WiMAX Forum® Test Procedures

WiMAX Forum® Mobile Inter-Operability Test (MIOT)

WMF-T25-003-R010v05

WiMAX Forum® Approved

(2010-09-07)

WiMAX Forum Proprietary

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Table of Contents

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1. Scope

This document specifies the WiMAX Forum® Inter-Operability Tests (MIOT) to certify compliance with the WiMAX Forum Mobile Certification Profile [4], the WiMAX Forum System Profile [5] and the WiMAX Forum PICS [6] for Wave 1 and Wave 2 Certification Testing. The standard specifications are found in the three IEEE Std 802.16 referenced documents, [1], [2], [3]. This document replaces the approved WiMAX Forum Inter-Operability Tests for Wave 1 which are included here.

2. Purpose

The purpose of this document is to define test scenarios to verify the interoperability of mobile equipment that meets WiMAX Forum® Mobile Certification Profile[4]. These tests represent the third major test area for WiMAX®Certification, with the other two areas being the Protocol Conformance Test Cases[8] and the WiMAX Forum Radio Conformance Tests[7]. The detailed processes for WiMAX Certification are found in WiMAX Forum Certification Program Reference Document [9].

3. References

[1]   IEEE Std 802.16-2004: "IEEE Standard for local and metropolitan area networks. Part 16: Air Interface for Fixed Broadband Wireless Access Systems"

[2]   IEEE Std 802.16e-2005: "IEEE Standard for Local and Metropolitan Area Networks – Part 16: Air Interface for Mobile Broadband Wireless Access Systems" and "Corrigendum to IEEE Standard for Local and Metropolitan Area Networks – Part 16: Air Interface for Fixed Broadband Wireless Access Systems"

[3]   WMF-T23-004-R010, WiMAX Forum® Standard Reference Document, WiMAX Forum® Technical Working Group[4]   WMF-T23-005-R015, WiMAX Forum Mobile Radio Specification Document, WiMAX Forum® Certification Working Group

[5]   WMF-T23-001-R010v09, WiMAX Forum® Mobile System Profile, WiMAX Forum® Technical Working Group

[6]   WMF-T24-001-R010v07, WiMAX Forum® Mobile Protocol Implementation Conformance Statement (PICS) Proforma, WiMAX Forum® Technical Working Group

[7]   WMF- T25-002-R010, WiMAX Forum® Mobile Radio Conformance Testing, WiMAX Forum® Technical Working Group

[8]   WMF- T25-001-R010, WiMAX Forum® Mobile Protocol Conformance Test, WiMAX Forum® Technical Working Group

[9]   DRAFT-C16-001-v06, WiMAX Forum® Certification Program Reference Manual, WiMAX Forum® Certification Working Group

4. Abbreviations

BS	Base Station
CQI	Channel Quality Indicator
DL	Downlink
IOT	Inter-Operability Test
MBS	Multicast and Broadcast Services
MS	Mobile Station
NW	Network
PHS	Payload Header Suppression
ROHC	Robust Header Compression
SBS	Serving Base Station
SM	Spatial Multiplexing
TD	Test Description
TO	Transmission Opportunity
SUT	System Under Test
UGS	Unsolicited Grant Service
UL	Uplink
W1	Wave 1
W2	Wave 2

5. Mobile Interoperability Test Suite

5.1 How to use the Interoperability Test Suite

- A test campaign is the execution of test scenarios according to the test scenario list.

- The test campaign parameters in clause 7 shall be filled out prior to any test scenario execution. The test campaign parameters specify how certain behavior can be triggered.

- Some test descriptions can be executed several times with a different parameter set for each execution. In the case where this is applicable, the test description list is appended below the test description Table.

5.2   How to document a Test Campaign

For each test campaign, the following chapters shall be printed out:

Clause 6:   Test Campaign Information - shall be filled out by the test participant(s).

Clause 7:   Test Campaign Parameters and Report - summarizes the results of the Test Campaign, is filled out during the Test Campaign.

Clause 8:   Test Scenarios - shall be filled out during the Test Campaign.

A copy of each Text Campaign Report is provided to every test participant after the Test Campaign.

5.3   Test Configuration

The figure below represents the MIOT Test Bed with two BSs (different vendors except for Handoff) and three MS (different vendors). It is assumed that this Test Bed will be validated and is referred to as the "Gold IOT Test Bed, with all tests initially run in this testbed during validation. The IOT tests are conductive tests. Each unit under test has to provide a RF interface for this purpose (female SMA or N connector). The data connector is the RJ45 LAN interface (Ethernet).

For a new vendor (MS or BS) to pass the IOT tests, the vendor replaces one of the units from the "Gold IOT Test Bed" and reruns the test case as specified in the Tables below.
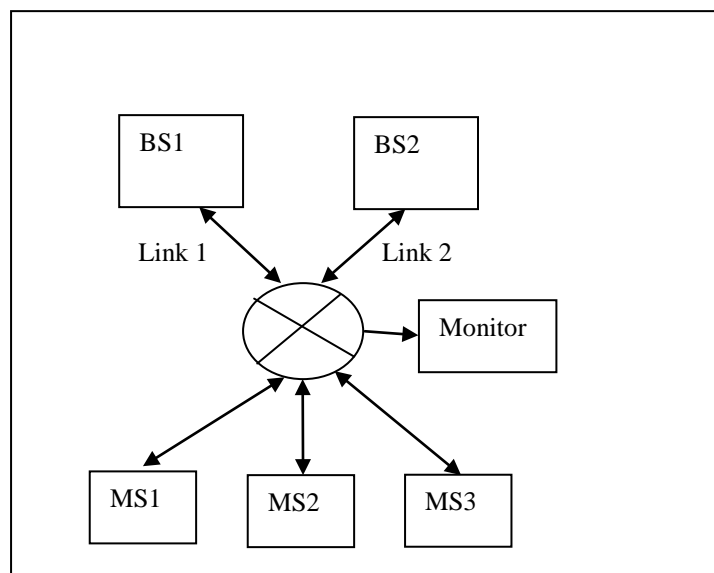
Figure 1 Basic Test Combinations for IOT Testing

5.3.1   Test Scenario List MS IOT

MS1 is the unit under test. MS in brackets are connected and have successfully performed NW entry before the IOT test starts. Not mentioned BS is powered off or disconnected. MS2 without brackets is also unit under test with a different PHY configuration (used for MIMO with collaborative SM). BSx (SBS&TBS) means that 2 units of the same vendor BS are used, one playing the Serving BS role and the other one playing the Target BS role.

Nr.	Test Scenario Name	Configuration
1	Scenario 1a Basic Configuration **	MS1+(MS2+MS3)+BS1
2		MS1+(MS2+MS3)+BS2
3	Scenario 1b BS initiated CQI Reporting using Fast Feedback Channel	MS1+(MS2+MS3)+BS1
4		MS1+(MS2+MS3)+BS2
5	Scenario 1c HARQ	MS1+(MS2+MS3)+BS1
6		MS1+(MS2+MS3)+BS2
7	Scenario 1d Mac-level ARQ	MS1+(MS2+MS3)+BS1
8		MS1+(MS2+MS3)+BS2
9	Scenario 1eb - BS initiated Open Loop Power Control Activation	MS1+(MS2+MS3)+BS1
10		MS1+(MS2+MS3)+BS2
11	Scenario 1ec - Closed Loop Power Control	MS1+(MS2+MS3)+BS1
12		MS1+(MS2+MS3)+BS2
13	Scenario 1f – Security Version 2	MS1+(MS2+MS3)+BS1
14		MS1+(MS2+MS3)+BS2
15	Scenario 1g – MS initiated Sleep Mode	MS1+(MS2+MS3)+BS1
16		MS1+(MS2+MS3)+BS2
17	Scenario 1ha – MS initiated Idle Mode	MS1+(MS2+MS3)+BS1
18		MS1+(MS2+MS3)+BS2
19	Scenario 1hb – BS initiated Idle Mode	MS1+(MS2+MS3)+BS1
20		MS1+(MS2+MS3)+BS2
21	Scenario 1i – ERT-VR	MS1+(MS2+MS3)+BS1
22		MS1+(MS2+MS3)+BS2
23	Scenario 1ja – MS initiated Handover	MS1+(MS2+MS3)+ BS1(SBS&TBS)
24		MS1+(MS2+MS3)+ BS2(SBS&TBS)
25	Scenario 2 PMP Configuration	MS1+MS2+ MS3+BS1
26		MS1+MS2+ MS3+BS2
27	Scenario 2A0 – DL PUSC with MIMO Matrix A and UL PUSC with Collaborative SM	MS1+MS2+(MS3)+BS1
28		MS1+MS2+(MS3)+BS2
29	Scenario 2A1 – DL PUSC with MIMO Matrix B and UL PUSC With Collaborative SM	MS1+MS2+(MS3)+BS1
30		MS1+MS2+(MS3)+BS2
31	Scenario 2B0 – Beam Forming with DL AMC with Dedicated Pilots and UL AMC	MS1+(MS2+MS3)+BS1
32		MS1+(MS2+MS3)+BS2
33	Scenario 2B1 – Beam Forming with DL PUSC with Dedicated Pilots and UL PUSC without channel rotation	MS1+(MS2+MS3)+BS1
34		MS1+(MS2+MS3)+BS2
35	Scenario 2AB0 – DL PUSC with dedicated pilot with MIMO Matrix A and UL PUSC with Collaborative SM	MS1+MS2+(MS3)+BS1
36		MS1+MS2+(MS3)+BS2
37	Scenario 2AB1 – DL PUSC with dedicated pilot with Matrix	MS1+MS2+(MS3)+BS1

38	B MIMO and UL PUSC with Collaborative SM	MS1+MS2+(MS3)+BS2
39	Scenario 2C0 – PHS IPv4	MS1+(MS2+MS3)+BS1
40		MS1+(MS2+MS3)+BS2
41	Scenario 2C1 – PHS IPv6	MS1+(MS2+MS3)+BS1
42		MS1+(MS2+MS3)+BS2
43	Scenario 2D0 – ROHC UDP/IPv4 streams*	MS1+(MS2+MS3)+BS1
44		MS1+(MS2+MS3)+BS2
45	Scenario 2D1 – ROHC UDP/Ipv6 streams*	MS1+(MS2+MS3)+BS1
46		MS1+(MS2+MS3)+BS2
47	Scenario 2E0 – MS initiated Service Flow Creation and Deletion	MS1+(MS2+MS3)+BS1
48		MS1+(MS2+MS3)+BS2
49	Scenario 2F0 – RT-VR/NRT-VR	MS1+(MS2+MS3)+BS1
50		MS1+(MS2+MS3)+BS2
51	Scenario 2G0- BS initiated Handover	MS1+(MS2+MS3)+BS1(SBS&TBS)
52		MS1+(MS2+MS3)+BS2(SBS&TBS)
53	Scenario 2G1– Drop of Target BS During Handover	MS1+(MS2+MS3)+BS1(SBS&TBS)
54		MS1+(MS2+MS3)+BS2(SBS&TBS)
55	Scenario 2M0 – Multi-BS MBS	MS1+(MS2+MS3)+BS1
56		MS1+(MS2+MS3)+BS2

* - Deferred

** For test Nr.1, BS1 should use compressed MAPs and for test Nr.2, BS2 should use the normal MAPs.

5.3.2   Test Scenario List BS IOT

BS1 is the unit under test. BS2 in brackets is connected and used for HO tests. Not mentioned MS are powered off or disconnected. BSx (SBS&TBS) means that 2 units of the same vendor BS are used, one playing the Serving BS role and the other one playing the Target BS role.

