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WiMAX Forum[®] Air Interface Specification

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WiMAX Forum[®] Mobile Test Interface

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WMF-T23-006-R010v02

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WMF Approved

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Mobile Test Interface

1 Overview

The Test Interface supports the automated execution of PCT, RCT and MIOT certification tests. More specifically, the Test Interface is intended to automate the procedures for the manual operations of the test operators in an effort to reduce possible errors and to save time and costs for certification testing. In the case where the Test Interface is not available, the test operator would still be able to execute the same test cases manually.

2 Scope

This document specifies the WiMAX Forum® Certification Automation Test Interface (CATI). It defines the CATI physical interface and protocol of applicable messaging between the Test Equipment (TE) and the candidate WiMAX Forum Certified product. The CATI facilitates automation of the referenced WiMAX Forum conformance and interoperability test specifications to improve the efficiency of certification testing. This document may also provide guidance for Test Equipment implementation. This document specifies basic CATI functionality and is not intended to preclude vendor-specific extensions to a vendor-supplied test interface.

3 References

- [1] WiMAX Forum® Mobile Radio Conformance Tests (MRCT) v1.0.1, WiMAX Forum Technical Working Group, July 2007
- [2] WiMAX Forum® Test Suite Structure and Test Purposes (TSS&TP) specification v2.0.1, WiMAX Forum Technical Working Group, August 2007.
- [3] WiMAX Forum® Mobile Interoperability Tests (MIOT) specification v2.0.3, WiMAX Forum Technical Working Group, October 2007.
- [4] P802.16-2004/Cor2/D3: Air Interface for Fixed and Mobile Broadband Wireless Access Systems Corrigendum 2.

4 Definitions

BS	Base Station
CATI	Certification Automation Test Interface
IUT	Implementation Under Test
MIOT	Mobile Inter-Operability Test
MS	Mobile Station
PCT	Protocol Conformance Test. See also TSS&TP.
MRCT	Mobile Radio Conformance Test
TE	Test Equipment
TSS&TP	Test Suite Structure and Test Purposes

5 Basic Principles

- The assumptions for the Test Interface for both the MS and the BS are noted as follows:
 - The test interface commands should normally initiate only functionality included in approved MRCT [1], TSS&TP [2], and MIOT [3] documents.
 - New MAC message TLVs shall not be introduced for this Test Interface.
 - Return values of test commands should not be interpreted as pass/fail results of a test case.

Mobile Test Interface

- 1 ○ In case where the Test Interface is multiplexed with the data interface on the same physical link, the
- 2 multiplexing should be stateless.
- 3 ○ The commands included in the Test Interface are not intended to control traffic generation from external
- 4 sources.
- 5 • The Test Interface is used only for commands that the test operator would normally issue. Specifically:
- 6 ○ The test commands must have basic granularity which does not require execution of a complex state
- 7 machine. For example, it is not allowed to command the creation of a service flow if the MS has not been
- 8 activated and has not performed network entry.
- 9 ○ There should be no special testing application required on the DUT except the functionality to receive and
- 10 execute the test commands herein and to provide the associated responses.
- 11 • The IUT is a slave of the test equipment. The IUT only responds to commands from the test equipment and does
- 12 not send unsolicited information.
- 13 • The MS is also a slave of the BS. The Test Interface should not change anything that the BS can configure in the
- 14 MS via the air interface; e.g. via SBC, UCD, DCD or Maps.

16 6 Test Interface Components

17
18 In the following section, the term IUT refers to vendor-supplied equipment that supports CATI. In the case that CATI is
19 not an integral function of the product being submitted for certification, any external vendor-supplied components
20 which facilitate use of the Test Interface shall be considered to be part of the IUT without being considered as part of
21 the product being submitted for certification.¹

22 23 **Physical & Link Component**

24 The IUT shall be capable of being connected via a standard RJ45 cable to an Ethernet LAN which is connected to the
25 test interface of the test equipment.

26 27 **Networking Component**

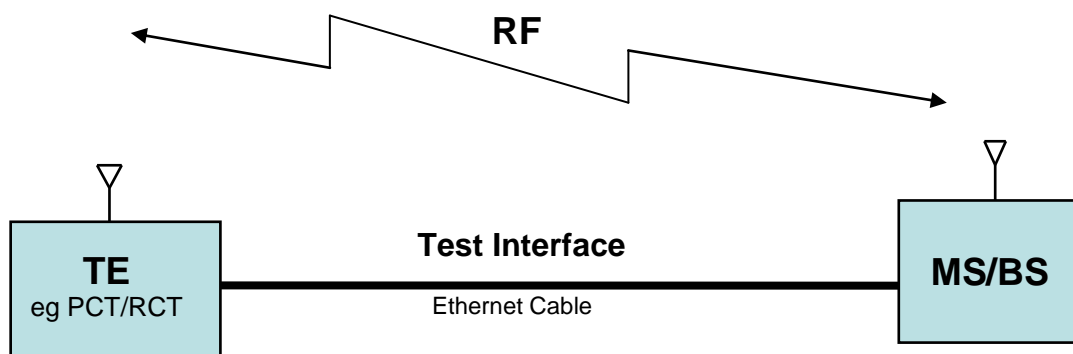
28 The IUT shall be capable of being connected to an IP network through the Ethernet interface described above. It shall
29 support configuration of IP address either manually or via DHCP. Alternative implementations of this component are
30 illustrated in Figure 1a and 1b.

31 32 **Communication Protocol Component**

- 33 • The IUT and TE follow a client-server relationship in which the IUT acts as a server and the TE acts as a
- 34 client.
- 35 • Both IUT and TE shall support manual configuration of the TCP port number on which communication is
- 36 initiated.
- 37 • The TE and IUT shall maintain a single Test Interface connection.
- 38 • If the TCP connection terminates for any reason, the IUT shall reset the connection and wait passively for the
- 39 next connection attempt.
- 40 • Once the TCP connection is established, all Test Interface messages sent between the TE and the IUT are sent
- 41 as ASCII formatted strings.
- 42 • The IUT should not echo TE messages.

