SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites: RDP Extension

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SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites:

RDP Extension

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Revision Summary

Revision summary		
Date	**Revision history**	**Comments**
01/20/2014	0.1	Initial draft

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1 Introduction

This document specifies the RDP extension for SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites, which runs over a TCP or UDP transport. The purpose of this protocol is to provide a protocol-based manner to control RDP client implementation on SUT. The protocol can be used to transfer RDP SUT control commands (with parameters) to SUT, and get execution result from SUT.

Sections 1.8, 2, and 3 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in RFC 2119. Sections 1.5 and 1.9 are also normative but cannot contain those terms. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are specific to this document:

SUT: System under test.

RDP: Remote Desktop Protocol

SUT Remote Control Protocol: SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites.

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

1.2.2 Informative References

1.3 Overview

SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites: RDP Extension is used for RDP Interoperability Test Suite. This protocol extends SUT Remote Control Protocol, and defines 11 RDP SUT control commands for RemoteFX Interoperability Test Suite. RemoteFX Interoperability Test Suite uses this protocol to transfer RDP SUT control commands to SUT, and gets result data from SUT.

There are two roles as described in SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites: server and client.

The server role is an implementation on SUT, which is used to receive control commands from client and do operations on SUT which required by client.

The client role is the SUT control adapter component in RemoteFX Interoperability Test Suite, which is used by test cases to send RDP SUT control commands.

1.4 Relationship to Other Protocols

This protocol is an extension of SUT Remote Control Protocol for Microsoft Protocol Interoperability Test Suites.

1.5 Prerequisites/Preconditions

1.6 Applicability Statement

1.7 Versioning and Capability Negotiation

1.8 Vendor-Extensible Fields

1.9 Standards Assignments

2 Messages

2.1 Transport

This protocol uses the same transport as SUT Remote Control Protocol. Both TCP and UDP can be used as transport.

2.2 Message Syntax

2.2.1 Enumerations

2.2.1.1 RDP_SUT_CONTROL_COMMAND_ENUM

Value	Meaning
START_RDP_CONNECTION 0x0001	Trigger SUT to start a RDP connection
CLOSE_RDP_CONNECTION 0x0002	Trigger SUT to close all RDP connection
AUTO_RECONNECT 0x0003	Trigger SUT to start an auto reconnect
BASIC_INPUT 0x0004	Trigger SUT to do basic input on RDP client
SCREEN_SHOT 0x0005	Do a screen shot on RDP client and send graphic data back
TOUCH_EVENT_SINGLE 0x0101	Ask SUT to trigger single touch event on RDP client
TOUCH_EVENT_MULTIPLE 0x0102	Ask SUT to trigger multiple touch event on RDP client
TOUCH_EVENT_DISMISS_HOVERING_CONTACT 0x0103	Ask SUT to trigger a dismiss hovering contact event on RDP client
DISPLAY_UPDATE_RESOLUTION 0x0201	Ask SUT to trigger RDPEDISP message to update display resolution
DISPLAY_UPDATE_MONITORS 0x0202	Ask SUT to trigger RDPEDISP message to update monitor setting, such as add a monitor, remove a monitor or change monitor position
DISPLAY_FULLSCREEN 0x0203	Ask SUT to change RDP client to full screen.

2.2.2 Messages

2.2.2.1 Basic RDP SUT Commands

2.2.2.1.1 START_RDP_CONNECTION

START_RDP_CONNECTION command is used to control SUT to start a RDP connection.

2.2.2.1.1.1 SUT Control Request Message

The request message used for this command is an SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be START_RDP_CONNECTION (0x0001).
The **payload** field is an RDP_Connection_Payload structures.