Nr.	Test Scenario Name	Configuration
1	Scenario 1a Basic Configuration	BS1+MS1
2		BS1+MS2
3		BS1+MS3
4	Scenario 1b BS initiated CQI Reporting using Fast Feedback Channel	BS1+MS1
5		BS1+MS2
6		BS1+MS3
7	Scenario 1c HARQ	BS1+MS1
8		BS1+MS2
9		BS1+MS3
10	Scenario 1d Mac-level ARQ	BS1+MS1
11		BS1+MS2
12		BS1+MS3
13	Scenario 1eb - BS initiated Open Loop Power Control Activation	BS1+MS1
14		BS1+MS2
15		BS1+MS3
16	Scenario 1ec – Closed Loop Power Control	BS1+MS1
17		BS1+MS2
18		BS1+MS3
19	Scenario 1f – Security Version 2	BS1+MS1
20		BS1+MS2
21		BS1+MS3
22	Scenario 1g – MS initiated Sleep Mode	BS1+MS1
23		BS1+MS2
24		BS1+MS3
25	Scenario 1ha – MS initiated Idle Mode	BS1+MS1
26		BS1+MS2
27		BS1+MS3
28	Scenario 1hb – BS initiated Idle Mode	BS1+MS1
29		BS1+MS2
30		BS1+MS3
31	Scenario 1i – ERT-VR	BS1+MS1
32		BS1+MS2
33		BS1+MS3
34	Scenario 1j – MS initiated Handover	BS1(SBS&TBS)+MS1
35		BS1(SBS&TBS)+MS2
36		BS1(SBS&TBS)+MS3
37	Scenario 2 PMP Configuration	BS1+MS1+MS2+MS3

38	Scenario 2A0 – DL PUSC with MIMO Matrix A and UL PUSC with Collaborative SM	BS1+MS1+MS2
39		BS1+MS2+MS3
40		BS1+MS3+MS1
41	Scenario 2A1 – DL PUSC with MIMO Matrix B and UL PUSC With Collaborative SM	BS1+MS1+MS2
42		BS1+MS2+MS3
43		BS1+MS3+MS1
44	Scenario 2B0 – Beam Forming with DL AMC with Dedicated Pilots and UL AMC	BS1+MS1
45		BS1+MS2
46		BS1+MS3
47	Scenario 2B1 – Beam Forming with DL PUSC with Dedicated Pilots and UL PUSC without channel rotation	BS1+MS1
48		BS1+MS2
49		BS1+MS3
50	Scenario 2AB0 – DL PUSC with dedicated pilot with MIMO Matrix A and UL PUSC with Collaborative SM	BS1+MS1+MS2
51		BS1+MS2+MS3
52		BS1+MS3+MS1
53	Scenario 2AB1 – DL PUSC with dedicated pilot with Matrix B MIMO and UL PUSC with Collaborative SM	BS1+MS1+MS2
54		BS1+MS2+MS3
55		BS1+MS3+MS1
56	Scenario 2C0 – PHS IPv4	BS1+MS1
57		BS1+MS2
58		BS1+MS3
59	Scenario 2C1 – PHS IPv6	BS1+MS1
60		BS1+MS2
61		BS1+MS3
62	Scenario 2D0 – ROHC UDP/IPv4 streams*	BS1+MS1
63		BS1+MS2
64		BS1+MS3
65	Scenario 2D1 – ROHC UDP/Ipv6 streams*	BS1+MS1
66		BS1+MS2
67		BS1+MS3
68	Scenario 2E0 - MS initiated Service Flow Creation and Deletion	BS1+MS1
69		BS1+MS2
70		BS1+MS3
71	Scenario 2F0 - RT-VR/NRT-VR	BS1+MS1
72		BS1+MS2
73		BS1+MS3
74	Scenario 2G0- BS initiated Handover	BS1(SBS&TBS)+MS1
75		BS1(SBS&TBS)+MS2
76		BS1(SBS&TBS)+MS3

77	Scenario 2G1– Drop of Target BS During Handover	BS1(SBS&TBS)+MS1
78		BS1(SBS&TBS)+MS2
79		BS1(SBS&TBS)+MS3
80	Scenario 2M0 – Multi-BS MBS	BS1+MS1
81		BS1+MS2
82		BS1+MS3

* - Deferred

5.4   Test Scenario Identifier Naming Conventions

The identifier of the test scenario is built according to the Table below.

Identifier:	SC_<w>_<g>_<n>		
	<w> = wave	1	Wave 1
		2	Wave 2
	<g> = group	A	MIMO
		B	BF
		C	PHS
		D	ROHC
		E	MS initiated Service Flow operations
		F	RT-VR and NRT-VR QoS types
		G	HO initiated by BS
		H	Features of Scanning and Association
		J	Sleep mode initiated by BS
		K	FFB initiated by MS
		L	HARQ
		M	MBS
	<n> = sequential number	N	(0, 1, …)

5.5 TD Identifier Naming Conventions

The identifier of the TD is built according to the Table below.

Identifier:	TD_<sc>_<pg>_<fg>_<nn>		
	<sc> = scenario	SC2A,…	Scenario Number
	<pg> = protocol group	ARQ	ARQ
		BF	Beam Forming
		BS_SLM	Sleep Mode initiated by the BS
		BS_GHF	General Handover Functionality initiated by the BS
		FFB	Fast Feedback
		GHF	General Handover Functionality
		MBS	Multicast and Broadcast services
		MIMO	MIMO
		PHS	Payload Header Suppression
		RLC	Radio Link Control
		ROHC	Robust Header Compression
	<fg> = function group	ACQ	Acquisition of DL and UL parameters
		ADV	Advertisement
		DTB	Drop of Target BS
		DAT	User Data Transfer
		DSA	Dynamic Service Addition
		DSC	Dynamic Service Change
		HOD	HO Decision
		INI	Initiation
		PRNG	Periodic Ranging
		REG	Registration
		SBC	Negotiate Basic Capabilities
		SCN	Scanning
		ULG	UL grants
		NEW	Network Entry
	<nn> = sequential number	Nn	(00, 01, …)

5.6   Test Scenario List

The following Table contains a list of the test scenarios applicable to the interoperability testing process for Wave 2. Each test scenario leads to one or more test descriptions.

Nr.	Test Scenario Name	Wave1 BS&MS	Wave2 BS	Wave2 MS
1	Scenario 1a Basic Configuration	M	M	M
2	Scenario 1b BS initiated CQI Reporting using Fast Feedback Channel	M	M	M
3	Scenario 1c HARQ	M	M	M
4	Scenario 1d Mac-level ARQ	M	M	M
5	Scenario 1eb BS initiated Open Loop Power Control	M	M	M
6	Scenario 1ec Closed Loop Power Control	M	M	M
7	Scenario 1f Security Version 2	M	M	M
8	Scenario 1g MS initiated Sleep Mode	M	M	M
9	Scenario 1ha MS initiated Idle Mode	M	M	M
10	Scenario 1hb BS initiated Idle Mode	M	M	M
11	Scenario 1i ERT-VR	M	M	M
12	Scenario 1j MS initiated Handover	M	M	M
13	Scenario 2 PMP Configuration	M	M	M
14	Scenario 2A0 – DL PUSC with MIMO Matrix A and UL PUSC with Collaborative SM		IO-MIMO	M
15	Scenario 2A1 – DL PUSC with MIMO Matrix B and UL PUSC With Collaborative SM		IO-MIMO	M
16	Scenario 2B0 – Beam Forming with DL AMC with Dedicated Pilots and UL AMC		IO-BF	M
17	Scenario 2B1 – Beam Forming with DL PUSC with Dedicated Pilots and UL PUSC without channel rotation		IO-BF	M
18	Scenario 2AB0 – DL PUSC with dedicated pilot with MIMO Matrix A and UL PUSC with Collaborative SM		IO-BF & IO-MIMO	M
19	Scenario 2AB1 – DL PUSC with dedicated pilot with Matrix B MIMO and UL PUSC with Collaborative SM		IO-BF & IO-MIMO	M
20	Scenario 2C0 – PHS IPv4		M	M
21	Scenario 2C1 – PHS IPv6		M	M
22	Scenario 2D0 – ROHC UDP/IPv4 streams		*	*
23	Scenario 2D1 – ROHC UDP/Ipv6 streams		*	*
24	Scenario 2E0 - MS initiated Service Flow Creation and Deletion		M	M
25	Scenario 2F0 - RT-VR/NRT-VR		M	M
26	Scenario 2G0 - BS initiated Handover		M	M
27	Scenario 2G1 – Drop of Target BS During Handover		M	M
28	Scenario 2M0 – Multi-BS MBS		IO-MBS	M

* - Deferred

6. Test Campaign Information

6.1 Date of statement

Date of statement (MM/DD/YYYY):	

6.2 Vendor Contact Person

IOT	
Name	
Location	
Date	
IOT Manager	
Name.	
Telephone Number	
Fax Number	
E-mail address	
Additional Information	

6.3 Product Supplier for Test Bed

	BS1	BS2	MS1	MS2	MS3
Vendor					
Vendor Name					
Model Name					
Model Version					
Firmware Version					
Test Operator					
Name.					
Telephone Num					
Fax Number					
E-mail address					
Additional Information					

7. Test Campaign Parameters and Report

7.1.1 Vendor Specific Instructions for UUT Setup

The following Table lists specific trigger/configure parameters required to run the IOT Tests. The Vendor shall supply the method for enabling/disabling/initiating each of these trigger/configure parameters by either a test interface or alternative way of enabling these triggers. In the Test Scenarios in Clause 8, these triggers are denoted by their specific name and number (N). The vendor of the UUT should review each Test Condition Initialization and indicate to the IOT Test House, how to accomplish this setup.

Table 7.1 Vendor Specific Instructions for UUT Setup

N	Feature	Wave	BS	MS	How to trigger/configure
1	Trigger BE Dynamic flow creation	W1,W2	Yes	No	_____?
2	Allocate Fast feedback channel for MS	W1,W2	Yes	No	_____?
3	Enable/Disable HARQ for transport connection	W1,W2	Yes	No	_____?
4	Enable/Disable ARQ for transport connection	W1,W2	Yes	No	_____?
5	Force Open loop Power Control	W1,W2	Yes	No	_____?
6	Disable Open Loop Power Control	W1,W2	Yes	No	_____?
7	Security Enable/Disable Authentication	W1,W2	Yes	No	_____?
8	Trigger Sleep mode (definition with activation)	W1,W2	No	Yes	_____?
10	Trigger Idle mode	W1,W2	Yes	Yes	_____?
11	Trigger ERT Dynamic flow creation	W1,W2	Yes	No	_____?
12	Trigger Handover	W1,W2	No	Yes	_____?
13	Configuration of DCD Message (Trigger TLV)	W1,W2	Yes	No	_____?
14	Configure BS	W1,W2	Yes	No	_____?
16	Trigger Delete Service Flow (DSD-REQ)	W2	No	Yes	_____?
17	Trigger MS initiated Service Flow (DSA-REQ)	W2	No	Yes	_____?
18	Trigger NRT-VR Dynamic flow creation	W2	Yes	No	_____?
19	Trigger RT-VR Dynamic flow creation	W2	Yes	No	_____?
21	Trigger BS initiated MBS Service Flow (DSA-REQ)	W2	Yes(IO-MBS)	No	_____?
22	Trigger MS initiated MBS Service Flow (DSA-REQ)	W2	No	Yes	_____?
23	For BS initiated Handover, configure BS so that BS initiated HO will occur before the MS initiated HO. Or alternatively, the vendor might provide a trigger for BS initiated HO.	W2	Yes	No	_____?
25	Trigger to enable and disable MIMO Matrix B at the BS	W2	Yes	No	_____?

For the UUT, the vendor shall submit the device to the laboratory so that it indicates, in the corresponding network entry messages (SBC-REQ or REG-REQ, depending on the capability), that it supports each of the capabilities that the vendor has declared as supported in the PICS. This is applicable to the following capabilities: HARQ, ARQ, Open Loop Power Control, PKMv2, Sleep Mode, Idle Mode, and Handover.

The term BS shall be interpreted as a logical unit consisting of BS, ASN-Gateway functionality and AAA server functionality. The reasons are missing standardization and conformance tests of the interfaces between these network elements. It is not necessary to provide full conformant ASN-GW and CSN AAA servers as specified in NWG Network Architecture specifications, but any implementation of the required backbone capabilities specified above (i.e. ASN/CSN emulator).

The UUT should have the capability to enable user data transfer via PING or FTP. The S/N levels will be set in such a way that virtually no errors will occur during the user data transfer tests. The maximum allowed packet error rate of the user data transfer of the UUT is 0.5 percent over at least 10 seconds if a successful user data transfer is part the pass/fail criterion in the test scenarios unless otherwise specified in the test description. For the BS, configuration method like local maintenance tools to configure the provided network elements shall be provided.

7.1.2   MS Test campaign parameters

Test campaign parameters to be provided by vendor. The vendor shall specify how that Triggers are set in order for the test lab to run the each test.

Nr	Item	Question	Answer
SBC			
1	PIC_MAX_SBC_REQ_RETRIES	What maximum number of retries on SBC-REQs does the UUT support?	_____
REG			
2	PIC_MAX_REG_REQ_RETRIES	What maximum number of retries on REG-REQs does the UUT support?	_____
DSA			
3	PIC_MAX_DSx_REQ_RETRIES	What maximum number of retries on DSx-REQs does the UUT support?	_____
4	PIC_MAX_DSx_RSP_RETRIES	What maximum number of retries on DSx-RSPs does the UUT support?	_____

7.1.3   BS Test campaign parameters

Test campaign parameters to be provided by vendor.

