Function key configuration	The number of additional function keys is displayed to the test engineer and he is asked to verify them for the current DUT.	<ul style="list-style-type: none"> • Server announces support for multimedia key events in the Server Display Configuration message.
6	Function key events	Send Key Event Mapping Request message for every supported function key (with server key value = 0).	<ul style="list-style-type: none"> • Server is returning a key event value, which is not equal to zero.
7	Intentional VNC Server Cleanup	See Definitions	

Table 96: Function Key Events – Test Steps

3.6.5 SR/VNC/KEYS/ItuKeys

Requirement: MANDATORY

Condition: None

The test verifies whether the indicated key events are advertised from the VNC server and whether they are mapped internally to any value. The test does not verify the semantic of the ITU key events.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	ITU key configuration	The ITU key support configuration, received from the server, is converted to a human readable form and the test engineer is asked to verify them for the current DUT.	<ul style="list-style-type: none"> • Server announces support for ITU key events in the Server Display Configuration message.
6	ITU key events	Send Key Event Mapping Request message for all ITU keys (with server key value = 0).	<ul style="list-style-type: none"> • Server is returning a key event value, which is not equal to zero.
7	Intentional VNC Server Cleanup	See Definitions	

7

Table 97: ITU Key Events – Test Steps

1 **3.7 Virtual Keyboard**

2 **3.7.1 SR/VNC/VKB/VirtualKbSupport**

3 Requirement: CONDITIONAL

4 Condition: Server supports Virtual Keyboard Trigger

5 Check that server announces support for Virtual Keyboard Trigger.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger Support MUST be '1'
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 98: Check Virtual Keyboard Trigger Support

7 **3.7.2 SR/VNC/VKB/TriggerWithoutTextEntry**

8 Requirement: CONDITIONAL

9 Condition: Server supports Virtual Keyboard Trigger AND

10 Server supports Text Entry Exchange, without Server and Client Cut Text

11 The test engineer is asked to start an application, which does allow triggering a virtual keyboard with known steps. Upon this a Virtual Keyboard Trigger message is expected to arrive.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow triggering a virtual keyboard with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger Support MUST be '1'
4	VNC Server Start Operation	See Definitions	
5	Start Virtual Keyboard Trigger Service	Send Virtual Keyboard Trigger Request message Support text entry exchange = '0'	<ul style="list-style-type: none">Continue receiving framebuffer updates on changing content
5	Receive Virtual Keyboard Trigger (Show)	The test engineer is asked to execute the known steps to raise the virtual keyboard trigger. Upon this a Virtual Keyboard Trigger message is expected to arrive. If a valid cursor position is provided the position MUST be highlighted.	<ul style="list-style-type: none">Valid Virtual Keyboard Trigger message arrivesVirtual keyboard control = show keyboardHighlighted cursor position matches actual cursor positionHighlighted entry position and size matches actual text entryA key event list is received, if the corresponding bit is set to '1'.

Step	Name	Description	Expected Result
		If a valid text entry is provided the entry MUST be highlighted	
6	Receive Virtual Keyboard Trigger (Remove)	Test engineer enters some text. Test engineer is asked to confirm the text entry on the test engineer interface. (See note)	<ul style="list-style-type: none"> • Valid Virtual Keyboard Trigger message arrives • Virtual keyboard control = remove keyboard • Continue receiving framebuffer updates on changing content • (See note)
6	Stop Virtual Keyboard Trigger Service	Send Virtual Keyboard Trigger Request message disabling the virtual keyboard trigger service.	<ul style="list-style-type: none"> • Continue receiving framebuffer updates on changing content
7	Intentional VNC Server Cleanup	See Definitions	

1 Table 99: Receive Virtual Keyboard Trigger (without Text Entry Exchange) – Test Steps

2 **Note:** In case the MirrorLink server does not allow confirming a text entry on its test engineer interface (step 3), the test engineer MAY need to close the virtual keyboard by himself. In that case it is ok for the VNC 4 server to not send a Virtual Keyboard Trigger message removing the keyboard.

5 **3.7.3 SR/VNC/VKB/TriggerWithTextEntry**

- 6 Requirement: CONDITIONAL
- 7 Condition: Server supports Virtual Keyboard Trigger AND
- 8 Server supports Text Entry Exchange, using Server and Client Cut Text
- 9 The test engineer is asked to start an application, which does allow triggering a virtual keyboard with known 10 steps. Upon this a Virtual Keyboard Trigger message is expected to arrive.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow triggering a virtual keyboard with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> • Virtual Keyboard Trigger Support MUST be '1'
4	VNC Server Start Operation	See Definitions	
5	Start Virtual Keyboard Trigger Service	Send Virtual Keyboard Trigger Request message Support text entry exchange = '1' Maximum number of characters = 10	<ul style="list-style-type: none"> • Continue receiving framebuffer updates on changing content
5	Receive Virtual Keyboard Trigger (Show)	The test engineer is asked to enter 15 characters into a text entry field and then to execute the known steps to raise the virtual keyboard trigger. Upon this a Virtual Keyboard Trigger message is expected to arrive.	<ul style="list-style-type: none"> • Valid Virtual Keyboard Trigger message arrives • Virtual keyboard control = show keyboard • Highlighted cursor position matches actual cursor position • Highlighted entry position and size matches actual text entry

Step	Name	Description	Expected Result
		If a valid cursor position is provided the position MUST be highlighted. If a valid text entry is provided the entry MUST be highlighted	<ul style="list-style-type: none"> A key event list is received, if the corresponding bit is set to '1'. Text Entry Exchange available is set to '1'. VNC Server Cut message arrives after the Virtual Keyboard Trigger message Not more than 10 characters are send in VNC Server Cut Text
6	Receive Virtual Keyboard Trigger (Remove)	Send VNC Client Cut Text message, reverting the order of the original text. Test engineer enters some text. Test engineer is asked to confirm the text entry on the test engineer interface.	<ul style="list-style-type: none"> Reverted text has replaced the entry. Valid Virtual Keyboard Trigger message arrives Virtual keyboard control = remove keyboard Continue receiving framebuffer updates on changing content
6	Stop Virtual Keyboard Trigger Service	Send Virtual Keyboard Trigger Request message disabling the virtual keyboard trigger service.	<ul style="list-style-type: none"> Continue receiving framebuffer updates on changing content
7	Intentional VNC Server Cleanup	See Definitions	

1 Table 100: Receive Virtual Keyboard Trigger (with Text Entry Exchange) – Test Steps

2 **3.7.4 SR/VNC/VKB/NoTrigger**

3 Requirement: CONDITIONAL

4 Condition: Server supports Virtual Keyboard Trigger

5 The virtual keyboard trigger service is not active. The test engineer is asked to start an application, which does allow triggering a virtual keyboard with known steps.. Upon this, no Virtual Keyboard Trigger message is expected to arrive.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow triggering a virtual keyboard with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> Virtual Keyboard Trigger Support MUST be '1'
4	VNC Server Start Operation	See Definitions	
5	Receive no Virtual Keyboard Trigger	The test engineer is asked to enter 15 characters into a text entry field and then to execute the known steps to raise the virtual keyboard trigger.	<ul style="list-style-type: none"> No Virtual Keyboard Trigger message arrives Continue receiving framebuffer updates on changing content
6	Intentional VNC Server Cleanup	See Definitions	

1

Table 101: Receive no Virtual Keyboard Trigger – Test Steps

Approved

1 3.8 Key Event Listing

2 3.8.1 SR/VNC/KEYLIST/KeyEventListingSupport

3 Requirement: CONDITIONAL

4 Condition: Server supports Key Event Listing

5 Check that server announces support for Key Event Listing.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Key Event Listing support MUST be '1'
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 102: Check Key Event Listing Support

7 3.8.2 SR/VNC/KEYLIST/DefaultList

8 Requirement: CONDITIONAL

9 Condition: Server supports Key Event Listing

10 The VNC server MUST send a key event default list after the VNC client has enabled the key event listing.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Key Event Listing support MUST be '1'
4	VNC Server Start Operation	See Definitions	
4	Default Key Event Listing	Send Key Event Listing Request message. <ul style="list-style-type: none">• Enable key event listing• Reset the key event counter	<ul style="list-style-type: none">• Valid Key Event Listing message arrives with the default key event list
6	Stop Key Event Listing Service	Send Key Event Listing Request message <ul style="list-style-type: none">• Disable key event listing	
7	Intentional VNC Server Cleanup	See Definitions	

11 Table 103: Key Event Listing Default List – Test Steps

12 3.8.3 SR/VNC/KEYLIST/IncrementalList

13 Requirement: CONDITIONAL

14 Condition: Server supports Key Event Listing

15 A Key Event Listing Request message is sent to the server in order to reset the key press counter. After an appropriate Key Event Listing answer a couple of key events are being sent to the server, each with some delay in between. The server is expected to send a Key Event Listing message after every key event to update the key event list.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow triggering a key event listing with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> • Key Event Listing support MUST be '1'
4	VNC Server Start Operation	See Definitions	
4	Default Key Event Listing	Send Key Event Listing Request message. <ul style="list-style-type: none"> • Enable key event listing • Incremental Updates • Reset the key event counter 	<ul style="list-style-type: none"> • Valid Key Event Listing message arrives with a default key event list
5	Initial Key Event Listing	The test engineer is asked to execute the known steps to trigger a key event listing message	<ul style="list-style-type: none"> • Valid Virtual Keyboard Trigger message arrives with Key Event Listing Follows flag set • Valid Key Event Listing message arrives with initial key event list (OPTIONAL) • Key event counter 0
6	Update Key Event Listing (incremental)	Send a series of 5 Key Event messages all with press and release events.	<ul style="list-style-type: none"> • Valid Key Event Listing messages arrives (OPTIONAL) • Key event counter has the expected number
7	Stop Key Event Listing Service	Send Key Event Listing Request message <ul style="list-style-type: none"> • Disable key event listing 	
8	Intentional VNC Server Cleanup	See Definitions	

Table 104: Key Event Listing Incremental Updates – Test Steps

Note: Leave at least 5s between key events to give enough time for key event listing updates. The server is NOT REQUIRED to send a key event list on every key event. This is true for the initial key event list as well. The server is NOT REQUIRED to send incremental key event lists.

3.8.4 SR/VNC/KEYLIST/NonIncrementalList

Requirement: CONDITIONAL

Condition: Server supports Key Event Listing

A Key Event Listing Request message is sent to the server in order to reset the key press counter. After an appropriate Key Event Listing answer a couple of key events are being sent to the server, each with some delay in between. The server is expected to send a Key Event Listing message after every key event to update the key event list.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow triggering a key event listing with known steps.	
2	VNC Server Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> • Key Event Listing support MUST be '1'
4	VNC Server Start Operation	See Definitions	
4	Default Key Event Listing	Send Key Event Listing Request message. <ul style="list-style-type: none"> • Enable key event listing • Non-Incremental updates • Reset the key event counter 	<ul style="list-style-type: none"> • Valid Key Event Listing message arrives with a default key event list
5	Initial Key Event Listing	The test engineer is asked to execute the known steps to trigger a key event listing message	<ul style="list-style-type: none"> • Valid Virtual Keyboard Trigger message arrives with Key Event Listing follows flag set • Valid Key Event Listing message arrives with initial key event list (OPTIONAL) • Key event counter is 0
6	Update Key Event Listing (non-incremental)	Send a series of 5 Key Event messages all with press and release events.	<ul style="list-style-type: none"> • Valid Key Event Listing messages arrives (OPTIONAL) • Key event counter has the expected number
6	Stop Key Event Listing Service	Send Key Event Listing Request message <ul style="list-style-type: none"> • Disable key event listing 	
7	Intentional VNC Server Cleanup	See Definitions	

1 Table 105: Key Event Listing Non-Incremental Update– Test Steps

2 **Note:** Leave at least 5s between key events to give enough time for key event listing updates. The server is
 3 NOT REQUIRED to send a key event list on every key event. This is true for the initial key event list as
 4 well.

5

1 **3.9 Device Status**

2 **3.9.1 SR/VNC/DEVICE/DeviceStatusCheck**

3 Requirement: MANDATORY

4 Condition: None

5 A Device Status Request message is sent to the server, leaving all features unchanged. The server is expected
6 to answer with a proper Device Status message. If no device status message is received from the server at all,
7 it is assumed, that the server didn't understand the device status request message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check Device Status message	Send a Device Status Request message, with all values set to unknown. Server is expected to answer with a Device Status message.	<ul style="list-style-type: none">• Valid Device Status message arrives• Values can be unknown
6	Intentional VNC Server Cleanup	See Definitions	

8 Table 106: Check Device Status message – Test Steps

9 **3.9.2 SR/VNC/DEVICE/NightMode**

10 Requirement: MANDATORY

11 Condition: None

12 A Device Status Request message is sent to the server in order to enable the night mode feature. The server
13 is expected to answer with a proper Device Status message. The test engineer is asked to verify that the night
14 mode is active. If no device status message is received from the server at all, it is assumed, that the server
15 didn't understand the device status request message. The Server MUST have an application installed, sup-
16 porting the Night Mode feature.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch Application, supporting Night Mode.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
4	Check night mode feature	Send a Device Status Request message, with night mode enabled, otherwise all other values set to unknown.	<ul style="list-style-type: none">• Valid Device Status message arrives• Indicated night mode status is true according to the test engineer

Step	Name	Description	Expected Result
		Server is expected to answer with a Device Status message. Test engineer is asked to verify that the night mode is active.	
6	Intentional VNC Server Cleanup	See Definitions	

1 Table 107: Check night mode feature – Test Steps

2 **3.9.3 SR/VNC/DEVICE/ScreenSaver**

3 Requirement: CONDITIONAL

4 Condition: Server supports Screen-Saver Device Status feature

5 A Device Status Request message is sent to the server in order to enable the screen saver feature. The server is expected to answer with a proper Device Status message. The test engineer is asked to verify that the MirrorLink screen saver is running. If no device status message is received from the server at all, it is assumed, that the server didn't understand the device status request message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check screen saver	Send a Device Status Request message, with screen saver enabled; otherwise all other values are set to unknown. Server is expected to answer with a proper Device Status message. Test engineer is asked to verify that the screen is dimmed.	<ul style="list-style-type: none">• Valid Device Status message arrives• Indicated screen saver status is true according to the test engineer
6	Intentional VNC Server Cleanup	See Definitions	

9 Table 108: Check screen saver – Test Steps

10 **3.9.4 SR/VNC/DEVICE/DeviceLock**

11 Requirement: CONDITIONAL

12 Condition: Server supports Device-Lock Device Lock feature

13 A Device Status Request message is sent to the server, enabling the device-lock. The server is expected to answer with a proper Device Status message. The test engineer is asked to verify that the MirrorLink server device is locked. If no device status message is received from the server, it is assumed, that the server didn't understand the device status request message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check device-lock	Send a Device Status Request message with device-lock enabled. Server is expected to answer with a proper Device Status message. Test engineer is asked to verify that the MirrorLink server device is locked.	<ul style="list-style-type: none"> Valid Device Status message arrives Indicated device-lock status is true according to the test engineer
6	Intentional VNC Server Cleanup	See Definitions	

Table 109: Check device-lock – Test Steps

3.9.5 SR/VNC/DEVICE/KeyLock

- Requirement: CONDITIONAL
- Condition: Server supports Key-Lock Device Status feature
- A Device Status Request message is sent to the server, enabling the key-lock. The server is expected to answer with a proper Device Status message. The test engineer is asked to verify that the keys on the MirrorLink server are disabled. If no device status message is received from the server at all, it is assumed, that the server didn't understand the device status request message.

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check key-lock	Send a Device Status Request message with key-lock enabled. Server is expected to answer with a proper Device Status message. Test engineer is asked to verify that the keys on the MirrorLink server are disabled.	<ul style="list-style-type: none"> Valid Device Status message arrives Indicated key-lock status is true according to the test engineer
6	Intentional VNC Server Cleanup	See Definitions	

Table 110: Check key-lock – Test Steps

3.9.6 SR/VNC/DEVICE/DriverDistractionAvoidance

- Requirement: MANDATORY

- 1 Condition: None
- 2 A Device Status Request message is sent to the server in order to enable the content rules features. The server is expected to answer with a proper Device Status message. If no device status message is received from the server, it is assumed, that the server didn't understand the device status request message. The Server MUST have an application installed, supporting the Driver Distraction Avoidance feature

Step	Name	Description	Expected Result
1	Server VNC Launch	See Definitions	
2	Server VNC Handshake	See Definitions	
3	Server VNC Initialization	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Check content rules mechanisms	Send a Device Status Request message with content rules enabled. Server is expected to answer with a Device Status message. It is not possible to verify consistently that Driver Distraction Avoidance is enabled.	<ul style="list-style-type: none">• Valid Device Status message arrives
6	Server VNC Cleanup	See Definitions	

6 Table 111: Check content rules mechanisms – Test Steps

7 **Note:** This test is not able to verify that content rules are actually followed from the MirrorLink server.

8 3.9.7 SR/VNC/DEVICE/FbOrientationSupport

9 Requirement: CONDITIONAL

10 Condition: Server supports Framebuffer Orientation Switch

11 Check that server announces support for orientation switch

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Server-side framebuffer orientation switch flag set to '1'
4	Intentional VNC Server Cleanup	See Definitions	

12 Table 112: Check Framebuffer Orientation Support

13 3.9.8 SR/VNC/DEVICE/FbOrientationSwitch

14 Requirement: MANDATORY

15 Condition: None

- 1 A Device Status Request message is sent to the server trying to change its screen orientation. A Framebuffer Update Request is sent and a corresponding Framebuffer Update is awaited. The Framebuffer Update is expected to have a swapped width and height, and a rectangle of the desktop-size pseudo-encoding is expected to be contained. The test engineer is asked to verify that the screen orientation did change.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application which is known to support both orientation modes	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> • Server-side framebuffer orientation switch flag set to '1'
4	VNC Server Start Operation	See Definitions	
5	Check server-side framebuffer orientation feature	Send Device Status Request message to change the framebuffer orientation.	<ul style="list-style-type: none"> • Valid Desktop Size Pseudo Encoding message arrives • Desktop Size Pseudo Encoding is the last rectangle in the Framebuffer Update message • Framebuffer orientation is correct • Valid Device Status message arrives • Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message
6	Request new framebuffer updates	Send Framebuffer Update Request messages with the new framebuffer orientation	<ul style="list-style-type: none"> • Start receiving framebuffer updates on changing content with new orientation • Orientation status is correct
7	Intentional VNC Server Cleanup	See Definitions	

5 Table 113: Check Framebuffer Orientation– Server Support

- 6 If the VNC server does not support framebuffer orientation switch, the following test sequence MUST be used.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application which is known to support both orientation modes	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> • Server-side framebuffer orientation switch flag set to '0'
4	VNC Server Start Operation	See Definitions	
5	Check server-side framebuffer orientation feature	Send Device Status Request message to change the framebuffer orientation.	<ul style="list-style-type: none"> • No Desktop Size Pseudo Encoding message arrives • Valid Device Status message arrives

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Orientation status is correct and has not changed.
6	Intentional VNC Server Cleanup	See Definitions	

1 Table 114: Check Framebuffer Orientation– No Server Support

2 **3.9.9 SR/VNC/DEVICE/FbRotationSupport**

3 Requirement: CONDITIONAL

4 Condition: Server supports Framebuffer Rotation Change

5 Check that server announces support for rotation changes

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> Server-side framebuffer rotation flag set to '1'
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 115: Check Framebuffer Rotation Support

7 **3.9.10 SR/VNC/DEVICE/FbRotationChange**

8 Requirement: MANDATORY

9 Condition: None

10 A Device Status Request message is sent to the server trying to rotate 90 degrees. A Frame-buffer Update Request is sent and a corresponding Framebuffer Update is awaited. The Framebuffer Update is expected to have a swapped width and height, and a rectangle of the desktop-size pseudo-encoding is expected to be contained.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none"> Server-side framebuffer rotation flag set to '1'
4	VNC Server Start Operation	See Definitions	
5	Check server-side framebuffer rotation feature	Send Device Status Request message to rotate the framebuffer by 90 degrees.	<ul style="list-style-type: none"> Valid Desktop Size Pseudo Encoding message arrives Desktop Size Pseudo Encoding is the last rectangle in the Framebuffer Update message Framebuffer orientation is correct Context Information and Framebuffer Data rectangles may be skipped in Desktop

Step	Name	Description	Expected Result
			Size Pseudo Encoding message
6	Request new framebuffer updates	Send Framebuffer Update Request messages with the new framebuffer orientation	<ul style="list-style-type: none">Start receiving framebuffer updates on rotated content with new orientationValid Device Status message arrivesOrientation status is correct
7	Intentional VNC Server Cleanup	See Definitions	

1 Table 116: Check Framebuffer Rotation – Server Support

2 If the VNC server does not support framebuffer rotation switch, the following test sequence MUST be used.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">Server-side framebuffer orientation flag set to '0'
4	VNC Server Start Operation	See Definitions	
5	Check server-side framebuffer rotation feature	Send Device Status Request message to rotate the framebuffer by 90 degrees.	<ul style="list-style-type: none">No Desktop Size Pseudo Encoding message arrivesValid Device Status message arrivesOrientation status is correct and is not rotated
6	Intentional VNC Server Cleanup	See Definitions	

3 Table 117: Check Framebuffer Rotation – No Server Support

1 **3.10 Framebuffer Alternative Text**

2 **3.10.1 SR/VNC/FBALT/ FbAlternativeTextSupport**

3 Requirement: CONDITIONAL

4 Condition: Server supports Framebuffer Alternative Text

5 Check that server announces support for a Framebuffer Alternative Text Request.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Framebuffer Alternative Text flag MUST be '1'
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 118: Check Framebuffer Alternative Text Support

7 **3.10.2 SR/VNC/FBALT/ FbAlternativeText**

8 Requirement: CONDITIONAL

9 Condition: Server supports Framebuffer Alternative Text AND

10 Server has an application installed, supporting the mechanism

11 A Framebuffer Alternative Text Request message is sent to the server in order to request a framebuffer alternative text. A corresponding Framebuffer Alternative Text is expected to arrive.
12

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow providing framebuffer alternative text with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Framebuffer Alternative Text flag MUST be '1'
4	VNC Server Start Operation	See Definitions	
5	Enable Framebuffer Alternative Text	Send Framebuffer Alternative Text Request message - Maximum length = 20 The test engineer is asked to execute the known steps to start the framebuffer alternative text.	<ul style="list-style-type: none">• Valid Framebuffer Alternative Text message arrives• Length of the returned text is smaller than 20
6	Intentional VNC Server Cleanup	See Definitions	

13 Table 119: Framebuffer Alternative Text – Test Steps

14 **3.10.3 SR/VNC/FBALT/NoFbAlternativeText**

15 Requirement: CONDITIONAL

16 Condition: Server supports Framebuffer Alternative Text AND

- 1 Server has an application installed, supporting the mechanism
- 2 No Framebuffer Alternative Text Request message is sent to the server in order to request a framebuffer alternative text. No corresponding Framebuffer Alternative Text messages are expected to arrive.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does allow providing framebuffer alternative text with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Framebuffer Alternative Text flag MUST be '1'
4	VNC Server Start Operation	See Definitions	
5	Enable Framebuffer Alternative Text	The test engineer is asked to execute the known steps to start the framebuffer alternative text.	<ul style="list-style-type: none">• No Framebuffer Alternative Text message arrives
6	Intentional VNC Server Cleanup	See Definitions	

4 Table 120: No Framebuffer Alternative Text – Test Steps

3.11 Framebuffer Blocking Notifications

The MirrorLink Server MUST handle a framebuffer blocking notification message for a foreground application with one of the following set of steps, in the given order:

1. Bring CCC certified Home Screen application into the foreground (if available)
 - a. DUT brings CCC certified Home Screen app into foreground
 - b. DUT informs the user about the blocking
 - c. Framebuffer Update message received with new Context Information
 - d. UPnP AppStatusUpdate event received
2. Bring CCC certified background application into the foreground (if available).
 - a. DUT brings CCC certified background application into the foreground
 - b. DUT informs the user about the blocking
 - c. Framebuffer Update message received with new Context Information
 - d. UPnP AppStatusUpdate event received
3. Have the MirrorLink Client switch to its native user interface.
 - a. Framebuffer Update message received with Context Information 0xF000FFFF (Switch to MirrorLink Client native UI)

The MirrorLink Server MUST handle a framebuffer blocking notification message for an overlay from a background application with one of the following set of steps, in the given order:

1. Overlay moved to background
 - a. Overlay not visible in the foreground
 - b. Foreground application visible on CTS
 - c. DUT informs the user about the blocking
 - d. Framebuffer Update message received with new Context Information for foreground application only.
 - e. No UPnP AppStatusUpdate event received
 - f. Failure to move overlay to background requires waiver from Certification Body, to whether this is covered from the platform specific specification (see functional specification).
2. Background application terminated
 - a. Overlay not visible in the foreground
 - b. Foreground application visible on CTS
 - c. DUT informs the user about the blocking & termination
 - d. Framebuffer Update message received with new Context Information for foreground application only.
 - e. UPnP AppStatusUpdate event received (terminated)
 - f. Failure to terminate background app requires waiver from Certification Body, to whether this is covered from the platform specific specification (see functional specification).
3. Overlay stays in foreground (MUST NOT happen in Drive Mode)
 - a. Overlay from background application still visible on CTS
 - b. Foreground application still visible under the overlay on CTS
 - c. VNC Context Information includes information for background & foreground application.
4. Have the MirrorLink Client switch to its native user interface.
 - a. Framebuffer Update message received with Context Information 0xF000FFFF (Switch to MirrorLink Client native UI)

3.11.1 SR/VNC/BLOCK/FB/BlockNonCertifiedApp

Requirement: MANDATORY

Condition: None

This test case validates, that the DUT responds correctly to the MirrorLink Client's blocking a non CCC-certified foreground app.