2.2.2.1.1.1.1 RDP_Connection_Payload Structure

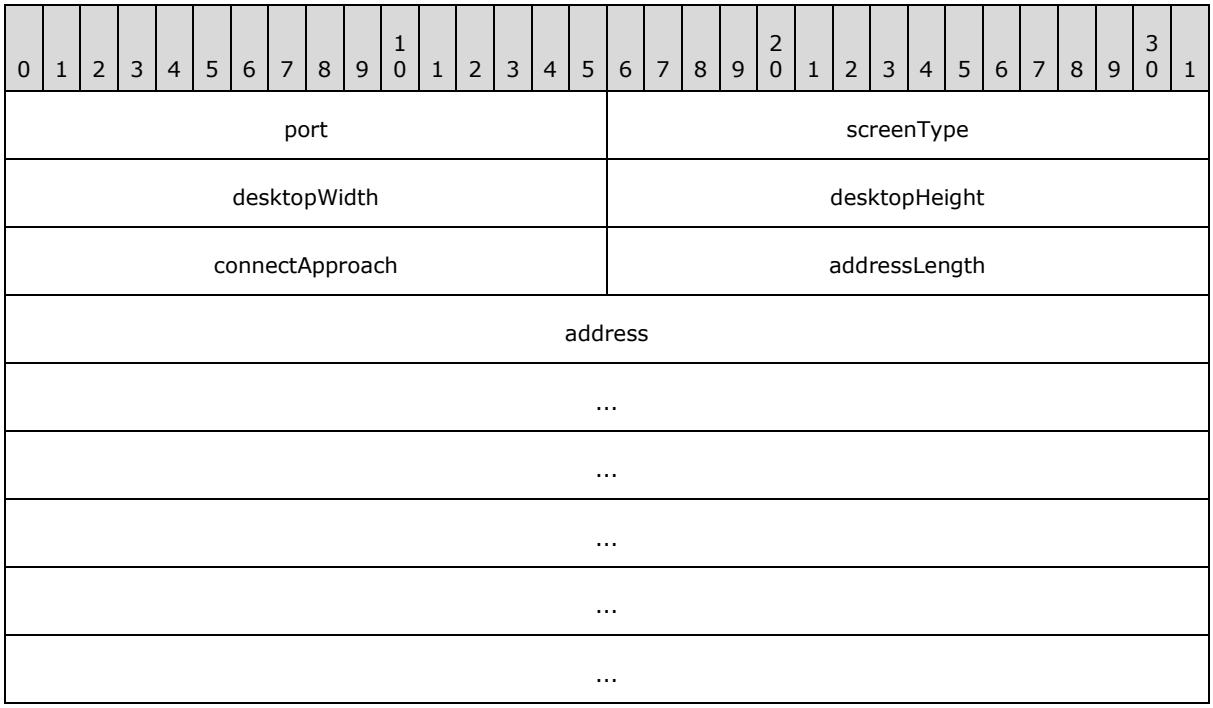
0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
payloadType																															
payload																															
...																															
...																															
...																															
...																															
...																															

payloadType (4 bytes): A 32-bit unsigned integer indicate the payload type.

Value	Meaning
RDP_FILE 0x0000	Payload is the content of a RDP file
PARAMETERS_STRUCT 0x0001	Payload is a RDP_CONNECTION_CONFIGURE_PARAMETER structure.

payload (variable): If payloadType is RDP_FILE (0x0000), this filed MUST be a Unicode-8 string for content of a RDP file; if payload Type is PARAMETERS_STRUCT (0x0001), this filed MUST be a RDP_CONNECTION_CONFIGURE_PARAMETER structure.

2.2.2.1.1.1.1 RDP_CONNECTION_CONFIGURE_PARAMETER



port (2 bytes): A 16-bit unsigned integer indicates the port RDP test suite listen to.

screenType (2 bytes): A 16-bit unsigned integer indicates whether the RDP client using full screen.

Value	Meaning
NORMAL 0x0000	Not full screen
FULL_SCREEN 0x0001	Full screen

desktopWidth (2 bytes): A 16-bit unsigned integer indicate the width of RDP client window.

desktopHeight (2 bytes): A 16-bit unsigned integer indicate the height of RDP client window.

connectApproach (2 bytes): A 16-bit unsigned integer indicates the connect approach.

Value	Meaning
Negotiate	Use negotiate connect method

Value	Meaning
0x0000	
Direct 0x0001	Use direct connect method

addressLength (2 bytes): A 16-bit unsigned integer indicate the length of address field.

address (variable): A Unicode-8 string for address of RDP Server. The size in byte of this field must equal to **addressLength** field.

2.2.2.1.1.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of START_RDP_CONNECTION command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST not appear.