Nr	Item	Question	Answer
DSA			
1	PIC_MAX_DSx_REQ_RETRIES	What maximum number of retries on DSx-REQs does the UUT support?	_____
2	PIC_MAX_DSx_RSP_RETRIES	What maximum number of retries on DSx-RSPs does the UUT support?	_____

7.2   Test campaign report

The following Table enables test operators to build a summary of the execution of the test scenarios for the IOT tests, either Wave 1 or Wave 2.

Nr.	TD ID	Selected? Yes/No	Run? Yes/No	Verdict Pass/Fail	Observations
	Scenario 1a – Basic Configuration				
	TD ID	**OK/NOK**			
1	TD_SC1a_RLC_IRNG_00				
2	TD_SC1a_RLC_SBC_00				
3	TD_SC1a_RLC_REG_00				
4	TD_SC1a_RLC_DSA_00				
5	TD_SC1a_RLC_DAT_00				
6	TD_SC1a_RLC_DAT_01				
	Scenario 1b BS initiated CQI Reporting using Fast Feedback Channel				
	TD ID	**OK/NOK**			
7	TD_SC1b_FFB_SBC_00				
8	TD_SC1b_FFB_SBC_01				
	Scenario 1c- HARQ				
	TD ID	**OK/NOK**			
9	TD_SC1c_HARQ_SBC_00				
10	TD_SC1c_HARQ_DSA_00				
11	TD_SC1c_HARQ_DAT_00				
12	TD_SC1c_HARQ_DAT_01				
	Scenario 1c- Mac-level ARQ				
	TD ID	**OK/NOK**			
13	TD_SC1d_ARQ_REG_00				
14	TD_SC1d_ARQ_DSA_00				
15	TD_SC1d_ARQ_DAT_00				
16	TD_SC1d_ARQ_DAT_01				
	Scenario 1eb BS initiated Open Loop Power Control				

	TD ID	OK/NOK			
17	TD_SC1eb_BS_OPC_SBC_00				
18	TD_SC1eb_BS_OPC_PMC_00				
19	TD_SC1eb_BS_OPC_DAT_00				
	Scenario 1ec Closed Loop Power Control				
	TD ID	**OK/NOK**			
20	TD_SC1ec_CPC_IRNG_00				
21	TD_SC1ec_CPC_DAT_00				
	Scenario 1f Security Version 2				
	TD ID	**OK/NOK**			
22	TD_SC1f_SEC_SBC_00				
23	TD_SC1f_SEC_AUTH_00				
24	TD_SC1f_SEC_TEK_00				
25	TD_SC1f_SEC_DAT_00				
26	TD_SC1f_SEC_REAUTH_00				
27	TD_SC1f_SEC_DAT_01				
	Scenario 1g MS initiated Sleep Mode				
	TD ID	**OK/NOK**			
28	TD_SC1g_MS_SLM_INI_00				
29	TD_SC1g_MS_SLM_PRNG_00				
30	TD_SC1g_MS_SLM_DAT_00				
31	TD_SC1g_MS_SLM_INI_01				
32	TD_SC1g_MS_SLM_DAT_01				
	Scenario 1ha MS initiated Idle Mode				
	TD ID	**OK/NOK**			
33	TD_SC1h_MS_IDM_REG_00				
34	TD_SC1h_MS_IDM_DREG_00				
35	TD_SC1h_MS_IDM_INI_00				
36	TD_SC1h_MS_IDM_DAT_00				
37	TD_SC1h_MS_IDM_DREG_01				
38	TD_SC1h_MS_IDM_DAT_01				
39	TD_SC1h_MS_IDM_DREG_02				

40	TD_SC1h_MS_IDM_DOWN				
	Scenario 1hb BS initiated Idle Mode				
	TD ID	**OK/NOK**			
41	TD_SC1h_BS_IDM_REG_00				
42	TD_SC1h_BS_IDM_DREG_00				
43	TD_SC1h_BS_IDM_DAT_00				
	Scenario 1i ERT-VR				
	TD ID	**OK/NOK**			
44	TD_SC1i_DSA_00				
45	TD_SC1i_DAT_00				
	Scenario 1j MS initiated Handover				
	TD ID	**OK/NOK**			
46	TD_SC1j_MS_GHF_ADV_00				
47	TD_SC1j_MS_GHF_HOD_00				
48	TD_SC1j_MS_GHF_NWE_00				
49	TD_SC1j_MS_GHF_DAT_00				
	Scenario 2 P2MP Configuration				
	TD ID	**OK/NOK**			
50	TD_SC2_RLC_IRNG_00				
51	TD_SC2_RLC_SBC_00				
52	TD_SC2_RLC_REG_00				
53	TD_SC2_RLC_DSA_00				
54	TD_SC2_RLC_DAT_00				
55	TD_SC2_RLC_DAT_01				

The following Table enables test operators to build a summary of the execution of the test scenarios for the Wave 2 Tests.

Nr.	Identifier	Selected ? Yes/No	Run? Yes/No	Verdict Pass/Fail	Observations
	Scenario 2A0 – DL PUSC with MIMO Matrix A and UL PUSC with Collaborative SM				
	TD Nr	**OK/NOK**			
55	TD_SC2A0_MIMO_SBC_00				
56	TD_SC2A0_MIMO_DAT_00				
57	TD_SC2A0_MIMO_DAT_01				
58	TD_SC2A0_MIMO_DAT_02				
	Scenario 2A1 – DL PUSC with MIMO Matrix B and UL PUSC With Collaborative SM				
	TD Nr	**OK/NOK**			
59	TD_SC2A1_MIMO_SBC_00				
60	TD_SC2A1_MIMO_DAT_00				
61	TD_SC2A1_MIMO_DAT_01				
62	TD_SC2A1_MIMO_DAT_02				
	Scenario 2B0 – Beam Forming with DL AMC with Dedicated Pilots and UL AMC				
	TD Nr	**OK/NOK**			
63	TD_SC2BO_BF_SBC_00				
64	TD_SC2BO_BF_DAT_00				
65	TD_SC2BO_BF_DAT_01				
66	TD_SC2BO_BF_DAT_02				
	Scenario 2B1 – Beam Forming with DL PUSC with Dedicated Pilots and UL PUSC without channel rotation				
	TD Nr	**OK/NOK**			
67	TD_SC2B1_BF_SBC_00				
68	TD_SC2B1_BF_DAT_00				
69	TD_SC2B1_BF_DAT_01				
70	TD_SC2B1_BF_DAT_02				
	Scenario 2AB0 – DL PUSC with dedicated pilot with MIMO Matrix				

	A and UL PUSC with Collaborative SM				
	TD Nr	**OK/NOK**			
71	TD_SC2AB0_MIMO_SBC_00				
72	TD_SC2AB0_MIMO_DAT_00				
73	TD_SC2AB0_MIMO_DAT_01				
74	TD_SC2AB0_MIMO_DAT_02				
	Scenario 2AB1 – DL PUSC with dedicated pilot with Matrix B MIMO and UL PUSC with Collaborative SM				
	TD Nr	**OK/NOK**			
75	TD_SC2AB1_MIMO_SBC_00				
76	TD_SC2AB1_MIMO_DAT_00				
77	TD_SC2AB1_MIMO_DAT_01				
78	TD_SC2AB1_MIMO_DAT_02				
	Scenario 2C0 – PHS IPv4				
	TD Nr	**OK/NOK**			
79	TD_SC2C0_PHS_REG_00				
80	TD_SC2C0_PHS_DSA_00				
81	TD_SC2C0_PHS_DAT_00				
	Scenario 2C1 – PHS IPv6				
	TD Nr	**OK/NOK**			
82	TD_SC2C1_PHS_REG_00				
83	TD_SC2C1_PHS_DSA_00				
84	TD_SC2C1_PHS_DAT_00				
	Scenario 2D0 – ROHC UDP/IPv4 streams				
	TD Nr	**OK/NOK**			
85	TD_SC2D0_ROHC_REG_00				
86	TD_SC2D0_ROHC_DSA_00				
87	TD_SC2D0_ROHC_DAT_00				
	Scenario 2D1 – ROHC UDP/Ipv6 streams				
	TD Nr	**OK/NOK**			

88	TD_SC2D1_ROHC_REG_00				
89	TD_SC2D1_ROHC_DSA_00				
90	TD_SC2D1_ROHC_DAT_00				
	Scenario 2E0 - MS initiated Service Flow Creation/Modification/Deletion				
	TD Nr	**OK/NOK**			
91	TD_SC2E0_RLC_DSA_00				
92	TD_SC2E0_RLC_DAT_00				
93	TD_SC2E0_RLC_DSD_00				
	Scenario 2F0 - RT-VR/NRT-VR				
	TD Nr	**OK/NOK**			
94	TD_SC2F0_RLC_DSA_00				
95	TD_SC2F0_RLC_DSA_00				
96	TD_SC2F0_RLC_DAT_00				
97	TD_SC2F0_RLC_DAT_00				
	Scenario 2G0 - BS initiated Handover				
	TD Nr	**OK/NOK**			
98	TD_SC2G0_BS_GHF_ADV_00				
99	TD_SC2G0_BS_GHF_SCN_00				
100	TD_SC2G0_BS_GHF_SCNRPT_00				
101	TD_SC2G0_BS_GHF_HOD_00				
102	TD_SC2G0_BS_GHF_NWE_00				
103	TD_SC2G0_BS_GHF_DAT_00				
	Scenario 2G1 – Drop of Target BS During Handover				
	TD Nr	**OK/NOK**			
104	TD_SC2G1_GHF_DTB_00				
105	TD_SC2G1_GHF_DAT_00				
	Scenario 2M0 – Multi-BS MBS				
	TD Nr	**OK/NOK**			
106	TD_SC2M0_MBS_ACQ_00				
107	TD_SC2M0_MBS_DSA_00				

108	TD_SC2M0_MBS_DAT_00				

8. Test Scenarios

Each test scenario contains a table to provide a summary description of the test scenario and single pass/fail verdict and several additional Test Description (TD) test tables used to describe the detailed test procedures. In the case of an unsuccessful test scenario, the test lab will use the TD test tables "Result Column" to indicate which was the primary event that failed (OK/NOK) for diagnostic purposes.

8.1 Scenario 1a - Basic Configuration

Test scenario behaviour	
Ref	Scenario 1a - Basic Configuration
Goal	Verify the exchange of Ping Traffic and User Data Transfer.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional. - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum® Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number. - For this test, BS1 should use compressed MAPs and BS2 should use normal MAPs in order to ensure that the MS can properly receive and process both types of MAPs.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. 5) Carry out DL and UL data transfer a) via the PING procedure: Host behind the BS pings the MS or pings the host behind the MS (depending on the type of MS) Host behind the MS or the MS itself (depending on the type of the MS) pings the host behind the BS b) via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criterion	Successful exchange of Ping Traffic and DL/UL data transfer.
Final Verdict	**PASS** **FAIL**
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.1.1 Network Entry procedure

8.1.1.1 MS Synchronization and Ranging

Test Description			
Identifier:	**TD_SC1a_RLC_IRNG_00**		
Description:	Verify that a BS sends broadcast messages (DL-MAP, UL-MAP, UCD, DCD) when switched on and that MS synchronizes with the BS. Verify the successful completion of initial ranging.		
Pre-test conditions:	MS is deregistered from BS. MS is switched off. BS remains on. BS is configured to transmit in the lowest channel (f_L). Then MS is switched on.		
Step	**Test Sequence**	**Result**	
1	BS sends DL-MAP in every frame.	OK	NOK
2	BS sends UL-MAP if appropriate.	OK	NOK
3	BS sends DCD every ten second (max).	OK	NOK
4	BS sends UCD every ten second (max).	OK	NOK
5	MS synchronizes to the BS.	OK	NOK
6	MS sends initial CDMA ranging codes in the Initial Ranging Region.	OK	NOK
7	BS sends RNG-RSP - with optional Power, Time or Frequency adjustments. - with ranging status = continue or success	OK	NOK
8	If the Ranging Status = continue in Step 7, MS sends initial CDMA ranging code in the Periodic Ranging Region until receiving: - RNG-RSP (with Ranging Status = success), - or CDMA_Allocation_IE in UL-MAP	OK	NOK
9	BS sends - RNG-RSP (with Ranging Status = success) followed by CDMA_Allocation_IE, - or CDMA_Allocation_IE only.	OK	NOK
10	MS sends RNG-REQ.	OK	NOK
11	Fill the gap with the MS MAC address read in the RNG-REQ and determine MAC Address. **MS MAC address:**	OK	NOK
12	BS sends RNG-RSP with ranging status = success.	OK	NOK
13	Fill the gap with the Basic Cid and Primary Management Cid assigned to the MS in the RNG-RSP. **Basic CID:** **Prim CID:**	OK	NOK
Observations			

8.1.1.2 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC1a_RLC_SBC_00**		
Description:	Verify the successful completion of basic capabilities negotiation.		
Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - with its capabilities set to on. - Are TLVs defined appropriate to the device capabilities?	OK	NOK
2	BS sends SBC-RSP - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.1.1.3 Registration

Test Description			
Identifier:	**TD_SC1a_RLC_REG_00**		
Description:	Verify the successful completion of registration.		
Pre-test conditions:	Successful completion of basic capabilities negotiation. No authentication is required.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs, - including valid TLVs defined for the appropriate Wave.	OK	NOK
2	BS sends REG-RSP - with response set to OK. - with valid TLVs that are present in the REG-REQ are in the appropriate Wave, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.1.2 Traffic Connection Establishment

8.1.2.1 Service Flow Provisioning

Test Description		
Identifier:	**TD_SC1a_RLC_DSA_00**	
Description:	Verify the successful completion of service flow establishment as in TD_SC1a_RLC_DSA_List.	
Pre-test conditions:	Successful completion of registration and 1 DL and 1 UL Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows.	