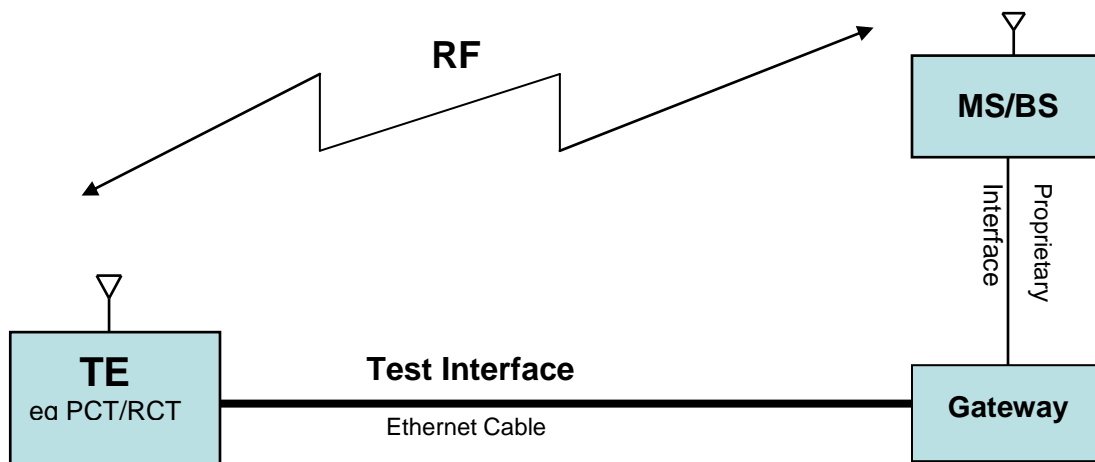
¹ For example, if the product submitted for certification is a PC card (and associated driver software) without an Ethernet port, the vendor should supply the PC card installed in a host computer with a LAN card (to facilitate the Ethernet interface) and a server application installed on the host which translates test commands received from the TE to whatever format the vendor has chosen for interface to the PC card.

Mobile Test Interface



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Figure 1a Connection of the IUT with an integral gateway



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Figure 1b Connection of the IUT with an external gateway

7 Functional Scope of the Test Automation and Trigger Commands

There are two types of commands. There are commands to replace manual interaction of the test operator and there are commands to trigger a certain behavior that is required for the test: The first type is Simulation of Test Operator Interaction for Test Automation; and the second type is Trigger Events for PCT, MRCT, or MIOT. For both types of commands, the TE sends a string to the IUT. After the IUT receives the string, it responds to the command on the same interface as indicated herein.

Example: Automated Test of Scanning (TP/MS/GHF/NTA/SCAN/BV-H000)

PCT: Test script is started and PCT has configured itself (Trigger Action parameter of the recently received DCD message is encoded as 0x3. Trigger Function is set to 0x5 or 0x6.)

This test only requires type 1 commands.

1. PCT: Sends activation command to the MS
2. MS: Performs NW entry, authentication and registration
3. PCT: Changes TX level of simulated neighbor BS.
4. MS: Upon reaching trigger condition, the IUT sends a valid MOB_SCN-REQ indicating the group of neighbor BSs for which scanning is requested.
5. PCT: Sends deactivation command to the MS
6. MS: Performs NW deregistration

8 CATI Commands Generic Description and Execution Process

- All test commands are case insensitive strings starting with prefix **xf_** and all numerical parameter values shall be in decimal format.
- Commands that asking for a status of the IUT are ending with a question mark “?”.
- Commands can have one or more parameters that follow the command after a blank and in case of more than one parameter is required all the parameters are also separated by a blank. A parameter can be followed by maximum one subparameter. Parameter and subparameter are separated by a colon “:”.
- The IUT will send a first response after reception of a new CATI command, providing feedback to the test system on whether
 - It understands the command, and
 - It is able to execute it.

The possible responses are ACK or NACK and should be sent by the IUT immediately to the test system.:

- An ACK is sent immediately by the IUT upon successful understanding and analysis of being able to execute the command. In this situation the IUT will proceed with the execution of the CATI command. After the completion of the CATI command execution the IUT will send feedback information to the test system on whether the execution has been successful or not. The possible responses are OK or ERROR
 - An OK response mean that the CATI command has been executed successfully within the time limits provided by the IUT vendor. The IUT is ready then to accept new CATI commands for execution.
 - An ERROR response means that the command has not been executed because an error during the command execution has been encountered. The expected status of the IUT will be the same as before the reception of the CATI command, and the IUT is ready then to accept new CATI commands for execution.
 - The IUT could not respond or never respond on the completion of the execution within the time limits provided by the IUT vendor. In this situation:
 1. The test system will consider that the command has not been completed successfully. Additionally the test system will consider that the IUT is not ready to accept new CATI commands and could abort the current test case under execution.

Mobile Test Interface

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2 Command: ***xf_MS_SetActDeactivation***

3 Response:

4 ***ACK***

5 ***OK***

6 Note: there may be 3 minutes between *ACK* and *OK*

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8 Command: ***xf_MS_ShowSF?***

9 Response:

10 ***ACK***

11 ***SFID:123 SFQoS:BE SFID:456 SFQoS:UGS***

12 ***OK***

13

14 Command: ***xf_triggerSsfDeleteLocal SFID:123***

15 Response:

16 ***ACK***

17 ***OK***

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20 **9 CATI Commands Description Conventions**

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22 The following conventions have been employed in the description of each command along the next sections:

- 23 • Each CATI command is described by means of a table, where a list of fields completely describes the
- 24 command.
- 25 • Each CATI command is easily identified by its corresponding section number inside this document.
- 26 • ASCII character strings that belong to the IUT exchange of commands and responses are indicated in the field
- 27 description using italic and bold courier font, size 12. Thus, for example:
 - 28 ○ The string *12* is not an ASCII character string and represents the number 12 and also it is not
 - 29 belonging to the CATI command/responses.
 - 30 ○ The string ***12*** is an ASCII character string and it could represent part of a CATI command/response.
- 31 • Special characters are represented between quotes. Thus, for example
 - 32 ○ “CR” is the special character carriage return with ASCII code 13
 - 33 ○ ***CR*** is a character string formed by two characters
 - 34 ○ CR is a part of the test of this specification document.
- 35 • Generic information that represents ASCII character strings are included between the meta-characters < and >.
 - 36 These two characters are used just for description purposes and they will not belong to the ASCII characters to
 - 37 be sent through the CATI. Thus, for example:
 - 38 ○ *v<x>.<y>.<z> ***OK**** means that there are 3 fields belonging to the response of a specific CATI message
 - 39 “v”, each is called x, y and z and a further description of the contents of each one should follow.
- 40 • The list of fields that describe the commands are:
 - 41 ○ **Name:** This field is the literal sequence of ASCII characters that will be sent to the IUT to instruct the
 - 42 execution of a CATI command.
 - 43 ○ **Purpose:** This field is a brief description of what it is the expected action to be performed by the IUT
 - 44 upon reception of the CATI command.
 - 45 ○ **Where Used:** This is the list of certification tests where the usage of this CATI command has been
 - 46 identified. However, this list is not exhaustive as there may be additional certification tests that use
 - 47 this command that are not included in this field.
 - 48 ○ **Parameters:** This field is the literal sequence of ASCII characters for identifying the parameters of
 - 49 the CATI command, including a brief description of their meaning. This field may also include a
 - 50 generic or literal description of the possible values range and their description.
 - 51 ○ **Max Response Time:** This is the maximum duration declared by the IUT vendor for the execution of
 - 52 the CATI command under description.

Mobile Test Interface

- 1 ○ **Syntax:** This field defines the rules of construction of the CATI command. It can contain either
2 ASCII characters or meta-characters which help to describe these rules. The meta-characters used are:
3 ▪ [parameter_type_x] denotes the inclusion of none or several parameters of the type
4 parameter_type_x.
5 ▪ (parameter_type_x) denotes the optional inclusion of only one parameter of the type
6 parameter_type_x.
7 ▪ parameter_type_x | parameter_type_y : The character | denotes the inclusion of only one
8 parameter of the type x or y.
9 ▪ {}: These braces are used just to group parameters.
10 ▪ parameter_type_x parameter_type_y: A space between parameters denotes that several
11 parameters are concatenated and it is necessary to include both of them in the CATI
12 command. This is not a meta-character and it will be sent through the CATI as part of the
13 command or as part of the response, when required.
- 14 ○ **Examples:** This field lists one or several examples of CATI commands sent by the test system as
15 explicit ASCII strings.
- 16 ○ **Return Values:** This field describes the possible return values after the successful execution of the
17 CATI command using ASCII characters. This field may also include the ASCII return values when
18 the execution of the command has produced an error. Note that the responses **ACK NACK** sent by the
19 IUT are not considered in the description of this field.
- 20 ○ **Comments:** This field provides additional information on the CATI command, for example:
21 ▪ Explanation of why the command is useful or required or any type of motivations.
22 ▪ Restrictions of use of the command.
23 ▪ Clarifications on the certification tests where the CATI command is required.

26 **10 List of Test commands for MS**

27 **10.1 xf_MS_ShowTIVersion?**

Name	<i>xf_MS_ShowTIVersion?</i>
Purpose	This command prompts the MS for the highest version of the Test Interface specification supported by MS.
Where Used	All MS test cases.
Parameters	None
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_MS_ShowTIVersion?</i>
Examples	<i>xf_MS_ShowTIVersion?</i>
Return Values	<i>v<x>.<y>.<z></i> where x, y, z are the ASCII character strings that represent the numbers in a Test Interface specification version, or <i>OK</i> or <i>ERROR</i>
Comments	

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32 **10.2 xf_MS_SetCenterFrequency**

Name	<i>xf_MS_SetCenterFrequency</i>
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Purpose	This command instructs the MS to set the proper carrier frequency, in order to let the MS start the NW entry.
Where Used	All RCT MS test cases MS-02.1 MS-02.2
Parameters	FREQ :<value>; Carrier frequency to be used followed by an ASCII string containing the frequency value in KHz.
Max. Response Time	Specified by IUT vendor
Syntax	xf_MS_SetCenterFrequency FREQ :<value>
Examples	xf_MS_SetCenterFrequency FREQ:2350000
Return Values	OK or ERROR
Comments	Even though IUTs are required to scan in the working frequency range in order to find a broadcast signal, by mean of this command the time execution will be substantially reduced. In MS-02.1 it is explicitly indicated in step 2 that it is allowed to direct the MS to scan only the frequency used in the test. Also in MS-02.2 it is stated that the purpose of the test is to verify the ability of the MS to decode the preamble in minimal time. Without any type of indication on whether the MS is scanning the proper RF channel it is difficult to know which is the time the MS takes to synch with the preamble.This CATI command allows to perform this evaluation.

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10.3 xf_MS_SetBandwidth

Name	xf_MS_SetBandwidth
Purpose	This command instructs the MS to set the proper bandwidth.
Where Used	All RCT MS test cases
Parameters	BW :<value>; Bandwidth to be used followed by <value> an ASCII string containing its value in KHz.
Max. Response Time	Specified by IUT vendor
Syntax	xf_MS_SetBandwidth BW :<value>
Examples	xf_MS_SetBandwidth BW:8750
Return Values	OK or ERROR
Comments	Using this command, the IUT will be directly configured with the appropriate bandwidth.