2.2.2.1.2 CLOSE_RDP_CONNECTION

2.2.2.1.2.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be CLOSE_RDP_CONNECTION (0x0002).
The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.1.2.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of STOP_RDP_CONNECTION command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.1.3 AUTO_RECONNECT

2.2.2.1.3.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be AUTO_RECONNECT (0x0003).
The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.1.3.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of AUTO_RECONNECT command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.1.4 BASIC_INPUT

2.2.2.1.4.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be BASIC_INPUT (0x0004).
The **payloadLength** filed MUST be 4.
The **payload** field is a 32-bit unsigned integer flag used to indicate basic inputs need for SUT

Value	Meaning
0x00000001	Input for Keyboard Event
0x00000002	Input for Unicode Keyboard Event
0x00000004	Input for Mouse Event
0x00000008	Input for Extended Mouse Event
0x00000010	Input for Synchronize Event
0x00000020	Control output by Refresh Rect PDU
0x00000040	Control output by Suppress Output PDU

2.2.2.1.4.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of BASIC_INPUT command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.1.5 SCREEN_SHOT

2.2.2.1.5.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be SCREEN_SHOT (0x0005).
The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

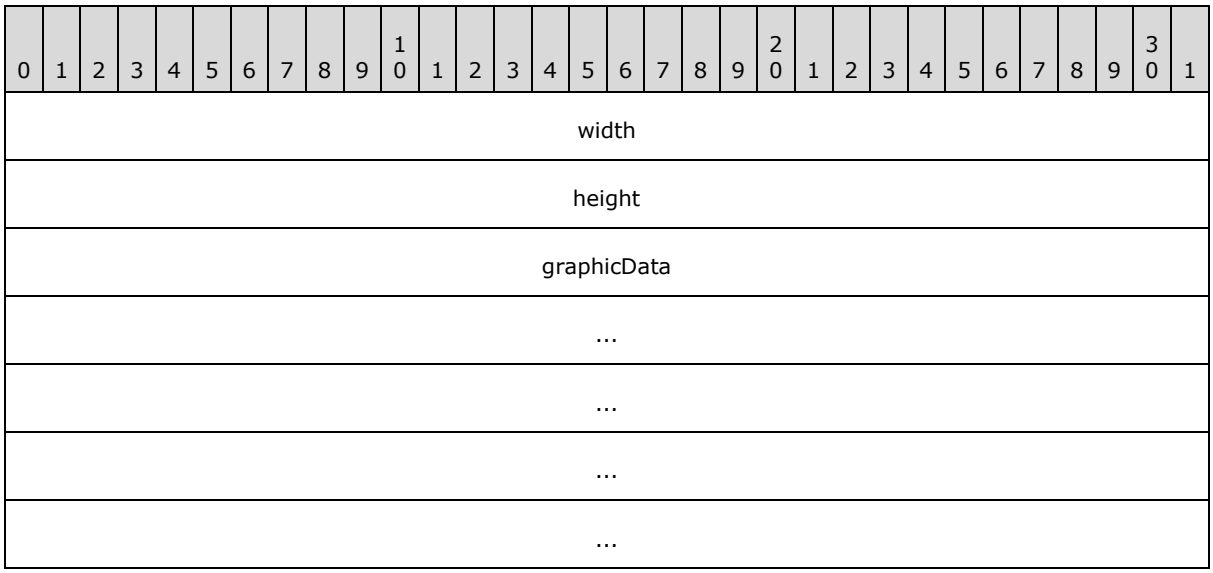
2.2.2.1.5.2 SUT Control Response Message

This is a message MUST be sent as the response of SUT Control Request Message of SCREEN_SHOT.

If **resultCode** is SUCCESS (0x00000000), payload must be a GRAPHIC_DATA structure, which contains data of screenshot graphic.

If **resultCode** is not SUCCESS, the payload MUST NOT be appeared.

2.2.2.1.5.2.1 GRAPHIC_DATA

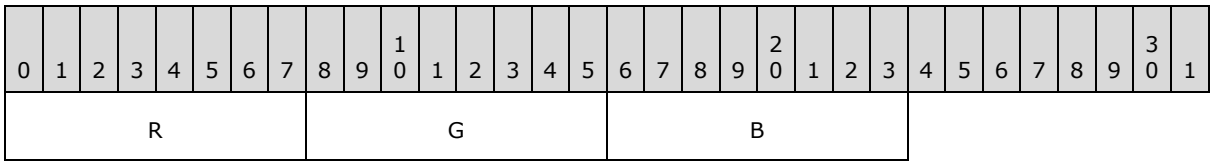


width (4 bytes): A 32-bit unsigned integer indicate the width of the graphic.

height (4 bytes): A 32-bit unsigned integer indicate the height of the graphic.

graphicData (variable): an array of PIXEL_DATA structure, each PIXEL_DATA descript a pixel of the graphic. The pixels are arranged from top to down, left to right sequence.