The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the following properties:

- 1 • App A: MirrorLink-aware app
 2 • App B: CCC drive-certified app (Global)

3 App A may not be able to launch from the MirrorLink Client, in case they are not included into the UPnP
 4 application listing. In this case, the test engineer MUST try to launch the respective application locally from
 5 the MirrorLink Server, unless otherwise mentioned.

6 The test case will check the behavior of the following setups:

- 7 1. No other CCC drive-certified app running; blocking with “Not allowed content category” reason.
 8 2. Other CCC drive-certified app running; blocking with “Not allowed application ID” reason.
 9 3. Other CCC drive-certified app running; blocking with “Not sufficient application trust level” reason.
 10 4. Other CCC drive-certified app running; terminate application.

11 The test case will also validate, that the MirrorLink Server displays a notification to the user, when blocking
 12 occurs, and that blocking is resolved from the MirrorLink Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch App A in Park Mode; launch only from CTS. If App A can't be launched go to step 16.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> App A visible on CTS
5	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: <ul style="list-style-type: none"> Not allowed content category 	<ul style="list-style-type: none"> Framebuffer blocking notification handling as specified above (no background App).
6	UPnP Launch	Launch App B	<ul style="list-style-type: none"> App B visible on CTS
7	UPnP Launch	Launch App A	<ul style="list-style-type: none"> App A visible on CTS
8	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: <ul style="list-style-type: none"> Not allowed application ID 	<ul style="list-style-type: none"> Framebuffer blocking notification handling as specified above (background App B).
9	UPnP Launch	Launch App A	<ul style="list-style-type: none"> App A visible on CTS
10	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> Drive Mode Enabled
11	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: <ul style="list-style-type: none"> Not sufficient application trust level 	<ul style="list-style-type: none"> Framebuffer blocking notification handling as specified above (background App B). <p>Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.</p>
12	Park Mode	CTS enables Park Mode	<ul style="list-style-type: none"> Park Mode Enabled
13	UPnP Launch	Launch App A	<ul style="list-style-type: none"> App A visible on CTS
14	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> Drive Mode Enabled
15	Framebuffer Blocking Notification	Send UPnP Terminate Application for App A.	<ul style="list-style-type: none"> Same as Framebuffer blocking notification handling as specified above (background App B), but without user notification by the DUT.

Step	Name	Description	Expected Result
			Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.
16	Intentional VNC Server Cleanup	See Definitions	

1 Table 121: Framebuffer Blocking Notification - Blocking Non CCC-Certified Application

2 **3.11.2 SR/VNC/BLOCK/FB/BlockBaseCertifiedApp**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT responds correctly to the MirrorLink Client's blocking a CCC base-certified foreground app.

6 The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the following properties:

- App A: CCC base-certified app
- App B: CCC drive-certified app (Global)

7 The test case will check the behavior of the following setups:

1. No other CCC drive-certified app running; blocking with "Not sufficient application trust level" reason.
2. Other CCC drive-certified app running; blocking with "Not sufficient application trust level" reason.
3. Other CCC drive-certified app running; terminate application

8 The test case will also validate, that the MirrorLink Server displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch App A in Park Mode; launch only from CTS.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> • App A visible on CTS
5	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> • Drive Mode Enabled
6	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: <ul style="list-style-type: none"> • Not sufficient application trust level 	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above (no background App). <p>Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.</p>
7	UPnP Launch	Launch App B	<ul style="list-style-type: none"> • App B visible on CTS
8	Park Mode	CTS enables Park Mode	<ul style="list-style-type: none"> • Park Mode Enabled
9	UPnP Launch	Launch App A	<ul style="list-style-type: none"> • App A visible on CTS
10	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> • Drive Mode Enabled

Step	Name	Description	Expected Result
11	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: • Not sufficient application trust level	• Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above (background App B). Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.
12	Park Mode	CTS enables Park Mode	• Park Mode Enabled
13	UPnP Launch	Launch App A	• App A visible on CTS
14	Drive Mode	CTS enables Drive Mode	• Drive Mode Enabled
15	Framebuffer Blocking Notification	Send UPnP Terminate Application for App A.	• Same as Framebuffer blocking notification handling as specified above (background App B), but without user notification by the DUT. Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.
16	Intentional VNC Server Cleanup	See Definitions	

1 Table 122: Framebuffer Blocking Notification - Blocking CCC base-certified Application

2 3.11.3 SR/VNC/BLOCK/FB/BlockDriveCertifiedApp

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT responds correctly to the MirrorLink Client's blocking a CCC drive-certified foreground app.

7 The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the following properties:

- 9 • App A: CCC drive-certified app (EU)
- 10 • App B: CCC drive-certified app (Global)

11 The test case will check the behavior of the following setups:

- 12 1. No other CCC drive-certified app running; blocking EU drive certified app with "Not sufficient application trust level" reason.
- 14 2. Other CCC drive-certified app running; blocking EU drive certified app with "Not sufficient application trust level" reason.
- 15 3. Other CCC drive-certified app running; terminate application.

17 The test case will also validate, that the MirrorLink Server displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch App A in Park Mode; launch only from CTS.	
2	VNC Server Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> App A visible on CTS
5	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> Drive Mode Enabled
6	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: <ul style="list-style-type: none"> Not sufficient application trust level 	<ul style="list-style-type: none"> Framebuffer Blocking Information Callback sent via Common API Framebuffer blocking notification handling as specified above (no background App).
7	UPnP Launch	Launch App B	<ul style="list-style-type: none"> App B visible on CTS
8	Park Mode	CTS enables Park Mode	<ul style="list-style-type: none"> Park Mode Enabled
9	UPnP Launch	Launch App A	<ul style="list-style-type: none"> App A visible on CTS
10	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> Drive Mode Enabled
11	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reasons: <ul style="list-style-type: none"> Not sufficient application trust level 	<ul style="list-style-type: none"> Framebuffer Blocking Information Callback sent via Common API Framebuffer blocking notification handling as specified above (background App B).
12	Park Mode	CTS enables Park Mode	<ul style="list-style-type: none"> Park Mode Enabled
13	UPnP Launch	Launch App A	<ul style="list-style-type: none"> App A visible on CTS
14	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> Drive Mode Enabled
15	Framebuffer Blocking Notification	Send UPnP Terminate Application for App A.	<ul style="list-style-type: none"> Same as Framebuffer blocking notification handling as specified above (background App B), but without user notification by the DUT. <p>Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.</p>
12	Intentional VNC Server Cleanup	See Definitions	

1 Table 123: Framebuffer Blocking Notification - Blocking CCC drive-certified Application

2 **3.11.4 SR/VNC/BLOCK/FB/UILayoutNotSupported**

3 Requirement: MANDATORY

4 Condition: None

5 The CTS attempts to change the framebuffer orientation. A Device Status message indicates the changed display orientation. A Framebuffer Blocking Notification message is sent to the server to block the last application being contained in the context information. The reason is "UI layout not supported". A Desktop Size Pseudo Encoding and a Device Status message are expected from the server to indicate that the orientation flipped back.

10 A MirrorLink Server, not supporting orientation changes, is expected to ignore any orientation change attempt and the blocking for the same reason.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	

Step	Name	Description	Expected Result
		Launch an application, which allow changing the orientation with known steps.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	Change Layout	CTS send Device Status message to change the orientation to Portrait to DUT	<ul style="list-style-type: none"> • DUT does not support Framebuffer Orientation Switch • DUT maintains framebuffer configuration (no rescaling) • Valid Device Status message arrives (no new orientation) OR <ul style="list-style-type: none"> • DUT does support Framebuffer Orientation Switch • Receive message <u>sequence</u> as defined in [3] (section 5.7): <ol style="list-style-type: none"> 1. Valid Desktop Size Pseudo Encoding message arrives 2. Valid Device Status message arrives • Desktop Size Pseudo Encoding is the last rectangle in the Framebuffer Update message • Framebuffer orientation in both messages is correct • Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message
6	UI Layout not supported	Send Framebuffer Blocking Notification message with the following reason. <ul style="list-style-type: none"> • UI Layout not supported 	<ul style="list-style-type: none"> • DUT does not support Framebuffer Orientation Switch • DUT maintains framebuffer configuration (no rescaling) OR <ul style="list-style-type: none"> • Receive message <u>sequence</u> as defined in [3] (section 5.7): <ol style="list-style-type: none"> 1. Valid Desktop Size Pseudo Encoding message arrives 2. Valid Device Status message arrives • Desktop Size Pseudo Encoding is the last rectangle in the Framebuffer Update message • Framebuffer orientation in both messages is correct • Orientation on screen changed back to original orientation. • Context Information and Framebuffer Data rectangles

Step	Name	Description	Expected Result
			may be skipped in Desktop Size Pseudo Encoding message
7	Intentional VNC Server Cleanup	See Definitions	

1 Table 124: Framebuffer Blocking – UI Layout not supported

2 **3.11.5 SR/VNC/BLOCK/FB/*UiNotVisible***

3 Requirement: MANDATORY

4 Condition: None

5 The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the following properties:

- App A: CCC drive-certified app (Global)

8 The MirrorLink Server MUST NOT change the applications state or disconnect the VNC session, when receiving a Framebuffer Blocking Notification message with the reason “UI not visible on remote display”.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch App A	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> • App A visible on CTS
5	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message with the following blocking reason: • UI not visible on remote display CTS stops sending Framebuffer Update Request messages	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • VNC session not disconnected • App A still in foreground on DUT • No UPnP AppStatusUpdate received
6	Framebuffer Unblock	CTS continues Framebuffer Update Request messages	<ul style="list-style-type: none"> • Framebuffer Unblocking Callback sent via Common API • App A still in foreground on DUT • App A visible on CTS • No UPnP AppStatusUpdate received
7	Intentional VNC Server Cleanup	See Definitions	

11 Table 125: Framebuffer Blocking Notification – UI Not Visible

12 **3.11.6 SR/VNC/BLOCK/FB/*NonCertifiedOverlay***

13 Requirement: MANDATORY

14 Condition: None

- 1 This test case validates, that the DUT responds correctly to the MirrorLink Client's blocking an overlay from
2 a background non-certified application.
- 3 The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the
4 following properties:
- 5 • App A: MirrorLink-aware app, creating an overlay, when the app is in the background.
6 • App B: CCC drive-certified app (Global)
- 7 App A may not be able to launch from the MirrorLink Client, in case they are not included into the UPnP
8 application listing. In this case, the test engineer MUST try to launch the respective application locally from
9 the MirrorLink Server, unless otherwise mentioned.
- 10 The test case will check the behavior of the following setups:
- 11 1. Overlay created in Park Mode.
12 2. Overlay created in Drive Mode.
- 13 The test case will also validate, that the MirrorLink Server displays a notification to the user, when blocking
14 occurs, and that blocking is resolved from the MirrorLink Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Test engineer launches App A in Park Mode. App may need to be launched outside a MirrorLink session.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	UPnP Launch	Launch App B	<ul style="list-style-type: none">• App B visible on CTS
6	Overlay	Test Engineer executed the necessary steps to have App A create an Overlay ² . If overlay not visible on CTS, go to step 8	<ul style="list-style-type: none">• Overlay from App A not visible on CTS• App B visible on CTS OR <ul style="list-style-type: none">• Overlay from App A visible on CTS• App B visible under the overlay on CTS• VNC Context Information includes information of App A and App B• Failure to include App A requires waiver from Certification Body, to whether this is covered from the platform specific specification (see functional specification)

² App A will be required to create an overlay, while running in the background. The test engineer will be asked to execute known steps to create the overlay. This may include using App B to send a trigger to App A, other external triggers or some automatic mechanism within App A.

Step	Name	Description	Expected Result
7	Framebuffer Blocking Notification	<p>Send Framebuffer Blocking Notification message, covering the App A's overlay, with the following blocking reasons:</p> <ul style="list-style-type: none"> • Not allowed content category 	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above for Overlays.
8	UPnP Launch	Launch App A	<ul style="list-style-type: none"> • App A visible on CTS
9	UPnP Launch	Launch App B	<ul style="list-style-type: none"> • App B visible on CTS
10	Overlay	<p>Test Engineer executed the necessary steps to have App A create an Overlay.</p> <p>If overlay not visible on CTS, go to step 12</p>	<ul style="list-style-type: none"> • Overlay from App A not visible on CTS • App B visible on CTS <p>OR</p> <ul style="list-style-type: none"> • Overlay from App A visible on CTS • App B visible under the overlay on CTS • VNC Context Information includes information of App A and App B • Failure to include App A requires waiver from Certification Body, to whether this is covered from the platform specific specification (see functional specification)
11	Framebuffer Blocking Notification	<p>Send Framebuffer Blocking Notification message, covering the App A's overlay, with the following blocking reasons:</p> <ul style="list-style-type: none"> • Not allowed application ID 	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above for Overlays.
12	UPnP Launch	Launch App A	<ul style="list-style-type: none"> • App A visible on CTS
13	UPnP Launch	Launch App B	<ul style="list-style-type: none"> • App B visible on CTS
14	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> • Drive Mode Enabled
15	Overlay	<p>Test Engineer executed the necessary steps to have App A create an Overlay.</p> <p>If overlay not visible on CTS, go to step 17</p>	<ul style="list-style-type: none"> • Overlay from App A not visible on CTS • App B visible on CTS <p>OR</p> <ul style="list-style-type: none"> • Overlay from App A visible on CTS • App B visible under the overlay on CTS • VNC Context Information includes information of App A and App B • Failure to include App A requires waiver from Certification Body, to whether this is covered from the platform specific specification (see functional specification)

Step	Name	Description	Expected Result
16	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message, covering the App A's overlay, with the following blocking reasons: <ul style="list-style-type: none"> • Not sufficient application trust level 	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above for Overlays.
17	Intentional VNC Server Cleanup	See Definitions	

1 Table 126: Framebuffer Blocking Notification - Blocking ML-aware Overlay

2 **3.11.7 SR/VNC/BLOCK/FB/BaseCertifiedOverlay**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT responds correctly to the MirrorLink Client's blocking an overlay from a background CCC base-certified application.

7 The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the following properties:

- 9
 - App A: CCC base-certified app, creating an overlay, when the app is in the background
 - App B: CCC drive-certified app (Global)

11 The test case will check the behavior of the following setups:

- 12 1. Overlay created in Drive Mode.

13 The test case will also validate, that the MirrorLink Server displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch App A in Park Mode	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> • App A visible on CTS
5	UPnP Launch	Launch App B	<ul style="list-style-type: none"> • App B visible on CTS
6	Overlay	Test Engineer executed the necessary steps to have App A create an Overlay ³ .	<ul style="list-style-type: none"> • Overlay from App A visible on CTS • App B visible under the overlay on CTS • VNC Context Information includes information of App B and App A • Failure to include App A requires waiver from Certification

³ App A will be required to create an overlay, while running in the background. The test engineer will be asked to execute known steps to create the overlay. This may include using App B to send a trigger to App A, other external triggers, or some automatic mechanism within App A.

Step	Name	Description	Expected Result
			Body, to whether this is covered from the platform specific specification (see functional specification)
7	Drive Mode	CTS enables Drive Mode	<ul style="list-style-type: none"> • Drive Mode Enabled
8	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message, covering the App A's overlay, with the following blocking reasons: <ul style="list-style-type: none"> • Not sufficient application trust level 	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above for Overlays. <p>Note: The DUT may not wait for the framebuffer blocking notification and immediately respond to enabling Drive Mode.</p>
9	Intentional VNC Server Cleanup	See Definitions	

1 Table 127: Framebuffer Blocking Notification - Blocking CCC Base-Certified Overlay

2 **3.11.8 SR/VNC/BLOCK/FB/DriveCertifiedOverlay**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT responds correctly to the MirrorLink Client's blocking an overlay from a background CCC drive-certified application.

7 The framebuffer blocking test cases, require apps to be installed on the DUT and validated, which have the following properties:

- 9
 - App A: CCC drive-certified app (EU), creating an overlay, when the app is in the background
 - App B: CCC drive-certified app (Global)

11 The test case will check the behavior of the following setups:

- 12 1. Overlay created in Drive Mode.

13 The test case will also validate, that the MirrorLink Server displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch App A in Drive Mode	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> • App A visible on CTS
5	UPnP Launch	Launch App B	<ul style="list-style-type: none"> • App B visible on CTS

Step	Name	Description	Expected Result
6	Overlay	Test Engineer executed the necessary steps to have App A create an Overlay ⁴ .	<ul style="list-style-type: none"> • Overlay from App A visible on CTS • App B visible under the overlay on CTS • VNC Context Information includes information of App A and App B • Failure to include App A requires waiver from Certification Body, to whether this is covered from the platform specific specification (see functional specification)
7	Framebuffer Blocking Notification	Send Framebuffer Blocking Notification message, covering the App A's overlay, with the following blocking reasons: <ul style="list-style-type: none"> • Not sufficient application trust level 	<ul style="list-style-type: none"> • Framebuffer Blocking Information Callback sent via Common API • Framebuffer blocking notification handling as specified above for Overlays.
8	Intentional VNC Server Cleanup	See Definitions	

1 Table 128: Framebuffer Blocking Notification - Blocking CCC Drive-Certified Overlay

2 **3.12 Audio Blocking Notification**

3 Note: Changes to the Audio Blocking Notification test case will be addressed in the next Errata release version.

5 **3.12.1 SR/VNC/BLOCK/RtpBlockingNotification**

6 Requirement: MANDATORY

7 Condition: None

8 One application ID contained in the RTP stream is being chosen and an Audio Blocking Notification message is sent to the server in order to block this application. If no application ID was contained in the RTP stream, the blocking will target any stream (0). The server is expected to react within 5 seconds, either by stopping the RTP stream or by removing the application ID from the stream.

Step	Name	Description	Expected Result
1	RTP Server Launch	See Definitions	
2	VNC Server Launch	See Definitions Launch an application, which does allow streaming an audio stream.	
3	VNC Server Handshake	See Definitions	

⁴ App A will be required to create an overlay, while running in the background. The test engineer will be asked to execute known steps to create the overlay. This may include using App B to send a trigger to App A, other external triggers or some automatic mechanism within App A.

Step	Name	Description	Expected Result
4	VNC Server Configuration	See Definitions	
5	VNC Server Start Operation	See Definitions	
6	Start audio stream	Execute the known steps to start audio streaming (if not already started with the application launch).	<ul style="list-style-type: none"> RTP audio stream received
7	Block audio stream	<p>Send Audio Blocking Notification message.</p> <p>One application ID contained in the RTP stream is being chosen. If no application ID was contained in the RTP stream, the blocking will target any stream (0).</p> <p>The server is expected to react within 5 seconds, either by stopping the entire RTP stream or by removing the RTP stream associated with application ID from the stream.</p>	<ul style="list-style-type: none"> Incoming RTP packets do not contain the blocked application ID, 200ms after the Audio Blocking Notification message has been sent. Marker bit of the last received packet is set (if RTP stream is stopped entirely)
8	RTP Server Termination	See Definitions	
9	Intentional VNC Server Cleanup	See Definitions	

Table 129: Block RTP Audio Stream

3.12.2 SR/VNC/BLOCK/RtpUnblockingNotification

Requirement: MANDATORY

Condition: None

The previously blocked application IDs are now unblocked via appropriate Audio Blocking Notification messages. The test engineer is asked to make sure that the applications send audio again (e.g. by re-starting them). The server is expected to react within 5 seconds by continuing streaming audio containing those application IDs.

Step	Name	Description	Expected Result
1	RTP Server Launch	See Definitions	
2	VNC Server Launch	See Definitions Launch an application, which does allow streaming an audio stream.	
3	VNC Server Handshake	See Definitions	
4	VNC Server Configuration	See Definitions	
5	VNC Server Start Operation	See Definitions	
6	Start audio stream	Execute the known steps to start audio streaming (if not already started with the application launch).	<ul style="list-style-type: none"> RTP audio stream received

Step	Name	Description	Expected Result
7	Block audio stream	<p>Send Audio Blocking Notification message.</p> <p>One application ID contained in the RTP stream is being chosen. If no application ID was contained in the RTP stream, the blocking will target any stream (0).</p> <p>The server is expected to react within 5 seconds, either by stopping the entire RTP stream or by removing the RTP stream associated with application ID from the stream.</p>	<ul style="list-style-type: none"> • Incoming RTP packets do not contain the blocked application ID, 200ms after the Audio Blocking Notification message has been sent. • Marker bit of the last received packet is set (if RTP stream is stopped entirely)
8	Unblocking audio stream	<p>Send Audio Blocking Notification message.</p> <ul style="list-style-type: none"> • Application ID is the one from previous blocking notification • Blocking reason is Zero <p>The test engineer is asked to make sure that the application is still sending audio or start the audio stream again.</p> <p>The server is expected to react within 5 seconds by continuing streaming audio containing those application IDs.</p>	<ul style="list-style-type: none"> • Incoming RTP packets do contain the previously blocked application ID
9	RTP Server Termination	See Definitions	
10	Server VNC Cleanup	See Definitions	

1 Table 130: Unblocking RTP Audio Stream

2 **3.12.3 SR/VNC/BLOCK/RtpBlockingNotification1ofMany**

3 Requirement: CONDITIONAL

4 Condition: MirrorLink Server supports an audio stream from multiple applications

5 Validate whether the RTP Server can block one audio stream, while keep other audio streams ongoing .

Step	Name	Description	Expected Result
1	RTP Server Launch	See Definitions	
2	VNC Server Launch	See Definitions	
		Launch an application, which streams audio	
3	VNC Server Handshake	See Definitions	
4	VNC Server Configuration	See Definitions	
5	VNC Server Start Operation	See Definitions	

Step	Name	Description	Expected Result
6	Start audio stream	Execute the known steps to start audio streaming (if not already started with the application launch).	<ul style="list-style-type: none">RTP audio stream received
7	Application Launch	Launch an additional application, which streams audio. Execute the known steps to start audio streaming.	<ul style="list-style-type: none">Audio stream from both applications received
8	Block audio stream	Send Audio Blocking Notification message. One application ID contained in the RTP stream is being chosen.	<ul style="list-style-type: none">Incoming RTP stream does not contain the blocked application ID, 200ms after the Audio Blocking Notification message has been sent.Incoming RTP stream does contain packets from the non-blocked application.
9	RTP Server Termination	See Definitions	
10	Intentional VNC Server Cleanup	See Definitions	

1

Table 131: Block one of multiple RTP Audio Streams

2

1 3.13 Touch Events

2 3.13.1 SR/VNC/TOUCH/TouchEventCheck

3 Requirement: CONDITIONAL

4 Condition: Server supports Touch Events

5 Check that server announces support for Touch Events.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Touch Events flag is '1'• Pressure mask in Server Event Configuration message is not equal 0
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 132: Check Touch Event Support

7 3.13.2 SR/VNC/TOUCH/TouchEventGesture

8 Requirement: CONDITIONAL

9 Condition: Server supports Touch Events AND

10 Server supports Touch Gestures

11 Touch events for all supported events (as reported via the Server Event Configuration) are being sent to the MirrorLink server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions Launch an application, which does support touch events and which supported gestures are known.	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Touch Events flag is '1'
4	VNC Server Start Operation	See Definitions	
4	Check Touch Events	Send a touch event for all known supported gestures. Send touch event gestures one by one. Note: Each gesture has to be completed within 500ms. Test engineer has to validate that the MirrorLink server behavior.	<ul style="list-style-type: none">• MirrorLink server shows the expected behavior on the reception of the touch event gestures.
5	Intentional VNC Server Cleanup	See Definitions	

13

Table 133: Touch Event Gestures

3.14 Server-Side Scaling

The following test cases may define specific framebuffer resolutions the MirrorLink Server is expected to up/down-scale to. The received framebuffer resolution from the MirrorLink Server might be slightly different. Only the following framebuffer resolutions are allowed (example target resolution 800x480):

- 800xH, with H ≤ 480 and Server's aspect ratio is maintained
- Wx480, with W ≤ 800 and Server's aspect ratio is maintained

In all cases, the actual width or height may be up to 5% smaller than expected from above. In addition the received aspect ratio may be up to 5% different than expected. The test case MUST fail, if either the width or the height of the framebuffer is bigger than expected.

Note: The MirrorLink Server is allowed to switch orientation, if the new orientation better matches the MirrorLink Client's framebuffer resolution and reversing the aspect ratio.

Note: The MirrorLink Server is allowed to add pad rows or columns to the framebuffer (up to the resolution of the MirrorLink Client framebuffer), in which case the aspect ratio of the received framebuffer will differ. In any case, the core framebuffer part MUST NOT look stretched.

Note: The CTS tool must use a display with a pixel aspect ratio of 1:1.

3.14.1 SR/VNC/DOWNSCALE/DownScalingCheck

Requirement: CONDITIONAL

Condition: Server framebuffer resolution is exceeding 800x480 OR
Server supports Framebuffer Down-Scaling

Check Server Display Configuration message, whether server-side framebuffer down-scaling is available.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	<ul style="list-style-type: none">• Server-side framebuffer down-scaling available
4	Server VNC Cleanup	See Definitions	

Table 134: Check Framebuffer Down-scaling

3.14.2 SR/VNC/DOWNSCALE/RequestOldFramebufferResolution

Requirement: CONDITIONAL

Condition: Server Framebuffer is exceeding 800x480 OR
Server Framebuffer is exceeding 1024x600

A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates no down-scaling support.