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10.4 xf_MS_TriggerSfDeleteLocal

Name	xf_MS_TriggerSfDeleteLocal
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Mobile Test Interface

Purpose	This command instructs the MS to delete service flow
Where Used	
Parameters	SFID: <id#>; SFID followed by the id#, separated by : The <id# >is an ASCII string containing the SF identifier.
Max. Response Time	Specified by IUT vendor
Syntax	xf_MS_TriggerSfDeleteLocal SFID: <id#> [SFID: <id#>]
Examples:	xf_MS_TriggerSfDeleteLocal SFID:123 SFID:456
Return Values	OK or ERROR
Comments	

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10.5 xf_MS_TriggerDSCReq

Name	xf_MS_TriggerDSCReq
Purpose	This command instructs the MS to change service flow
Where Used	
Parameters	SFID: <id#>; SFID followed by the id#, separated by :. The <id# >is an ASCII string containing the SF identifier. SFP: <parameters string>; Service flow parameters string, followed by a string containing the new settings.
Max. Response Time	Specified by IUT vendor
Syntax	xf_MS_TriggerDSCReq SFID: <id#> SFP: <parameters string>
Examples	xf_MS_TriggerDSCReq SFID:123 SFP:xyz
Return Values	OK or ERROR
Comments	

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10.6 xf_MS_TriggerDSAREq

Name	xf_MS_TriggerDSAREq
Purpose	This command instructs the MS to send a DSA-REQ
Where Used	TP/SS/DS/DSA/BV-H004 .. BV-H006 TP/SS/DS/DSA/BV-H010 .. BV-H013 TP/SS/DS/DSA/TI-H000 .. TI-H002
Parameters	SFT: <SFtype>; Type of service flow, where <SFtype> represents one of the following strings: <ul style="list-style-type: none"> • UL to command the creation of an UL service flow • DL to command the creation of a DL service flow

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	<p>SFQoS:<QoSType>; Type of QoS service class , where < QoSType > represents one of the following strings:</p> <ul style="list-style-type: none"> • BE to command the creation of a best effort service flow • UGS to command the creation of an unsolicited grant service service flow • rtPS to command the creation of a real-time polling service service flow • nrtPS to command the creation of a non-real-time polling service service flow • ertPS to command the creation of an extended real-time polling service service flow
Max. Response Time	Specified by IUT vendor
Syntax	xf_MS_TriggerDSAREq SFT :<SFtype> SFQoS :<QoSType>
Examples	xf_MS_TriggerDSAREq SFT:UL SFQoS:BE
Return Values	<p>SFID:<id#> SFID followed by the id#, separated by :. The <id# >is an ASCII string containing the SF identifier, or</p> <p>OK or ERROR</p>
Comments	

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10.7 xf_MS_ShowSF?

Name	xf_MS_ShowSF?
Purpose	This command prompts the MS for established service flows
Where Used	
Parameters	None
Max. Response Time	Specified by IUT vendor
Syntax	xf_MS_ShowSF?
Examples	xf_MS_ShowSF?
Return Values	<p>SFID:<id#> SFQoS:<QoSType> ["Space" SFID:<id#> SFQoS:<QoSType>]</p> <p>SFID followed by the id#, separated by :. The <id# >is an ASCII string containing the SF identifier, following Type of QoS service class , where < QoSType > represents one of the following strings:</p> <ul style="list-style-type: none"> • BE to command the creation of a Best Effort service flow • UGS to command the creation of an Ungranted service flow <p>OK or ERROR</p>
Comments	

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10.8 xf_MS_SetActDeactivation

Name	<i>xf_MS_SetActDeactivation</i>
Purpose	This command prompts the MS to either perform the network entry or deregister from the network
Where Used	All RCT MS test cases.
Parameters	<i>ACT</i> :<Switch>; Type of activation, where <Switch> represents one of the following strings: <ul style="list-style-type: none"> • <i>ON</i> to command the activation of the network entry • <i>OFF</i> to command the deregistration from the network
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_MS_SetActDeactivation ACT</i> :<Switch>
Examples	<i>xf_MS_SetActDeactivation ACT:ON</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comment	This command is needed for test cases network entry/reentry or deregistration are required. Activation is necessary in order to let the TE reach Initial Conditions without letting the IUT's timer expires before Initial Ranging is started. This command will be called from TE whenever is ready to start with the NW Entry process.

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10.9 xf_MS_SetPowerOnOff

Name	<i>xf_MS_SetPowerOnOff</i>
Purpose	This command instructs the MS to power on or power off.
Where Used	<ul style="list-style-type: none"> • All RCT MS test cases • General automation of PCT and MIOT (PWR down between the different tests) • Trigger PWR down for MIOT Scenario 1ha MS initiated Idle Mode (8.9.7 Power Down Final Test) • Trigger PWR down for PCT TP/MS/IDM/PWD/BV-H000
Parameters	<i>PWR</i> :<Switch>; Type of powering, where <Switch> represents one of the following strings: <ul style="list-style-type: none"> • <i>ON</i> to command the powering on • <i>OFF</i> to command the powering off
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_MS_SetPowerOnOff PWR</i> :<Switch>
Examples	<i>xf_MS_SetPowerOnOff PWR:ON</i>

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Return Values	<i>OK</i> or <i>ERROR</i> .
Comments	When performing power off, the MS shall either go into waiting state (that is, the state before carrying out network entry including PHY synchronization) or physically shut down the power. When performing power on, the MS shall start NW entry automatically either on power up or on waking up from the waiting state. When performing power off, the MS should perform NW deregistration unless a previous call to <i>xf_MS_SetActDeactivation ACT: OFF</i> has been made.