PIXEL_DATA:



R (1 byte): red dimension

G (1 byte): green dimension

B (1 byte): blue dimension

2.2.2.2 RDPEI SUT Commands

2.2.2.2.1 TOUCH_EVENT_SINGLE

2.2.2.2.1.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be TOUCH_EVENT_SINGLE (0x0101).

The **payload** filed MUST be the following structure.

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
touchEventTimes																															
positions (optional)																															
...																															
...																															
...																															
...																															

touchEventTimes (4 bytes): A 32-bit unsigned integer indicates how many single touch event need to be triggered.

positions (variable, optional): optional field contains an array of POSITION structure used to indicate touch position, if exists, the number of POSITION structure MUST be equal to the value in **touchEventTimes** field.

POSITION:

0	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	20	1	2	3	4	5	6	7	8	9	30	1
X																															
Y																															

X (4 byte): X coordinate of the position

Y (4 byte): Y coordinate of the position

2.2.2.2.1.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of TOUCH_EVENT_SINGLE command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.2.2 TOUCH_EVENT_MULTIPLE

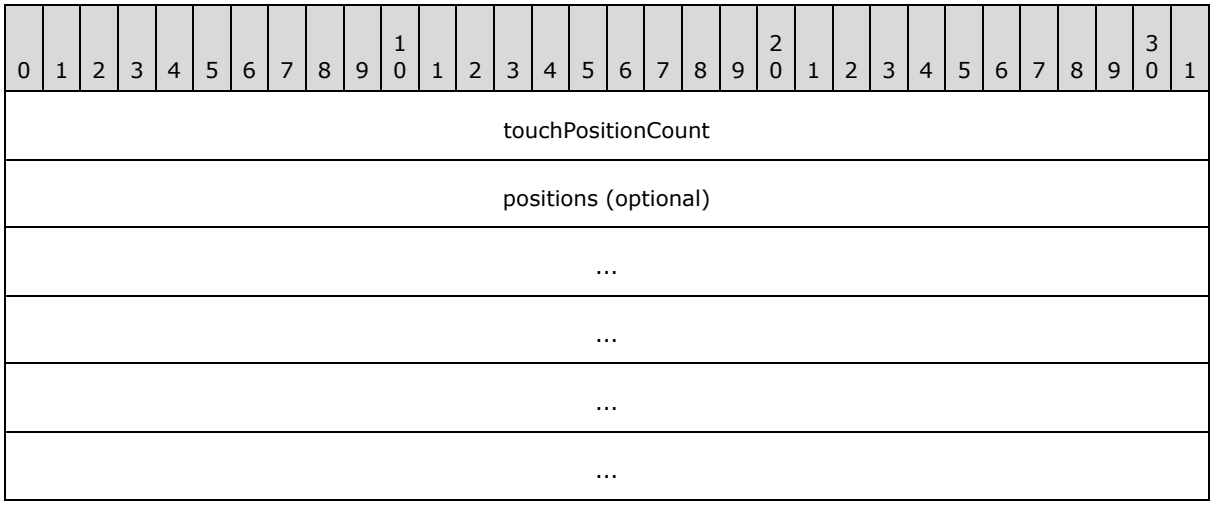
2.2.2.2.2.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be TOUCH_EVENT_MULTIPLE (0x0102).

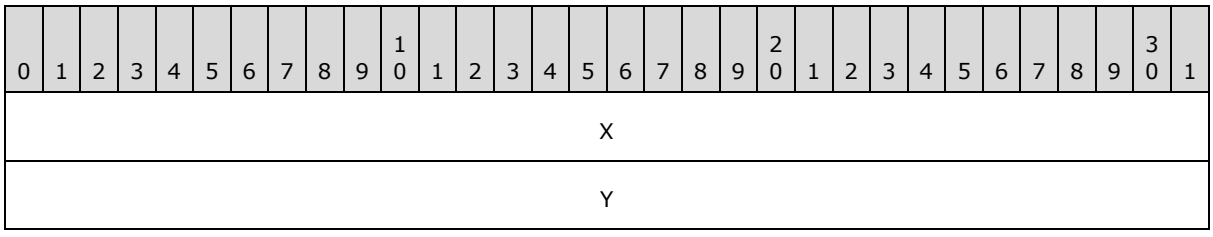
The **payload** filed MUST be the following structure.



touchPositionCount (4 bytes): A 32-bit unsigned integer indicate how many position a multi touch event contains.

positions (variable): optional field contains an array of POSITION structure used to indicate touch position, if existed, the number of POSITION structure MUST be equal to the value in **touchPositionCount** field.