The test case checks, whether the VNC Server can handle the situation, where the VNC Client sends the next framebuffer update request prior fully decoding a Desktop Size Pseudo Encoding message. In this situation, the VNC Client is requesting a wrong framebuffer area from the VNC Server.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Indicate no down-scaling support in Client Display Configuration message Set Client Framebuffer resolution in Client Display Configuration to 640x360	<ul style="list-style-type: none"> Server-side framebuffer down-scaling available
4	VNC Server Start Operation	Send first non-incremental Framebuffer Update Request message with Server's native framebuffer resolution.	<ul style="list-style-type: none"> Received Framebuffer Update message Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message. New Framebuffer resolution is 640x360 or 800x480 as specified in VNC specification Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message
5	VNC Server FB update request	Send non-incremental Framebuffer Update Request message with Server's old framebuffer resolution, as provided in VNC Server Init.	<ul style="list-style-type: none"> Receive Framebuffer Update message If Desktop Size Pseudo Encoding rectangle included, size must be identical to previous one (step 4) Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message
6	Regular FB transfer	Send non-incremental Framebuffer Update Request message with Server's framebuffer resolution, as provided in Desktop Size Pseudo Encoding rectangle.	<ul style="list-style-type: none"> Receive Framebuffer Update message Message contains Context Information for entire framebuffer Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer) Framebuffer update area is identical to requested area
7	Server VNC Cleanup	See Definitions	

1 Table 135: Framebuffer Down-scaling – No Client support – Old Framebuffer Resolution

2 **3.14.3 SR/VNC/DOWNSCALE/NoClientSupport/ServerExceed800x480**

3 Requirement: CONDITIONAL

4 Condition: Server Framebuffer is exceeding 800x480 OR

- 1 Server Framebuffer is exceeding 1024x600
2 A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates no down-scaling support.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	<p>See Definitions</p> <p>Indicate no down-scaling support in Client Display Configuration message</p> <p>Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none">• 1280x720, 1024x600, 854x480, 800x480, 640x360 (and corresponding portrait resolutions)• 5 random resolutions exceeding 800x480 (Landscape & Portrait)• 5 random resolutions within 800x480 but exceeding 320x240 (Landscape & Portrait) <p>Use only those framebuffer resolutions, which are within the Server's native framebuffer resolution.</p> <p>Aspect ratio of random resolutions must be within [0.4 , 2.5].</p>	<ul style="list-style-type: none">• Server-side framebuffer down-scaling available
4	VNC Server Start Operation	Send first non-incremental Framebuffer Update Request message with Server's native framebuffer resolution.	<ul style="list-style-type: none">• Received Framebuffer Update message• Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message.• New Framebuffer resolution is either Client FB or a fixed resolution dependent on Client and Server FB size as specified in VNC specification.• Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message• Framebuffer Data rectangles not exceeding requested Framebuffer Update.

Step	Name	Description	Expected Result
5	Regular VNC transfer	Send at least 1 non-incremental followed by 5 incremental framebuffer Update Request messages with a framebuffer resolution, provided in Desktop Size Pseudo Encoding rectangle.	<ul style="list-style-type: none"> Received Framebuffer Update message. Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)
6	Server VNC Cleanup	See Definitions	

Table 136: Framebuffer Down-scaling – No Client support – Server exceeding 800x480

3.14.4 SR/VNC/DOWNSCALE/NoClientSupport/ServerWithin800x480

Requirement: CONDITIONAL

Condition: Server supports Framebuffer Down-Scaling AND
 Server Framebuffer is within 800x480.

A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates no down-scaling support.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	<p>See Definitions</p> <p>Indicate no down-scaling support in Client Display Configuration message</p> <p>Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> 5 random resolutions exceeding 320x240 (Landscape & Portrait), exceeding 320x240 <p>Use only those framebuffer resolutions, which are within the Server's native framebuffer resolution.</p> <p>Aspect ratio of random resolutions must be within [0.4 , 2.5].</p>	<ul style="list-style-type: none"> Server-side framebuffer down-scaling available
4	VNC Server Start Operation	<p>Send first non-incremental Framebuffer Update Request message with Server's native framebuffer resolution.</p>	<ul style="list-style-type: none"> Received Framebuffer Update message Framebuffer Data rectangles not exceeding requested Framebuffer Update. <p>Option 1 – No down-scaling</p> <ul style="list-style-type: none"> No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init (down-

Step	Name	Description	Expected Result
			<p>scaling not required as specified in VNC specification)</p> <p>Option 2 – Down-scaling</p> <ul style="list-style-type: none"> • Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message. • New Framebuffer resolution is Client FB as specified in VNC specification. • Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message
5	Regular VNC transfer	<p>Send at least 1 non-incremental followed by 5 incremental framebuffer Update Request messages with a framebuffer resolution, provided in Desktop Size Pseudo Encoding rectangle.</p> <p>Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.</p>	<ul style="list-style-type: none"> • Received Framebuffer Update message. • Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)
6	Server VNC Cleanup	See Definitions	

1 Table 137: Framebuffer Down-scaling – No Client support – Server within 800x480

2 **3.14.5 SR/VNC/DOWNSCALE/NoClientSupport/DynamicClientDisplayConfig**

3 Requirement: MANDATORY

4 Condition: None

5 Multiple Client Display Configuration messages are sent to the MirrorLink server with varying client framebuffer resolutions.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	<p>See Definitions</p> <p>Indicate no down-scaling support in Client Display Configuration message</p> <p>Client Display Configuration follows Server resolution</p>	<ul style="list-style-type: none"> • Server-side framebuffer down-scaling available
4	VNC Server Start Operation	<p>Follow the following sequence</p> <ol style="list-style-type: none"> 1. Send non-incremental Framebuffer Update Request message for Server's current framebuffer resolution 	<ul style="list-style-type: none"> • Received Framebuffer Update message • Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)

Step	Name	Description	Expected Result
		<p>2. Send Client Display Configuration message (random resolution, within Server's native framebuffer resolution), exceeding 320x240 and having an aspect ratio within [0.4 , 2.5]</p> <p>3. Send 10 non-incremental Framebuffer Update Request messages with new framebuffer resolution. Repeat at least 5 times. Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.</p>	<ul style="list-style-type: none"> • Framebuffer update area is identical to requested area <p>Option 1 – No down-scaling</p> <ul style="list-style-type: none"> • No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init (down-scaling not required as specified in VNC specification) • Allowed only if Server framebuffer resolution is within 800x480 as specified in VNC specification <p>Option 2 – Down-scaling</p> <ul style="list-style-type: none"> • Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message after Client Display Configuration message. • New Framebuffer resolution is either Client FB or a fixed resolution dependent on Client and Server FB size. • Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message
5	Server VNC Cleanup	See Definitions	

1 Table 138: Framebuffer Down-scaling – No Client support – Dynamic Client framebuffer

2 **3.14.6 SR/VNC/DOWNSCALE/ClientSupport/ServerExceed800x480**

3 Requirement: CONDITIONAL

4 Condition: Server Framebuffer is exceeding 800x480 OR

5 Server Framebuffer is exceeding 1024x600

6 A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates down-scaling support.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Indicate down-scaling support in Client Display Configuration message	<ul style="list-style-type: none"> • Server-side framebuffer down-scaling available

Step	Name	Description	Expected Result
		<p>Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 1280x720, 1024x600, 854x480, 800x480, 640x360 (and corresponding portrait resolutions) • 5 random resolutions exceeding 800x480 (Landscape & Portrait) • 5 random resolutions within 800x480 exceeding 320x240 (Landscape & Portrait) <p>Use only those framebuffer resolutions, which are within the Server's native framebuffer resolution.</p> <p>Aspect ratio of random resolutions must be within [0.4 , 2.5].</p>	
4	VNC Server Start Operation	<p>See Definitions</p> <p>Send non-incremental Framebuffer Update Request messages for Server's current framebuffer resolution.</p> <p>Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.</p>	<ul style="list-style-type: none"> • Received Framebuffer Update message • Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer) • Framebuffer update area is identical to requested area <p>Option 1 – No down-scaling</p> <ul style="list-style-type: none"> • No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init (down-scaling not required as specified in VNC specification) • Allowed only if Server framebuffer resolution is within 1024x600 as specified in VNC specification <p>Option 2 – Down-scaling</p> <ul style="list-style-type: none"> • Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message. • New framebuffer resolution is either Client FB or a fixed resolution dependent on Client and Server FB size. • Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message

Step	Name	Description	Expected Result
5	Server VNC Cleanup	See Definitions	

1 Table 139: Framebuffer Down-scaling – Client support – Server exceeding 800x480

2 3.14.7 SR/VNC/DOWNSCALE/ClientSupport/ServerWithin800x480

3 Requirement: CONDITIONAL

4 Condition: Server supports Framebuffer Down-Scaling AND

5 Server Framebuffer is within 800x480.

6 A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change
 7 its framebuffer. The Client indicates down-scaling support.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	<p>See Definitions</p> <p>Indicate down-scaling support in Client Display Configuration message</p> <p>Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 5 random resolutions (Landscape & Portrait) exceeding 320x240 <p>Use only those framebuffer resolutions, which are within the Server's native framebuffer resolution.</p> <p>Aspect ratio of random resolutions must be within [0.4 , 2.5].</p>	<ul style="list-style-type: none"> • Server-side framebuffer down-scaling available
4	VNC Server Start Operation	<p>See Definitions</p> <p>Send non-incremental Framebuffer Update Request message for Server's current framebuffer resolution.</p> <p>Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.</p>	<ul style="list-style-type: none"> • Received Framebuffer Update message • Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer) • Framebuffer update area is identical to requested area <p>Option 1 – No down-scaling</p> <ul style="list-style-type: none"> • No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init (down-scaling not required as specified in VNC specification) <p>Option 2 – Down-scaling</p>

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message. New framebuffer resolution is within Server's framebuffer Client FB as specified in VNC specification. Context Information and Framebuffer Data rectangle may be skipped in Desktop Size Pseudo Encoding message
5	Server VNC Cleanup	See Definitions	

1 Table 140: Framebuffer Down-scaling – Client support – Server within 800x480

2 **3.14.8 SR/VNC/DOWNSCALE/ClientSupport/DynamicClientDisplayConfig**

3 Requirement: MANDATORY

4 Condition: None

5 A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates down-scaling support.
 6

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Indicate down-scaling support in Client Display Configuration message Client Display Configuration follows Server resolution	<ul style="list-style-type: none"> Server-side framebuffer down-scaling available
4	VNC Server Start Operation	Follow the following sequence <ol style="list-style-type: none"> Send non-incremental Framebuffer Update Request message for Server's current framebuffer resolution Send Client Display Configuration message (random resolution, within Server's native framebuffer resolution), exceeding 320x240 and having an aspect ratio within [0.4 , 2.5]. Send 10 non-incremental Framebuffer Update Request messages with new framebuffer resolution. Repeat at least 5 times. 	<ul style="list-style-type: none"> Received Framebuffer Update message Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer) Framebuffer update area is identical to requested area Option 1 – No down-scaling <ul style="list-style-type: none"> No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init (down-scaling not required as specified in VNC specification)

Step	Name	Description	Expected Result
		Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.	<ul style="list-style-type: none"> Allowed only if Server framebuffer resolution is within 1024x600 as specified in VNC specification <p>Option 2 – Down-scaling</p> <ul style="list-style-type: none"> Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message after Client Display Configuration message. New Framebuffer resolution is either Client FB or a fixed resolution dependent on Client and Server FB size. Context Information and Framebuffer Data rectangle may be skipped in Desktop Size Pseudo Encoding message
5	Server VNC Cleanup	See Definitions	

1 Table 141: Framebuffer Down-scaling – Client support – Dynamic client framebuffer

2 **3.14.9 SR/VNC/UPSCALE/UpScalingCheck**

3 Requirement: CONDITIONAL

4 Condition: Server supports Framebuffer Up-Scaling

5 Check Server Display Configuration message, whether server-side framebuffer up-scaling is available.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions <ul style="list-style-type: none"> Client-side framebuffer up-scaling not available 	<ul style="list-style-type: none"> Server-side framebuffer up-scaling available
4	Intentional VNC Server Cleanup	See Definitions	

6 Table 142: Check Framebuffer Up-scaling

7 **3.14.10 SR/VNC/UPSCALE/NoClientSupport/ServerWithin800x480**

8 Requirement: CONDITIONAL

9 Condition: Server supports Framebuffer Up-Scaling AND

10 Server Framebuffer is within 800x480.

11 A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates no up-scaling support.

13 The test case checks, whether the VNC Server up-scales to a resolution, within the resolution requested in the Client Display Configuration message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	<p>See Definitions</p> <p>Indicate no up-scaling support in Client Display Configuration message</p> <p>Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 5 random resolutions (Landscape & Portrait) <p>Use only those framebuffer resolutions, which are exceeding the Server's native framebuffer resolution, but within 800x480. Aspect ratio of random resolutions must be within [0.4 , 2.5].</p>	<ul style="list-style-type: none"> • Server-side framebuffer up-scaling available
4	VNC Server Start Operation	Send first non-incremental Framebuffer Update Request message with Server's native framebuffer resolution.	<ul style="list-style-type: none"> • Received Framebuffer Update message • Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message. • Context Information and Framebuffer Data rectangles may be skipped in Desktop Size Pseudo Encoding message • New Framebuffer resolution is within the "requested" one as specified in VNC specification • Framebuffer Data rectangles not exceeding requested Framebuffer Update.
5	Regular VNC transfer	<p>Send at least 1 non-incremental followed by 5 incremental framebuffer Update Request messages with a framebuffer resolution, provided in Desktop Size Pseudo Encoding rectangle.</p> <p>Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.</p>	<ul style="list-style-type: none"> • Received Framebuffer Update message. • Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)
6	Server VNC Cleanup	See Definitions	

1 Table 143: Framebuffer Up-scaling – No Client support – Server within 800x480

2 **3.14.11 SR/VNC/UPSCALE/ClientSupport/ServerWithin800x480**

3 Requirement: CONDITIONAL

- 1 Condition: Server supports Framebuffer Up-Scaling AND
- 2 Server Framebuffer is within 800x480.
- 3 A Client Display Configuration message is sent to the MirrorLink server, triggering the VNC server to change its framebuffer. The Client indicates up-scaling support.
- 4 The test case checks, whether the VNC Server up-scales to a resolution, within the resolution requested in the Client Display Configuration message.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	<p>See Definitions</p> <p>Indicate up-scaling support in Client Display Configuration message</p> <p>Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 5 random resolutions (Landscape & Portrait) <p>Use only those framebuffer resolutions, which are exceeding the Server's native framebuffer resolution, but within 800x480. Aspect ratio of random resolutions must be within [0.4 , 2.5].</p>	<ul style="list-style-type: none"> • Server-side framebuffer up-scaling available
4	VNC Server Start Operation	<p>See Definitions</p> <p>Send non-incremental Framebuffer Update Request message for Server's native framebuffer resolution</p>	<ul style="list-style-type: none"> • Received Framebuffer Update message • Framebuffer Data rectangles not exceeding requested Framebuffer Update. <p>Option 1 – No up-scaling</p> <ul style="list-style-type: none"> • No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init <p>Option 2 – Up-scaling</p> <ul style="list-style-type: none"> • Desktop Size Pseudo Encoding rectangle received in response to 1st Framebuffer Update Request message. • New framebuffer resolution is exceeding the Server's native framebuffer resolution, and is equal or within the Client's framebuffer resolution as specified in VNC specification. • Context Information and Framebuffer Data rectangle may be skipped in Desktop Size Pseudo Encoding message

Step	Name	Description	Expected Result
5	Regular VNC transfer	Send at least 1 non-incremental followed by 5 incremental framebuffer Update Request messages with a framebuffer resolution, provided in Desktop Size Pseudo Encoding rectangle. Always wait until potential Desktop Size Pseudo Encoding rectangle decoded.	<ul style="list-style-type: none"> Received Framebuffer Update message. Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)
6	Server VNC Cleanup	See Definitions	

1 Table 144: Framebuffer Up-scaling – Client support – Server within 800x480

2 **3.14.12 SR/VNC/SCALE/NoServerUpscaling**

3 Requirement: CONDITIONAL

4 Condition: Server does not support Framebuffer Up-Scaling

5 The test case checks, whether the VNC Server, which does not support up-scaling, can handle a situation,
 6 where the VNC Client's resolution is exceeding the VNC Server's resolution.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Indicate no up-scaling support in Client Display Configuration message Set Client Framebuffer resolution in Client Display Configuration to the following values (in separate runs of the test case) <ul style="list-style-type: none"> 5 random resolutions (Landscape & Portrait) Use only those framebuffer resolutions, which are exceeding the Server's native framebuffer resolution; include 1280x720, 1024x600 and 800x480 when applicable. Aspect ratio of random resolutions must be within [0.4 , 2.5].	<ul style="list-style-type: none"> Server-side framebuffer up-scaling not available
4	VNC Server Start Operation	See Definitions Send non-incremental Framebuffer Update Request message for Server's native framebuffer resolution	<ul style="list-style-type: none"> Received Framebuffer Update message Framebuffer Data rectangles not exceeding requested Framebuffer Update. No Desktop Size Pseudo Encoding message received with a different size than the original DUT's framebuffer size from the VNC Server Init.

Step	Name	Description	Expected Result
5	Regular VNC transfer	Send at least 1 non-incremental followed by 5 incremental framebuffer Update Request messages.	<ul style="list-style-type: none"> Received Framebuffer Update message. Framebuffer content is replicating server's framebuffer (visual confirmation from test engineer)
6	Server VNC Cleanup	See Definitions	

1 Table 145: No Framebuffer Up-scaling

2 **3.14.13 SR/VNC/SCALE/ClientFB0x0**

3 Requirement: MANDATORY

4 Condition: None

5 A Client Display Configuration message is sent to the MirrorLink server with unknown size (0x0). The VNC Server is expected to operate without scaling.
 6

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions Set Client Framebuffer resolution in Client Display Configuration to <ul style="list-style-type: none"> 0x0 0x65,535 0x(random number) 65,535x0 (random number)x0 	<ul style="list-style-type: none"> VNC session continues
4	VNC Server Start Operation	See Definitions Send non-incremental Framebuffer Update Request messages for Server's current framebuffer resolution.	<ul style="list-style-type: none"> Received Framebuffer Update message
5	Server VNC Cleanup	See Definitions	

7 Table 146: Framebuffer Scaling – Client Framebuffer advertised as 0x0

8 **3.14.14 SR/VNC/SCALE/ClientFB0x0Change**

9 Requirement: MANDATORY

10 Condition: None

11 A Client Display Configuration message is sent to the MirrorLink server with unknown size (0x0). The VNC Server is expected to operate without scaling.
 12

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	<ul style="list-style-type: none"> Received Framebuffer Update message
5	VNC Server Configuration Change	Update Client Framebuffer resolution in Client Display Configuration to <ul style="list-style-type: none"> 0x0 0x65,535 0x(random number) 65,535x0 (random number)x0 Continue sending non-incremental Framebuffer Update Request messages for Server's current framebuffer resolution.	<ul style="list-style-type: none"> Received Framebuffer Update message No Desktop Size Pseudo Encoding message received with a different framebuffer resolution, as currently set
6	Server VNC Cleanup	See Definitions	

1 Table 147: Framebuffer Scaling – Client Framebuffer configured to 0x0

2 **3.15 Content Attestation**

3 **3.15.1 SR/VNC/ATTEST/SetSessionKey**

4 Requirement: CONDITIONAL

5 Condition: Server supports Device Attestation Protocol for VNC AND

6 Server supports Content Attestation AND

7 Server supports Signing the Content Attestation Response

8 The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.

10 The test case provides the VNC Server with a Session key and a nonce.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	<ul style="list-style-type: none"> VNC URI same as attested in DAP
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	VNC Attestation Request	<ul style="list-style-type: none"> Send VNC attestation request <ul style="list-style-type: none"> Requested attestation: All Include nonce Include session key Signature type set to 1 (HMAC-SHA256) Request framebuffer 	<ul style="list-style-type: none"> Receive framebuffer update followed by VNC attestation response message Received nonce equals sent nonce Received error code is Success (0, or 1) Received signed info is correct

		update	<ul style="list-style-type: none"> Received signature is correct
6	VNC Attestation Request	<ul style="list-style-type: none"> Send VNC attestation request <ul style="list-style-type: none"> Requested attestation: All Includes NEW nonce Include NEW session key Signature type set to 1 (HMAC-SHA256) Request framebuffer update 	<ul style="list-style-type: none"> Receive framebuffer update followed by VNC attestation response message Received nonce equals sent NEW nonce Received error code is Success (0, or 1) Received signed info is correct Received signature is correct
7	Server VNC Cleanup	See definitions	

Table 148: Content Attestation – Set Session Key

3.15.2 SR/VNC/ATTEST/NoSessionKey

Requirement: MANDATORY

Condition: None

The test case assumes that the CTS has executed DAP for all components before. See [2] for details.

Note: The test case MUST NOT fail, if the DUT does not provide an attestation for the VNC Server or does not provide an application public key for the VNC Server.

The test case provides the VNC Server with No Session key, but a nonce.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	VNC Attestation Request	<ul style="list-style-type: none"> Send VNC attestation request <ul style="list-style-type: none"> Requested attestation: All Include nonce Include No session key Signature type set to 0 Request framebuffer update 	<ul style="list-style-type: none"> Receive framebuffer update followed by VNC attestation response message Received nonce equals sent nonce Received error code is Success (2, or 3) Received signed info is correct <p>OR</p> <ul style="list-style-type: none"> Receive framebuffer update followed by VNC attestation response message Received nonce equals sent nonce Received error code is Success (128, or 129) <p>OR</p> <ul style="list-style-type: none"> Receive framebuffer update

			followed by no VNC attestation response message.
6	Server VNC Cleanup	See definitions	

Table 149: Content Attestation – No Session Key

3.15.3 SR/VNC/ATTEST/AttestationResponseContextInfo

Requirement: CONDITIONAL

Condition: Server supports Device Attestation Protocol for VNC AND
 Server supports Content Attestation AND
 Server support Context Information Attestation

The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	<ul style="list-style-type: none"> • VNC URI same as attested in DAP
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	VNC Attestation Request	<ul style="list-style-type: none"> • Send VNC attestation request <ul style="list-style-type: none"> ○ Requested attestation: context information ○ Include nonce ○ Set signature type set to 0 • Request framebuffer update 	<ul style="list-style-type: none"> • Receive framebuffer update followed by VNC attestation response message • Received nonce equals sent nonce • Received error code is Success (2, or 3) • Received signed info is correct • Received signed info contains Context information
6	Server VNC Cleanup	See definitions	

Table 150: Content Attestation Response – Context Info

3.15.4 SR/VNC/ATTEST/AttestationResponseFbContent

Requirement: CONDITIONAL

Condition: Server supports Device Attestation Protocol for VNC AND
 Server supports Content Attestation AND
 Server supports Framebuffer Content Attestation

The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	<ul style="list-style-type: none"> • VNC URI same as attested in DAP

2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	VNC Attestation Request	<ul style="list-style-type: none"> • Send VNC attestation request <ul style="list-style-type: none"> ◦ Requested attestation: framebuffer content ◦ Include nonce ◦ Set signature type set to 0 • Request framebuffer update 	<ul style="list-style-type: none"> • Receive framebuffer update followed by VNC attestation response message • Received nonce equals sent nonce • Received error code is Success (2, or 3) • Received signed info is correct • Received signed info contains framebuffer content
6	Server VNC Cleanup	See definitions	

Table 151: Content Attestation Response – Framebuffer Content

3.15.5 SR/VNC/ATTEST/AttestationResponseFbSize

Requirement: CONDITIONAL

Condition: Server supports Device Attestation Protocol for VNC AND

Server supports Content Attestation AND

Server supports Framebuffer Size Attestation

The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	<ul style="list-style-type: none"> • VNC URI same as attested in DAP
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	VNC Server Start Operation	See Definitions	
5	VNC Attestation Request	<ul style="list-style-type: none"> • Send VNC attestation request <ul style="list-style-type: none"> ◦ Requested attestation: framebuffer size ◦ Include nonce ◦ Set signature type set to 0 • Request framebuffer update 	<ul style="list-style-type: none"> • Receive framebuffer update followed by VNC attestation response message • Received nonce equals sent nonce • Received error code is Success (2, or 3) • Received signature is correct, if added • Received signed info is correct • Received signed info contains framebuffer size
6	Server VNC Cleanup	See definitions	

Table 152: Content Attestation Response – Framebuffer Size

3.16 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.