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10.10 xf_MS_TriggerSleepMode

Name	<i>xf_MS_TriggerSleepMode</i>
Purpose	This command instructs the MS to initiate Sleep Mode
Where Used	TP/MS/SLM/PW1/BV-H003 TP/MS/SLM/PW1/BV-H014
Parameters	<i>Operation</i> : <value>; Setting of power saving class, where <value> represents one of the following ASCII strings: <ul style="list-style-type: none"> • <i>Deact</i> to command the deactivation of power saving class • <i>Act</i> to command the activation of power saving class <i>TrfIndReqd</i> : <value>; For Power Saving Class Type I only. Indicating whether or not BS shall transmit at least one MOB_TRF-IND message in each availability interval which contains at least one listening window of Power Saving Class of type I. <ul style="list-style-type: none"> • <i>YES</i> The BS shall transmit at least one MOB_TRF-IND message in each availability interval which contains at least one listening window of Power Saving Class of type I. • <i>NO</i> Otherwise.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_MS_TriggerSleepMode</i> <i>Operation</i> :<value> <i>TrfIndReqd</i> : <value>
Examples	<i>xf_MS_TriggerSleepMode Operation:Deact TrfIndReqd:YES</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This activation and deactivation require the definition of power saving class.

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11 List of Test commands for BS

11.1 xf_BS_ShowTIVersion?

Name	<i>xf_BS_ShowTIVersion?</i>
Purpose	This command prompts BS for the highest version of the Test Interface specification supported by BS.

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Where Used	All BS test cases.
Parameters	None
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_ShowTIVersion?</i>
Examples	<i>xf_BS_ShowTIVersion?</i>
Return Values	<i>v<x>.<y>.<z></i> where x, y, z are the ASCII character strings that represent the numbers in a Test Interface specification version, or <i>OK</i> or <i>ERROR</i>
Comments	

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11.2 xf_BS_SetCenterFrequency

Name	<i>xf_BS_SetCenterFrequency</i>
Purpose	This command instructs the BS to set the downlink frequency to the desired value
Where Used	All RCT BS Test Cases
Parameters	<i>FREQ:</i> <value>; Carrier frequency to be used followed by <value>, an ASCII string containing the frequency value in KHz.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetCenterFrequency FREQ:<value></i>
Examples:	<i>xf_BS_SetCenterFrequency FREQ:2350000</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.3 xf_BS_SetDownlinkPower

Name	<i>xf_BS_SetDownlinkPower</i>
Purpose	This command instructs the BS to set the downlink power to the desired value
Where Used	All RCT BS Test Cases
Parameters	<i>POWER:</i> <value>; Indicates RF transmission power to be used by the BS followed by <value>, an ASCII string containing the RF power in dBm, including one decimal place.
Max. Response Time	Specified by IUT vendor

Syntax	<i>xf_BS_SetDownlinkPower POWER:<value></i>
Examples	<i>xf_BS_SetDownlinkPower POWER:25.0</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.4 ***xf_BS_SetDownlinkMCS***

Name	<i>xf_BS_SetDownlinkMCS</i>
Purpose	This command instructs the BS to set the downlink MCS to the desired value
Where Used	All RCT BS Test Cases
Parameters	<i>MCS:<MCSType></i> ; Indicates the modulation and coding scheme to be used by the BS when transmitting bursts to the MS emulator of the tester, where <MCSType> represents one of the following strings: <ul style="list-style-type: none"> • <i>QPSK-1_2</i> to command the transmission of QPSK ½ bursts • <i>QPSK-3_4</i> to command the transmission of QPSK 3/4 bursts • <i>16QAM-1_2</i> to command the transmission of 16QAM ½ bursts • <i>16QAM-3_4</i> to command the transmission of 16QAM 3/4 bursts • <i>64QAM-1_2</i> to command the transmission of 64QAM ½ bursts • <i>64QAM-2_3</i> to command the transmission of 64QAM 3/4 bursts • <i>64QAM-3_4</i> to command the transmission of 64QAM ½ bursts
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetDownlinkMCS MCS:<MCSType></i>
Examples	<i>xf_BS_SetDownlinkMCS MCS:QPSK-1_2</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.5 ***xf_BS_SetDLPreableIndex***

Name	<i>xf_BS_SetDLPreableIndex</i>
Purpose	This command instructs the BS to set the downlink preamble index to the desired value
Where Used	RCT BS-09.1
Parameters	<i>INDEX:<value></i> ; Indicates the preamble to be used by the BS in the DL, where <value> represents an ASCII string with the preamble index between 0 and 113

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Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetDLPreambleIndex INDEX:<value></i>
Examples	<i>xf_BS_SetDLPreambleIndex INDEX:2</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.6 xf_BS_SetNumSymbolsInDL

Name	<i>xf_BS_SetNumSymbolsInDL</i>
Purpose	This command instructs the BS to set the number of symbols in DL to the desired value
Where Used	All BS RCT Test Cases
Parameters	<i>SYMBOLS:<value></i> ; Indicates the number of symbols in the DL, where <value> represents an ASCII string with the number of symbols in DL
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetNumSymbolsInDL SYMBOLS:<value></i>
Examples	<i>xf_BS_SetNumSymbolsInDL SYMBOLS:29</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.7 xf_BS_SetNumSymbolsInUL

Name	<i>xf_BS_SetNumSymbolsInUL</i>
Purpose	This command instructs the BS to set the number of symbols in UL to the desired value
Where Used	All BS RCT Test Cases
Parameters	<i>SYMBOLS:<value></i> ; Indicates the number of symbols in the UL, where <value> represents an ASCII string with the number of symbols in UL
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetNumSymbolsInUL SYMBOLS:<value></i>
Examples	<i>xf_BS_SetNumSymbolsInUL SYMBOLS:18</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.8 xf_BS_SetBandwidth

Name	<i>xf_BS_SetBandwidth</i>
Purpose	This command instructs the BS to set the nominal bandwidth to the desired value
Where Used	All BS RCT Test Cases
Parameters	<i>BW</i> :<value>; Bandwidth to be used followed by <value> an ASCII string containing its value in KHz.
Max. Response Time	
Syntax	<i>xf_BS_SetBandwidth BW</i> :<value>
Examples	<i>xf_BS_SetBandwidth BW</i> :8750
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.9 xf_BS_SetDLNumSubchannels

Name	<i>xf_BS_SetDLNumSubchannels</i>
Purpose	This command instructs the BS to set the number of subchannels to be used in the downlink to the desired value
Where Used	RCT BS-11.1
Parameters	<i>SUBCHANS</i> :<value>; Number of subchannels to be used followed by <value> an ASCII string containing the number of subchannels.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetDLNumSubchannels SUBCHANS</i> :<value>
Examples	<i>xf_BS_SetDLNumSubchannels SUBCHANS</i> :30
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This command is only applicable to the first PUSC mandatory zone.