Step	Test Sequence	Result	
1	BS sends 1 or more DSA-REQ - not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs.	OK	NOK
3	BS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

TD_SC1a_RLC_DSA_List				
Nr.	**Stimulate the BS to use the following parameters**	**Status**	**Run**	**Result**
	UL DSA-REQ			
1	Service Flow Scheduling Type set to BE	m	Yes/No	
	DL DSA-REQ			
2	Service Flow Scheduling Type set to BE	m	Yes/No	

8.1.3 User Data Transfer

8.1.3.1 PING

Test Description			
Identifier:	**TD_SC1a_RLC_DAT_00**		
Description:	Verify the successful completion of data transfer via the PING procedure.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number.		
Step	**Test Sequence**	**Result**	
1	Host behind the BS pings the host behind the MS. - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
2	Host behind the MS pings the host behind the BS. - The CID of the UL MAC PDU (EchoRequest) is the Transport Cid of the UL Service Flow. - The CID of the DL MAC PDU (EchoReply) is the Transport Cid of the DL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.1.3.2 File Data Transfer

Test Description			
Identifier:	**TD_SC1a_RLC_DAT_01**		
Description:	Verify the successful completion of file data transfer for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.2   Scenario 1b – BS initiated CQI Reporting using Fast Feedback Channel

Test scenario behaviour	
Ref	Scenario 1b – BS initiated CQI Reporting using Fast Feedback Channel.
Goal	Verify the Fast Feedback Channel Allocation of the BS and Fast Feedback Reporting of the MS during DL data transfer.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Disable - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture. This is the only scenario that needs a monitor in order to check that MS sends CINR report headers. 2) Switch on the MS. 3) Carry out the Network Entry procedure with CQI Reporting support.. 4) Carry out 1 DL BS initiated BE service flow. 5) BS allocates Fast feedback channel for MS. **(Table 7.1 / Item 2).** 6) Carry out DL data transfer with enhanced fast feedback activated (BS assigns a CQI channel), via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criterion	Successful DL data transfer with enhanced fast feedback activated; MS sends CINR report (CQI) in the assigned fast-feedback channel.
Final Verdict	**PASS**			**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.2.1 Network Entry procedure

8.2.1.1 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC1b_FFB_SBC_00**		
Description:	Verify the Fast Feedback capabilities negotiation.		
Pre-test conditions:	X		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs - Uplink Control Channel Support indicating enhanced fast feedback support, - OFDMA MS CINR measurement capability indicating Physical CINR measurement from the preamble.	OK	NOK
2	BS sends SBC-RSP - with TLVs that are present in the SBC-REQ, and with values that do not enable a feature disabled by MS, - confirming the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - confirming Uplink Control Channel Support - confirming OFDMA MS CINR measurement capability	OK	NOK
Observations			

8.2.1.2 MAP

<table>
<tr><td colspan="4" align="center">Test Description</td></tr>
<tr><td>Identifier:</td><td colspan="3">TD_SC1b_FFB_SBC_01</td></tr>
<tr><td>Description:</td><td colspan="3">Verify the fast feedback channel allocation, CQI feedback and the successful completion of file data transfer for 5 minutes.</td></tr>
<tr><td>Pre-test conditions:</td><td colspan="3">1 DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number.</td></tr>
<tr><td align="center">Step</td><td align="center">Test Sequence</td><td colspan="2" align="center">Result</td></tr>
<tr><td align="center">1</td><td>BS sends UCD with:

-    Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.</td><td>OK</td><td>NOK</td></tr>
<tr><td align="center">2</td><td>-   BS sends UCD with:Fast Feedback Region TLV, allocating the fast feedback region.
and/or BS sends UL-MAP or compressed UL-MAP with:

-    Fast Feedback Allocation IE, allocating the fast-feedback region if a Fast Feedback Region TLV is not included in the UCD or overriding the fast-feedback region allocation made with a Fast Feedback Region TLV included in the UCD.
BS sends UL-MAP or compressed UL-MAP with:

-    CQICH Allocation IE, allocating the fast-feedback slots.</td><td>OK</td><td>NOK</td></tr>
<tr><td align="center">3</td><td>MS sends CINR report as indicated in the CQICH Allocation IE.</td><td>OK</td><td>NOK</td></tr>
<tr><td align="center">4</td><td>Has the data from the BS to the MS been transferred correctly?</td><td></td><td></td></tr>
<tr><td colspan="4">Observations

</td></tr>
</table>

8.3   Scenario 1c – HARQ

<table>
<tr><td colspan="3" align="center">Test scenario behaviour</td></tr>
<tr><td>Ref</td><td colspan="2">Scenario 1c – HARQ</td></tr>
<tr><td>Goal</td><td colspan="2">Verify the use of HARQ with chase combining during data transfer when no packet error rate is introduced. This test may be replaced with an HARQ test with packet errors at a later date.</td></tr>
<tr><td>Wave</td><td colspan="2">W1</td></tr>
<tr><td>Configuration</td><td colspan="2">Basic Test Configuration for IOT Testing.</td></tr>
<tr><td>Test Condition</td><td colspan="2">- Frequency channel: Middle.
- TX Power Level: Medium.
- ARQ: Disable.
- HARQ: Enable.
- Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum® Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3.
- SS Management: Unmanaged.
- 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows.
- Service Flows Classification Rule: Based on IP address/port number.</td></tr>
<tr><td>Initial State</td><td colspan="2">MS is deregistered from BS. MS is switched off. BS remains on.</td></tr>
<tr><td>Test process</td><td colspan="2">1) Start the monitor message capture, if available.
2) Switch on the MS.
3) Carry out the Network Entry procedure with HARQ support for transport connections.
4) Carry out 1 DL and 1 UL BS initiated BE service flow with HARQ support. (Table 7.1 / Item 3).
5) Carry out DL and UL data transfer with HARQ activated.
  a) via freestyle BE (such as FTP) data transfer. (5 minute transfer for some stability evaluation).</td></tr>
<tr><td>Pass verdict criterion</td><td colspan="2">Successful DL/UL data transfer and HARQ is activated for DL/UL data transfer.</td></tr>
<tr><td>Final Verdict</td><td>PASS</td><td>FAIL</td></tr>
<tr><td colspan="3">If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.</td></tr>
</table>

8.3.1 Network Entry procedure

8.3.1.1 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC1c_HARQ_SBC_00**		
Description:	Verify HARQ capabilities negotiation.		
Pre-test conditions:	X		
Step	**Test Sequence**	Result	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - OFDMA MAP Capability, bit#1 = 1 (Extended HARQ IE capability) - OFDMA MS Demodulator", bit#2 = 1 (DL CTC) - And bit#5 = 1 (DL HARQ Chase): - OFDMA MS Modulator", bit#2 = 1 (UL CTC) and bit#4 = 1 (UL HARQ Chase): - HARQ Chase Combining and CC-IR Buffer Capability, - Maximum number of burst per frame capability in HARQ. - The number of DL/UL HARQ Channels	OK	NOK
2	BS sends SBC-RSP - with TLVs that are present in the SBC-REQ, and with values that do not enable a feature disabled by MS, - confirming the support of the following capability using OFDMA Parameters Set and/or individual TLVs, - confirming HARQ capability.	OK	NOK
Observations			

8.3.2 Traffic Connection Establishment

8.3.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC1c_HARQ_DSA_00**		
Description:	Verify the activation of HARQ during traffic connection establishment.		
Pre-test conditions:	Registration completed.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ, if HARQ is enabled for the transport connection, - not more than PIC_DSx_REQ_MAX_RETRIES DSA-REQs, - HARQ Service Flows, = 1 (enabled) - HARQ Channel mapping (if specific HARQ channels (ACIDs) are to be used on the connection), - PDU SN extended subheader for HARQ reordering (if reordering PDUs at the receiver is enabled.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES DSA-RSPs.	OK	NOK
3	BS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

8.3.3 User Data Transfer

8.3.3.1 Verification of DL HARQ Allocations

Test Description			
Identifier:	**TD_SC1c_HARQ_DAT_00**		
Description:	Verify the use of HARQ during DL data transfer.		
Pre-test conditions:	1 DL Service Flow is established and Fast Feedback Channel is established		
Step	**Test Sequence**	**Result**	
1	BS sends DL MAP with - - HARQ DL MAP IE containing DL HARQ Chase Sub Burst IE.	OK	NOK
2	BS sends - HARQ allocation containing one or more PDUs and 16 bit CRC.	OK	NOK
3	BS sends UL-MAP - in the same frame as the DL HARQ allocation (ACK is one frame after DL allocation) - with HARQ ACKCH Region Allocation IE defining an ACK region.		
4	MS - decodes the DL HARQ allocation - then Ms sends ACK or NACK in the correct HARQ ACK channel.	OK	NOK
5	BS - either re-sends previous blocks, if MS NACKs. The retransmission allocation uses the same ACID as the previous allocation with the AI_SN maintained. - or send a new sub-burst, if MS ACKs and DL data is available for transmission. The next allocation that uses the same ACID has the AI_SN toggled.	OK	NOK
6	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.3.3.2 Verification of UL HARQ Allocations

Test Description			
Identifier:	**TD_SC1c_HARQ_DAT_01**		
Description:	Verify the use of HARQ during UL data transfer.		
Pre-test conditions:	1 UL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends UL-MAP with - HARQ UL MAP IE containing UL HARQ Chase Sub Burst IE with UL allocation to MS's Basic CID.	OK	NOK
2	MS - MS decodes the HARQ UL MAP IE - encodes the UL HARQ allocation, - containing MAC PDUs and 16 bit CRC.	OK	NOK
3	BS decodes the UL HARQ allocation. - Requests retransmission if UL allocation was unsuccessful by using the same value of AI_SN bit and ACID from previous allocation - Or requests new transmission if UL allocation was successful. The next allocation that uses the same ACID has the AI_SN toggled.	OK	NOK
4	Has the data from the MS to the BS been transferred correctly?	OK	NOK
Observations			

8.4 Scenario 1d – Mac-level ARQ

Test scenario behaviour	
Ref	Scenario 1d – Mac-level ARQ [11]
Goal	Verify the exchange of data transfer with ARQ active without packet errors. This test may be replaced with an HARQ test with packet errors at a later date…..
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Enable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure with ARQ support. 4) Carry out 1 DL and 1 UL BS initiated BE service flow with ARQ support.**(Table 7.1 / Item 4)** 5) Carry out DL and UL data transfer with ARQ activated. a) via freestyle BE (such as FTP) data transfer.
Pass verdict criterion	Successful exchange of DL/UL data transfer and ARQ is activated for DL/UL data transfer.
Final Verdict	**PASS**　　　　　　　　　　　　　　　　　　**FAIL**
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.4.1 Network Entry procedure