3.16.1 SR/VNC/PICS/EventConfiguration

Requirement: MANDATORY

Condition: None

This test case validates the PICS entries with respect to the Server Event settings.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See definitions	
4	Check PICS feature	FEAT_SERVER_VNC_ServerEventConfiguration	<ul style="list-style-type: none">Server Event Configuration message received.
5	Check PICS feature	FEAT_SERVER_VNC_KeyEvent	<ul style="list-style-type: none">Server Event Configuration message received.
6	Check PICS feature	FEAT_SERVER_VNC_Knob_Keys	<ul style="list-style-type: none">Server Event Configuration message has set Knob Keys bitmask > 0x00.
8	Check PICS feature	FEAT_SERVER_VNC_Device_Keys	<ul style="list-style-type: none">Server Event Configuration message has set Device Keys bitmask > 0x00.
9	Check PICS feature	FEAT_SERVER_VNC_Multimedia_Keys	<ul style="list-style-type: none">Server Event Configuration message has set Multimedia Keys bitmask > 0x00.
10	Check PICS feature	FEAT_SERVER_VNC_X11_Keys	<ul style="list-style-type: none">Server Event Configuration message received.
11	Check PICS feature	FEAT_SERVER_VNC_ITU_Keys	<ul style="list-style-type: none">Server Event Configuration message has enabled ITU Key Pad flag.
12	Check PICS feature	FEAT_SERVER_VNC_VirtualKeyboardTrigger	<ul style="list-style-type: none">Server Event Configuration message has enabled Virtual Keyboard Trigger flag.
13	Check PICS feature	FEAT_SERVER_VNC_KeyEventListing	<ul style="list-style-type: none">Server Event Configuration message has enabled Key Event Listing flag

Step	Name	Description	Expected Result
14	Check PICS feature	FEAT_SERVER_VNC_EventMapping	<ul style="list-style-type: none"> Server Event Configuration message has enabled Event Mapping Support flag
15	Check PICS feature	FEAT_SERVER_VNC_Function_Keys	<ul style="list-style-type: none"> Server Event Configuration message has set Additional Function Keys bitmask > 0x00.
16	Check PICS feature	FEAT_SERVER_VNC_PointerEvent	<ul style="list-style-type: none"> Server Event Configuration message received.
17	Check PICS feature	FEAT_SERVER_VNC_PointerEvent_Gestures	<ul style="list-style-type: none"> Server Event Configuration message received.
18	Check PICS feature	FEAT_SERVER_VNC_TouchEvent	<ul style="list-style-type: none"> Server Event Configuration message has enabled Touch Event flag
20	Check PICS feature	FEAT_SERVER_VNC_TouchEvent_Multitouch	<ul style="list-style-type: none"> Server Event Configuration message has set Number of simultaneous touch events > 0x00.
21	Check PICS feature	FEAT_SERVER_VNC_TouchEvent_Force	<ul style="list-style-type: none"> Server Event Configuration message has set Touch Event Pressure Mask > 0x01.
22	Intentional VNC Server Cleanup	See Definitions	

Table 153: VNC Client Event Configuration PICS Checkup

3.16.2 SR/VNC/PICS/DisplayConfiguration

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates the PICS entries with respect to the Server Display settings.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See definitions	
4	Check PICS feature	FEAT_SERVER_VNC_ServerDisplayConfiguration	<ul style="list-style-type: none"> Server Display Configuration received
5	Check PICS feature	FEAT_SERVER_VNC_Framebuffer_Bigger	<ul style="list-style-type: none"> Server Display Configuration received
6	Check PICS feature	FEAT_SERVER_VNC_Scaling_Up	<ul style="list-style-type: none"> Server Display Configuration message has enabled Server-Side Frame-buffer up-scaling available flag
7	Check PICS feature	FEAT_SERVER_VNC_Framebuffer_Huge	<ul style="list-style-type: none"> Server Init has [width, height] > 1024x600

Step	Name	Description	Expected Result
8	Check PICS feature	FEAT_SERVER_VNC_HugeFB_Scaling_Down	<ul style="list-style-type: none"> • Server Init has [width, height] > 1024x600 • Server Display Configuration message has enabled Server-Side Framebuffer down-scaling available flag
9	Check PICS feature	FEAT_SERVER_VNC_Framebuffer_Large	<ul style="list-style-type: none"> • Server Init has [width, height] > 800x480 && <= 1024x600
10	Check PICS feature	FEAT_SERVER_VNC_LargeFB_Scaling_Down	<ul style="list-style-type: none"> • Server Init has [width, height] > 800x480 && <= 1024x600 • Server Display Configuration message has enabled Server-Side Framebuffer down-scaling available flag
11	Check PICS feature	FEAT_SERVER_VNC_Framebuffer_Small	<ul style="list-style-type: none"> • Server Init has [width, height] <= 800x480
12	Check PICS feature	FEAT_SERVER_VNC_SmallFB_Scaling_Down	<ul style="list-style-type: none"> • Server Init has [width, height] <= 800x480 • Server Display Configuration message has enabled Server-Side Framebuffer down-scaling available flag
13	Check PICS feature	FEAT_SERVER_VNC_Framebuffer_Alt_Text	<ul style="list-style-type: none"> • Server Display Configuration message has enabled Framebuffer Alternative flag
14	Check PICS feature	FEAT_SERVER_VNC_Orientation_Change	<ul style="list-style-type: none"> • Server Display Configuration message has enabled Server-side framebuffer orientation switch flag.
15	Check PICS feature	FEAT_SERVER_VNC_Rotation_Change	<ul style="list-style-type: none"> • Server Display Configuration message has enabled Server-side framebuffer rotation flag.
16	Check PICS feature	FEAT_SERVER_VNC_Portrait	<ul style="list-style-type: none"> • Server Display Configuration message has enabled Server-side framebuffer orientation switch flag.
17	Check PICS feature	FEAT_SERVER_VNC_ARGB_888	<ul style="list-style-type: none"> • Server Display Configuration message has enabled 32-bit ARGB 888 flag.
18	Check PICS feature	FEAT_SERVER_VNC_RGB_565	<ul style="list-style-type: none"> • Server Display Configuration message has enabled 16-bit RGB 565 flag.
19	Check PICS feature	FEAT_SERVER_VNC_ARGB_555	<ul style="list-style-type: none"> • Server Display Configuration message has enabled 16-bit RGB 555 flag.

Step	Name	Description	Expected Result
20	Check PICS feature	FEAT_SERVER_VNC_RGB_444	<ul style="list-style-type: none">• Server Display Configuration message has enabled 16-bit RGB 444 flag.
21	Check PICS feature	FEAT_SERVER_VNC_RGB_343	<ul style="list-style-type: none">• Server Display Configuration message has enabled 16-bit RGB 343 flag.
22	Check PICS feature	FEAT_SERVER_VNC_16bit_Grey scale	<ul style="list-style-type: none">• Server Display Configuration message has enabled 16-bit grayscale flag.
23	Check PICS feature	FEAT_SERVER_VNC_8bit_Greyscale	<ul style="list-style-type: none">• Server Display Configuration message has enabled 8-bit grayscale flag.
24	Intentional VNC Client Cleanup	See Definitions	

1 Table 154: VNC Client Display Configuration PICS Checkup

2 **3.16.3 SR/VNC/PICS/ContentAttestation**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates the PICS entries with respect to the Content Attestation settings.

Step	Name	Description	Expected Result
1	DAP Server Launch	See Definitions in [2]	
2	DAP Attestation Request	Request device attestation for the “*”. Use CCC trust root.	<ul style="list-style-type: none">• Receive Device Attestation Response
3	Check PICS feature	FEAT_SERVER_VNC_Attestation.	<ul style="list-style-type: none">• Component TerminalMode: VNC-Server included in DAP response• applicationPublicKey available bound to the VNC Server
4	Check PICS feature	FEAT_SERVER_VNC_Attestation_Request	<ul style="list-style-type: none">• Component TerminalMode: VNC-Server included in DAP response• applicationPublicKey available bound to the VNC Server
5	Check PICS feature	FEAT_SERVER_VNC_Attestation_Response	<ul style="list-style-type: none">• Component TerminalMode: VNC-Server included in DAP response• applicationPublicKey available bound to the VNC Server
6	UPnP Terminate Application	Call UPnP ApplicationServer:1 TerminateApplication action for DAP server	
7	VNC Server Launch	See Definitions	

8	VNC Server Handshake	See Definitions	
9	VNC Server Configuration	See Definitions	
10	VNC Server Start Operation	See Definitions	
11	VNC Attestation Request	Send VNC attestation request; <ul style="list-style-type: none"> • Include nonce • Include session key • Request full attestation • Request signature Request framebuffer update	<ul style="list-style-type: none"> • Receive framebuffer update message
12	Check PICS feature	FEAT_SERVER_VNC_Attestation. FEAT_SERVER_VNC_Attestation_Request FEAT_SERVER_VNC_Attestation_Response	<ul style="list-style-type: none"> • Receive VNC attestation response message
13	Check PICS feature	FEAT_SERVER_VNC_Attestation_Context	<ul style="list-style-type: none"> • SignedInfo Flag bit [0] enabled in VNC attestation response message
14	Check PICS feature	FEAT_SERVER_VNC_Attestation_Content	<ul style="list-style-type: none"> • SignedInfo Flag bit [1] enabled in VNC attestation response message
15	Check PICS feature	FEAT_SERVER_VNC_Attestation_Bytes	<ul style="list-style-type: none"> • SignedInfo Flag bit [2] enabled in VNC attestation response message
16	Check PICS feature	FEAT_SERVER_VNC_Attestation_Signature	<ul style="list-style-type: none"> • ErrorCode set to "0" or "1" in VNC attestation response message
17	Server VNC Cleanup	See definitions	

Table 155: VNC Server Content Attestation PICS Checkup

3.16.4 SR/VNC/PICS/Initialization

Requirement: MANDATORY

Condition: None

This test case validates the PICS entries with respect to the VNC Initialization settings.

Step	Name	Description	Expected Result
1	VNC Server Launch	See Definitions	
2	VNC Server Handshake	See Definitions	
3	VNC Server Configuration	See Definitions	
4	Check PICS feature	FEAT_SERVER_VNC_Protocol_Handshake	<ul style="list-style-type: none"> • Server Protocol Version message received
5	Check PICS feature	FEAT_SERVER_VNC_RFB38	<ul style="list-style-type: none"> • Server Protocol Version is 3.8

Step	Name	Description	Expected Result
6	Check PICS feature	FEAT_SERVER_VNC_SecurityTypeSelection	<ul style="list-style-type: none">• Security Type Support message received
7	Check PICS feature	FEAT_SERVER_VNC_None	<ul style="list-style-type: none">• Security Result message received with OK response
8	Check PICS feature	FEAT_SERVER_VNC_Init	<ul style="list-style-type: none">• Server Init message received
9	Check PICS feature	FEAT_SERVER_VNC_Client_Cut	<ul style="list-style-type: none">• Server Init message received
10	Check PICS feature	FEAT_SERVER_VNC_Set_Pixel_Format	<ul style="list-style-type: none">• Server Init message received
11	Check PICS feature	FEAT_SERVER_VNC_SetEncodings	<ul style="list-style-type: none">• Server Init message received
12	Intentional VNC Client Cleanup	See Definitions	

1

Table 156: VNC Server Initialization PICS Checkup

2

1 4 CLIENT FEATURE TEST CASES

2 Many Client conformance test cases expect the MirrorLink Client to display applications coming from the
3 CTS tool. This MAY require a dedicated setup (e.g. setting of an application category or other application
4 context information) to be fulfilled from the CTS tool. This information MUST be provided to the Test En-
5 gineer prior to the test.

6 4.1 VNC Handshaking Phase

7 4.1.1 CL/VNC/HS/TcpConnect

8 Requirement: MANDATORY

9 Condition: None

10 Tests if the VNC Client connects to the VNC server via a TCP socket.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none">A connection has been established within a given timeout.
3	Unintentional VNC Client Cleanup	See Definitions	

11 Table 157: VNC Connect – Test Steps

12 4.1.2 CL/VNC/HS/ValidVersion

13 Requirement: MANDATORY

14 Condition: None

15 Checks, if the client understands the Server Protocol Version message. This is the case, if a Client Protocol
16 Version message has been received as an answer.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none">A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version - RFB version 3.8 Checks, if the client understands the Server Protocol Version message. This is the case, if a Client Protocol Version message has been received as an answer.	<ul style="list-style-type: none">A valid Client Protocol Version message is receivedSupport for RFB 3.8
4	Unintentional VNC Client Cleanup	See Definitions	

17 Table 158: Client MirrorLink Server Protocol Version – Test Steps

1 **4.1.3 CL/VNC/HS/SecurityTypeSelection**

2 Requirement: MANDATORY

3 Condition: None

4 During the handshaking phase, MirrorLink-CTS allows only the security type 1 (None) via the Security Type Support message. The client is expected to select this type via the Security Type Selection message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version RFB version 3.8	<ul style="list-style-type: none">• A valid Client Protocol Version message is received• Support for RFB 3.8
4	VNC Security Type Selection	Send Security Type Supported message, only including security type None (1).	<ul style="list-style-type: none">• A correct Client Security Type Selection message arrives.• Client selects security type None
5	Unintentional VNC Client Cleanup	See Definitions	

6 Table 159: VNC Security Type None – Test Steps

7 **4.1.4 CL/VNC/HS/ClientInit**

8 Requirement: MANDATORY

9 Condition: None

10 Checks, if the client understands the Server Security Type Response message. This is the case the client is supposed to send a Client Init message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none">• A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version - RFB version 3.8	<ul style="list-style-type: none">• A valid Client Protocol Version message is received• Support for RFB 3.8
4	VNC Security Type Selection	Send Security Type Supported message, only including security type None (1).	<ul style="list-style-type: none">• A correct Client Security Type Selection message arrives.• Client selects security type None
5	VNC Client Init	Send Security Type Result message (Ok)	<ul style="list-style-type: none">• Receive valid Client Init message.
6	Unintentional VNC Client Cleanup	See Definitions	

12 Table 160: Client MirrorLink Security Type Support – Test Steps

13 **4.1.5 CL/VNC/HS/VersionFailure**

14 Requirement: MANDATORY

- 1 Condition: None
- 2 Tests if the VNC client closes the VNC connection on reception of a Security Failure message after sending the Client Version message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none"> A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version RFB version 3.8	<ul style="list-style-type: none"> A valid Client Protocol Version message is received Support for RFB 3.8
4	VNC Version Failure	Send Security Type Supported message, including no security types Send Security Failure Reason message.	<ul style="list-style-type: none"> TCP disconnect
5	Unintentional VNC Client Cleanup	See Definitions	

- 4 Table 161: VNC 3.8 Security Failure Reason – Test Steps
- 5 Note: The VNC client is NOT REQUIRED to reconnect to the VNC server in a production system. But the VNC client MUST allow for reconnection on testing system, to continue with other test cases.

4.1.6 CL/VNC/HS/SecurityFailure

- 8 Requirement: MANDATORY
- 9 Condition: None
- 10 Checks, if the client closes the VNC connection on reception of a Security Failure message after sending the Security Type Selection message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none"> A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version RFB version 3.8	<ul style="list-style-type: none"> A valid Client Protocol Version message is received Support for RFB 3.8
4	VNC Security Type Selection	Send Security Type Supported message, only including security type None (1).	<ul style="list-style-type: none"> A correct Client Security Type Selection message arrives. Client selects security type None
5	VNC Security Failure	Send Security Result message (Failure) Send Security Failure Reason message.	<ul style="list-style-type: none"> Receive no Client Init. Client disconnects
5	Unintentional VNC Client Cleanup	See Definitions	

- 12 Table 162: Client MirrorLink Security Result – Test Steps
- 13 Note: The VNC client is NOT REQUIRED to reconnect to the VNC server in a production system. But the VNC client MUST allow for reconnection on testing system, to continue with other test cases.

1 **4.1.7 CL/VNC/HS/RfbVersion3.7**

2 Requirement: MANDATORY

3 Condition: None

4 Test if the VNC client supports RFB version 3.7.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC TCP Connect	Wait for TCP connection	<ul style="list-style-type: none">A connection has been established within a given timeout.
3	VNC Valid Version	Send Server Protocol Version - RFB version 3.7	<ul style="list-style-type: none">A valid Client Protocol Version message is receivedSupport for RFB 3.7
4	Unintentional VNC Client Cleanup	See Definitions	

5 Table 163: Client MirrorLink RFB 3.7 support

6

1 4.2 VNC Initialization

2 4.2.1 CL/VNC/INIT/SetEncodings

3 Requirement: MANDATORY

4 Condition: None

5 The test fails if no SetEncodings message could be received that clearly identifies the client to be in the
6 "Framebuffer Update and Event Phase".

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Set Encodings	Send Server Init message - Pixel format ARGB 888 - FB size WVGA (800 x 480) The test fails if no Set Encodings could be received.	<ul style="list-style-type: none">• A valid Set Encodings message is received• Set Pixel Format message MAY come in between• Set Encodings includes MirrorLink Pseudo Encoding and Context Information Pseudo Encoding
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 164: VNC Set Encodings – Test Steps

8 4.2.2 CL/VNC/INIT/ClientDisplayConfiguration

9 Requirement: MANDATORY

10 Condition: None

11 Checks, if the client understands the Server Display Configuration. This is the case, if a Client Display Configuration has been received as an answer.
12

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Set Encodings	Send Server Init message - Pixel format ARGB 888 - FB size WVGA (800 x 480) The test fails if no Set Encodings could be received.	<ul style="list-style-type: none">• A valid Set Encodings message is received• Set Pixel Format message MAY come in between• Set Encodings includes MirrorLink Pseudo Encoding and Context Information Pseudo Encoding
4	VNC Client Display Configuration	Send VNC Server Display Configuration message. Checks, if a Client Display Configuration has been received as an answer.	<ul style="list-style-type: none">• Valid Client Display Configuration message arrives.
5	Intentional VNC Client Cleanup	See Definitions	

13 Table 165: Client Display Configuration

1 **4.2.3 CL/VNC/INIT/ClientEventConfiguration**

2 Requirement: MANDATORY

3 Condition: None

4 Checks, if the client understands the Server Event Configuration. This is the case, if a Client Event Configuration has been received as an answer.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Set Encodings	Send Server Init message - Pixel format ARGB 888 - FB size WVGA (800 x 480) The test fails if no Set Encodings could be received.	<ul style="list-style-type: none"> A valid Set Encodings message is received Set Pixel Format message MAY come in between Set Encodings includes MirrorLink Pseudo Encoding and Context Information Pseudo Encoding
3	VNC Client Display Configuration	Send VNC Server Display Configuration message. Checks, if a Client Display Configuration has been received as an answer.	<ul style="list-style-type: none"> Valid Client Display Configuration message arrives.
4	VNC Client Event Configuration	Send VNC Server Event Configuration message Checks, if Client Event Configuration has been received as an answer.	<ul style="list-style-type: none"> Valid Client Event Configuration is received arrives. <p>If DUT supports MirrorLink-Certified Applications, the following checks MUST pass:</p> <ul style="list-style-type: none"> Support for Pointer events OR Support for the knob event Knob_2D_shift_push AND the following knob event combinations: <ul style="list-style-type: none"> Knob_2D_0_shift_right, Knob_2D_0_shift_left Knob_2D_0_shift_up, Knob_2D_0_shift_down Knob_2D_0_rotate_z, Knob_2D_0_rotate_Z
5	Intentional VNC Client Cleanup	See Definitions	

6 Table 166: Client Event Configuration

7 **4.2.4 CL/VNC/INIT/SetPixelFormatARGB888OrRGB565**

8 Requirement: MANDATORY

9 Condition: None

10 Checks, if the client selects only ARGB 888 or RGB 565, if the VNC server does not support anything else.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Client Handshake	See Definitions	
3	VNC Set Encodings	Send Server Init message - Pixel format ARGB 888 - FB size WVGA (800 x 480) The test fails if no Set Encodings could be received.	<ul style="list-style-type: none"> A valid Set Encodings message is received Set Pixel Format message MAY come in between Set Encodings includes MirrorLink Pseudo Encoding and Context Information Pseudo Encoding
3	VNC Client Display Configuration	Send VNC Server Display Configuration message. Support only ARGB 888 and RGB 565 pixel formats Checks, if a Client Display Configuration has been received as an answer.	<ul style="list-style-type: none"> Valid Client Display Configuration message arrives.
4	VNC Client Event Configuration	Send VNC Server Event Configuration message Checks, if Client Event Configuration has been received as an answer.	<ul style="list-style-type: none"> Valid Client Event Configuration is received arrives. <p>If DUT supports MirrorLink-Certified Applications, the following checks MUST pass:</p> <ul style="list-style-type: none"> Support for Pointer events OR Support for the knob event Knob_2D_shift_push AND at least one of the following knob event combinations: <ul style="list-style-type: none"> Knob_2D_0_shift_right, Knob_2D_0_shift_left Knob_2D_0_shift_up, Knob_2D_0_shift_down Knob_2D_0_rotate_z, Knob_2D_0_rotate_Z
5	VNC Set Pixel Format	Wait for Framebuffer Update Request message Pixel Format selection MUST be finished prior the arrival of the first Framebuffer Update Request message.	<ul style="list-style-type: none"> Set Pixel Format message for ARGB 888 or RGB 565 arrives Set Pixel Format message arrives while having no outstanding Framebuffer Update Request message arrives Set Pixel Format message MAY be skipped, if ARG 888 is the MirrorLink client's preferred pixel format.
6	Intentional VNC Client Cleanup	See Definitions	

1 Table 167: Client Event Configuration

2 **4.2.5 CL/VNC/INIT/ClientDisplaySizeLandscape**

3 Requirement: MANDATORY

4 Condition: None

5 Checks, if the client provides correct measurements for its Display Size.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions Note: Launch Client in Landscape orientation	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS stores the received Display dimension [mm] values (width and height). CTS uses the Reference Screen values, if Display dimension [mm] values (width or height) are 0 (zero).	
4	VNC Operation	Provide Full Framebuffer Update (change FB resolution to match the ML Client's one) Test Engineer goes to the worst case setup on the head-unit (PIXIT) Send test image, according to the definition below. Test Engineer measures the size of the test image on the DUT screen.	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • Test Engineer confirms that the test screen is shown in full on the DUT. • Test image screen size matches provided information (+/- 3 mm). • Checkered board square are square (+/- 5%) • 16 vertical and horizontal lines visible in dedicated squares • DUT is not violating the minimum display requirements (Note: MUST use adjusted width and height values, if distance is reported to be different than 900mm)
5	Intentional VNC Client Cleanup	See Definitions	

1 Table 168: Client Display Size

2 Test Image Requirements:

- 3 • Same framebuffer resolution as the MirrorLink Client display (i.e. no scaling is going to be needed)
 4 • Framebuffer has a frame of 1 pixel-width that is white and inside it another one of same width that
 5 is black. This is used to allow the test engineer to measure the entire size of the display.
 6 • The rest of the framebuffer is a checkered board (at least 16x16 pixel).
 7 • At least 1 checkered board square consists of vertical 1-pixel wide lines
 8 • At least 1 checkered board square consists of horizontal 1-pixel wide lines.

9 **4.2.6 CL/VNC/INIT/ClientDisplaySizePortrait**

10 Requirement: CONDITIONAL

11 Condition: MirrorLink Client supports a Portrait mode of operation.

12 Checks, if the client provides correct measurements for its Display Size, when the MirrorLink Client is in
 13 Portrait mode of operation.

1 Note: This test cases assumes that the MirrorLink Client reconfigures its screen to provide a Portrait orientation frame for the MirrorLink Server to render into. I.e. this test case does not address the use case of a
2 MirrorLink Client in landscape mode of operation, displaying a MirrorLink Server's framebuffer, which is
3 configured in Portrait.
4

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions Note: Launch Client in Portrait orientation	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS stores the received Display dimension [mm] values (width and height). CTS uses the Reference Screen values, if Display dimension [mm] values (width or height) are 0 (zero).	
4	VNC Operation	Provide Full Framebuffer Update (change FB resolution to match the ML Client's one) Send test image, according to the definition below. Test Engineer measures the size of the test image on the DUT screen.	<ul style="list-style-type: none">• Framebuffer Update Request messages arrive• Test Engineer confirms that the test screen is shown in full on the DUT.• Test image screen size matches provided information (+/- 3 mm).• Checkered board square are square (+/- 5%)• 16 vertical and horizontal lines visible in dedicated squares
5	Intentional VNC Client Cleanup	See Definitions	

5 Table 169: Client Display Size

6 Test Image Requirements:

- 7
- Same framebuffer resolution as the MirrorLink Client display (i.e. no scaling is going to be needed)
 - Framebuffer has a frame of 1 pixel-width that is white and inside it another one of same width that is black. This is used to allow the test engineer to measure the entire size of the display.
 - The rest of the framebuffer is a checkered board (at least 16x16 pixel).
 - At least 1 checkered board square consists of vertical 1-pixel wide lines
 - At least 1 checkered board square consists of horizontal 1-pixel wide lines.
- 8
- 9
- 10
- 11
- 12

1 4.3 VNC Basic Operation

2 4.3.1 CL/VNC/BASIC/InitialFbUpdateRequest

3 Requirement: MANDATORY

4 Condition: None

5 Checks, if first non-incremental, full Framebuffer Update Request has been received from the client within a certain timeframe and whether at least one follow-up Framebuffer Update Request has been received.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Full Framebuffer Update Request	Wait for Framebuffer Update Request message	<ul style="list-style-type: none">• Framebuffer Update Request message arrives• Non-incremental• Requests full framebuffer
5	VNC Operation	Provide Full Framebuffer Update (following the incremental flag)	<ul style="list-style-type: none">• Framebuffer Update Request messages arrive• Test Engineer confirms that the test screen is shown in full on the DUT.
6	Intentional VNC Client Cleanup	See Definitions	

7 Table 170: Initial Framebuffer Update Request

8 4.3.2 CL/VNC/BASIC/NonIncrementalFbUpdate

9 Requirement: MANDATORY

10 Condition: None

11 For 5 seconds MirrorLink-CTS answers all incoming FramebufferUpdateRequests with full framebuffer updates, no matter if the incremental flag has not been set in the FramebufferUpdateRequest. The test engineer is asked to spectate the client screen while the MirrorLink-CTS renders a short animation. The test succeeds if the test engineer did see the animation.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
5	VNC Full Framebuffer Update Request	Wait for Framebuffer Update Request message	<ul style="list-style-type: none">• Framebuffer Update Request message arrives• Non-incremental• Requests full framebuffer
6	VNC Client Full Framebuffer Update	For 5 iterations all incoming Framebuffer Update Requests are answered with full framebuffer updates, no matter if the	<ul style="list-style-type: none">• At least 5 Framebuffer Update Requests received• Test engineer can see the animation on the client display.