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11.10 xf_BS_GetPER

Name	<i>xf_BS_GetPER</i>
Purpose	This command instructs the BS to start a Packet Error Rate measurement for a specific amount of packets. On completion of the measurement, the BS returns the results to the caller.

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Where Used	RCT BS-01.1 RCT BS-04.1 RCT BS-05.1 RCT BS-06.1 RCT BS-16.1 RCT BS-17.2 RCT BS-18.2 RCT BS-21.2
Parameters	CID : <value>; The CID of the connection, where <value> is an ASCII string containing the connection ID. PACKETS : <value>; Number of packets to be considered in the PER calculation, where <value> is an ASCII string containing the number of packets for the particular CID. Multiple CID and PACKETS values are needed if multiple mobiles are required in a test case..
Max. Response Time	Specified by IUT vendor
Syntax	xf_BS_GetPER CID : <value> PACKETS : <value> [CID : <value> PACKETS : <value>]
Examples	xf_BS_GetPER CID:7 PACKETS:6000 CID:8 PACKETS:5000
Return Values	For each CID parameter in the order of their appearance in the command line: CID : <value1> ReceivedPackets : <value2> PacketErrors : <value3> PER : <value4> Where <ul style="list-style-type: none"> • <value1> is an ASCII string containing the connection ID • <value2> is an ASCII string containing the number of packets received by the BS in the particular CID • <value3> is an ASCII string containing the number of packet errors detected by the BS in the particular CID • <value4> is an ASCII string containing the PER recorded over the total number of received packets in the particular CID OK or ERROR
Comments	This command is required for measuring PER using the “MAC CRC Method” described in Appendix 3 of the MRCT specification [1].

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11.11 xf_BS_ResetIUT

Name	xf_BS_ResetIUT
Purpose	This command instructs the BS to reset and set its power to the default state.
Where Used	All RCT BS tests
Parameters	None

Mobile Test Interface

Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_ResetIUT</i>
Examples	<i>xf_BS_ResetIUT</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This command decouples the previous state achieved by the IUT in a previous test execution from the initial conditions establishment for a subsequent test. As such, the repeatability of testing results do not depend on previous test executions.

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11.12 xf_BS_SetSCHParamFragmentation

Name	<i>xf_BS_SetSCHParamFragmentation</i>
Purpose	This command instructs the BS to set the scheduling parameter Fragmentation to the desired value
Where Used	BS-06.1 BS-14.1 See comment below
Parameters	<i>FRAGMT</i> :<Switch>; Fragmentation settings, where <Switch> represents one of the following strings: <ul style="list-style-type: none"> • <i>ON</i> to command the usage of fragmentation upon BS decision • <i>OFF</i> to command disabling fragmentation in the UL/DL service flows.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetSCHParamFragmentation FRAGMT</i> :<Switch>
Examples	<i>xf_BS_SetSCHParamFragmentation FRAGMT:ON</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This command may be used by the following tests as the requirement for disabling this feature for the data link exchange is implicit in the test procedure (in conjunction with Appendix 1): BS-01.1 BS-04.1 BS-05.1 BS-07.1 BS-10.1 BS-11.1 BS-12.1 BS-13.1 BS-16.1 For the remaining tests defined, this command is not applicable.

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1 **11.13 xf_BS_SetSCHParamPacking**

Name	<i>xf_BS_SetSCHParamPacking</i>
Purpose	This command instructs the BS to set the scheduling parameter Packing to the desired value.
Where Used	BS-06.1 BS-14.1 See comment below
Parameters	<i>PACK</i> :<Switch>; Packing settings, where <Switch> represents one of the following strings: <ul style="list-style-type: none"> • <i>ON</i> to command the usage of packing upon BS decision • <i>OFF</i> to command disabling packing in the UL/DL service flows.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetSCHParamPacking PACK</i> : <Switch>
Examples	<i>xf_BS_SetSCHParamPacking PACK:OFF</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This command may be used by the following tests as the requirement of disabling the this feature for the data link exchange is implicit in the test procedure (in conjunction with Appendix 1): BS-01.1 BS-04.1 BS-05.1 BS-07.1 BS-10.1 BS-11.1 BS-12.1 BS-13.1 BS-16.1 For the remaining tests defined, this command is not applicable.

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11.14 xf_BS_SetSCHParamEncryption

Name	<i>xf_BS_SetSCHParamEncryption</i>
Purpose	This command instructs the BS to set the scheduling parameter Encryption to the desired value
Where Used	BS-06.1 BS-14.1 See comment below
Parameters	<i>ENCRYP</i> :<Switch>; Encryption settings, where <Switch> represents one of the following strings: <ul style="list-style-type: none"> • <i>ON</i> to command the usage of encryption upon BS decision • <i>OFF</i> to command disabling encryption in the UL/DL service flows.
Max. Response Time	Specified by IUT vendor

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Syntax	<i>xf_BS_SetSCHParamFragmentation ENCRYP</i> : <Switch>
Examples	<i>xf_BS_SetSCHParamFragmentation ENCRYP:OFF</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This command may be used by the following tests as the requirement of disabling the this feature for the data link exchange is implicit in the test procedure (in conjunction with Appendix 1): BS-01.1 BS-04.1 BS-05.1 BS-07.1 BS-10.1 BS-11.1 BS-12.1 BS-13.1 BS-16.1 For the remaining tests defined, this command is not applicable.