8.4.1.1 Registration

Test Description			
Identifier:	**TD_SC1d_ARQ_REG_00**		
Description:	Verify the activation of ARQ during registration.		
Pre-test conditions:	X		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES REG-REQs, - ARQ Support, - ARQ ACK Type.	OK	NOK
2	BS sends REG-RSP - with TLVs that are present in the REG-REQ, and with values that do not enable a feature disabled by MS, - confirming ARQ support.	OK	NOK
Observations			

8.4.2 Traffic Connection Establishment

8.4.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC1d_ARQ_DSA_00**		
Description:	Verify the activation of ARQ during traffic connection establishment.		
Pre-test conditions:	Registration completed.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ - not more than PIC_DSx_REQ_MAX_RETRIES DSA-REQs, - ARQ_enable, - ARQ_WINDOW_SIZE, - ARQ_RETRY_TIMEOUT_TRANSMITTER_DELAY or - ARQ_RETRY_TIMEOUT_RECEIVER_DELAY, - ARQ_BLOCK_LIFETIME, - ARQ_SYNC_LOSS_TIMEOUT, - ARQ_DELIVER_IN_ORDER, - ARQ_RX_PURGE_TIMEOUT, - ARQ_BLOCK_SIZE.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES DSA-RSPs - ARQ_RETRY_TIMEOUT_TRANSMITTER_DELAY or ARQ_RETRY_TIMEOUT_RECEIVER_DELAY, - ARQ_BLOCK_SIZE.	OK	NOK
3	BS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

8.4.3 User Data Transfer

8.4.3.1 Verification of DL ARQ Allocations

Test Description			
Identifier:	**TD_SC1d_ARQ_DAT_00**		
Description:	Verify the use of ARQ during DL data transfer.		
Pre-test conditions:	1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends - DL allocation(s) to basic CID - or compressed DL allocation(s) to basic CID.	OK	NOK
2	BS sends - One or more PDUs including packing and/or fragmentation subheaders with BSN, - on Transport Cid.	OK	NOK
3	MS - receives PDU's on one or more DL allocations - sends an ARQ ACK that allows the MS to ACK or NACK each individual block.	OK	NOK
4	BS re-sends previous blocks, if there were NACK's by the MS.	OK	NOK
5	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.4.3.2 Verification of UL ARQ Allocations

Test Description			
Identifier:	**TD_SC1d_ARQ_DAT_01**		
Description:	Verify the use of ARQ during UL data transfer.		
Pre-test conditions:	1 UL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends - UL allocation(s) to basic CID - or compressed UL allocation(s) to basic CID.	OK	NOK
2	MS sends - PDUs including packing and/or fragmentation subheaders with BSN, - on Transport Cid.	OK	NOK
3	BS - receives PDU's on one or more UL allocations - sends an ACK or NACK for each block.	OK	NOK
4	MS - re-sends previous blocks, if there were NACK's by the BS.	OK	NOK
5	Has the data from the MS to the BS been transferred correctly?	OK	NOK
Observations			

8.5   Scenario 1eb – BS initiated Open Loop Power Control

Test scenario behaviour	
Ref	Scenario 1eb BS Initiated Open Loop Power Control
Goal	Open Loop Power Control is activated by BS. Check that a data transfer continues properly when there is a fading in the UL channel (needs to be simulated by introducing a certain amount of attenuation).
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 UL and DL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) **BS Force Open loop Power Control (Table 7.1 / Item 5)** 2) Start the monitor message capture, if available. 3) Switch on the MS. 4) Carry out the Network Entry procedure with BS initiated Open Loop Power Control Activation. 5) Carry out 1 UL and DL BS initiated BE service flow. 6) Carry out UL data transfer via freestyle Best Effort (such as FTP) data transfer. During UL data transfer the MSs UL power is brought to a distance from the desired power level, e.g. with an attenuator, in order to simulate fading on the UL. In parallel the DL is also attenuated by the same amount.
Pass verdict criterion	Attenuation is introduced during UL data transfer. The data are transferred correctly and the connection will not be lost.
Final Verdict	PASS		FAIL	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.5.1 Open Loop Power Control Activation

Test Description			
Identifier:	**TD_SC1eb_BS_OPC_SBC_00**		
Description:	Verify the Open Loop Power Control support during negotiation of basic capabilities.		
Pre-test conditions:	BS "Force Open loop Power Control" Table 7.1 / Item 5.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - 'OFDMA MS uplink power control support' TLV - indicating Uplink open loop power control support, - with the minimum number of frames that SS takes to switch from the closed loop power control scheme to the opened loop power control scheme - with the MS's maximum transmit power for BPSK,QPSK,16-QAM, and 64-QAM (if supported).	OK	NOK
2	BS sends SBC-RSP - with TLVs that are present in the SBC-REQ, and with values that do not enable a feature disabled by MS, - confirming the support of the following capability using OFDMA Parameters Set and/or individual TLVs, - confirming Open Loop Power Control support.	OK	NOK
Observations			

Test Description			
Identifier:	**TD_SC1eb_BS_OPC_PMC_00**		
Description:	Verify the Open Loop Power Control Activation.		
Pre-test conditions:	X		
Step	**Test Sequence**	**Result**	
1	BS sends PMC-RSP in unsolicited manner, - Power control mode change = 0b10 or 0b01(Cor2) for Open Loop power control passive mode	OK	NOK
2	MS sends PMC-REQ, - Power control mode change = 0b10 or 0b01(Cor2) for Open Loop power control passive mode - Confirmation = 1	OK	NOK
Observations			

8.5.2 Open Loop Power Control during User Data Transfer

Test Description			
Identifier:	**TD_SC1eb_BS_OPC_DAT_00**		
Description:	Verify the use of Open Loop Power Control during data transfer.		
Pre-test conditions:	1 UL and DL Service Flow is established and Open Loop Power Control is activated. During User Data Transfer the MSs UL power is brought to a distance from the desired power level, e.g. with an attenuator, in order to simulate fading on the UL. In parallel the DL is also attenuated by the same amount.		
Step	**Test Sequence**	**Result**	
1	BS allocates UL BW sufficient for data transfer.	OK	NOK
2	BS sends to MS - RNG-RSP with power, corrections and status continue or success, or, - unsolicited RNG-RSP with power, corrections and status continue or success, or - Fast Power Control (FPC) message, or - UL-MAP with Power Control IE.	OK	NOK
3	Verify that BS power corrections are used by MS – or, if MS tx power not readily available - verify that no additional power corrections adjustments made by BS.	OK	NOK
4	Has the data from the MS to the BS been transferred correctly?	OK	NOK
Observations			

8.6   Scenario 1ec - Closed Loop Power Control

Test scenario behaviour	
Ref	Scenario 1e Power Control [11]
Goal	Check that a data transfer continues properly when there is a fading in the UL channel (needs to be simulated by introducing a certain amount of attenuation) and Closed Loop Power Control is active.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Open Loop Power Control: Not active. - Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional - HARQ: Optional - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 UL and 1 DL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Trigger BS to disable Open loop Power Control (**Table 7.1 / Item 6**) 3) Switch on the MS. 4) Carry out the Network Entry procedure. 5) Carry out 1 UL and 1 DL BS initiated BE service flow. 6) Carry out UL data transfer via freestyle Best Effort (such as FTP) data transfer. During UL data transfer the MSs UL power is brought to a distance from the desired power level, e.g. with an attenuator, in order to simulate fading on the UL. In parallel the DL can also be attenuated by the same amount.
Pass verdict criterion	Attenuation is introduced during UL data transfer. The data are transferred correctly and the connection will not be lost.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.6.1   Initial Ranging

Test Description			
Identifier:	**TD_SC1ec_CPC_IRNG_00**		
Description:	Verify the use of Closed Loop Power Control during initial ranging.		
Pre-test conditions:	X		
Step	**Test Sequence**	**Result**	
1	BS sends RNG-RSP - with possibly Power, Time or Frequency adjustments.	OK	NOK
2	MS sends initial CDMA ranging codes - where the new transmit power is P_t = P_last + P_adjust P_t (is the new transmit power) P_last (is the previous transmit power) P_adjust (is the correction term as sent by the BS in previous RNG-RSP)	OK	NOK
3	MS sends initial CDMA ranging codes until BS sends RNG-RSP - with ranging status success - then the MS begins negotiation of basic capabilities.	OK	NOK
Observations			

8.6.2 Closed Loop Power Control during User Data Transfer

Test Description			
Identifier:	**TD_SC1ec_CPC_DAT_00**		
Description:	Verify the use of Closed Loop Power Control during data transfer.		
Pre-test conditions:	1 UL Service Flow is established. During User Data Transfer the MSs UL power is brought to a distance from the desired power level, e.g. with an attenuator, in order to simulate fading on the UL. In parallel the DL can also be attenuated by the same amount.		
Step	**Test Sequence**	**Result**	
1	BS allocates UL BW sufficient for data transfer.	OK	NOK
2	BS sends - RNG-RSP with power, corrections and status continue or success, or - unsolicited RNG-RSP with power corrections and status continue or success, or - Fast Power Control (FPC) message, or - UL-MAP with Power Control IE	OK	NOK
3	Verify that BS power corrections are used by MS – or, if MS tx power not readily available - verify that no additional power corrections adjustments made by BS.	OK	NOK
4	Has the data from the MS to the BS been transferred correctly?	OK	NOK
Observations			

8.7 Scenario 1f – Security Version 2

Test scenario behaviour	
Ref	Scenario 1f – Security Version 2
Goal	Verify the general security process.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Enabled. - Authentication method shall be compliant to NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.

Test process	1) Enable PKMv2 (Table 7.1 / Item 7)
	2) Configure MS according to item nr #1 of TD_SC1f_SEC_List.
	3) Start the monitor message capture, if available.
	4) Switch on the MS.
	5) Carry out the Network Entry procedure with PKMv2 .
	6) Carry out 1 DL and 1 UL BS initiated BE service flow.
	7) Carry out DL and UL data transfer
	a) via the PING procedure: Host behind the BS pings the MS or pings the host behind the MS (depending on the type of MS)
	     Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the BS.
	8) Wait for reauthorization (Periodic TEK refresh is running).
	9) Wait until periodic TEK refresh uses the new AK.
	10) Carry out again DL and UL data transfer
	a) via the PING procedure: Host behind the BS pings the MS or pings the host behind the MS (depending on the type of MS)
	     Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the BS.
	11) Repeat steps 1) to 9) for the other items of TD_SC1f_SEC_List

Pass verdict criterion	Successful execution of Initial Authentication, PKM v.2 SA-TEK 3-way handshake, Periodic TEK refresh process
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.7.1 Security Capabilities Negotiation

Test Description			
Identifier:	**TD_SC1f_SEC_SBC_00**		
Description:	Verify the successful completion of security capabilities negotiation.		
Pre-test conditions:	X		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - with its capabilities set to on, - indicating in PKM Version Support the support of PKM version 2.	OK	NOK
2	BS sends SBC-RSP - with TLVs that are present in the SBC-REQ, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
3	Fill the gap with the Security Negotiation Parameters assigned to the MS in the SBC-RSP. **Authorization Policy Support** **at initial network entry:** **Message Authentication Code Mode:** **PN Window Size:** **Maximum number of supported Security Associations:**	OK	NOK
Observations			

8.7.2 Authentication and Authorization

Test Description			
Identifier:	**TD_SC1f_SEC_AUTH_00**		
Description:	Verify the successful completion of Authentication and Authorization.		
Pre-test conditions:	Successful completion of security capabilities negotiation. MS and BS have negotiated to perform PKMv2 EAP.		
Step	**Test Sequence**	**Result**	
1	MS may send PKMv2 EAP Start.	OK	NOK
2	MS and BS exchange EAP messages over PKMv2 EAP-Transfer	OK	NOK
3	BS sends PKMv2 EAP - Transfer - with EAP-success.	OK	NOK
4	Are Master Session Key, KEK, CMAC UL key and CMAC DL key created?	OK	NOK
Observations			