Step	Name	Description	Expected Result
		incremental flag has not been set. Test engineer is asked to spectate the client screen while a short animation is rendered. .	
7	Intentional VNC Client Cleanup	See Definitions	

Table 171: VNC Client Full Framebuffer Update – Test Steps

4.3.3 CL/VNC/BASIC/IncrementalFbUpdate

Requirement: CONDITIONAL

Condition: Client supports incremental Framebuffer Update Requests

For 5 seconds MirrorLink-CTS answers all incoming Framebuffer-UpdateRequests with incremental framebuffer updates, no matter if the incremental flag has not been set in the FramebufferUpdateRequest. The test engineer is asked to spectate the client screen while the MirrorLink-CTS renders a short animation. The test succeeds if the test engineer did see the animation.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Configuration	See Definitions	
5	VNC Full Framebuffer Update Request	Wait for Framebuffer Update Request message	<ul style="list-style-type: none"> • Framebuffer Update Request message arrives • Non-incremental • Requests full framebuffer
6	VNC Client Incremental Framebuffer Update	For 5 seconds incoming Framebuffer Update Requests are answered with incremental framebuffer updates, if the incremental flag has been set. Test engineer is asked to spectate the client screen while a short animation is rendered. If no incremental Framebuffer-Update Request messages have been received during that time the verdict is inconclusive.	<ul style="list-style-type: none"> • At least 5 Incremental Framebuffer Update Request messages received • Test engineer can see the animation on the client display.
7	Intentional VNC Client Cleanup	See Definitions	

Table 172: VNC Client Incremental Framebuffer Update – Test Steps

Note: The test case expects the VNC Client to request incremental framebuffer updates, after the first full framebuffer update request.

4.3.4 CL/VNC/BASIC/PointerEventSupport

Requirement: CONDITIONAL

Condition: Clients supports Pointer Events

- 1 The client is expected to indicate its support for PointerEvents via the ClientEventConfiguration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS MUST advertise support for Pointer events. CTS MUST NOT advertise support for Touch Events	<ul style="list-style-type: none"> Pointer events supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

2 Table 173: VNC Client Pointer Event Support – Test Steps

3 **4.3.5 CL/VNC/BASIC/PointerEvents**

4 Requirement: CONDITIONAL

5 Condition: Client supports Pointer Events

6 The MirrorLink-CTS is configured to visually track pointer events on the VNC frame buffer. The test engineer is asked to "draw" on the client device and watch the resulting strokes on the display. If no pointer events arrived or the test engineer did not see his drawing on the display (although FramebufferUpdates have been sent), this test fails.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS MUST advertise support for Pointer events. CTS MUST NOT advertise support for Touch Events	<ul style="list-style-type: none"> Pointer events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Client Pointer Events	The test engineer is asked to "draw" on the client device and watch the resulting strokes on the display. If no pointer events arrived or the test engineer did not see his drawing on the display (although FramebufferUpdates have been sent), this test fails.	<ul style="list-style-type: none"> Valid Pointer Event messages arrive Multiple Pointer press events, followed by a single Pointer release event, received (may receive multiple strokes) Drawing on the client display does correspond to the input Framebuffer Update Request message continue to arrive
6	Intentional VNC Client Cleanup	See Definitions	

10

Table 174: VNC Client Pointer Events – Test Steps

1 **4.3.6 CL/VNC/BASIC/PointerEventCoverage**

2 Requirement: CONDITIONAL

3 Condition: Client supports Pointer Events

4 The MirrorLink-CTS is configured to visually show a set of buttons, which the test engineer has to press & release. This test case validates, whether the entire area of the framebuffer can be used for pointer interaction and whether the DUT is correctly mapping the pointer event's location into the MirrorLink Server's framebuffer dimension.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS MUST advertise support for Pointer events. CTS MUST NOT advertise support for Touch Events	<ul style="list-style-type: none">• Pointer events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Client Pointer Events	The CTS renders a set of buttons on the display, which the test engineer is asked to press & release (press must happen at the center of the button). Button size is following the driver distraction guidelines for button sizes. Buttons MUST be rendered at the following positions: <ul style="list-style-type: none">- All 4 screen corners- Screen center	<ul style="list-style-type: none">• Valid Pointer Event messages arrive (Press & Release)• Pointer Event location matches the rendered buttons• Location matches the center of the button +/- 5mm.• Framebuffer Update Request message continue to arrive
6	Intentional VNC Client Cleanup	See Definitions	

8 Table 175: VNC Client Pointer Events – Coverage

9 **4.3.7 CL/VNC/BASIC/ServerCutText**

10 Requirement: MANDATORY

11 Condition: None

12 A VNC ServerCutText message is sent to the client. A FramebufferUpdateRequest is awaited as indicator for a still working VNC client. Unfortunately there is currently no better way to test whether the message was recognized.

15

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	

Step	Name	Description	Expected Result
4	VNC Client Start Operation	See Definitions	
4	VNC Client Server Cut Text	<p>Send Server Cut Text message with medium sized text (20-100 bytes).</p> <p>Send framebuffer update.</p> <p>Send Server Cut Text message with empty text (0 bytes).</p> <p>Send framebuffer update.</p> <p>Send Server Cut Text message with large text (>32kByte bytes).</p> <p>Note: The test engineer MUST keep the MirrorLink's application graphical user interface in the foreground on the MirrorLink Client.</p>	<ul style="list-style-type: none"> • Valid Framebuffer Update Requests arrives on each framebuffer update request • Client MAY indicate received Server Cut Text
6	Intentional VNC Client Cleanup	See Definitions	

Table 176: ServerCutText – Test Steps

2 **4.3.8 CL/VNC/BASIC/UniCodeServerCutText**

3 Requirement: **CONDITIONAL**

4 Condition: Support Unicode in Server Cut Text message

5 A Server Cut Text message is sent to the VNC client, containing Unicode text elements. A Framebuffer-UpdateRequest is awaited as indicator for a still working VNC client.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Server Cut Text	<p>Test engineer is asked to bring the Head-Unit into a state to receive and show UniCode text, being received from the VNC Server Cut Text</p> <p>Send Server Cut Text message, containing the following elements, within a Single message (without the quotation marks):</p> <ul style="list-style-type: none"> • "This is Latin-1 text" • 0x1B 0x25 0x67 • "This is Unicode text" • 0x03 0xA3 (Greek Σ) • 0x03 0xBC (Greek μ) • 0x00 0x1B 0x00 0x25 0x00 0x40 	<ul style="list-style-type: none"> • Valid Framebuffer Update Requests arrives on each framebuffer update request • Client shows correct received Server Cut Text

Step	Name	Description	Expected Result
		• "This is Latin-1 text"	
6	Intentional VNC Client Cleanup	See Definitions	

1 Table 177: Unicode Server Cut Text – Test Steps

2 **4.3.9 CL/VNC/BASIC/Bell**

3 Requirement: MANDATORY

4 Condition: None

5 A VNC Bell message is sent to the client.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Bell	A VNC Bell message is sent to the client. The test engineer is asked whether any kind of acoustic (or visual) notification was perceivable. Provide FB updates	<ul style="list-style-type: none"> Client device MAY react upon the Bell message according to the test engineer. Continue to receive framebuffer update request messages after Bell message has been sent
6	Intentional VNC Client Cleanup	See Definitions	

6 Table 178: Bell

7 **4.3.10 CL/VNC/BASIC/ContextInfoSupport**

8 Requirement: MANDATORY

9 Condition: None

10 The test succeeds if the client does indicate support for the encoding -525 (Run-Length-Encoding) via a
 11 SetEncodings message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See definitions	<ul style="list-style-type: none"> Support of Context Information Pseudo Encoding included in Set Encodings message
4	Intentional VNC Client Cleanup	See Definitions	

12 Table 179: VNC Client Context Information Support

1 **4.3.11 CL/VNC/BASIC/UnknownMirrorLinkExtensionMessage**

2 Requirement: MANDATORY

3 Condition: None

4 MirrorLink-CTS sends actively a MirrorLink extension message of type 98 to the client. The client is expected to correctly read the full message from its input stream and process succeeding DeviceStatus and FramebufferUpdate messages correctly.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Unknown MirrorLink VNC Extension Message	Send VNC message with the message type 128 and the unknown extension type 98. Send framebuffer update message	<ul style="list-style-type: none">• VNC client does not disconnect (either intentional or unintentional)• VNC client continue to send framebuffer update request messages
6	Intentional VNC Client Cleanup	See Definitions	

7 Table 180: VNC Unknown MirrorLink Extension Message – Test Steps

8 **4.3.12 CL/VNC/BASIC/UnknownMirrorLinkExtensionMessageSize**

9 Requirement: MANDATORY

10 Condition: None

11 A DeviceStatusMessage with 4 bytes "padding" is sent to the client. The client is expected to correctly read the full message from its input stream and process succeeding framebuffer updates correctly.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Unknown MirrorLink Extension Message Size	Send VNC Device Status message with 4 bytes "padding" is sent to the client. Send framebuffer update message	<ul style="list-style-type: none">• VNC client does not disconnect (either intentional or unintentional)• VNC client continue to send framebuffer update request messages
6	Intentional VNC Client Cleanup	See Definitions	

13 Table 181: VNC Unknown MirrorLink Extension Message Size – Test Steps

1 **4.3.13 CL/VNC/BASIC/ByeBye**

2 Requirement: MANDATORY

3 Condition: None

4 The client MUST drop TCP socket upon a VNC byebye message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definition	
5	VNC ByeBye	Send VNC ByeBye message	<ul style="list-style-type: none">• TCP connection is disconnected within 5s
6	Unintentional VNC Client Cleanup	See Definitions	

5 Table 182: VNC ByeBye

6 **4.3.14 CL/VNC/BASIC/Reconnect**

7 Requirement: MANDATORY

8 Condition: None

9 Testing if the client device can reconnect after an unintentional disconnect. The test case validates correct
10 DUT behavior, in case the CTS does an unintentional disconnect in the middle of the VNC session. The DUT
11 is expected to automatically or manually reestablish the VNC Session.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definition	<ul style="list-style-type: none">• Framebuffer update request received.
5	VNC TCP Disconnect	Disconnect the TCP socket. No ByeBye message sent.	
6	VNC Client Launch	See Definitions Test engineer may need to manually launch the application again.	
7	VNC Client Handshake	See Definitions	
8	VNC Client Configuration	See Definitions	
9	VNC Client Start Operation	See Definition	<ul style="list-style-type: none">• Framebuffer update request received.

Step	Name	Description	Expected Result
10	Intentional VNC Client Cleanup	See Definitions	

1

Table 183: VNC Reconnect

2

Approved

1 **4.4 Pixel Format Support**

2 **4.4.1 CL/VNC/PIXEL/ARGB888**

3 Requirement: CONDITIONAL

4 Condition: Clients supports ARGB 888 OR

5 Client does not support RGB 565

6 Tests if the client selects ARGB 888 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions VNC Server's native pixel format is set to RGB 444.	
4	VNC Set Pixel Format ARGB 888	Wait for Set Pixel Format message	<ul style="list-style-type: none">• Set Pixel Format message for ARGB 888 arrives• Big or Little Endian• Framebuffer Update Request message arrives
5	VNC Color Test ARGB 888	Send Color Test Image Use RAW encoding	<ul style="list-style-type: none">• Framebuffer Update Request message arrives• Non-incremental• Requests full framebuffer• Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

8 Table 184: ARGB 888 – RAW

9 **4.4.2 CL/VNC/PIXEL/RGB888**

10 Requirement: CONDITIONAL

11 Condition: Clients supports RGB 888

12 Tests if the client selects RGB 888 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format RGB 888	Wait for Set Pixel Format message	<ul style="list-style-type: none">• Set Pixel Format message for RGB 888 arrives• Big or Little Endian• Framebuffer Update Request message arrives

Step	Name	Description	Expected Result
5	VNC Color Test RGB 888	Send Color Test Image	<ul style="list-style-type: none"> • Framebuffer Update Request message arrives • Non-incremental • Requests full framebuffer • Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

Table 185: RGB 888 – RAW

4.4.3 CL/VNC/PIXEL/RGB565

Requirement: CONDITIONAL

Condition: Clients supports RGB 565 OR

Client does not support ARGB 888

Tests if the client selects RGB 565 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format RGB 565	Wait for Set Pixel Format message	<ul style="list-style-type: none"> • Set Pixel Format message for RGB 565 arrives • Big or Little Endian • Framebuffer Update Request message arrives
5	VNC Color Test RGB 565	Send Color Test Image	<ul style="list-style-type: none"> • Framebuffer Update Request message arrives • Non-incremental • Requests full framebuffer • Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

Table 186: RGB 565 – RAW

4.4.4 CL/VNC/PIXEL/ARGB555

Requirement: CONDITIONAL

Condition: Clients supports RGB 555

Tests if the client selects ARGB 555 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format ARGB 555	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for ARGB 555 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test ARGB 555	Send Color Test Image	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

1 Table 187: ARGB 555 – RAW

2 **4.4.5 CL/VNC/PIXEL/RGB444**

3 Requirement: CONDITIONAL

4 Condition: Clients supports RGB 444

5 Tests if the client selects RGB 444 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format RGB 444	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for RGB 444 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test RGB 444	Send Color Test Image	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

7 Table 188: RGB 444 – RAW

8 **4.4.6 CL/VNC/PIXEL/RGB343**

9 Requirement: CONDITIONAL

- 1 Condition: Clients supports RGB 343
- 2 Test if client selects RGB 343 pixel format. A color test image is rendered on the framebuffer. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format RGB 343	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for RGB 343 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test RGB 343	Send Color Test Image	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

Table 189: RGB 343 – RAW

- 5 **4.4.7 CL/VNC/PIXEL/16BitGrey**
- 6 Requirement: CONDITIONAL
- 7 Condition: Clients supports 16-Bit greyscale
- 8 Test if client selects 16-Bit Greyscale pixel format. A color test image is rendered on the framebuffer. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format 16-Bit greyscale	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for 16-Bit greyscale arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test 16-Bit greyscale	Send Color Test Image	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image

Step	Name	Description	Expected Result
6	Intentional VNC Client Cleanup		

1 Table 190: 16-Bit greyscale – RAW

2 **4.4.8 CL/VNC/PIXEL/8Bitgrey**

3 Requirement: CONDITIONAL

4 Condition: Clients supports 8-Bit greyscale

5 Test if client selects 8-Bit Greyscale pixel format. A color test image is rendered on the framebuffer. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Set Pixel Format 8-Bit greyscale	Wait for Set Pixel Format message	<ul style="list-style-type: none">• Set Pixel Format message for 8-Bit greyscale arrives• Big or Little Endian• Framebuffer Update Request message arrives
5	VNC Color Test 8-Bit greyscale	Send Color Test Image	<ul style="list-style-type: none">• Framebuffer Update Request message arrives• Non-incremental• Requests full framebuffer• Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

7 Table 191: 8-Bit grayscale – RAW

1 4.5 Run-Length Encoding Support

2 4.5.1 CL/VNC/RLE/RleSupport

3 Requirement: CONDITIONAL

4 Condition: Clients supports run-length encoding

5 The test succeeds if the client does indicate support for the encoding -525 (Run-Length-Encoding) via a
6 SetEncodings message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Support of Run-Length Encoding included in Set Encodings message
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 192: VNC Client Run-Length-Encoding Support – Test Steps

8 4.5.2 CL/VNC/RLE/ARGB888

9 Requirement: CONDITIONAL

10 Condition: Clients supports ARGB 888 OR

11 Client does not support RGB 565 AND

12 Client supports RLE encoding

13 Tests if the client selects ARGB 888 pixel format. The test succeeds if the test engineer does see the color
14 test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions VNC Server's native pixel format is set to RGB 444.	<ul style="list-style-type: none">• Support for RLE in Set Encodings message
4	VNC Set Pixel Format ARGB 888	Wait for Set Pixel Format message	<ul style="list-style-type: none">• Set Pixel Format message for ARGB 888 arrives• Big or Little Endian• Framebuffer Update Request message arrives
5	VNC Color Test ARGB 888	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none">• Framebuffer Update Request message arrives• Non-incremental• Requests full framebuffer• Test Engineer confirms the Color Test Image

Step	Name	Description	Expected Result
6	Intentional VNC Client Cleanup		

1 Table 193: ARGB 888 – RLE

2 **4.5.3 CL/VNC/RLE/RGB888**

3 Requirement: CONDITIONAL

4 Condition: Clients supports RGB 888 AND

5 Client supports RLE encoding

6 Tests if the client selects RGB 888 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message
4	VNC Set Pixel Format RGB 888	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for RGB 888 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test RGB 888	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

8 Table 194: RGB 888 – RLE

9 **4.5.4 CL/VNC/RLE/RGB565**

10 Requirement: CONDITIONAL

11 Condition: Clients supports RGB 565 OR

12 Client does not support ARGB 888 AND

13 Client supports RLE encoding

14 Tests if the client selects RGB 565 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message
4	VNC Set Pixel Format RGB 565	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for RGB 565 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test RGB 565	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

Table 195: RGB 565 – RLE

4.5.5 CL/VNC/RLE/ARGB555

Requirement: CONDITIONAL

Condition: Clients supports RGB 555 AND
Client supports RLE encoding

Tests if the client selects ARGB 555 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message
4	VNC Set Pixel Format ARGB 555	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for ARGB 555 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test ARGB 555	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

Table 196: ARGB 555 – RLE

4.5.6 CL/VNC/RLE/RGB444

Requirement: CONDITIONAL

Condition: Clients supports RGB 444 AND

- 1 Client supports RLE encoding
- 2 Tests if the client selects RGB 444 pixel format. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message
4	VNC Set Pixel Format RGB 444	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for RGB 444 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test RGB 444	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

Table 197: RGB 444 – RLE

4.5.7 CL/VNC/RLE/RGB343

Requirement: CONDITIONAL

Condition: Clients supports RGB 343 AND

Client supports RLE encoding

- 9 Test if client selects RGB 343 pixel format. A color test image is rendered on the framebuffer. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message
4	VNC Set Pixel Format RGB 343	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for RGB 343 arrives Big or Little Endian Framebuffer Update Request message arrives
5	VNC Color Test RGB 343	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

1 Table 198: RGB 343 – RLE

2 **4.5.8 CL/VNC/RLE/16BitGrey**

3 Requirement: CONDITIONAL

4 Condition: Clients supports 16-Bit greyscale AND

5 Client supports RLE encoding

6 Test if client selects 16-Bit Greyscale pixel format. A color test image is rendered on the framebuffer. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message
4	VNC Set Pixel Format 16-Bit greyscale	Wait for Set Pixel Format message	<ul style="list-style-type: none"> Set Pixel Format message for 16-Bit greyscale arrives Big or LittleEndian Framebuffer Update Request message arrives
5	VNC Color Test 16-Bit greyscale	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none"> Framebuffer Update Request message arrives Non-incremental Requests full framebuffer Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

8 Table 199: 16-Bit greyscale – RLE

9 **4.5.9 CL/VNC/RLE/8Bitgrey**

10 Requirement: CONDITIONAL

11 Condition: Clients supports 8-Bit greyscale AND

12 Client supports RLE encoding

13 Test if client selects 8-Bit Greyscale pixel format. A color test image is rendered on the framebuffer. The test succeeds if the test engineer does see the color test image correctly displayed on the client device.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Support for RLE in Set Encodings message

Step	Name	Description	Expected Result
4	VNC Set Pixel Format 8-Bit greyscale	Wait for Set Pixel Format message	<ul style="list-style-type: none">• Set Pixel Format message for 8-Bit greyscale arrives• Big or Little Endian• Framebuffer Update Request message arrives
5	VNC Color Test 8-Bit greyscale	Send Color Test Image Use RLE encoding	<ul style="list-style-type: none">• Framebuffer Update Request message arrives• Non-incremental• Requests full framebuffer• Test Engineer confirms the Color Test Image
6	Intentional VNC Client Cleanup		

1

Table 200: 8-Bit grayscale – RLE

2

4.6 Transform Encoding Support

These test cases verify the support for the different pixel formats as supported from the VNC. These tests MUST be executed individually for every supported framebuffer encoding.

The following framebuffer encodings MUST be validated:

- | | | |
|-----------------------|-------------|--|
| • RAW encoding | MANDATORY | |
| • Run-length encoding | CONDITIONAL | If VNC Client supports run-length encoding |
| • Transform encoding | CONDITIONAL | If VNC Client supports transform encoding |

4.6.1 CL/VNC/TRANSFORM/TransformSupport

Requirement: CONDITIONAL

Condition: Clients supports Transform Encoding

The test succeeds if the client does indicate support for the encoding -526 (Transform-Encoding) via a SetEncodings message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">Support of Transform Encoding included in Set Encodings message
4	Intentional VNC Client Cleanup	See Definitions	

Table 201: VNC Client Transform-Encoding Support

4.6.2 CL/VNC/TRANSFORM/TransformEncoding

Requirement: CONDITIONAL

Condition: Clients supports Transform Encoding

Tests if the client supports transform encoding.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Transform Encoding	Provide Test Images for all supported color formats (one-by-one), For each color format, send a Test Image for each supported scaling factor. Supported color formats and scaling factors are available	<ul style="list-style-type: none">Framebuffer Update Request message arrivesTest images are shown on the MirrorLink Client's displayImage is up-scaled.Color values are correctly represented.

Step	Name	Description	Expected Result
		from the Client Display Configuration message. Test Images MUST support the selected scaling factors.	
6	Intentional VNC Client Cleanup		

1

Table 202: Transform Encoding

Approved

1 4.7 Key Events

2 4.7.1 CL/VNC/KEYS/X11Keys

3 Requirement: CONDITIONAL

4 Condition: Client supports X11 Key Events

5 The test engineer is asked to press and release a number of keys at the MirrorLink client. The supported keys
 6 are provided from within PIXIT. If enabled, the Virtual Keyboard Trigger is sent to the MirrorLink client
 7 before. The received key events are expected to be in correct order and have proper key symbol values. For
 8 all keys exactly one press event and one release event is expected.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	VNC Client X11 Default Keys	<p>Test engineer is asked to press and release a number of keys. Test engineer MAY need to enable Virtual Keyboard on the DUT (with the default list as given below). Send a series of Key Press and Release events</p> <ul style="list-style-type: none"> • Letters: ‘a’ – ‘z’ • Letters: ‘A’ – ‘Z’ • Numbers: ‘0’ – ‘9’ • Symbols as specified: ‘ ’, ‘!’, ‘”’, ‘#’, ‘\$’, ‘%’, ‘&’, ‘’’, ‘(’, ‘)’, ‘*’, ‘+’, ‘-’, ‘.’, ‘/’, ‘:’, ‘;’, ‘<’, ‘=’, ‘>’, ‘?’, ‘@’, ‘[’, ‘\’, ‘]’, ‘^’, ‘_’, ‘{’, ‘ ’, ‘}’, ‘~’, Backspace, Return 	<ul style="list-style-type: none"> • Key symbol values in specified range • Key symbol order match the expected values • Press key events are properly closed with an appropriate release key event. • All expected key symbols are received. • DUT MAY send encapsulating SHIFT events, which MUST be ignored from CTS • DUT MAY send CapsLock or NumLock events, which MUST be ignored from CTS • SHIFT, CapsLock and NumLock events MUST be properly closed though with an appropriate release event.
6	Intentional VNC Client Cleanup	See Definitions	

9 Table 203: VNC Client MirrorLink X11 Default Keys – Test Steps

10 4.7.2 CL/VNC/KEYS/ItuKeySupport

11 Requirement: CONDITIONAL

12 Condition: Client supports ITU Key Events

13 This test checks if the ITUKeyPadSupport flag is set in the ClientEventConfiguration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for ITU Keys	<ul style="list-style-type: none"> ITU key events supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

1 Table 204: ITU Keys Supported – Test Steps

2 **4.7.3 CL/VNC/KEYS/ItuKeys**

3 Requirement: CONDITIONAL

4 Condition: Client supports ITU Key Events

5 The test engineer is asked to press and release the ITU keys at the MirrorLink client. For all keys exactly one press event and one release event is expected.
 6

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for ITU Keys	<ul style="list-style-type: none"> ITU key events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	ITU Keys	Test engineer is asked to press and release all ITU keys one after the other. Maintain order as specified in the ITU Key Event symbol list (start with smallest value). All ITU events are pressed and released only once.	<ul style="list-style-type: none"> Key symbol values in specified ITU range Key symbol order match the expected values Press key events are properly closed with an appropriate release key event. All expected key symbols are received.
6	Intentional VNC Client Cleanup	See Definitions	

7 Table 205: ITU Keys – Test Steps

8 **4.7.4 CL/VNC/KEYS/KnobKeySupport**

9 Requirement: CONDITIONAL

10 Condition: Client supports Knob Key Events

11 The supported knob keys, which have been reported to be supported by the client within the ClientEventConfiguration message, are verified by the test engineer.
 12

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for all Knob Keys	<ul style="list-style-type: none"> Knob key events supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

1 Table 206: Knob Keys Supported – Test Steps

2 **4.7.5 CL/VNC/KEYS/KnobKeys**

3 Requirement: CONDITIONAL

4 Condition: Client supports Knob Key Events

5 The tester is asked to perform various actions using the available knob keys at the client device. Only the
 6 knob keys that are reported to be supported by the ClientEventConfiguration message are being taken into
 7 account.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for all Knob Keys	<ul style="list-style-type: none"> Knob key events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	Client VNC Knob Keys	Tester is asked to press and release all supported Knob Key events. Maintain order as specified in the Knob Key Event symbol list (start with smallest value). All Knob Key events are pressed and released only once.	<ul style="list-style-type: none"> Key symbol values in specified Knob Key range Key symbol order match the expected values Press key events are properly closed with an appropriate release key event. All expected key symbols are received.
6	Intentional VNC Client Cleanup	See Definitions	

8 Table 207: Client VNC Knob Keys – Test Steps

9 **4.7.6 CL/VNC/KEYS/DeviceKeySupport**

10 Requirement: CONDITIONAL

11 Condition: Client supports Device Key Events

12 The client is expected to indicate its support for more than 0 device keys via a ClientEventConfiguration
 13 message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Client Configuration	See Definitions CTS announces support for all Device Keys	<ul style="list-style-type: none"> Device key events supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

1 Table 208: VNC Client Device Keys Support – Test Steps

2 **4.7.7 CL/VNC/KEYS/DeviceKeys**

3 Requirement: CONDITIONAL

4 Condition: Client supports Device Key Events

5 The test engineer is asked to press and release all device keys the MirrorLink client supports. The received key events are expected to be in correct order and have proper key symbol values. For all keys, at least one press event and at least one release event is expected.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for all Device Keys	<ul style="list-style-type: none"> Device key events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Client Device Keys	Tester is asked to press and release all supported Device Key events. Maintain order as specified in the Device Key Event symbol list (start with smallest value). All Device Key events are pressed and released only once.	<ul style="list-style-type: none"> Key symbol values in specified Device Key range Key symbol order match the expected values Press key events are properly closed with an appropriate release key event. All expected key symbols are received.
6	Intentional VNC Client Cleanup	See Definitions	

8 Table 209: VNC Client Device Keys – Test Steps

9 **4.7.8 CL/VNC/KEYS/MultimediaKeySupport**

10 Requirement: CONDITIONAL

11 Condition: Client supports Multimedia Key Events

12 The multimedia keys, which have been reported as supported by the client, are presented to the test engineer, who is asked to verify the supported multimedia keys.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Client Configuration	See Definitions CTS announces support for all Multimedia Keys	<ul style="list-style-type: none"> Multimedia key events supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

1 Table 210: VNC Client Multimedia Key Support – Test Steps

2 **4.7.9 CL/VNC/KEYS/MultimediaKeys**

3 Requirement: CONDITIONAL

4 Condition: Client supports Multimedia Key Events

5 The test engineer is asked to press and release all multimedia keys the MirrorLink client supports. The received key events are expected to be in correct order and have proper key symbol values. For all keys exactly one press event and one release event is expected.