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11.15 xf_BS_SetDefaultFrame_DLBurstConfiguration

Name	<i>xf_BS_SetDefaultFrame_DLBurstConfiguration</i>
Purpose	This command instructs the BS to set the Appendix 2 DL Frame structure and configure the data burst modulation and coding scheme, repetition coding, symbols duration and subchannels interval to the desired values.
Where Used	BS-07.1 BS-08.1 BS-09.1 BS-10.1 BS-11.1 BS-12.1 BS-13.1 BS-14.1 BS-16.1

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Parameters	<p>MCS : <MCSType>; Indicates the modulation and coding scheme to be used by the BS when transmitting bursts to the MS emulator of the tester, where <MCSType> represents one of the following strings:</p> <ul style="list-style-type: none"> • QPSK-1_2 to command the transmission of QPSK ½ bursts • QPSK-3_4 to command the transmission of QPSK 3/4 bursts • 16QAM-1_2 to command the transmission of 16QAM ½ bursts • 16QAM-3_4 to command the transmission of 16QAM 3/4 bursts • 64QAM-1_2 to command the transmission of 64QAM ½ bursts • 64QAM-2_3 to command the transmission of 64QAM 2/3 bursts • 64QAM-3_4 to command the transmission of 64QAM 3/4 bursts <p>RC : <value>; Indicates the repetition coding to be used by the BS when transmitting bursts to the MS emulator of the tester, where <value> is an ASCII string containing the values 1,2,4, or 6.</p> <p>SYMBOLS : <value>; Indicates the number of symbols in the DL, where <value> represents an ASCII string with the number of symbols in DL</p> <p>SUBCHANS : <value>; Number of subchannels to be used followed by <value> an ASCII string containing the number of subchannels.</p>
Max. Response Time	Specified by IUT vendor
Syntax	<p>xf_BS_SetDefaultFrame_DLBurstConfiguration MCS : <MCSType> RC : <value> SYMBOLS : <value> SUBCHANS : <value></p>
Examples	<p>xf_BS_SetDefaultFrame_DLBurstConfiguration MCS : 16QAM-1_2 RC : 1 SYMBOLS : 16 SUBCHANS : 4</p>
Return Values	<p>SYMOFF : <value> Where <value> is an ASCII string containing the symbol offset to where the first DL data bursts start. This value depends on the vendor's implementation of the broadcast signaling. OK or ERROR</p>
Comments	<p>The following tests require configuration of a non default DL subframe structure: BS-12.1 The following test explicit the use of a specific DL subframe structure: BS-07.1 BS-10.1 BS-11.1 BS-16.1 The following test do not explicit the use of a specific DL subframe structure, but appendix 2 of MRCT states that a specific frame structure will be used for all tests unless it is stated the opposite: BS-08.1 BS-09.1 BS-13.1 BS-14.1</p>

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2 **11.16 xf_BS_SetDefaultFrame_ULBurstConfiguration**

Name	<i>xf_BS_SetDefaultFrame_ULBurstConfiguration</i>
Purpose	This command instructs the BS to set the Appendix 2 UL frame structure and configures the data burst modulation and coding scheme, repetition coding and slots number.
Where Used	BS-01.1 BS-03.1 BS-04.1 BS-05.1 BS-06.1 BS13.1 BS-14.1 BS-16.1
Parameters	<p>MCS : <MCSType>; Indicates the modulation and coding scheme to be used by the BS when allocating UL bursts to the MS emulator of the tester, where <MCSType> represents one of the following strings:</p> <ul style="list-style-type: none"> • QPSK-1_2 to command the transmission of QPSK ½ bursts • QPSK-3_4 to command the transmission of QPSK 3/4 bursts • 16QAM-1_2 to command the transmission of QPSK ½ bursts • 16QAM-3_4 to command the transmission of QPSK 3/4 bursts <p>RC : <value>; Indicates the repetition coding to be used by the BS when allocating UL bursts to the MS emulator of the tester, where <value> is an ASCII string containing the values 1,2,4, or 6.</p> <p>SLOTS : <value>; Indicates the number of slots in the UL that the BS should allocate to the MS emulator, where <value> represents an ASCII string with the number of slots in the first PUSC zone in the UL.</p>
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetDefaultFrame_ULBurstConfiguration MCS:<MCSType> RC:<value> SLOTS:<value></i>
Examples	<i>xf_BS_SetDefaultFrame_ULBurstConfiguration MCS:QPSK-1_2 RC:2 SLOTS:104</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	<p>The following tests explicitly require the use of a specific UL subframe structure:</p> <p>BS-01.1 BS-06.1 BS-16.1</p> <p>The following test do not explicitly require the use of a specific UL subframe structure, but appendix 2 of MRCT states that a specific frame structure will be used for all tests unless it is stated the opposite:</p> <p>BS-03.1 BS-04.1 BS-05.1 BS-13.1 BS-14.1</p>

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11.17 xf_BS_SetDefaultFrameStructureStatus

Name	<i>xf_BS_SetDefaultFrameStructureStatus</i>
Purpose	This command instructs the BS to determine whether the frame structure in Appendix 2 is to be followed or not. In case default frame structure is to be used, the BS also indicates which default frame (normal map or compressed map) shall be used.
Where Used	BS-01.1 BS-03.1 BS-04.1 BS-05.1 BS-06.1 BS-07.1 BS-08.1 BS-09.1 BS-10.1 BS-11.1 BS-12.1 BS-13.1 BS-14.1 BS-16.1
Parameters	<p>STAT: <Switch>; Indicates whether it is commanded to use the frame structure specified in MRCT specification, appendix 2, where <Switch> represents one of the following strings:</p> <ul style="list-style-type: none"> • ON to command the usage of one of the default frame structure types described by a following parameter in this CATI command. • OFF to command the BS to use the frame configuration decided by itself. <p>FRAMETYPE: <DefaultFrameType>; Indicates, when the parameter STAT is set to ON, which specific default frame structure will be used. The possible options are indicated in <DefaultFrameType>, which it is an ASCII string that can have the following values:</p> <ul style="list-style-type: none"> • NORMAL to command the usage of the default frame structure that uses NORMAL MAPS. • COMPRESSED to command the usage the default frame structure that uses COMPRESSED MAPS.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetDefaultFrameStructureStatus</i> <i>STAT</i> : <Switch> (<i>FRAMETYPE</i> : <DefaultFrameType>)
Examples	<p>When Default frame is disabled: <i>xf_BS_SetDefaultFrameStructureStatus STAT:OFF</i></p> <p>When Default frame is enabled: <i>xf_BS_SetDefaultFrameStructureStatus STAT:ON</i> <i>FRAMETYPE: NORMAL</i></p>
Return Values	OK or ERROR