POSITION:



X (4 byte): X coordinate of the position

Y (4 byte): Y coordinate of the position

2.2.2.2.2.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of TOUCH_EVENT_MULTIPLE command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.2.3 TOUCH_EVENT_DISMISS_HOVERING_CONTACT

2.2.2.2.3.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be TOUCH_EVENT_DISMISS_HOVERING_CONTACT (0x0103).
The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.2.3.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of TOUCH_EVENT_DISMISS_HOVERING_CONTACT command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.3 RDPEDISP SUT Commands

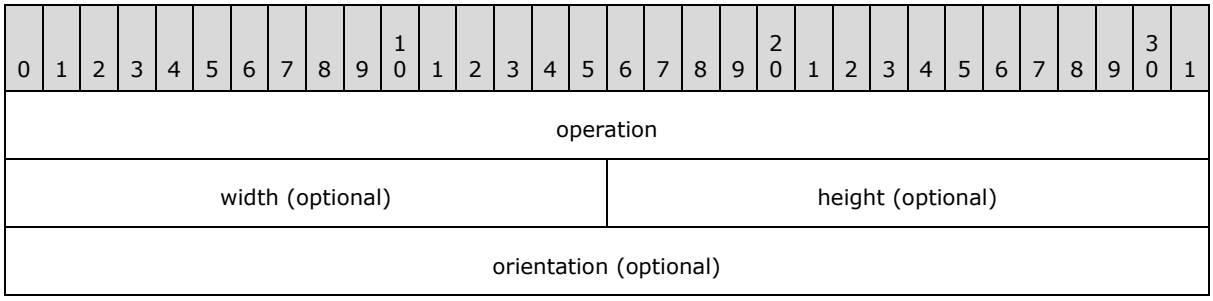
2.2.2.3.1 DISPLAY_UPDATE_RESOLUTION

2.2.2.3.1.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be DISPLAY_UPDATE_RESOLUTION (0x0201).
The **payload** field MUST be the following structure.



operation (4 bytes): A 32-bit unsigned integer flag indicate display resolution update operations.

flag	Meaning
UPDATE_RESOLUTION 0x00000001	Update display resolution
UPDATE_ORIENTATION 0x00000002	Update the orientation

width (2 bytes): optional field indicate new resolution width of screen, this field MUST be present if operation field contains UPDATE_RESOLUTION (0x00000001) flag.

height (2 bytes): optional field indicate new resolution height of screen, this field MUST be present if operation field contains UPDATE_RESOLUTION (0x00000001) flag.

orientation (4 bytes): optional field indicate new orientation of screen, this field MUST be present if operation field contains UPDATE_ORIENTATION (0x00000002) flag.

2.2.2.3.1.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of DISPLAY_UPDATE_RESOLUTION command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.3.2 DISPLAY_UPDATE_MONITORS

2.2.2.3.2.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be DISPLAY_UPDATE_MONITORS (0x0202).
The **payload** field MUST be a 4 bytes unsigned integer flag used to indicate monitors update operation.

flag	Meaning
ADD_MONITOR 0x00000001	Add a monitor
REMOVE_MONITOR 0x00000002	Remove a monitor
MOVE_MONITOR_POSITION 0x00000004	Move monitor position

2.2.2.3.2.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of DISPLAY_UPDATE_MONITORS command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.3.3 DISPLAY_FULLSCREEN

2.2.2.3.3.1 SUT Control Request Message

The request message used for this command is a SUT Control Request Message of SUT Remote Control protocol.

The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

The **commandId** field must be DISPLAY_FULLSCREEN (0x0203).

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

2.2.2.3.3.2 SUT Control Response Message

This is an optional message as the response of SUT Control Request Message of DISPLAY_FULLSCREEN command.

The **payloadLength** filed MUST be 0, and the **payload** field MUST NOT appear.

3 Protocol Details

3.1 Server Details

3.1.1 Abstract Data Model

No abstract data model on server.

3.1.2 Timers

None

3.1.3 Initialization

The server should start listening to a pre-defined port using TCP or UDP.