Step	Name	Description	Expected Result
1	VNC Client Server Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for all Multimedia Keys	<ul style="list-style-type: none"> Multimedia key events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Client Multimedia Keys	Tester is asked to press and release all supported Multimedia Key events. Maintain order as specified in the Multimedia Key Event symbol list (start with smallest value). All Multimedia Key events are pressed and released only once. Note: The Client MAY use long press events for the Fast Forward and Rewind events.	<ul style="list-style-type: none"> Key symbol values in specified Multimedia Key range Key symbol order match the expected values Press key events are properly closed with an appropriate release key event. All expected key symbols are received.
6	Intentional VNC Client Cleanup	See Definitions	

8 Table 211: VNC Client Multimedia Keys – Test Steps

9 **4.7.10 CL/VNC/KEYS/FunctionKeySupport**

10 Requirement: CONDITIONAL

11 Condition: Client supports Function Key Events

12 The test checks how many additional function keys are supported by the client which has been propagated by the client's ClientEventConfiguration.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	

Step	Name	Description	Expected Result
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for all Function Keys	<ul style="list-style-type: none">Function key events supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

1 Table 212: VNC Client Function Key Support – Test Steps

2 **4.7.11 CL/VNC/KEYS/FunctionKeys**

3 Requirement: CONDITIONAL

4 Condition: Client supports Function Key Events

5 The test engineer is asked to press a number of function keys several times. It is checked if the key symbol for the key up and down events match and the sent key symbol is an additional function key event.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS announces support for all Function Keys	<ul style="list-style-type: none">Function key events supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Client Additional Function Keys	Tester is asked to press and release all supported Function Key events. Maintain order as specified in the Function Key Event symbol list (start with smallest value). All Function Key events are pressed and released only once.	<ul style="list-style-type: none">Key symbol values in specified Function Key rangeKey symbol order match the expected valuesPress key events are properly closed with an appropriate release key event.All expected key symbols are received.
6	Intentional VNC Client Cleanup	See Definitions	

7 Table 213: VNC Client Additional Function Keys – Test Steps

1 4.8 Key Event Mapping

2 4.8.1 CL/VNC/KEYMAP/EventMappingSupport

3 Requirement: CONDITIONAL

4 Condition: Client supports Key Event Mapping

5 Tests if client announces support for Key Event Mapping in the Client Event Configuration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Event Mapping supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

6 Table 214: VNC Client sends EventMappingRequests – Test Steps

7 4.8.2 CL/VNC/KEYMAP/EventMappingRequest

8 Requirement: CONDITIONAL

9 Condition: Client supports Key Event Mapping

10 Evaluates if EventMappingRequests messages have been sent by the client. If this is not the case, the verdict
11 is inconclusive.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Event Mapping supported in Client Event Configuration message
4	VNC Client Event Mapping Requests	Evaluates if EventMappingRequests messages have been sent by the client. Respond with Event Mapping message.	<ul style="list-style-type: none">• Event Mapping Request message sent
5	Intentional VNC Client Cleanup	See Definitions	

12 Table 215: VNC Client sends EventMappingRequests – Test Steps

1 4.9 Virtual Keyboard

2 4.9.1 CL/VNC/VKB/VirtualKbSupport

3 Requirement: CONDITIONAL

4 Condition: Client supports Virtual Keyboard Trigger

5 This test checks if the VirtualKeyboardSupport flag is set in the ClientEventConfiguration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

6 Table 216: Virtual Keyboard support – Test Steps

7 4.9.2 CL/VNC/VKB/VirtualKbTriggerRequest

8 Requirement: CONDITIONAL

9 Condition: Client supports Virtual Keyboard Trigger

10 This test waits for a VirtualKeyboardTriggerRequest message from the client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Virtual Keyboard Trigger Request	Wait for Virtual Keyboard Trigger Request message from the client.	<ul style="list-style-type: none">Valid Virtual Keyboard Trigger Request messages arrivesEnable virtual keyboard
6	Intentional VNC Client Cleanup	See Definitions	

11 Table 217: VirtualKeyboardTriggerRequest – Test Steps

12 4.9.3 CL/VNC/VKB/VirtualKbShow

13 Requirement: CONDITIONAL

14 Condition: Client supports Virtual Keyboard Trigger

15 The test waits for a VirtualKeyboardTriggerRequest message. If the triggering feature is enabled, a text box will show up and a VirtualKeyboardTrigger message is sent to the client. After the test engineer has confirmed that the virtual keyboard showed up, another VirtualKeyboardTrigger message is sent in order to close the virtual keyboard. The test engineer is asked if the virtual keyboard did disappear

19

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Virtual Keyboard Trigger supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Virtual Keyboard Trigger Request	Wait for Virtual Keyboard Trigger Request message from the client.	<ul style="list-style-type: none"> Valid Virtual Keyboard Trigger Request messages arrives Enable virtual keyboard
6	VNC Keyboard Trigger (Show)	Send Virtual Keyboard Trigger message (Show)	<ul style="list-style-type: none"> Virtual Keyboard is visible on DUT
7	Intentional VNC Client Cleanup	See Definitions	

Table 218: VirtualKeyboardTrigger – Test Steps

4.9.4 CL/VNC/VKB/VirtualKbRemove

Requirement: CONDITIONAL

Condition: Client supports Virtual Keyboard Trigger

The test waits for a VirtualKeyboardTriggerRequest message. If the triggering feature is enabled, a text box will show up and a VirtualKeyboardTrigger message is sent to the client. After the test engineer has confirmed that the virtual keyboard showed up, another VirtualKeyboardTrigger message is sent in order to close the virtual keyboard. The test engineer is asked if the virtual keyboard did disappear

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> Virtual Keyboard Trigger supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Virtual Keyboard Trigger Request	Wait for Virtual Keyboard Trigger Request message from the client.	<ul style="list-style-type: none"> Valid Virtual Keyboard Trigger Request messages arrives Enable virtual keyboard
6	VNC Keyboard Trigger (Show)	Send Virtual Keyboard Trigger message (Show)	<ul style="list-style-type: none"> Virtual Keyboard is visible on DUT
7	VNC Keyboard Trigger (Remove)	Send Virtual Keyboard Trigger message (Remove)	<ul style="list-style-type: none"> Virtual Keyboard is removed from DUT
8	Intentional VNC Client Cleanup	See Definitions	

Table 219: VirtualKeyboardTrigger – Test Steps

If this test does not fail, the following test cases MUST be considered passed:

- CL/VNC/VKB/VirtualKbSupport
- CL/VNC/VKB/VirtualKbTriggerRequest
- CL/VNC/VKB/VirtualKbShow

1 **4.9.5 CL/VNC/VKB/VirtualKbWithTextEntry**

2 Requirement: CONDITIONAL

3 Condition: Client supports Virtual Keyboard Trigger AND

4 Client supports Text Entry Exchange, using Server and Client Cut Text

5 The test case validates, whether the MirrorLink Client can handle a virtual keyboard trigger situation, where
6 the MirrorLink is providing a text entry value via a Server Cut Text message. On completion, the MirrorLink
7 Client sends a Client Cut Text message containing the completed text.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Virtual Keyboard Trigger Request	Test engineer is asked to start the Virtual keyboard trigger service	<ul style="list-style-type: none">Receive Virtual Keyboard Trigger Request messageSupport text entry exchange
6	VNC Virtual Keyboard Trigger (Show)	<p>Send Virtual Keyboard Trigger message</p> <ul style="list-style-type: none">Show virtual keyboardText Entry Exchange enabled <p>Send Server Cut Text message with the text "This is a test."</p>	<ul style="list-style-type: none">Virtual Keyboard is visible on DUTText "This is a test." is visible
7	Edit text	<p>Test Engineer is asked to change the text to "This was a test."</p> <p>Test Engineer is asked to confirm the changes.</p>	<ul style="list-style-type: none">Receive a Client Cut text message with the text "This was a test."
8	VNC Virtual Keyboard Trigger (Remove)	<p>Send Virtual Keyboard Trigger message</p> <ul style="list-style-type: none">Remove virtual keyboard	<ul style="list-style-type: none">Virtual Keyboard is removed from DUT
9	Intentional VNC Client Cleanup	See Definitions	

8

Table 220: Virtual Keyboard Trigger (with Text Entry Exchange)

1 4.10 Key Event Listing

2 4.10.1 CL/VNC/KEYLIST/KeyEventListingSupport

3 Requirement: CONDITIONAL

4 Condition: Client supports Virtual Keyboard Trigger AND

5 Client supports Key Event Listing

6 This test checks if the KeyEventListingSupport flag is set in the ClientEventConfiguration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger supported in Client Event Configuration messageKey Event Listing supported in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 221: Key Event Listing support – Test Steps

8 4.10.2 CL/VNC/KEYLIST/KeyEventListingRequest

9 Requirement: CONDITIONAL

10 Condition: Client supports Virtual Keyboard Trigger AND

11 Client supports Key Event Listing

12 This test waits for a KeyEventListingRequest message from the client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">Virtual Keyboard Trigger supported in Client Event Configuration messageKey Event Listing supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Key Event Listing Request	Wait for Key Event Listing Request and Virtual Keyboard Trigger Request messages from the client.	<ul style="list-style-type: none">Valid Virtual Keyboard Trigger Request message arrives (support for virtual keyboard)Valid Key Event Listing Request messages arrives (support for key event listing)
6	Intentional VNC Client Cleanup	See Definitions	

Table 222: KeyEventListingRequest – Test Steps

4.10.3 CL/NNC/KEYLIST/BlackList

3 Requirement: CONDITIONAL

- 4 Condition: Client supports Virtual Keyboard Trigger AND
- 5 Client supports Key Event Listing

6 Tests if the use of key event listing together with virtual keyboard trigger message, is bringing a virtual
7 keyboard on the DUT, showing the Default key event list, minus the black listed key events.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Configuration	See Definitions	<ul style="list-style-type: none"> Virtual Keyboard Trigger supported in Client Event Configuration message Key Event Listing supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Key Event Listing Request	Wait for Key Event Listing Request and Virtual Keyboard Trigger Request messages from the client.	<ul style="list-style-type: none"> Valid Virtual Keyboard Trigger Request message arrives (support for virtual keyboard) Valid Key Event Listing Request messages arrives (support for key event listing)
6	VNC Default Key Event List	Send Default Key Event list to client, containing letter 'A' to 'Z'	
7	VNC Virtual Keyboard Trigger	Send Virtual Keyboard Trigger <ul style="list-style-type: none"> Show Keyboard Key Event list follows 	<ul style="list-style-type: none"> Virtual Keyboard shown at the DUT
8	Initial Black list	Send Key Event Listing message <ul style="list-style-type: none"> Black List Non-incremental Event list contains letter 'A' – 'F' 	<ul style="list-style-type: none"> Virtual Keyboard shown with the reduced Key Events Showing only 'G' – 'Z'
9	VNC Key Event	Test Engineer randomly clicks a single listed key	<ul style="list-style-type: none"> VNC Key (press & release) event message received
10	Incremental Black List	Send Key Event Listing message <ul style="list-style-type: none"> Black List Incremental Event list contains letter 'G' – 'K' 	<ul style="list-style-type: none"> Virtual Keyboard shown with the reduced Key Events Showing only 'L' – 'Z'
11	VNC Key Event	Test Engineer randomly clicks a single listed key	<ul style="list-style-type: none"> VNC Key (press & release) event message received
12	Intentional VNC Client Cleanup	See Definitions	

Table 223: Fallback to Default Key Event List – Test Steps

1 **4.10.4 CL/VNC/KEYLIST/WhiteList**

2 Requirement: CONDITIONAL

3 Condition: Client supports Virtual Keyboard Trigger AND

4 Client supports Key Event Listing

5 Tests if the use of key event listing together with virtual keyboard trigger message, is bringing a virtual keyboard on the DUT, showing the white listed key events.

Step	Name	Description	Expected Result
1	Launch VNC Server	See Definitions	
2	VNC Hand-shake	See Definitions	
3	VNC Configuration	See Definitions	<ul style="list-style-type: none"> • Virtual Keyboard Trigger supported in Client Event Configuration message • Key Event Listing supported in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	VNC Key Event Listing Request	Wait for Key Event Listing Request and Virtual Keyboard Trigger Request messages from the client.	<ul style="list-style-type: none"> • Valid Virtual Keyboard Trigger Request message arrives (support for virtual keyboard) • Valid Key Event Listing Request messages arrives (support for key event listing)
6	VNC Default Key Event List	Send Default Key Event list to client, containing letter 'A' to 'Z'	
7	VNC Virtual Keyboard Trigger	<ul style="list-style-type: none"> • Show Keyboard • Key Event list follows 	<ul style="list-style-type: none"> • Virtual Keyboard shown at the DUT
8	Fallback to Default Key Event List	<ul style="list-style-type: none"> • Send Key Event Listing message • White List • Event list contains letter 'A' – 'F' 	<ul style="list-style-type: none"> • Virtual Keyboard shown with the reduced Key Events • Showing only 'A' – 'F'
9	VNC Key Event	Test Engineer randomly clicks a single listed key	<ul style="list-style-type: none"> • VNC Key (press & release) event message received
10	Incremental Black List	<ul style="list-style-type: none"> • Send Key Event Listing message • White List • Incremental • Event list contains letter 'G' – 'K' 	<ul style="list-style-type: none"> • Virtual Keyboard shown with the reduced Key Events • Showing only 'A' – 'K'
11	VNC Key Event	Test Engineer randomly clicks a single listed key	<ul style="list-style-type: none"> • VNC Key (press & release) event message received
12	Intentional VNC Client Cleanup	See Definitions	

1 4.11 Device Status

2 4.11.1 CL/VNC/DEVICE/DeviceStatus

3 Requirement: CONDITIONAL

4 Condition: Client supports Device Status

5 The MirrorLink-CTS sends actively a DeviceStatus message to the client. The client is expected to correctly
6 read the full message from its input stream and process a succeeding FramebufferUpdate message correctly.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Client Device Status	Wait for Device Status Request message. Send Device Status message Respond to framebuffer update request message.	<ul style="list-style-type: none">• Device Status Request message received• Continue receiving framebuffer update request message
6	Intentional VNC Client Cleanup	See Definitions	

7 Table 225: Client MirrorLink Device Status – Test Steps

8 4.11.2 CL/VNC/DEVICE/NightMode

9 Requirement: CONDITIONAL

10 Condition: Client supports Device Status AND

11 Client supports Night Mode

12 This test checks if the client sends Night Mode switch when the client's day/night status is changed.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Change day/night status	Test engineer changes a client day/night switch to Night	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none">• Device Status Request message received• Night Mode flag is set to '11'
7	Change day/night status	Test engineer changes a client day/night switch to Day	
8	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none">• Device Status Request message received• Night Mode flag is set to '10'

Step	Name	Description	Expected Result
9	Intentional VNC Client Cleanup	See Definitions	

1 Table 226: Client ML Device Status – Night Mode

2 **4.11.3 CL/VNC/DEVICE/ScreenSaver**

3 Requirement: CONDITIONAL

4 Condition: Client supports Device Status AND

5 Client supports Screen Saver Enable & Disable

6 This test checks if the client sends Screen Saver switch when the client requests MirrorLink Server to display/dim the display.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Display dimmed	Test engineer changes a client screen-saver switch to ON	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> Device Status Request message received Screen-saver flag is set to '11'
7	Display shown	Test engineer changes a client screen-saver switch to OFF	
8	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> Device Status Request message received Screen-saver flag is set to '10'
9	Intentional VNC Client Cleanup	See Definitions	

8 Table 227: Client ML Device Status – Screen Saver

9 **4.11.4 CL/VNC/DEVICE/ScreenSaverEnable**

10 Requirement: CONDITIONAL

11 Condition: Client supports Device Status AND

12 Client supports Screen Saver Enable

13 This test checks if the client sends Screen Saver switch when the client requests MirrorLink Server to dim the display.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	

Step	Name	Description	Expected Result
4	VNC Client Start Operation	See Definitions	
5	Display dimmed	Test engineer changes a client screen-saver switch to ON	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> • Device Status Request message received • Screen-saver flag is set to '11'
7	Intentional VNC Client Cleanup	See Definitions	

1 Table 228: Client ML Device Status – Screen Saver Enable

2 **4.11.5 CL/VNC/DEVICE/KeyLock**

3 Requirement: CONDITIONAL

4 Condition: Client supports Device Status AND

5 Client supports Key Lock Enable & Disable

6 This test checks if the client sends Key Lock switch when the client requests MirrorLink Server to lock/unlock the key input.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Lock Server key input	Test engineer changes a client Key Lock switch to ON	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> • Device Status Request message received • Key Lock flag is set to '11'
7	Unlock Server key input	Test engineer changes a client Key Lock switch to OFF	
8	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> • Device Status Request message received • Key Lock flag is set to '10'
9	Intentional VNC Client Cleanup	See Definitions	

8 Table 229: Client ML Device Status – Key Lock

9 **4.11.6 CL/VNC/DEVICE/KeyLockEnable**

10 Requirement: CONDITIONAL

11 Condition: Client supports Device Status AND

12 Client supports Key Lock Enable

13 This test checks if the client sends Key Lock switch when the client requests MirrorLink Server to lock the key input.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Lock Server key input	Test engineer changes a client Key Lock switch to ON	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> Device Status Request message received Key Lock flag is set to '11'
7	Intentional VNC Client Cleanup	See Definitions	

Table 230: Client ML Device Status – Key Lock Enable

2 **4.11.7 CL/VNC/DEVICE/DriverDistractionAvoidance**

3 Requirement: CONDITIONAL

4 Condition: Client supports Device Status AND

5 Client supports Driver Distraction Avoidance

6 This test checks if the client sends Driver Distraction Avoidance switch when the client's driving status is changed.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Enable Driver Distraction Avoidance	Test engineer changes a client Driver Distraction Avoidance switch to ON	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> Device Status Request message received Driver Distraction Avoidance flag is set to '11'
7	Disable Driver Distraction Avoidance	Test engineer changes a client Driver Distraction Avoidance switch to OFF	
8	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none"> Device Status Request message received Driver Distraction Avoidance flag is set to '10'
9	Intentional VNC Client Cleanup	See Definitions	

Table 231: Client ML Device Status – Driver Distraction Avoidance

1 **4.11.8 CL/VNC/DEVICE/DeviceLock**

2 Requirement: CONDITIONAL

3 Condition: Client supports Device Status AND

4 Client supports Device Lock Enable and Disable

5 This test checks if the client sends Device Lock switch when the client requests MirrorLink Server to lock/unlock the device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Lock Server Device	Test engineer changes a client Device Lock switch to ON	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none">• Device Status Request message received• Device Lock flag is set to '11'
7	Unlock Server Device	Test engineer changes a client Device Lock switch to OFF	
8	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none">• Device Status Request message received• Device Lock flag is set to '10'
9	Intentional VNC Client Cleanup	See Definitions	

7 Table 232: Client ML Device Status – Device Lock

8 **4.11.9 CL/VNC/DEVICE/DeviceLockDisable**

9 Requirement: CONDITIONAL

10 Condition: Client supports Device Status AND

11 Client supports Device Lock Disable

12 This test checks if the client sends Device Lock switch when the client requests MirrorLink Server to unlock the device.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Unlock Server Device	Test engineer changes a client Device Lock switch to OFF	
6	Client Device Status	Wait for Device Status Request message. Send Device Status message	<ul style="list-style-type: none">• Device Status Request message received• Device Lock flag is set to '10'

Step	Name	Description	Expected Result
7	Intentional VNC Client Cleanup	See Definitions	

1 Table 233: Client ML Device Status – Device Lock Disable

2 *4.11.10 CL/VNC/DEVICE/RotationChangeAvailable*

3 Requirement: CONDITIONAL

4 Condition: Client supports Device Status AND

5 Client supports Rotation Change

6 This test checks if the client uses the framebuffer rotation switch.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> • Rotation flag set to '1' in Client Display Configuration message • Desktop Size Pseudo Encoding included in Set Encodings Message
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 234: Server-side framebuffer rotation available – Test Steps

8 *4.11.11 CL/VNC/DEVICE/RotationSwitch*

9 Requirement: CONDITIONAL

10 Condition: Client supports Device Status AND

11 Client supports Rotation Change

12 Test is the client supports a new orientation.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> • Rotation flag set to '1' in Client Display Configuration message • Desktop Size Pseudo Encoding included in Set Encodings Message.
4	VNC Client Start Operation	See Definitions	
5	Desktop Size Pseudo Encoding	Rotate Test Image by 90 degree Send Desktop Size Pseudo Encoding message with new orientation	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • Full size, non-incremental

Step	Name	Description	Expected Result
		Send Device Status message with new rotation.	<ul style="list-style-type: none"> • Framebuffer size matches the one from the Desktop Size message • No framebuffer blocking
6	Intentional VNC Client Cleanup	See Definitions	

1 Table 235: VNC Client Rotation Change

2 **4.11.12 CL/VNC/DEVICE/OrientationSwitchAvailable**

- 3 Requirement: CONDITIONAL
- 4 Condition: Client supports Device Status AND
- 5 Client supports Orientation Switch
- 6 Test if the client supports framebuffer orientation switch.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
2	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> • Orientation flag set to '1' in Client Display Configuration message • Desktop Size Pseudo Encoding included in Set Encodings Message
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 236: Server-side framebuffer orientation available – Test Steps

8 **4.11.13 CL/VNC/DEVICE/OrientationSwitch**

- 9 Requirement: CONDITIONAL
- 10 Condition: Client supports Device Status AND
- 11 Client supports Orientation Switch
- 12 Test if the client supports a new orientation.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> • Orientation flag set to '1' in Client Display Configuration message • Desktop Size Pseudo Encoding included in Set Encodings Message.
4	VNC Client Start Operation	See Definitions	

Step	Name	Description	Expected Result
5	Desktop Size Pseudo Encoding	Send Desktop Size Pseudo Encoding message with new orientation Send Device Status message with new orientation.	<ul style="list-style-type: none">• Framebuffer Update Request messages arrive• Full size, non-incremental• Framebuffer size matches the one from the Desktop Size message• No framebuffer blocking
6	Intentional VNC Client Cleanup	See Definitions	

1

Table 237: VNC Client Orientation Switch

2

1 **4.12 Framebuffer Alternative Text**

2 **4.12.1 CL/VNC/FBALT/FbAltTextSupport**

3 Requirement: CONDITIONAL

4 Condition: Client supports Framebuffer Alternative Text

5 This test checks if the Supports-Framebuffer-Alternative-Text flag is set in the Client Display Configuration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Framebuffer Alternative Text support in Client Event Configuration message
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 238: Client-side supports framebuffer alternative text – Test Steps

8 **4.12.2 CL/VNC/FBALT/FbAltTextEnable**

9 Requirement: CONDITIONAL

10 Condition: Client supports Framebuffer Alternative Text

11 This test waits for a Framebuffer Alternative Text Request message from the client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Framebuffer Alternative Text support in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	Framebuffer Alternative Text Request	Waits for a Framebuffer Alternative Text Request message from client.	<ul style="list-style-type: none">• Framebuffer Alternative Text Request messages arrives• Enable support
6	Intentional VNC Client Cleanup	See Definitions	

12 Table 239: Framebuffer Alternative Text Request – Test Steps

13 **4.12.3 CL/VNC/FBALT/FbAltTextSend**

14 Requirement: CONDITIONAL

15 Condition: Client supports Framebuffer Alternative Text

16 If the client set the maximum meta-information length to a value bigger than 0, this step sends a Framebuffer Alternative Text message for every application to the client. The client is expected to display at least one of those texts somewhere. The test engineer is asked to verify this.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Framebuffer Alternative Text support in Client Event Configuration message
4	VNC Client Start Operation	See Definitions	
5	Framebuffer Alternative Text Request	Waits for a Framebuffer Alternative Text Request message from client.	<ul style="list-style-type: none">• Framebuffer Alternative Text Request messages arrives• Enable support
6	Framebuffer Alternative Text	Send Framebuffer Alternative Text to the Client Client is expected to display at least one of those texts somewhere. Test engineer is asked to verify this.	<ul style="list-style-type: none">• Test Engineer confirms that the text is visible
7	Intentional VNC Client Cleanup	See Definitions	

Table 240: FramebufferAlternativeText – Test Steps

- 2 If this test does not fail, the following test cases MUST be considered passed:

3 • CL/VNC/FBALT/FbAltTextSupport

4 • CL/VNC/FBALT/FbAltTextEnable

1 **4.13 Framebuffer Blocking Notification**

2 **4.13.1 CL/VNC/BLOCK/FB/NonMIAwareApp**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT correctly blocks a non-MirrorLink-aware foreground app.