Comments	
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11.18 xf_BS_SetPowerControlOverMS

Name	<i>xf_BS_SetPowerControlOverMS</i>
Purpose	This command instructs the BS to enable or disable the power control mechanism to command the MS to modify its RF power.
Where Used	All RCT BS tests See comment below
Parameters	<i>PWRCTRL</i> : <Switch>; Power control settings, where <Switch> represents one of the following strings: <ul style="list-style-type: none"> • <i>ON</i> to command the BS to manage upon its own decision the power control that the BS performs over the MS • <i>OFF</i> to command disabling power control once initial ranging has been completed with the MS emulator.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_SetPowerControlOverMS PWRCTRL</i> : <Switch>
Examples	<i>xf_BS_SetPowerControlOverMS PWRCTRL:OFF</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	This command is required in order to reach the conditions of fixed input RF power assumed in BS antenna ports by all the MRCT tests. If this feature is not disabled, then the BS could command the MS emulator to increase its power with the risk that, if there is no response from the MS, the BS decides to drop the communication and making the test not possible to be completely executed.

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11.19 xf_BS_TriggerDSAReq

Name	<i>xf_BS_TriggerDSAReq</i>
Purpose	This command instructs the BS to trigger to send a <i>DSA-REQ</i>
Where Used	TP/BS/DS/DSA/BV-H000 .. BV-H011 TP/BS/DS/DSA/TI-H000 .. TI-H005
Parameters	<i>SFT</i> : <SFtype>; Type of service flow, where <SFtype> represents one of the following strings: <ul style="list-style-type: none"> • <i>UL</i> to command the creation of an UL service flow • <i>DL</i> to command the creation of a DL service flow • <i>UL+DL</i> to command the creation of a DL and a UL service flow
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_TriggerDSAReq: SFT</i> : <SFtype>

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Examples	<i>xf_BS_TriggerDSAREq: SFT:UL</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.20 xf_BS_TriggerDSCReq

Name	<i>xf_BS_TriggerDSCReq</i>
Purpose	command instructs the BS to change a service flow
Where Used	TP/BS/DS/DSC/BV-H001..BV-H007 TP/BS/DS/DSC/TI-H000 .. TI-H003
Parameters	<i>SFID:<id#></i> ; SFID followed by the id#, separated by : The <id# >is an ASCII string containing the target SF identifier.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_TriggerDSCReq: SFID:<id#></i>
Examples	<i>xf_BS_TriggerDSCReq: SFID:123</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.21 xf_BS_TriggerDSDReq

Name	<i>xf_BS_TriggerDSDReq</i>
Purpose	This command instructs the BS to delete a service flow
Where Used	TP/BS/DS/DSD/BV-H000 .. BV-H004 TP/BS/DS/DSD/TI-H000 .. TI-H002
Parameters	<i>SFID:<id#></i> ; SFID followed by the id#, separated by : The <id# >is an ASCII string containing the target SF identifier.
Max. Response Time	Specified by IUT vendor
Syntax	<i>xf_BS_TriggerDSDReq: SFID:<id#></i>
Examples	<i>xf_BS_TriggerDSDReq: SFID:123</i>
Return Values	<i>OK</i> or <i>ERROR</i>
Comments	

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11.22 xf_BS_TriggerIdleMode

Name	<i>xf_BS_TriggerIdleMode</i>
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Purpose	MS has completed initial network entry with IUT. The IUT determines that the MS should enter idle mode. This command instructs the BS to send an unsolicited DREG-CMD.
Where Used	TP/BS/IDM/TIDM/BV-H002 TP/BS/IDM/TIDM/TI-H000 TP/BS/IDM/TIDM/TI-H001
Parameters	ActionCode :<code>; Specifying the action for MS to take upon receiving the DREG-CMD, where <code> represents one of the following strings per definition in 6.3.2.3.26 of 802.16-2004/Cor2/D3 [4]. <ul style="list-style-type: none"> • 00 • 01 • 02 • 03 • 05 ReqDuration :<numFrames>; Specifying the duration for the TLV REQ-duration as defined in 6.3.2.3.26 of [4], where <numFrames> is a ASCII string indicating a decimal number ranging from 0 to 255.. This parameter may exist only when ActionCode is 05.
Max. Response Time	Specified by IUT vendor
Syntax	xf_BS_TriggerIdleMode ActionCode :<code> (ReqDuration :<numFrames>)
Examples	xf_BS_TriggerIdleMode ActionCode:5 ReqDuration:15
Return Values	OK or ERROR
Comments	

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11.23 xf_BS_SetMSPowerLimitation

Name	xf_BS_SetMSPowerLimitation
Purpose	This command instructs the BS to add the MS Maximum Transmission Power Limitation TLV to the UCD with the specified parameter value.
Where Used	TP/BS/CDM/CD/BV-H009
Parameters	MaxPwr :<value>; Indicates the Maximum Transmission Power Limitation value in dBm.
Max. Response Time	Specified by IUT vendor
Syntax	xf_BS_SetMSPowerLimitationTLV MaxPwr : <value>
Examples	xf_BS_SetMSPowerLimitationTLV MaxPwr:23
Return Values	OK or ERROR
Comments	

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