8.7.3 3-way handshake and SA creation

Test Description			
Identifier:	**TD_SC1f_SEC_TEK_00**		
Description:	Verify the successful completion of 3-way handshake and SA creation.		
Pre-test conditions:	Successful completion of Authentication and Authorization.		
Step	**Test Sequence**	**Result**	
1	BS sends PKMv2 SA-TEK-Challenge - with CMAC Digest.	OK	NOK
2	MS sends PKMv2 SA-TEK-REQ - indicates its security capabilities with Security Negotiation Parameters that were included in the SBC-REQ, - with CMAC Digest.	OK	NOK
3	BS sends PKMv2 SA-TEK-RESPONSE - with primary SA and zero or more static SAs, - confirming the successful validation of the PKMv2 SA-TEK-REQ, - with CMAC Digest, - shall have the same SEC Negotiation Parameters included in the SBC-RSP.	OK	NOK
4	Fill the gap with the number of SAs defined in the SA descriptor list assigned to the MS in the PKMv2 SA-TEK-RESPONSE. **Number of SAs defined in SA Descriptor List:**	OK	NOK
5	MS sends for each SA a PKMv2 KEY-REQ unless the data encryption algorithm is No Data Encryption - with a SAID, - with the AK sequence number.	OK	NOK
6	BS sends a PKMv2 KEY-REPLY for each PKMv2 KEY-REQ - with older and newer TEK parameters.	OK	NOK
Observations			

8.7.4 User Data Transfer

8.7.4.1 PING

Test Description			
Identifier:	**TD_SC1f_SEC_DAT_00**		
Description:	Verify the successful completion of data transfer via the PING procedure.		
Pre-test conditions:	Successful completion of 3-way handshake. 1 UL and 1 DL BE Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Host behind the BS pings the host behind the MS. - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.7.5 Periodic TEK Refresh

Test Description			
Identifier:	**TD_SC1f_SEC_REAUTH_00**		
Description:	Verify the successful completion of Periodic TEK Refresh		
Pre-test conditions:	Successful completion of 3-way handshake and SA creation and successful PING unless the Cipher-Suite is NO Data Encryption.		
Step	**Test Sequence**	**Result**	
1	MS sends for each SA a PKMv2 KEY-REQ unless the Cipher –Suite is NO Data Encryption - before the older TEK material expires, - in order to acquire newer TEK material.	OK	NOK
2	BS sends a PKMv2 KEY-REPLY for each PKMv2 KEY-REQ - with older and newer TEK parameters.	OK	NOK
3	MS continues with Periodic TEK refresh.	OK	NOK
4	The periodic TEK refresh produces key material where the newer key material has a key sequence number one greater than (modulo 4) that of the older key material.	OK	NOK
Observations			

8.7.6 User Data Transfer with refreshed key material

8.7.6.1 PING

Test Description			
Identifier:	**TD_SC1f_SEC_DAT_01**		
Description:	Verify the successful completion of data transfer, with refreshed key material via the PING procedure.		
Pre-test conditions:	Successful completion of 3-way handshake and SA creation. 1 UL and 1 DL BE Service Flow is established. Successful completion of Periodic TEK refresh and Reauthorization.		
Step	**Test Sequence**	**Result**	
1	Host behind the BS pings the host behind the MS. - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
Observations			

TD_SC1f_SEC_List				
Nr.	**Configure the MS to use the following parameters**	**Status**	**Run**	**Result**
	SA-TEK-REQ			
1	Cryptographic-Suite-List indicating only: 0x010001 CBC-Mode 56-bit DES, no data authentication and 3-DES,128	o	Yes/No	
2	Cryptographic-Suite-List indicating only: 0x010002 CBC-Mode 56-bit DES, no data authentication and RSA, 1024	o	Yes/No	
3	Cryptographic-Suite-List indicating only: 0x020103 CCM-Mode 128-bit AES, CCM-Mode, 128-bit, ECB mode AES with 128-bit key	o	Yes/No	
4	Cryptographic-Suite-List indicating only: 0x020104 CCM-Mode 128bits AES, CCM-Mode, AES Key Wrap with 128-bit key	m	Yes/No	
5	Cryptographic-Suite-List indicating only: 0x030003 CBC-Mode 128-bit AES, no data authentication, ECB mode AES with 128-bit key	o	Yes/No	
6	Cryptographic-Suite-List indicating only: 0x080003 MBS CTR Mode 128 bits AES, no data authentication, AES ECB mode with 128-bit key	o	Yes/No	
7	Cryptographic-Suite-List indicating only: 0x080004 MBS CTR mode 128 bits AES, no data authentication, AES Key Wrap with 128-bit key	o	Yes/No	

8.8   Scenario 1g- MS initiated Sleep Mode

Test scenario behaviour	
Ref	Scenario 1g- MS Initiated Sleep Mode
Goal	Verify the MS initiated sleep mode activation.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- TRF-IND Required: set. - TTWF (traffic trigger wakening flag): set. - Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional - HARQ: Optional - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum® Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. 5) Trigger MS (Table 7.1 / Item 8) to initiate sleep mode procedure. TRF-IND Required is set, TTWF (traffic trigger wakening flag) is set for DL and UL connection. 6) Once, MS is in sleep mode, host behind BS pings host behind MS. 7) Trigger MS (Table 7.1 / Item 8) to activate the deactivated PSC. 8) Host behind MS or the MS itself (depending on the type of the MS) pings host behind BS.
Pass verdict criterion	Successfully MS initiated sleep mode. MS awakes in order to receive traffic reception, re-initiates sleep mode and awakes again in order to send traffic.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.8.1   Setup of MS initiated Sleep Mode

Test Description			
Identifier:	**TD_SC1g_MS_SLM_REG_00**		
Description:	Verify the Sleep Mode parameters during registration.		
Pre-test conditions:	MS is performing network entry.		
Step	**Test Sequence**		

1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs	OK	NOK
2	BS sends REG-RSP - with response set to OK, - with TLVs that are present in the REG-REQ, and with values that do not enable a feature disabled/not supported by MS. - with idle mode timeout TLV.	OK	NOK
Observations			

8.8.2   MS initiated Sleep Mode

Test Description			
Identifier:	**TD_SC1g_MS_SLM_INI_00**		
Description:	Verify the successful completion of MS initiated Sleep Mode.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more MOB_SLP-REQs (Initiated by Trigger in Table 7.1 / Item 8) - with one or more PSC definitions and activating one PSC, - or only defining a PSC.	OK	NOK
2	BS sends MOB_SLP-RSP - if MOB_SLP-REQ defined and activated a PSC, then MOB_SLP-RSP confirms and optionally reconfigures sleep mode parameters, - if MOB_SLP-REQ did only define a PSC, the MOB_SLP-RSP activates and possibly reconfigures sleep mode parameters.	OK	NOK
Observations			

8.8.3 Sleep Mode Verification

Test Description			
Identifier:	**TD_SC1g_MS_SLM_PRNG_00**		
Description:	Verify Sleep Mode.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. PSC is defined and activated with TRF-IND Required that includes DL connection. No data is to be sent. MS is in sleep mode.		
Step	**Test Sequence**	**Result**	
1	BS sends MOB_TRF-INDs - at least one MOB_TRF-IND during each listening window of the Power Saving Class, - with negative indication.	OK	NOK
2	MS may participate in periodic ranging. The successful periodic ranging does not deactivate any PSC.	OK	NOK
Observations			

8.8.4 BS initiated PING

Test Description			
Identifier:	**TD_SC1g_MS_SLM_DAT_00**		
Description:	Verify the successful completion of BS sleep mode deactivation.		
Pre-test conditions:	Sleep Mode is activated. Host behind BS pings host behind MS. PSC is defined and activated with TRF-IND Required that includes DL connection and TTWF (traffic trigger wakening flag) is set.		
Step	**Test Sequence**	**Result**	
1	BS sends MOB_TRF-IND - with positive indication.	OK	NOK
2	MS receives MOB_TRF_IND and deactivates PSC	OK	NOK
3	Data is transferred. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.8.5 MS initiated activation of deactivated PSC

Test Description			
Identifier:	**TD_SC1g_MS_SLM_INI_01**		
Description:	Verify the successful completion of MS activation of deactivated sleep mode.		
Pre-test conditions:	Sleep Mode is deactivated. No data to be sent.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more MOB_SLP-REQs activating the PSC (Initiated by Trigger in Table 7.1 / Item 8)	OK	NOK
2	BS sends MOB_SLP-RSP to confirm.	OK	NOK
3	BS sends MOB_TRF-INDs - at least one MOB_TRF-IND during each listening window of the Power Saving Class, - with negative indication.	OK	NOK
Observations			

8.8.6 MS initiated PING

Test Description			
Identifier:	**TD_SC1g_MS_SLM_DAT_01**		
Description:	Verify the successful completion of MS sleep mode deactivation.		
Pre-test conditions:	Sleep Mode is activated. Host behind MS pings host behind BS. PSC is defined and activated with TRF-IND Required that includes UL connection and TTWF (traffic trigger wakening flag) is set.		
Step	**Test Sequence**	**Result**	
1	MS sends Bandwidth Request Header and deactivates PSC.	OK	NOK
2	BS receives BW request header and deactivates PSC.	OK	NOK
3	Data is transferred. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.9 Scenario 1ha - MS initiated Idle Mode

Test scenario behaviour	
Ref	Scenario 1ha- MS Idle Mode
Goal	Verify MS initiated Idle Mode.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional. - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. **5) Trigger MS to initiate idle mode procedure. TABLE 7.1 / Item 10)** 6) Once, MS is in idle mode, host behind BS pings host behind MS. 7) BS Pages the MS and the MS performs Network Re-Entry. **8) Trigger MS to re-initiate idle mode procedure. TABLE7.1 / Item 10)** 9) Host behind MS or the MS itself (depending on the type of the MS) pings host behind BS. **10) Trigger MS to re-initiate idle mode procedure. TABLE 7.1 / Item 10)** 11) Power down MS.
Pass verdict criterion	Successful exchange of Ping Traffic and DL/UL data transfer.
Final Verdict	PASS	FAIL
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.9.1 MS initiated Idle Mode

Test Description			
Identifier:	**TD_SC1h_MS_IDM_REG_00**		
Description:	Verify the Idle Mode parameters during registration.		
Pre-test conditions:	MS is performing network entry.		
Step	**Test Sequence**	Result	**Result**
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs - With bit#2 = 1 in the "Mobility features supported" TLV.	OK	NOK
2	BS sends REG-RSP - with response set to OK, - with TLVs that are present in the REG-REQ, and with values that do not enable a feature disabled/not supported by MS. - Mobility feature supported: bit#1 (SLM) equals 0. bit#2 (Idle) equals 1 - with idle mode timeout TLV.	OK	NOK
3	Fill the gap with the Idle Mode Timer value assigned to the MS in the REG-RSP. **Idle Mode Timer:**		
Observations			

Test Description			
Identifier:	**TD_SC1h_MS_IDM_DREG_00**		
Description:	Verify the successful completion of MS initiated Idle Mode.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent.		
Step	**Test Sequence**	Result	**Result**
1	MS sends 1 or more DREG-REQs with Deregistration Request Code 0x01	OK	NOK
2	BS sends DREG-CMD with Action Code 0x05 - acknowledging MS-initiated Idle Mode, or - if DREG-CMD (with Action Code 0x06) requests re-transmission of DREG-REQ with Deregistration Request ode 0x01, then MS sends again DREG-REQ with Deregistration Request Code 0x01.	OK	NOK
Observations			

8.9.2 Idle Mode Verification

Test Description			
Identifier:	**TD_SC1h_MS_IDM_INI_00**		
Description:	Verify Idle Mode.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent. MS is in idle mode.		
Step	**Test Sequence**	**Result**	
1	BS must send MOB_PAG-ADVs. - during the MS Paging Listening Interval, - does not contain MS MAC address hash	OK	NOK
2	After Paging listening interval, MS remains in idle mode.	OK	NOK
Observations			

8.9.3 BS initiated PING

Test Description			
Identifier:	**TD_SC1h_MS_IDM_DAT_00**		
Description:	Verify the successful completion of Idle Mode Termination.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent. MS is in idle mode. Host behind BS pings the MS or pings host behind MS (depending on the type of the MS).		
Step	**Test Sequence**	**Result**	
1	BS sends MOB_PAG-ADVs - during the MS Paging Listening Interval, - with the MSs MAC address hash.	OK	NOK
2	MS performs Network Re-Entry from Idle mode.	OK	NOK
3	Data is transferred. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.9.4 MS initiated Idle Mode (Re-initiation)

Test Description			
Identifier:	**TD_SC1h_MS_IDM_DREG_01**		
Description:	Verify the successful completion of MS initiated Idle Mode.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more DREG-REQs.	OK	NOK
2	BS sends DREG-CMD - acknowledging MS-initiated Idle Mode, or - if DREG-CMD requests re-transmission of DRERG-REQ, then MS sends again DREG-REQ.	OK	NOK
Observations			