6 The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- 8 • App A: non-MirrorLink-aware app
9 • App B: CCC drive-certified app (Global)

10 The test case will check the behavior of the following setups:

- 11 1. Bring Non-MirrorLink-aware App into foreground in Park Mode
12 2. Bring Non-MirrorLink-aware App into foreground in Park Mode and switch into Drive Mode
13 3. Bring Non-MirrorLink-aware App into foreground in Drive Mode

14 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions Launch App B in Park Mode If Park Mode is not available on DUT, go to step 6.	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none">• App B visible on DUT• Receive Framebuffer Update Requests
5	Framebuffer Blocking	CTS moves App A into foreground. CTS provides Context Information for App A with appID = 0x00, appCategory = 0x00.	<ul style="list-style-type: none">• App A visible on DUT• Receive Framebuffer Update Requests <p>OR</p> <ul style="list-style-type: none">• Framebuffer Blocking Notification message for App A<ul style="list-style-type: none">◦ AppID = 0x00◦ Include blocking reason = Not allowed application ID◦ Width/Height as in context information
6	Drive Mode	Enable Drive Mode on DUT Skip test step, if Drive Mode is not supported or App A has been already blocked in previous step.	<ul style="list-style-type: none">• Framebuffer Blocking Notification message for App A<ul style="list-style-type: none">◦ AppID = 0x00◦ Include blocking reason = Not sufficient application trust level◦ Width/Height as in context information

Step	Name	Description	Expected Result
7	App Launch	CTS moves App B into foreground. CTS provided Context Information for App B.	<ul style="list-style-type: none"> • App B visible on CTS
8	Drive Mode	Enable Drive Mode on DUT If Drive Mode is not available on DUT, go to step 10	<ul style="list-style-type: none"> • Drive Mode Enabled
9	Framebuffer Blocking	CTS moves App A into foreground. CTS provides Context Information for App A with appId = 0x00, appCategory = 0x00.	<ul style="list-style-type: none"> • Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> ◦ AppID = 0x00 ◦ Include Blocking reason = Not sufficient application trust level ◦ Width/Height as in context information
10	Intentional VNC Client Cleanup	See Definitions	

Table 241: Framebuffer Blocking Notification – Non-MirrorLink-Aware App

4.13.2 CL/VNC/BLOCK/FB/MIAwareApp

Requirement: MANDATORY

Condition: None

This test case validates, that the DUT correctly blocks a MirrorLink-aware foreground app.

The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- App A: MirrorLink-aware app
- App B: CCC drive-certified app (Global)

The test case will check the behavior of the following setups:

1. Bring MirrorLink-aware App into foreground in Park Mode
4. Bring MirrorLink-aware App into foreground in Park Mode and switch into Drive Mode
5. Bring MirrorLink-aware App into foreground in Drive Mode

The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions Launch App B in Park Mode If Park Mode is not available on DUT, go to step 6.	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none"> • App B visible on DUT • Receive Framebuffer Update Requests
5	Framebuffer Blocking	CTS moves App A into foreground.	<ul style="list-style-type: none"> • App A visible on DUT

Step	Name	Description	Expected Result
		<p>CTS provides Context Information for App A.</p> <p>CTS will need to know, which app category will be blocked (if any)</p>	<ul style="list-style-type: none"> Receive Framebuffer Update Requests <p>OR</p> <ul style="list-style-type: none"> Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> AppID of App A Include blocking reason = Not allowed application category Width/Height as in context information
6	Drive Mode	<p>Enable Drive Mode on DUT</p> <p>Skip test step, if Drive Mode is not supported or App A has been already blocked in previous step.</p>	<ul style="list-style-type: none"> Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> AppID of App A Include blocking reason = Not sufficient application trust level Width/Height as in context information <p>OR</p> <ul style="list-style-type: none"> UPnP terminate application for App A. DUT informs the user about the termination.
7	App Launch	<p>CTS moves App B into foreground.</p> <p>CTS provided Context Information for App B.</p>	<ul style="list-style-type: none"> App B visible on CTS
8	Drive Mode	<p>Enable Drive Mode on DUT</p> <p>If Drive Mode is not available on DUT, go to step 10</p>	<ul style="list-style-type: none"> Drive Mode Enabled
9	Framebuffer Blocking	<p>CTS moves App A into foreground.</p> <p>CTS provides Context Information for App A.</p>	<ul style="list-style-type: none"> Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> AppID of App A Include Blocking reason = Not sufficient application trust level Width/Height as in context information
10	Intentional VNC Client Cleanup	See Definitions	

1 Table 242: Framebuffer Blocking Notification – MirrorLink-Aware App

2 **4.13.3 CL/VNC/BLOCK/FB/BaseCertifiedApp**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT correctly blocks a CCC base-certified foreground app.

6 The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- 8 • App A: CCC base-certified app

- 1 • App B: CCC drive-certified app (Global)

2 The test case will check the behavior of the following setups:

- 3 1. Bring CCC base-certified App into foreground in Park Mode
 4 2. Bring CCC base-certified App into foreground in Park Mode and switch into Drive Mode
 5 3. Bring CCC base-certified App into foreground in Drive Mode

6 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions Launch App B in Park Mode If Park Mode is not available on DUT, go to step 6.	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none"> App B visible on DUT Receive Framebuffer Update Requests
5	No Framebuffer Blocking	CTS moves App A into foreground. CTS provides Context Information for App A.	<ul style="list-style-type: none"> App A visible on DUT Receive Framebuffer Update Requests
6	Drive Mode	Enable Drive Mode on DUT Skip test step, if Drive Mode is not supported.	<ul style="list-style-type: none"> Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> AppID of App A Include blocking reason = Not sufficient application trust level Width/Height as in context information OR UPnP terminate application for App A DUT informs the user about the termination.
7	App Launch	CTS moves App B into foreground. CTS provided Context Information for App B.	<ul style="list-style-type: none"> App B visible on CTS
8	Drive Mode	Enable Drive Mode on DUT If Drive Mode is not available on DUT, go to step 10	<ul style="list-style-type: none"> Drive Mode Enabled
9	Framebuffer Blocking	CTS moves App A into foreground. CTS provides Context Information for App A.	<ul style="list-style-type: none"> Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> AppID of App A Include Blocking reason = Not sufficient application trust level

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> ○ Width/Height as in context information
10	Intentional VNC Client Cleanup	See Definitions	

1 Table 243: Framebuffer Blocking Notification – CCC base-certified App

2 **4.13.4 CL/VNC/BLOCK/FB/SwitchToNativeUI**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT correctly handles a request to switch back to its native user interface, after blocking a foreground applications.

7 The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- 9 • App A: CCC base-certified app
 10 • App B: CCC drive-certified app (Global)

11 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions Launch App B in Park Mode If Park Mode is not available on DUT, go to step 6.	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none"> • App B visible on DUT • Receive Framebuffer Update Requests
5	Drive Mode	Enable Drive Mode on DUT If Drive Mode is not available on DUT, go to step 8	<ul style="list-style-type: none"> • Drive Mode Enabled
6	Framebuffer Blocking	CTS moves App A into foreground. CTS provides Context Information for App A.	<ul style="list-style-type: none"> • Framebuffer Blocking Notification message for App A <ul style="list-style-type: none"> ○ AppID of App A ○ Include Blocking reason = Not sufficient application trust level ○ Width/Height as in context information
7	Switch to Native UI	Send context information with "Switch to MirrorLink Client native UI" (0xF000FFFF) application category.	<ul style="list-style-type: none"> • DUT switches to native user interface • DUT intentionally terminates the VNC session OR stops sending further Framebuffer Update Requests. • DUT informs the user about the switch.

Step	Name	Description	Expected Result
8	Intentional VNC Client Cleanup	See Definitions	

1 Table 244: Framebuffer Blocking Notification – Switch to Native UI after Blocking

2 **4.13.5 CL/VNC/BLOCK/FB/ClientSwitchToNativeUI**

3 Requirement: MANDATORY

4 Condition: None

5 The Test Engineer will need to switch to the MirrorLink Client's native UI, pushing the VNC display into the background and then back to the foreground again. The MirrorLink Client is expected to respond with a
 6 Framebuffer Blocking Notification message.
 7

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Framebuffer not Blocking	Provide Framebuffer Update messages, containing allowed context Information.	<ul style="list-style-type: none"> • Update the display • Continue to send Framebuffer Update Requests
6	Framebuffer Blocking	Test Engineer switches to the MirrorLink Client's application listing UI.	Option 1 – FB blocking <ul style="list-style-type: none"> • Send Framebuffer Blocking Notification message • Application IDs match the current application • Blocking reason is “UI not visible on remote display ” • No further Framebuffer Update Request messages arrive Option 2 – App Termination <ul style="list-style-type: none"> • MirrorLink Client terminates the application via UPnP and intentionally disconnects VNC session
7	Framebuffer Unblocking	Based on previous DUT behavior, Test Engineer switches to the MirrorLink Client's VNC display (option 1) or launches the application again (option 2).	Option 1 - FB Blocking <ul style="list-style-type: none"> • Send Framebuffer Update Request message • Show VNC display Option 2 - App Termination <ul style="list-style-type: none"> • UPnP Application Launch • VNC session established and started • Show VNC display
8	Intentional VNC Client Cleanup	See Definitions	

8 Table 245: Framebuffer into Background and back into Foreground

1 **4.13.6 CL/VNC/BLOCK/FB/ServerSwitchToNativeUI**

2 Requirement: MANDATORY

3 Condition: None

4 This Client conformance test case expects the MirrorLink Client to switch to its native user interface or in-
5 tentionally disconnects the VNC session, when receiving VNC framebuffer context information with the ap-
6 plication category "Switch to MirrorLink Client native UI" (0xF000FFFF).

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Switch to native UI	Send context information with "Switch to MirrorLink Client native UI" (0xF000FFFF) application category.	<ul style="list-style-type: none">DUT switches to native user interfaceDUT intentionally terminates the VNC session OR stops sending further Framebuffer Update Requests.
6	Intentional VNC Client Cleanup	See Definitions (if needed)	

7 Table 246: Switch to Native UI

8 **4.13.7 CL/VNC/BLOCK/FB/NonMIAwareAppOverlay**

9 Requirement: MANDATORY

10 Condition: None

11 This test case validates, that the DUT correctly blocks an overlay from a non-MirrorLink-aware background app.

13 The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- 15
 - App A: non-MirrorLink-aware app, creating an overlay, when the app is in the background
 - App B: CCC drive-certified app (Global)

17 The test case will check the behavior of the following setups:

- 18 1. Overlay created in Park Mode.
19 2. Overlay created in Drive Mode.

20 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none">App A visible on DUT

Step	Name	Description	Expected Result
			<ul style="list-style-type: none"> • Receive Framebuffer Update Requests
5	Launch Application	Launch App B in park mode; If Park Mode is not available, go to step 8.	<ul style="list-style-type: none"> • App B visible on DUT
6	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information (ApplID = 0x00).	<ul style="list-style-type: none"> • Overlay visible on DUT • Receive Framebuffer Update Requests <p>OR</p> <ul style="list-style-type: none"> • Framebuffer Blocking Notification message for Overlay <ul style="list-style-type: none"> ◦ ApplID = 0x00 ◦ Include blocking reason = Not allowed application ID ◦ Width/Height as in context information
7	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • No Framebuffer Blocking Notification messages received • Overlay not visible on DUT • App B visible on DUT
8	Drive Mode	Enable Drive Mode on DUT If Park Mode is not available on DUT, go to step 11.	<ul style="list-style-type: none"> • Send VNC Device Status message
9	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • Framebuffer Blocking Notification message for Overlay <ul style="list-style-type: none"> ◦ ApplID = 0x00 ◦ Include blocking reason = Not sufficient application trust level ◦ Width/Height as in context information
10	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • No Framebuffer Blocking Notification messages received • Overlay not visible on DUT • App B visible on DUT
11	Intentional VNC Client Cleanup	See Definitions	

Table 247: Framebuffer Blocking Notification – Non-MirrorLink-Aware Overlay

4.13.8 CL/VNC/BLOCK/FB/MIAwareAppOverlay

Requirement: MANDATORY

Condition: None

This test case validates, that the DUT correctly blocks an overlay from a MirrorLink-aware background app.

The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- App A: MirrorLink-aware app, creating an overlay, when the app is in the background
- App B: CCC drive-certified app (Global)

The test case will check the behavior of the following setups:

3. Overlay created in Park Mode.

1 4. Overlay created in Drive Mode.

2 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none"> • App A visible on DUT • Receive Framebuffer Update Requests
5	Launch Application	Launch App B in park mode; If Park Mode is not available, go to step 8.	<ul style="list-style-type: none"> • App B visible on DUT
6	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • Overlay visible on DUT • Receive Framebuffer Update Requests <p>OR</p> <ul style="list-style-type: none"> • Framebuffer Blocking Notification message for Overlay <ul style="list-style-type: none"> ◦ AppID of App A ◦ Include blocking reason = Not allowed application category ◦ Width/Height as in context information
7	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • No Framebuffer Blocking Notification messages received • Overlay not visible on DUT • App B visible on DUT
8	Drive Mode	Enable Drive Mode on DUT If Park Mode is not available on DUT, go to step 11.	<ul style="list-style-type: none"> • Send VNC Device Status message
9	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • Framebuffer Blocking Notification message for Overlay <ul style="list-style-type: none"> ◦ AppID of App A ◦ Include blocking reason = Not sufficient application trust level ◦ Width/Height as in context information
10	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none"> • No Framebuffer Blocking Notification messages received • Overlay not visible on DUT • App B visible on DUT
11	Intentional VNC Client Cleanup	See Definitions	

4

Table 248: Framebuffer Blocking Notification – MirrorLink-Aware Overlay

1 **4.13.9 CL/VNC/BLOCK/FB/BaseCertifiedOverlay**

2 Requirement: MANDATORY

3 Condition: None

4 This test case validates, that the DUT correctly blocks an overlay from a CCC base-certified background app.

5 The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- 7 • App A: CCC base-certified app, creating an overlay, when the app is in the background
8 • App B: CCC drive-certified app (Global)

9 The test case will check the behavior of the following setups:

- 10 1. Overlay created in Park Mode.
11 2. Overlay created in Drive Mode.

12 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none">• App A visible on DUT• Receive Framebuffer Update Requests
5	Launch Application	Launch App B in park mode; If Park Mode is not available, go to step 8.	<ul style="list-style-type: none">• App B visible on DUT
6	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Overlay visible on DUT• Receive Framebuffer Update Requests
7	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Overlay not visible on DUT• App B visible on DUT
8	Drive Mode	Enable Drive Mode on DUT If Park Mode is not available on DUT, go to step 11.	<ul style="list-style-type: none">• Send VNC Device Status message
9	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Framebuffer Blocking Notification message for Overlay<ul style="list-style-type: none">◦ AppID of App A◦ Include blocking reason = Not sufficient application trust level◦ Width/Height as in context information
10	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• No Framebuffer Blocking Notification messages received• Overlay not visible on DUT• App B visible on DUT
11	Intentional VNC Client Cleanup	See Definitions	

1 Table 249: Framebuffer Blocking Notification – CCC base-certified overlay

2 **4.13.10 CL/VNC/BLOCK/FB/DriveCertifiedOverlay**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates, that the DUT correctly blocks an overlay from a CCC base-certified background app.

6 The framebuffer blocking test cases, require apps to be available on the CTS, which have the following properties:

- 8 • App A: CCC drive-certified app (Global), creating an overlay, when the app is in the background
9 • App B: CCC drive-certified app (Global)

10 The test case will check the behavior of the following setups:

- 11 1. Overlay created in Park Mode.
12 2. Overlay created in Drive Mode.

13 The test case will also validate, that the MirrorLink Client displays a notification to the user, when blocking occurs, and that blocking is resolved from the MirrorLink Client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	<ul style="list-style-type: none">• App A visible on DUT• Receive Framebuffer Update Requests
5	Launch Application	Launch App B in park mode; If Park Mode is not available, go to step 8.	<ul style="list-style-type: none">• App B visible on DUT
6	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Overlay visible on DUT• Receive Framebuffer Update Requests
7	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Overlay not visible on DUT• App B visible on DUT
8	Drive Mode	Enable Drive Mode on DUT If Park Mode is not available on DUT, go to step 11.	<ul style="list-style-type: none">• Send VNC Device Status message
9	Show Overlay	CTS enables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Overlay visible on DUT• Receive Framebuffer Update Requests
10	Remove Overlay	CTS disables overlay and provides updated Context Information with Overlay information.	<ul style="list-style-type: none">• Overlay not visible on DUT• App B visible on DUT
11	Intentional VNC Client Cleanup	See Definitions	

15 Table 250: Framebuffer Blocking Notification – CCC drive-certified overlay

1 **4.14 Audio Blocking Notification**

2 Note: Changes to the Audio Blocking Notification test case will be addressed in the next Errata release ver-
3 sion.

4 **4.14.1 CL/VNC/BLOCK/AudioBlocking**

5 Requirement: CONDITIONAL

6 Condition: Client supports RTP header extension AND
7 Client is blocking RTP audio

8 This Client conformance test case expects the MirrorLink Client to play audio from one application (allowed context information) and to blocking audio from another application (not-allowed context information). This
9 MAY require a dedicated setup (e.g. defining application context information) to be fulfilled from the CTS
10 tool. This information MUST be provided to the Test Engineer prior to the test.
11

Step	Name	Description	Expected Result
1	RTP Client Connect	See Definitions in [1] Audio is streamed, which is allowed from the MirrorLink Client	
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Start Operation	See Definitions	•
6	Audio Blocking	RTP server sends an audio stream with not-allowed context information.	• Receive at least one Audio Blocking Notification message • Blocking reason includes the correct application ID.
7	Intentional VNC Client Cleanup	See Definitions	
8	RTP Client Disconnect	See Definitions in [1]	

12 Table 251: AudioBlockingNotification – Test Steps

13 **4.14.2 CL/VNC/BLOCK/AudioMute**

14 Requirement: CONDITIONAL

15 Condition: Client can globally mute audio

16 The Test Engineer will need to mute global audio on the MirrorLink Client. The MirrorLink Client is expected
17 to respond with an Audio Blocking Notification message.

Step	Name	Description	Expected Result
1	RTP Client Connect	See Definitions in [1] Audio is streamed, which is allowed from the MirrorLink Client	
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	

Step	Name	Description	Expected Result
4	VNC Start Operation	See Definitions	
6	Audio Blocking	Test Engineer is asked to mute global audio on the MirrorLink Client	<ul style="list-style-type: none">• Receive at least one Audio Blocking Notification message• Blocking reason includes the correct application ID.• Blocking reason is “Global audio muted”
7	Intentional VNC Client Cleanup	See Definitions	
8	RTP Client Disconnect	See Definitions in [1]	

1

Table 252: AudioBlockingNotification – Test Steps

1 4.15 Touch Events

2 4.15.1 CL/VNC/TOUCH/TouchEventSupport

3 Requirement: CONDITIONAL

4 Condition: Clients supports Touch Events

5 The client is expected to indicate its support for Touch Events via the Client Event Configuration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions <ul style="list-style-type: none">• Support 256 simultaneous touch events• Pressure mask 0xFF	<ul style="list-style-type: none">• Touch Events flag is '1' in Client Event Configuration message• Pressure mask in Client Event Configuration message is not equal 0
4	Intentional VNC Client Cleanup	See Definitions	

6 Table 253: VNC Client Touch Event Support

7 4.15.2 CL/VNC/TOUCH/SimultaneousEvents

8 Requirement: CONDITIONAL

9 Condition: Clients supports Touch Events

10 The MirrorLink-CTS is configured to visually track touch events on the VNC frame buffer. The test engineer is asked to "draw" on the client device and watch the resulting strokes on the display.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions <ul style="list-style-type: none">• Support 256 simultaneous touch events• Pressure mask 0xFF	<ul style="list-style-type: none">• Touch Events flag is '1'• Pressure mask is not equal 0
4	VNC Client Start Operation	See Definitions	
5	TouchEvent	Read number of supported simultaneous touch events. Test engineer is asked to draw with as many fingers as supported from the client (not more than 10) on the MirrorLink Client's screen. The CTS tool is configured to visually track all received touch events.	<ul style="list-style-type: none">• Valid Touch Event messages arrives• Test Engineer can visually confirm the received Touch Event gesture.• Number of simultaneous touch events matches the number of used finger.• All touch events are closed with a release event• Framebuffer Update Request continue to arrive

Step	Name	Description	Expected Result
6	Intentional VNC Client Cleanup	See Definitions	

1 Table 254: Touch Event – Simultaneous Events

2 **4.15.3 CL/VNC/TOUCH/ForceEvents**

3 Requirement: CONDITIONAL

4 Condition: Clients supports Touch Events AND

5 Clients supports multiple pressure levels (more than 2, i.e. pressure mask is > 0x01)

6 The MirrorLink-CTS is configured to visually track the applied force of touch events. The test engineer is
 7 asked to press on the client device with different forces and watch the result on the display.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions <ul style="list-style-type: none"> • Support 256 simultaneous touch events • Pressure mask 0xFF 	<ul style="list-style-type: none"> • Touch Events flag is '1' • Pressure mask is not equal 0
4	VNC Client Start Operation	See Definitions	
5	TouchEvent	Read number of supported pressure events Test engineer is asked to press with one finger with different pressure forces on the MirrorLink Client's touch screen. The CTS tool is configured to visually show the pressure level of the received touch events.	<ul style="list-style-type: none"> • Valid Touch Event messages arrives • Test Engineer can visually confirm different pressure levels. • All touch events are closed with a release event • Framebuffer Update Request continue to arrive
6	Intentional VNC Client Cleanup	See Definitions	

8 Table 255: Touch Event – Pressure Levels

1 **4.16 Client-side Down-Scaling**

2 **4.16.1 CL/VNC/DOWNSCALE/DownScalingCheck**

3 Requirement: CONDITIONAL

4 Condition: Client supports down-scaling

5 Test if the Down-Scaling is supported in the Client Display Configuration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none">• Down-Scaling supported in Client Display Configuration.
4	Intentional VNC Client Cleanup	See Definitions	

6 Table 256: Client-side framebuffer down-scaling available – Test Steps

7 **4.16.2 CL/VNC/DOWNSCALE/ServerFB/ClientWithin800x480**

8 Requirement: CONDITIONAL

9 Condition: Client framebuffer within 800x480

10 Test if the client is down-scaling or following the received server framebuffer. The test engineer MAY need
11 to bring the MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions Set Server Framebuffer resolution in Server Init to the following values (in separate runs of the test case) <ul style="list-style-type: none">• 800x480, 640x360• 5 random resolutions within 800x480, exceeding 320x240 and having an aspect ratio within [0.4 , 2.5] Use only those framebuffer resolutions, which are exceeding the Client framebuffer resolution.	
4	VNC Client Start Operation	See Definitions	
5	VNC Down-Scaling	Provide Test Image to the VNC client in Framebuffer Update Requests. Test Engineer confirms the received image visually.	<ul style="list-style-type: none">• Framebuffer Update Request messages arrive for Server framebuffer area• Quality is sufficient• No clipping/panning

Step	Name	Description	Expected Result
6	Intentional VNC Client Cleanup	See Definitions	

1 Table 257: Client Down Scaling – Server FB (small FB)

2 **4.16.3 CL/VNC/DOWNSCALE/ServerFB/ClientExceed800x480**

3 Requirement: CONDITIONAL

4 Condition: Client framebuffer exceeds 800x480 AND

5 Client framebuffer within 1024x600 AND

6 Client supports downscaling

7 Test if the client is down-scaling the received server framebuffer to its native resolution. The test engineer
 8 MAY need to bring the MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions Set Server Framebuffer resolution in Server Init to the following values (in separate runs of the test case) <ul style="list-style-type: none">• 1024x600, 854x480 (and corresponding portrait resolutions)• 5 random resolutions (Landscape & Portrait), exceeding 800x480 and being within 1024x600 and having an aspect ratio within [0.4 , 2.5] Use only those framebuffer resolutions, which are exceeding the Client framebuffer resolution.	<ul style="list-style-type: none">• Down-Scaling supported in Client Display Configuration.
4	VNC Client Start Operation	See Definitions	
5	VNC Down-Scaling	Provide Test Image to the VNC client in Framebuffer Update Requests. Test Engineer confirms the received image visually.	<ul style="list-style-type: none">• Framebuffer Update Request messages arrive for Server framebuffer area• VNC screen is down-scaled• Quality is sufficient• No clipping/panning
6	Intentional VNC Client Cleanup	See Definitions	

9 Table 258: Client Down Scaling – Server FB (large FB)

10 **4.16.4 CL/VNC/DOWNSCALE/FixedResolutions**

11 Requirement: MANDATORY

12 Condition: None

- 1 Test if the client supports server scaling to pre-defined fixed framebuffer resolutions. The test engineer MAY need to bring the MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions Set Server Framebuffer resolution in Server Init to 1280x720 or a higher value exceeding the Client framebuffer resolution.	
4	VNC Client Start Operation	See Definitions	
5	Desktop Size Pseudo Encoding	Send Desktop Size Pseudo Encoding message with possible fixed resolutions (dependent on the client framebuffer resolution). Skip Framebuffer data Skip Context Information Note: Run the test case for all possible fixed resolutions.	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • Full size, non-incremental • Framebuffer size matches the one from the Desktop Size message • Note: Client may send 1 framebuffer update request with out-of-date framebuffer information
6	VNC Down-Scaling	Provide Test Image to the VNC client in Framebuffer Update Requests. Test Engineer confirms the received image visually.	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • VNC screen is up-scaled • Quality is sufficient
7	Intentional VNC Client Cleanup	See Definitions	

3 Table 259: Client Down-Scaling – Fixed Resolution

4 **4.17 Client-side Up-Scaling**

5 **4.17.1 CL/VNC/UPSCALE/UpScalingCheck**

6 Requirement: CONDITIONAL

7 Condition: Client supports up-scaling

- 8 Test if the Up-Scaling is supported in the Client Display Configuration message.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> • Up-Scaling supported in Client Display Configuration.
4	Intentional VNC Client Cleanup	See Definitions	

9 Table 260: Client-side framebuffer up-scaling available – Test

1 **4.17.2 CL/VNC/UPSCALE/ClientWithin800x480**

2 Requirement: CONDITIONAL

3 Condition: Client framebuffer within 800x480

4 Test if the client is up-scaling or following the server framebuffer. The test engineer MAY need to bring the
5 MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions Set Server Framebuffer resolution in Server Init to the following values (in separate runs of the test case) <ul style="list-style-type: none">• 5 random resolutions within Client framebuffer resolution (Landscape & Portrait), exceeding 320x240 and having an aspect ratio within [0.4 , 2.5]	
4	VNC Client Start Operation	See Definitions	
5	VNC Up-Scaling	Provide Test Image to the VNC client in Framebuffer Update Requests. Test Engineer confirms the received image visually.	<ul style="list-style-type: none">• Framebuffer Update Request messages arrive for Server framebuffer area• Quality is sufficient• Framing possible (in case the server does not support up-scaling)
6	Intentional VNC Client Cleanup	See Definitions	

6 Table 261: Client Side Up-Scaling – Client Within 800x480

7 **4.17.3 CL/VNC/UPSCALE/ClientExceeding800x480**

8 Requirement: CONDITIONAL

9 Condition: Client framebuffer exceeding 800x480 OR

10 Client framebuffer exceeding 1024x600

11 Test if the client is up-scaling the received server framebuffer to its native resolution. The test engineer MAY
12 need to bring the MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions Set Server Framebuffer resolution in Server Init to the following	<ul style="list-style-type: none">• Up-Scaling supported in Client Display Configuration.