3.1.4 Higher-Layer Triggered Events

None

3.1.5 Message Processing Events and Sequencing Rules

3.1.5.1 Processing a SUT Control Request Message

The server should process SUT Control Request Message as section 3.1.5.1 of SUT Remote Control protocol. The **testsuiteId** field must be RDP_TESTSUITE (0x0001).

3.1.5.1.1 START_RDP_CONNECTION

If the **commandId** field is START_RDP_CONNECTION (0x0001). The server should start a RDP connection according to the information in the payload field, then send the corresponding SUT Control Response message to the client.

3.1.5.1.2 CLOSE_RDP_CONNECTION

If the **commandId** field is CLOSE_RDP_CONNECTION (0x0002). The server should close all RDP connection on SUT, then send the corresponding SUT Control Response message to the client.

3.1.5.1.3 AUTO_RECONNECT

If the **commandId** field is AUTO_RECONNECT (0x0003). The server should send the corresponding SUT Control Response message to the client firstly and then trigger the auto-reconnect event.

3.1.5.1.4 BASIC_INPUT

If the **commandId** field is BASIC_INPUT (0x0004). The server should perform corresponding basic input event according to the value in payload field, then send the corresponding SUT Control Response message to the client.

3.1.5.1.5 SCREEN_SHOT

If the **commandId** field is SCREEN_SHOT (0x0005). The server should take a screen shot on RDP client, then send the picture as the payload of SUT Control Response message to the client.

3.1.5.1.6 TOUCH_EVENT_SINGLE

If the **commandId** field is TOUCH_EVENT_SINGLE (0x0101). The server should trigger single touch event on RDP client. The times of event should be larger or equal to **touchEventTimes** field in payload. If **positions** field in payload is present, the single touch event should be triggered on corresponding positions. After triggered these single touch events, the server then should send the corresponding SUT Control Response message.

3.1.5.1.7 TOUCH_EVENT_MULTIPLE

If the **commandId** field is TOUCH_EVENT_MULTIPLE (0x0102). The server should trigger multiple touch event on RDP client. The count of multi-touch should be equal to **touchPositionCount** field in payload. If **positions** field in payload is present, the multiple touch event should be triggered on corresponding positions. After triggered the multiple touch event, the server then should send the corresponding SUT Control Response message.

3.1.5.1.8 TOUCH_EVENT_DISMISS_HOVERING_CONTACT

If the **commandId** field is TOUCH_EVENT_DISMISS_HOVERING_CONTACT (0x0103). The server should trigger a DISMISS_HOVERING_CONTACT event on RDP client, and then send the corresponding SUT Control Response message.

3.1.5.1.9 DISPLAY_UPDATE_RESOLUTION

If the **commandId** field is DISPLAY_UPDATE_RESOLUTION (0x0201). The server should change the display resolution on SUT. If the **operation** field in payload contains **UPDATE_RESOLUTION** (0x00000001), change the resolution of desktop using new width and height value in payload; if the operation field in payload contains **UPDATE_ORIENTATION** (0x00000002), update the orientation of the desktop according to **orientation** field in payload, then send the corresponding SUT Control Response message.

3.1.5.1.10 DISPLAY_UPDATE_MONITORS

If the **commandId** field is DISPLAY_UPDATE_MONITORS (0x0202). The server should update monitors of the SUT, add a monitor, remove a monitor, or change monitors position according to the value of payload, then send the corresponding SUT Control Response message.

3.1.5.1.11 DISPLAY_FULLSCREEN

If the **commandId** field is DISPLAY_FULLSCREEN (0x0203). The server should change the RDP client window to full screen, and then send the corresponding SUT Control Response message.

3.1.5.2 Sending a SUT Control Response Message

Server should response SUT Control Response Message as section 3.1.5.2 of SUT Remote Control protocol.

3.1.6 Timer Events

None

3.1.7 Other Local Events

None

3.2 Client Details

3.2.1 Abstract Data Model

No abstract data model on server.

3.2.2 Timers

None

3.2.3 Initialization

If using TCP as transport, the client should establish a TCP connection with server.

3.2.4 Higher-Layer Triggered Events

None

3.2.5 Message Processing Events and Sequencing Rules

3.2.5.1 Sending a SUT Control Request Message

Client should send SUT Control Request Message as section 3.2.5.1 of SUT Remote Control protocol.

3.2.5.2 Processing a SUT Control Response Message

Client should process SUT Control Response Message as section 3.2.5.2 of SUT Remote Control protocol.

3.2.6 Timer Events

None

3.2.7 Other Local Events

None

4 Protocol Examples

None