8.9.5 MS initiated PING

Test Description			
Identifier:	**TD_SC1h_MS_IDM_DAT_01**		
Description:	Verify the successful completion of Idle Mode Termination.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent. MS is in idle mode. Host behind MS or the MS itself (depending on the type of the MS) pings host behind BS.		
Step	**Test Sequence**	**Result**	
1	MS performs Network Re-Entry from Idle mode.	OK	NOK
2	Data is transferred. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.9.6 MS initiated Idle Mode (Re-initiation)

Test Description			
Identifier:	**TD_SC1h_MS_IDM_DREG_02**		
Description:	Verify the successful completion of idle mode initiation.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more DREG-REQs.	OK	NOK
2	BS sends DREG-CMD - acknowledging MS-initiated Idle Mode, or - if DREG-CMD requests re-transmission of DREG-REQ, then MS sends again DREG-REQ.	OK	NOK
Observations			

8.9.7 Power Down Final Test

Test Description			
Identifier:	**TD_SC1h_MS_IDM_DOWN_00**		
Description:	Verify the successful completion of Power Down Update.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent. MS is in idle mode.		
Step	**Test Sequence**	**Result**	
1	MS sends RNG-REQ - with Power_Down_Indicator TLV.	OK	NOK
2	BS sends RNG-RSP - confirming the power down.	OK	NOK
Observations			

8.10   Scenario 1hb - BS initiated Idle Mode

Test scenario behaviour	
Ref	Scenario 1hb- BS Initiated Idle Mode
Goal	Verify BS initiated Idle Mode.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional. - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. **5) Trigger BS to initiate idle mode procedure. (Table 7.1 / Item 10)** 6) Once, MS is in idle mode, host behind BS pings the MS or pings host behind MS (depending on the type of the MS).
Pass verdict criterion	Successful exchange of Ping Traffic and DL/UL data transfer.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.10.1 Setup for BS initiated Idle Mode

Test Description			
Identifier:	**TD_SC1h_BS_IDM_REG_00**		
Description:	Verify the Idle Mode parameters during registration.		
Pre-test conditions:	MS is performing network entry.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs - With bit#2 = 1 (Idle Mode supported) in the "Mobility features supported" TLV. - Extended Capability: bit#3 (extended BS-initiated idle mode) equals 1 if the MS supports action code 0x07.	OK	NOK
2	BS sends REG-RSP - with response set to OK. - with TLVs that are present in the REG-REQ, and with values that do not enable a feature disabled/not supported by MS. - With idle mode timeout TLV - Mobility feature supported: bit#1 (SLM) equals 0, bit#2 (Idle) equals 1 - Extended Capability: bit#3 (extended BS-initiated idle mode) equals 1 if the BS supports action code 0x07.	OK	NOK
3	Fill the gap with the Idle Mode Timer value assigned to the MS in the REG-RSP.		
Observations			

8.10.2 BS Triggers Idle Mode

Test Description			
Identifier:	**TD_SC1h_BS_IDM_DREG_00**		
Description:	Verify the successful completion of BS initiated Idle Mode.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent.		
Step	**Test Sequence**	**Result**	
1	BS sends unsolicited DREG-CMD - with action code = 0x05 or 0x07 and optional REQ-duration TLV. Action code = 0x07 shall only be sent if Extended Capability: bit#3 the REG-RSP meaning extended BS-initiated idle mode was equal 1. Note: In case of action code 0x05, the BS may include the REQ-duration TLV. The value of the REQ-duration TLV may be 0.	OK	NOK
2	MS send DREG-REQ - with De-Registration Request Code = 0x02 in order to start Idle Mode.	OK	NOK
Observations			

8.10.3 BS initiated PING

Test Description			
Identifier:	**TD_SC1h_BS_IDM_DAT_00**		
Description:	Verify the successful completion of Idle Mode Termination.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. No data is to be sent. MS is in idle mode. Host behind BS pings the MS or pings host behind MS (depending on the type of the MS).		
Step	**Test Sequence**	**Result**	

1	BS sends MOB_PAG-ADVs
	
	    - during the MS Paging Listening Interval,
	    - with the MSs MAC address hash.
		OK	NOK

2	MS performs Network Re-Entry from Idle mode.	OK	NOK
3	Data is transferred. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.11   Scenario 1i – ERT-VR

Test scenario behaviour	
Ref	Scenario 1a – Basic Configuration
Goal	Checks that QoS characteristics of the ERT-VR service are not damaged by any simultaneous transmission through a BE service flow.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Disable (Initiated by Trigger in Table 7.1 / Item 4). - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1 (Initiated by Trigger in Table 7.1 / Item 3).. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ' - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 UL and 1 DL ERT-VR and 1 UL and 1 DL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. 5) Carry out 1 UL and 1 DL ERT-VR (Table 7.1 / Item 11). 6) Carry out simultaneous UL data transfer.
Pass verdict criterion	QoS characteristics of the ERT-VR service are not damaged by any simultaneous transmission through a BE service flow.

Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.				

8.11.1 Traffic Connection Establishment

8.11.1.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC1i_DSA_00**		
Description:	Verify the successful completion of BS initiated ERT-VR service flow establishment.		
Pre-test conditions:	ERT-VR service is pre-provisioning		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ - to define 2 UL and 2 DL service flows, - Scheduling type for one UL SF is BE and is ertPS for the other UL SF. Data Delivery Service for one DL SF is BE and is ERT-VR for the other DL SF. For the ERT-VR (ertPS) SF the following QoS parameters shall be set: - with Service Flow Scheduling Type set to ertPS (UL only), - with Service Flow Data Delivery Type set to ERT-VR (DL only), - with Maximum Sustained Traffic Rate, - with Minimum Reserved Traffic Rate, - unsolicited grant interval (UL only), - with Maximum Latency, - with Request/Transmission Policy, - Tolerated Jitter, - Traffic Priority, - not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs.	OK	NOK
3	BS sends DSA-ACK to each MS - Confirmation Code set to OK.	OK	NOK
Observations			

8.11.2 User Data Transfer

8.11.2.1 File Data Transfer

Test Description			
Identifier:	**TD_SC1i_DAT_00**		
Description:	Verify the successful data transfer of the data delivery services ERT-VR.		
Pre-test conditions:	1 UL ERT-VR service flow established and 1 UL BE service flow established.		
Step	**Test Sequence**	**Result**	
1	Are the QoS characteristics of the ERT-VR service not damaged by the simultaneous transmission through a BE service flow?	OK	NOK
Observations			

8.12 Scenario 1j - MS initiated Handover

Test scenario behaviour	
Ref	Scenario 1j- Handover
Goal	Verify MS initiated handover.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional. - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - TPC Mode: Open Loop. - SBS & TBS Transmit on same frequency. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the SBS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number. - TPC mode: Open loop. - SBS and TBS transmit on the same frequency.
Initial State	MS is deregistered from each BS. MS is switched off. BSs remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure and create UL and DL service flows. 4) Ensure the target BS is on. 5) Use the DCD for BS **(Table 7.1 / Item 13)** and Fade the Serving BS signal in order to trigger handover initiation or trigger directly at the MS **(Table 7.1 / Item 12)**. 6) Carry out DL and UL data transfer with TBS a) via the PING procedure: Host behind the BS pings the MS or pings the host behind the MS (depending on the type of MS) Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the BS.
Pass verdict criterion	Successful handover from SBS to TBS and PING procedure with TBS.
Final Verdict	**PASS** **FAIL**
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.12.1 Neighbor Advertisement

Test Description			
Identifier:	**TD_SC1j_MS_GHF_ADV_00**		
Description:	Verify the Neighbor Advertisement and UL-MAPs of SBS and TBS.		
Pre-test conditions:	Successful completion of initial network entry and service flow establishment.		
Step	**Test Sequence**	**Result**	
1	SBS and TBS send MOB_NBR-ADV.	OK	NOK
Observations			

8.12.2 Handover Decision

Test Description			
Identifier:	**TD_SC1j_MS_GHF_HOD_00**		
Description:	Verify the successful completion of MS initiated Handover Decision.		
Pre-test conditions:	Successful completion of initial network entry. MS received Neighbor Advertisement from Serving BS.		
Step	**Test Sequence**	**Result**	
1	When trigger condition are met MS sends 1 or more MOB_MSHO-REQ to SBS	OK	NOK
2	BS sends MOB_BSHO-RSP	OK	NOK
3	MS optionally sends MOB_HO-IND to serving BS - with final indication that it is about to perform a HO.	OK	NOK
Observations			

8.12.3 Handover Initiation

Test Description			
Identifier:	**TD_SC1j_MS_GHF_NWE_00**		
Description:	Verify the successful completion of Handover Initiation from serving BS to target BS.		
Pre-test conditions:	MS has decided to handover from serving BS to target BS.		
Step	**Test Sequence**	**Result**	
1	MS optionally sends MOB_HO-IND to serving BS - with final indication that it is about to perform a HO.	OK	NOK
2	MS sends Handover CDMA ranging codes in the Initial Ranging Interval to the target BS or uses Fast Ranging IE.	OK	NOK
3	MS finishes Network Entry with TBS and the BS updates the CIDs.	OK	NOK
Observations			

8.12.4 Handover Verification

Test Description			
Identifier:	**TD_SC1j_MS_GHF_DAT_00**		
Description:	Verify the successful completion of data transfer via the PING procedure.		
Pre-test conditions:	Handover completes at TBS.		
Step	**Test Sequence**	**Result**	
1	Host behind the BS pings the MS or pings the host behind the MS (depending on the type of the MS). - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
2	Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the BS. - The CID of the UL MAC PDU (EchoRequest) is the Transport Cid of the UL Service Flow. - The CID of the DL MAC PDU (EchoReply) is the Transport Cid of the DL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.13   Scenario 2 - P2MP Configuration

Test scenario behaviour	
Ref	Scenario 2 – P2MP Configuration
Goal	Verify the exchange of Ping Traffic and data transfer in a P2MP configuration.
Wave	W1
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional - HARQ: Optional - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for all MSs and each MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MSs are switched on. BS remains on.

Test process	1) Start the monitor message capture, if available.
	2) Switch on the MSs.
	3) Carry out the Network Entry procedure for each MS simultaneously.
	4) Carry out 1 DL and 1 UL BS initiated BE service flow for each MS simultaneously.
	5) Carry out DL and UL data transfer for each MS simultaneously
	  a) via the PING procedure Host behind the BS pings the MS or pings the host behind the MS (depending on the type of MS)
	                                                      Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the BS
	  b) via freestyle Best Effort (such as FTP) data transfer (5 minute transfer for some stability evaluation).

Pass verdict criterion	Successful exchange of Ping Traffic and DL/UL data transfer in a P2MP configuration.
Final Verdict	**PASS**			**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.13.1 Network Entry procedure

8.13.1.1 Ranging

Test Description			
Identifier:	**TD_SC2_RLC_IRNG_00**		
Description:	Verify that a BS sends broadcast messages (DL-MAP, UL-MAP, UCD, DCD) when switched on and that all MSs synchronize with the BS. Verify the successful completion of initial ranging.		
Pre-test conditions:	BS and all MSs are switched off. BS is configured to transmit in the lowest channel (f_L). Then BS and all MSs are switched on.		
Step	**Test Sequence**	**Result**	
1	BS sends DL-MAP in every frame.	OK	NOK
2	BS sends UL-MAP if appropriate.	OK	NOK
3	BS sends DCD every ten second(max).	OK	NOK

4	BS sends UCD every ten second(max).	OK	NOK
	For each MS the following applies		
5	MS synchronizes to the BS.	OK	NOK
6	MS sends initial CDMA ranging codes in the Initial Ranging Region.	OK	NOK
7	BS sends RNG-RSP - With optional Power, Time or Frequency adjustments. - With ranging status = continue or success	OK	NOK
8	If the Ranging Status = continue in Step 7, MS sends initial CDMA ranging code in the Periodic Ranging Region until receiving: - RNG-RSP (with Ranging Status = success), - or CDMA_Allocation_IE in UL-MAP.	OK	NOK
9	BS sends - RNG-RSP (with Ranging Status = success) followed by CDMA_Allocation_IE, - or CDMA_Allocation_IE only.	OK	NOK
10	MS sends RNG-REQ.	OK	NOK
11	BS sends RNG-RSP with ranging status = success	OK	NOK
12	Fill the table below with the MSs MAC address read in the corresponding RNG-REQ and determine MAC Address.	OK	NOK
13	Fill the table below with the Basic Cid and Primary Management Cid assigned to the MS in the corresponding RNG-RSP.	OK	NOK