Step	Name	Description	Expected Result
		<p>values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 1280x720, 1024x600, 854x480, 800x480, 640x360 (and corresponding portrait resolutions) • 5 random resolutions (Landscape & Portrait), exceeding 320x240 and having an aspect ratio within [0.4 , 2.5] <p>Use only those framebuffer resolutions, which are within the Client framebuffer resolution.</p>	
4	VNC Client Start Operation	See Definitions	
5	VNC Up-Scaling	<p>Provide Test Image to the VNC client in Framebuffer Update Requests.</p> <p>Test Engineer confirms the received image visually.</p>	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • VNC screen is up-scaled • Quality is sufficient • Limited framing
6	Intentional VNC Client Cleanup	See Definitions	

1 Table 262: Client Side Up-Scaling – Client Exceeding 800x480 – Client scales

2 **4.18 Desktop Size Pseudo Encoding**

3 **4.18.1 CL/VNC/DESKTOPSIZE/Support**

4 Requirement: MANDATORY

5 Condition: None

6 Test if client supports Desktop Size Pseudo Encoding.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	<ul style="list-style-type: none"> • Desktop Size Pseudo Encoding included in Set Encodings message.
4	Intentional VNC Client Cleanup	See Definitions	

7 Table 263: VNC Client DesktopSize Encoding Support – Test Steps

8 **4.18.2 CL/VNC/DESKTOPSIZE/ScalingSkipping**

9 Requirement: MANDATORY

10 Condition: None

11 Test if the client supports server scaling to client framebuffer resolution. The test engineer MAY need to bring the MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	<p>See Definitions</p> <p>Set Server Framebuffer resolution in Server Init to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 1280x720, 1024x600, 854x480, 800x480, 640x360 (and corresponding portrait resolutions) • Maximum resolution (65,535x65,535) • 5 random resolutions exceeding Client framebuffer resolution (Landscape & Portrait) • 5 random resolutions within Client framebuffer resolution (Landscape & Portrait) 	
4	VNC Client Start Operation	See Definitions	
5	Desktop Size Pseudo Encoding	<p>Send Desktop Size Pseudo Encoding message with VNC client's native resolution (if valid resolution is provided, Server's native resolution otherwise).</p> <p>Skip Framebuffer data Skip Context Information</p>	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • Full size, non-incremental • Framebuffer size matches the one from the Desktop Size message • Note: Client may send 1 framebuffer update request with out-of-date framebuffer information
6	VNC Scaling	<p>Provide Test Image to the VNC client in Framebuffer Update Requests.</p> <p>Test Engineer confirms the received image visually.</p>	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • VNC screen is scaled • Quality is sufficient
7	Intentional VNC Client Cleanup	See Definitions	

1 Table 264: VNC Client Desktop Size Encoding with Scaling

2 **4.18.3 CL/VNC/DESKTOPSIZE/ScalingNoSkipping**

3 Requirement: MANDATORY

4 Condition: None

5 Test if the client supports server scaling to client framebuffer resolution. The test engineer MAY need to bring the MirrorLink client into a full (or near to full) screen mode.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	<p>See Definitions</p> <p>Set Server Framebuffer resolution in Server Init to the following values (in separate runs of the test case)</p> <ul style="list-style-type: none"> • 1280x720, 1024x600, 854x480, 800x480, 640x360 (and corresponding portrait resolutions) • Maximum resolution (65,535x65,535) • 5 random resolutions exceeding Client framebuffer resolution (Landscape & Portrait) • 5 random resolutions within Client framebuffer resolution (Landscape & Portrait) 	
4	VNC Client Start Operation	See Definitions	
5	Desktop Size Pseudo Encoding	<p>Send Desktop Size Pseudo Encoding message with VNC client's native resolution (if valid resolution is provided, Server's native resolution otherwise).</p> <p>Include Framebuffer data Include Context Information</p>	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • Full size, non-incremental • Framebuffer size matches the one from the Desktop Size message • Note: Client may send 1 framebuffer update request with out-of-date framebuffer information
6	VNC Scaling	<p>Provide Test Image to the VNC client in Framebuffer Update Requests.</p> <p>Test Engineer confirms the received image visually.</p>	<ul style="list-style-type: none"> • Framebuffer Update Request messages arrive • VNC screen is scaled • Quality is sufficient
7	Intentional VNC Client Cleanup	See Definitions	

1 Table 265: VNC Client Desktop Size Encoding with Scaling

2 **4.19 Content Attestation**

3 **4.19.1 CL/VNC/ATTEST/ContentAttestationRequest**

4 Requirement: CONDITIONAL

5 Condition: Client supports Device Attestation Protocol AND

6 Client supports Content Attestation

- 1 The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.
- 2 This test waits for a ContentAttestationRequest message from the client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Content Attestation Request	Waits for a Content Attestation Request message from the client.	<ul style="list-style-type: none"> Content Attestation Request message received First message contains a session key
6	Intentional VNC Client Cleanup	See Definitions	

4 Table 266: Content Attestation Request

5 **4.19.2 CL/VNC/ATTEST/NoVncAppPublicKey**

- 6 Requirement: CONDITIONAL
- 7 Condition: Client supports Device Attestation Protocol AND
Client supports Content Attestation
- 9 The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.
- 11 NOTE: CTS MUST NOT provide an application public key together with the VNC Server attestation.
- 12 This test waits for a ContentAttestationRequest message from the client.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Content Attestation Request	Waits for a Content Attestation Request message from the client. The CTS provides continuous full framebuffer updates.	<ul style="list-style-type: none"> Content Attestation Request message received Message MUST NOT contain a session key <p>OR</p> <ul style="list-style-type: none"> No Content Attestation Request message received for at least 5 min.
6	Intentional VNC Client Cleanup	See Definitions	

13 Table 267: Content Attestation Request with no VNC application public key

1 **4.19.3 CL/VNC/ATTEST/ContentAttestationSuccess**

2 Requirement: CONDITIONAL

3 Condition: Client supports Device Attestation Protocol AND
4 Client supports Content Attestation

5 The test case assumes that the DAP has executed before and that the VNC client has successfully attested the
6 VNC server. See [2] for details.

7 This test waits for a Content Attestation Request message from the client. The Content Attestation Response
8 message contains correct data and is correctly signed. The VNC Client is therefore expected to continue
9 normal operation.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Content Attestation Request	Waits for a Content Attestation Request message from the client.	<ul style="list-style-type: none">• Content Attestation Request message received• First message contains a session key
6	Content Attestation Response	Provide Correct Content Attestation Response message	<ul style="list-style-type: none">• VNC Client does not disconnect• VNC Client continues to send Framebuffer Update Requests.
7	Intentional VNC Client Cleanup	See Definitions	

10 Table 268: Content Attestation Response - Success

11 **4.19.4 CL/VNC/ATTEST/ContentAttestationWrongData**

12 Requirement: CONDITIONAL

13 Condition: Client supports Device Attestation Protocol AND
14 Client supports Content Attestation

15 The test case assumes that the DAP has executed before and that the VNC client has successfully attested the
16 VNC server. See [2] for details.

17 This test waits for a Content Attestation Request message from the client. The Content Attestation Response
18 message contains incorrect data, but is correctly signed. The VNC Client is therefore expected to not continue
19 normal operation.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	

Step	Name	Description	Expected Result
4	VNC Client Start Operation	See Definitions	
5	Content Attestation Request	Waits for a Content Attestation Request message from the client.	<ul style="list-style-type: none"> Content Attestation Request message received First message contains a session key
6	Content Attestation Response	Provide Correct Content Attestation Response message The response contains wrong data SignedInfo entry	<ul style="list-style-type: none"> VNC Client disconnects TCP socket or sends VNC ByeBye message Not more than one further Framebuffer Update Requests sent
7	VNC Client Cleanup	See Definitions	

Table 269: Content Attestation Response – Wrong Data

4.19.5 CL/VNC/ATTEST/ContentAttestationWrongSignature

- Requirement: CONDITIONAL
- Condition: Client supports Device Attestation Protocol AND
 Client supports Content Attestation AND
 Client requests Signature
- The test case assumes that the DAP has executed before and that the VNC client has successfully attested the VNC server. See [2] for details.
- This test waits for a Content Attestation Request message from the client. The Content Attestation Response message contains correct data, but is incorrectly signed. The VNC Client is therefore expected to not continue normal operation.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Content Attestation Request	Waits for a Content Attestation Request message from the client.	<ul style="list-style-type: none"> Content Attestation Request message received Signature requested First message contains a session key
6	Content Attestation Response	Provide Correct Content Attestation Response message Wrong Signature	<ul style="list-style-type: none"> VNC Client disconnects TCP socket or sends VNC ByeBye message Not more than one further Framebuffer Update Requests sent.
7	VNC Client Cleanup	See Definitions	

Table 270: Content Attestation Response – Signature Failure

1 4.20 PICS Validation

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

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

10 4.20.1 CL/VNC/PICS/Encoding

11 Requirement: MANDATORY

12 Condition: None

13 This test case validates the PICS entries with respect to the Set Encoding settings.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See definitions	
4	Check PICS feature	FEAT_CLIENT_VNC_SetEncoding	<ul style="list-style-type: none">• Set Encoding message received
5	Check PICS feature	FEAT_CLIENT_VNC_Pseudo_Desktop_Encoding	<ul style="list-style-type: none">• Set Encoding message includes -223
6	Check PICS feature	FEAT_CLIENT_VNC_Pseudo_Mirrorlink_Encoding	<ul style="list-style-type: none">• Set Encoding message includes -523
7	Check PICS feature	FEAT_CLIENT_VNC_Pseudo_Context_Information_Encoding	<ul style="list-style-type: none">• Set Encoding message includes -524
8	Check PICS feature	FEAT_CLIENT_VNC_Pseudo_RLE_Encoding	<ul style="list-style-type: none">• Set Encoding message includes -525
9	Check PICS feature	FEAT_CLIENT_VNC_Pseudo_Transform_Encoding	<ul style="list-style-type: none">• Set Encoding message includes -526
10	Intentional VNC Client Cleanup	See Definitions	

14 Table 271: VNC Client Encoding Support PICS Checkup

15 4.20.2 CL/VNC/PICS/EventConfiguration

16 Requirement: MANDATORY

17 Condition: None

18 This test case validates the PICS entries with respect to the Client Event settings.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	

Step	Name	Description	Expected Result
3	VNC Client Configuration	See definitions	
4	Check PICS feature	FEAT_CLIENT_VNC_ClientEvent Configuration	<ul style="list-style-type: none"> Client Event Configuration message received.
5	Check PICS feature	FEAT_CLIENT_VNC_KeyEvent Partial validation only - If expected result is TRUE, then feature MUST be supported.	<p>In Client Event Configuration message, if any of the following is true:</p> <ul style="list-style-type: none"> Knob Keys bitmask > 0x00 Device Keys bitmask > 0x00 Multimedia Keys bitmask > 0x00 Enabled ITU Key Pad flag Enabled Virtual Keyboard Trigger flag Enabled Key Event Listing flag Additional Function Keys bitmask > 0x00
6	Check PICS feature	FEAT_CLIENT_VNC_Knob_Keys	<ul style="list-style-type: none"> Client Event Configuration message has set Knob Keys bitmask > 0x00.
7	Check PICS feature	FEAT_CLIENT_VNC_Device_Keys	<ul style="list-style-type: none"> Client Event Configuration message has set Device Keys bitmask > 0x00.
8	Check PICS feature	FEAT_CLIENT_VNC_Multimedia_Keys	<ul style="list-style-type: none"> Client Event Configuration message has set Multimedia Keys bitmask > 0x00.
9	Check PICS feature	FEAT_CLIENT_VNC_X11_Keys Partial validation only - If expected result is TRUE, then feature MUST be supported.	<ul style="list-style-type: none"> Client Event Configuration message has enabled Virtual Keyboard Trigger flag.
10	Check PICS feature	FEAT_CLIENT_VNC_ITU_Keys	<ul style="list-style-type: none"> Client Event Configuration message has enabled ITU Key Pad flag.
11	Check PICS feature	FEAT_CLIENT_VNC_VirtualKeyboard	<ul style="list-style-type: none"> Client Event Configuration message has enabled Virtual Keyboard Trigger flag.
12	Check PICS feature	FEAT_CLIENT_VNC_KeyEventListing	<ul style="list-style-type: none"> Client Event Configuration message has enabled Key Event Listing flag
13	Check PICS feature	FEAT_CLIENT_VNC_EventMapping	<ul style="list-style-type: none"> Client Event Configuration message has enabled Event Mapping Support flag
14	Check PICS feature	FEAT_CLIENT_VNC_Function_Keys	<ul style="list-style-type: none"> Client Event Configuration message has set Additional Function Keys bitmask > 0x00.

Step	Name	Description	Expected Result
15	Check PICS feature	FEAT_CLIENT_VNC_PointerEvent	<ul style="list-style-type: none"> Client Event Configuration message has enabled Pointer Events flag Client Event Configuration message has set Pointer Event Button Mask > 0x00.
16	Check PICS feature	FEAT_CLIENT_VNC_PointerEvent_Gestures	<ul style="list-style-type: none"> Client Event Configuration message has enabled Pointer Events flag
17	Check PICS feature	FEAT_CLIENT_VNC_TouchEvent	<ul style="list-style-type: none"> Client Event Configuration message has enabled Touch Event flag
18	Check PICS feature	FEAT_CLIENT_VNC_TouchEvent_Multi-Touch	<ul style="list-style-type: none"> Client Event Configuration message has set Number of simultaneous touch events > 0x00.
19	Check PICS feature	FEAT_CLIENT_VNC_TouchEvent_Force	<ul style="list-style-type: none"> Client Event Configuration message has set Touch Event Pressure Mask > 0x01.
20	Intentional VNC Client Cleanup	See Definitions	

Table 272: VNC Client Event Configuration PICS Checkup

4.20.3 CL/VNC/PICS/DisplayConfiguration

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates the PICS entries with respect to the Client Display settings.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See definitions	
4	Check PICS feature	FEAT_CLIENT_VNC_ClientDisplayConfiguration	<ul style="list-style-type: none"> Client Display Configuration received
5	Check PICS feature	FEAT_CLIENT_VNC_Scaling	<ul style="list-style-type: none"> Client Display Configuration message has enabled Client-Side Framebuffer up-scaling available flag OR Client Display Configuration message has enabled Client-Side Framebuffer down-scaling available flag

Step	Name	Description	Expected Result
6	Check PICS feature	FEAT_CLIENT_VNC_Follow_Server_FB	<ul style="list-style-type: none"> Client Display Configuration message has disabled Client-Side Framebuffer up-scaling available flag AND <ul style="list-style-type: none"> Client Display Configuration message has disabled Client-Side Framebuffer down-scaling available flag
7	Check PICS feature	FEAT_CLIENT_VNC_Framebuffer_Huge	<ul style="list-style-type: none"> Client Display Configuration has [width, height] > 1024x600
8	Check PICS feature	FEAT_CLIENT_VNC_Scaling_Up	<ul style="list-style-type: none"> Client Display Configuration has [width, height] > 1024x600 Client Display Configuration message has enabled Client-Side Framebuffer up-scaling available flag
9	Check PICS feature	FEAT_CLIENT_VNC_Scaling_HugeDown	<ul style="list-style-type: none"> Client Display Configuration has [width, height] > 1024x600 Client Display Configuration message has enabled Client-Side Framebuffer down-scaling available flag
10	Check PICS feature	FEAT_CLIENT_VNC_Framebuffer_Large	<ul style="list-style-type: none"> Client Display Configuration has [width, height] > 800x480 && <= 1024x600
11	Check PICS feature	FEAT_CLIENT_VNC_Scaling_Up_Large	<ul style="list-style-type: none"> Client Display Configuration has [width, height] > 800x480 && <= 1024x600 Client Display Configuration message has enabled Client-Side Framebuffer up-scaling available flag
12	Check PICS feature	FEAT_CLIENT_VNC_Scaling_LargeDown	<ul style="list-style-type: none"> Client Display Configuration has [width, height] > 800x480 && <= 1024x600 Client Display Configuration message has enabled Client-Side Framebuffer down-scaling available flag
13	Check PICS feature	FEAT_CLIENT_VNC_Framebuffer_Small	<ul style="list-style-type: none"> Client Display Configuration has [width, height] <= 800x480

Step	Name	Description	Expected Result
14	Check PICS feature	FEAT_CLIENT_VNC_Scaling_Up_Small	<ul style="list-style-type: none"> Client Display Configuration has [width, height] <= 800x480
15	Check PICS feature	FEAT_CLIENT_VNC_Scaling_SmaIIDown	<ul style="list-style-type: none"> Client Display Configuration has [width, height] <= 800x480
16	Check PICS feature	FEAT_CLIENT_VNC_Scaling_SmaIILargeDown	<ul style="list-style-type: none"> Client Display Configuration has [width, height] <= 800x480 Client Display Configuration message has enabled Client-Side Framebuffer down-scaling available flag
17	Check PICS feature	FEAT_CLIENT_VNC_Framebuffer_Alt_Text	<ul style="list-style-type: none"> Client Display Configuration message has enabled Framebuffer Alternative flag
18	Check PICS feature	FEAT_CLIENT_VNC_Orientation_Change	<ul style="list-style-type: none"> Client Display Configuration message has enabled Server-side framebuffer orientation switch flag.
19	Check PICS feature	FEAT_CLIENT_VNC_Rotation_Change	<ul style="list-style-type: none"> Client Display Configuration message has enabled Server-side framebuffer rotation flag.
20	Intentional VNC Client Cleanup	See Definitions	

Table 273: VNC Client Display Configuration PICS Checkup

4.20.4 CL/VNC/PICS/ContentAttestation

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates the PICS entries with respect to the Content Attestation settings.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions	
4	VNC Client Start Operation	See Definitions	
5	Check PICS feature	FEAT_CLIENT_VNC_Attestation	<ul style="list-style-type: none"> Content Attestation Request message received
6	Check PICS feature	FEAT_CLIENT_VNC_Attestation_Request	<ul style="list-style-type: none"> Content Attestation Request message received
7	Check PICS feature	FEAT_CLIENT_VNC_Attestation_Response	<ul style="list-style-type: none"> Content Attestation Request message received

Step	Name	Description	Expected Result
8	Check PICS feature	FEAT_CLIENT_VNC_Attestation_Context	<ul style="list-style-type: none"> Content Attestation Request has enabled Context Information Pseudo Encoding flag
9	Check PICS feature	FEAT_CLIENT_VNC_Attestation_Content	<ul style="list-style-type: none"> Content Attestation Request has enabled Last Framebuffer Update flag
10	Check PICS feature	FEAT_CLIENT_VNC_Attestation_Bytes	<ul style="list-style-type: none"> Content Attestation Request has enabled Number of Pixels sent flag
11	Check PICS feature	FEAT_CLIENT_VNC_Attestation_Signature	<ul style="list-style-type: none"> Content Attestation Request has enabled Signature Algorithm flag
12	Intentional VNC Client Cleanup	See Definitions	

1 Table 274: VNC Client Content Attestation PICS Checkup

2 **4.20.5 CL/VNC/PICS/Initialization**

3 Requirement: MANDATORY

4 Condition: None

5 This test case validates the PICS entries with respect to the VNC Initialization settings.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS uses an unknown pixel format.	
4	Check PICS feature	FEAT_CLIENT_VNC_Protocol_Handshake	<ul style="list-style-type: none"> Client Protocol Version message received
5	Check PICS feature	FEAT_CLIENT_VNC_RFB38	<ul style="list-style-type: none"> Client Protocol Version is 3.8
6	Check PICS feature	FEAT_CLIENT_VNC_SecurityTypeSelection	<ul style="list-style-type: none"> Security Type Selection message received
7	Check PICS feature	FEAT_CLIENT_VNC_None	<ul style="list-style-type: none"> Selected security type is None
8	Check PICS feature	FEAT_CLIENT_VNC_Init	<ul style="list-style-type: none"> Client Init message received
9	Check PICS feature	FEAT_CLIENT_VNC_Set_Pixel_Format	<ul style="list-style-type: none"> Set Pixel Format message received
10	Intentional VNC Client Cleanup	See Definitions	

6 Table 275: VNC Client Initialization PICS Checkup

7 **4.20.6 CL/VNC/PICS/Operation**

8 Requirement: MANDATORY

- 1 Condition: None
- 2 This test case validates the PICS entries with respect to the VNC Operation settings.

Step	Name	Description	Expected Result
1	VNC Client Launch	See Definitions	
2	VNC Client Handshake	See Definitions	
3	VNC Client Configuration	See Definitions CTS uses an unknown pixel format.	
4	VNC Client Start Operation	See Definitions	
5	Check PICS feature	FEAT_CLIENT_VNC_FB_Update_Request	<ul style="list-style-type: none">• Framebuffer Update Request message received
6	Check PICS feature	FEAT_CLIENT_VNC_NonIncrementalFullUpdates	<ul style="list-style-type: none">• Incremental flag disabled in first Framebuffer Update Request message
7	Check PICS feature	FEAT_CLIENT_VNC_Incremental Framebuffer	<ul style="list-style-type: none">• Incremental flag enable in any following Framebuffer Update Request message
8	Intentional VNC Client Cleanup	See Definitions	

3 Table 276: VNC Client Operation PICS Checkup

4

1 **5 REFERENCES**

- 2 [1] Car Connectivity Consortium, "MirrorLink – Audio Test Specification", Version 1.1, CCC-TS-
3 013
- 4 [2] Car Connectivity Consortium, "MirrorLink – Device Attestation Test Specification", Version 1.1,
5 CCC-TS-015
- 6 [3] Car Connectivity Consortium, "MirrorLink – VNC based Display and Control", Version 1.1,
7 CCC-TS-010
- 8 [4] IETF, RFC 2119, Keys words for use in RFCs to Indicate Requirement Levels, March 1997.
9 <http://www.ietf.org/rfc/rfc2119.txt>

Approved