Observations

		TD_SC2_RLC_IRNG_00_List		
Nr.	**Parameters**	**MS1**	**MS2**	**MS3**
1	MAC Address			
	Basic CID			
	Primary CID			

8.13.1.2 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC2_RLC_SBC_00**		
Description:	Verify the successful completion basic capabilities negotiation.		
Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	Each MSs sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - with capabilities set to on. - Are TLVs defined appropriate to the device capabilities?	OK	NOK
2	BS sends SBC-RSP to each MS - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.13.1.3 Registration

Test Description			
Identifier:	**TD_SC2_RLC_REG_00**		
Description:	Verify the successful completion of registration.		
Pre-test conditions:	Successful completion of basic capabilities negotiation. No authentication is required.		
Step	**Test Sequence**	**Result**	
1	Each MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs, - including valid TLVs defined for the appropriate Wave.	OK	NOK
2	BS sends REG-RSP to each MS - with response set to OK. - with valid TLVs that are present in the REG-REQ are in the appropriate Wave, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.13.2 Traffic Connection Establishment

8.13.2.1 Service Flow Provisioning

<table>
<tr><td colspan="5" align="center">Test Description</td></tr>
<tr><td>Identifier:</td><td colspan="4">TD_SC2_RLC_DSA_00</td></tr>
<tr><td>Description:</td><td colspan="4">Verify the successful completion of service flow establishment as in TD_SC2_RLC_DSA_List</td></tr>
<tr><td>Pre-test conditions:</td><td colspan="4">Successful completion of registration and 1 DL and 1 UL Service Flows are Pre-Provisioned at the BS for all three MS and each MS can support the Pre-Provisioned Service Flows.</td></tr>
<tr><td align="center">Step</td><td colspan="2" align="center">Test Sequence</td><td colspan="2" align="center">Result</td></tr>
<tr><td align="center">1</td><td colspan="2">BS sends 1 or more DSA-REQ to each MS

- not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">2</td><td colspan="2">MSs send 1 or more DSA-RSP

- not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">3</td><td colspan="2">BS sends DSA-ACK to each MS

- Confirmation Code set to OK.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td>Observations</td><td colspan="4"></td></tr>
</table>

<table>
<tr><td></td><td colspan="4" align="center">TD_SC2_RLC_DSA_List</td></tr>
<tr><td align="center">Nr.</td><td align="center">Stimulate the BS to use the following parameters</td><td align="center">Status</td><td align="center">Run</td><td align="center">Result</td></tr>
<tr><td></td><td>UL DSA-REQ</td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>Service Flow Scheduling Type set to BE</td><td>m</td><td>Yes/No</td><td></td></tr>
<tr><td></td><td>DL DSA-REQ</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Service Flow Scheduling Type set to BE</td><td>m</td><td>Yes/No</td><td></td></tr>
</table>

8.13.3 User Data Transfer

8.13.3.1 PING

Test Description			
Identifier:	**TD_SC2_RLC_DAT_00**		
Description:	Verify the successful completion of data transfer via the PING procedure to three MS.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number.		
Step	**Test Sequence**	**Result**	
1	Host behind the BS pings the MS or pings the host behind MS (depending on the type of the MS). - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow.	OK	NOK
2	The Host behind MS or the MS itself (depending on the type of the MS) pings the host behind the BS. - The CID of the UL MAC PDU (EchoRequest) is the Transport Cid of the UL Service Flow. - The CID of the DL MAC PDU (EchoReply) is the Transport Cid of the DL Service Flow.	OK	NOK
Observations			

8.13.3.2 File Data Transfer

Test Description			
Identifier:	**TD_SC2_RLC_DAT_01**		
Description:	Verify the successful completion of file data transfer for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from MS1, MS2 and MS3 to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to MS1, MS2 and MS3 been transferred correctly?	OK	NOK
Observations			

8.14   Scenario 2A0 – DL PUSC with MIMO Matrix A and UL PUSC with Collaborative SM

Test scenario behaviour	
Ref	11.8.3.7.5, 11.8.3.7.6 [2]
Goal	Verify DL and UL data transfer between BS and 2 MS when DL PUSC with Matrix A MIMO and UL PUSC with Collaborative SM is activated.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 2 MS+ 1 BS

Test Condition	- Frequency channel: Middle.
	- TX Power Level: Medium.
	- DL 2-antenna STC matrix A: Enable in MS and BS.
	- DL 2-antenna STC matrix B: disable in BS (Table 7.1 / Item 29)
	- DL zone type. PUSC.
	- UL Single-antenna Collaborative SM: Enable.
	- UL zone type. PUSC.
	- CQI Channel for physical CINR Feedback: Enable.
	- ARQ: Disable.
	- HARQ: Optional (The following two sub-bullets apply to the case that HARQ is disabled.)
	  - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set -ACK disable = 1.
	  - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ').
	- Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3.
	- SS Management: Unmanaged.
	- 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for all MSs and each MS can support the Pre-Provisioned Service Flows.
	- Service Flows Classification Rule: Based on IP address/port number.

Initial State	MS is deregistered from BS. MSs are switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MSs. 3) Carry out the Network Entry procedure for each MS simultaneously. 4) Carry out 1 DL and 1 UL BS initiated BE service flow for each MS simultaneously. 5) **BS allocates Fast feedback channel for each MS. (Table 7.1 / item 2).** 6) Carry out for each MS simultaneously: DL data transfer with 2-antenna STC matrix A, and UL data transfer with Single-antenna Collaborative SM, via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criteria	Successful data transfer in UL and DL.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.14.1 Network Entry procedure

8.14.1.1 Capabilities Negotiation

Test Description	
Identifier:	**TD_SC2A0_MIMO_SBC_00**
Description:	Verify the successful completion of basic capabilities negotiation with Matrix A MIMO and Collaborative SM support.

Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - SS Demodulator for MIMO support TLV: 2-Antenna STC Matrix A, - SS Modulator for MIMO support TLV: Capable of single antenna transmission, Capable of collaborative SM with one antenna. - Are TLVs defined appropriate to the required device capabilities?	OK	NOK
2	BS sends SBC-RSP - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.14.2 User Data Transfer

8.14.2.1 MAP

Test Description			
Identifier:	**TD_SC2A0_MIMO_DAT_00**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends UL-MAP or compressed UL-MAP with - MIMO UL Basic IE or HARQ_UL_MAP_IE()+ UL HARQ Chase Sub-Burst IE() with ACK Disable = 1 or 0.. or HARQ_UL_MAP_IE()+ MIMO UL Chase HARQ Sub-Burst IE() with ACK Disable = 1 or 0..	OK	NOK
2	BS sends DL-MAP or compressed DL-MAP with - STC_DL_ZONE_IE() - DL_MAP_IE() or MIMO DL Basic IE or HARQ_DL_MAP_IE()+ MIMO DL Chase HARQ Sub-Burst IE() with ACK Disable = 1 or 0..	OK	NOK
3	BS sends UL-MAP, compressed UL-MAP or UCD to each MS with - Fast Feedback Allocation IE or fast-feedback region TLV. - CQICH Allocation IE, allocating the fast-feedback slots.	OK	NOK
4	BS sends UCD to each MS with - Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.	OK	NOK
5	MS sends physical CINR report as indicated in the CQICH Allocation IE.	OK	NOK
Observations			

8.14.2.2 Data grants for the MS

Test Description			
Identifier:	**TD_SC2A0_MIMO_DAT_01**		
Description:	Verify the generation of data grants for the MS in the UL/DL PUSC zone.		
Pre-test conditions:	Successful network entry.		
Step	**Test Sequence**	**Result**	
1	Are MAP message sent in the DL PUSC zone?	OK	NOK
2	Has the BS sent DL data for each MS in the appropriate DL PUSC zone?	OK	NOK
3	Has the BS generated UL grants for each MS in the appropriate UL PUSC zone?	OK	NOK
Observations			

8.14.2.3 Data Transfer

Test Description			
Identifier:	**TD_SC2A0_MIMO_DAT_02**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from each MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to each MS been transferred correctly?	OK	NOK
Observations			

8.15 Scenario 2A1 – DL PUSC with MIMO Matrix B and UL PUSC With Collaborative SM

Test scenario behaviour	
Ref	11.8.3.7.5, 11.8.3.7.6 [2]
Goal	Verify DL and UL data transfer between BS and 2 MS when DL PUSC with Matrix B MIMO and UL PUSC With Collaborative SM is activated.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 2 MS+ 1 BS
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - DL 2-antenna STC matrix A: Enable in MS and BS. - DL 2-antenna STC matrix B: Enable in MS and BS. - DL zone type. PUSC. - UL Single-antenna Collaborative SM: Enable. - UL zone type. PUSC. - CQI Channel for physical CINR Feedback: Enable. - ARQ: Disable. - HARQ: Enable. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for all MSs and each MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MSs are switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MSs. 3) Carry out the Network Entry procedure for each MS simultaneously. 4) Carry out 1 DL and 1 UL BS initiated BE service flow for each MS simultaneously. 5) BS allocates Fast feedback channel for each MS. (Table 7.1 / Item 2). 6) If the field value of 'MIMO_permutation_feedback_cycle' in the CQICH allocation IE() is set for MIMO mode selection by the BS, the MS shall provide MIMO Mode selection via fast-feedback special codeword. 7) Carry out for each MS simultaneously: 8) DL data transfer with 2-antenna STC matrix B, and UL data transfer with Single-antenna Collaborative SM, via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criteria	Successful data transfer in UL and DL.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.				

8.15.1 Network Entry procedure

8.15.1.1 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC2A1_MIMO_SBC_00**		
Description:	Verify the successful completion of basic capabilities negotiation with Matrix B MIMO and Collaborative SM support.		
Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - SS Demodulator for MIMO support TLV: 2-Antenna STC Matrix B, - SS Modulator for MIMO support TLV: Capable of single antenna transmission, Capable of collaborative SM with one antenna, - Are TLVs defined appropriate to the required device capabilities?	OK	NOK
2	BS sends SBC-RSP - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.15.2 User Data Transfer

8.15.2.1 MAP

<table>
<tr><td colspan="4" align="center">Test Description</td></tr>
<tr><td>Identifier:</td><td colspan="3">TD_SC2A1_MIMO_DAT_00</td></tr>
<tr><td>Description:</td><td colspan="3">Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.</td></tr>
<tr><td>Pre-test conditions:</td><td colspan="3">1 UL and 1 DL Service Flow is established. If MIMO mode selection feedback is enabled by the BS, the MS is expected to select MIMO Matrix B. If MIMO mode selection feedback is not enabled by the BS, the BS is expected to select MIMO Matrix B. The MS or BS is expected to select MIMO Matrix B, if MIMO mode selection was enabled by the BS, without a special test trigger since the MS and BS will be in optimal RF conditions for MIMO matrix B (strong signal conditions with separate cable between each BS transmitter and MS receiver).</td></tr>
<tr><td align="center">Step</td><td align="center">Test Sequence</td><td colspan="2" align="center">Result</td></tr>
<tr><td align="center">1</td><td>BS sends UL-MAP or compressed UL-MAP with

- HARQ_UL_MAP_IE()+ UL HARQ Chase Sub-Burst IE()
or HARQ_UL_MAP_IE()+ MIMO UL Chase HARQ Sub-Burst IE()</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">2</td><td>BS sends DL-MAP or compressed DL-MAP with

- STC_DL_ZONE_IE()
- HARQ_DL_MAP_IE()+ MIMO DL Chase HARQ Sub-Burst IE()</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">3</td><td>BS sends UL-MAP, compressed UL-MAP or UCD to each MS with

- CQICHAllocation IE or fast-feedback region TLV.
- CQICH Allocation IE, allocating the fast-feedback slots, with MIMO mode selection, if MIMO mode selection was enabled by the BS.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">4</td><td>BS sends UCD to each MS with

- Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">5</td><td>MS sends physical CINR report as indicated in the CQICH Allocation IE.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">6</td><td>MS sends special CQICH code to indicate preference for MIMO Matrix B if MIMO mode selection was enabled by the BS</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td colspan="4">Observations</td></tr>
</table>

8.15.2.2 Data grants for the MS

Test Description			
Identifier:	**TD_SC2A1_MIMO_DAT_01**		
Description:	Verify the generation of data grants for the MS in the UL/DL PUSC zone. Note that UL collaborative SM does not occur if a frame only has an UL allocation for a single MS.		
Pre-test conditions:	Successful network entry.		
Step	**Test Sequence**	**Result**	
1	Are MAP message sent in the DL PUSC zone?	OK	NOK
2	Has the BS sent DL data for each MS in the appropriate DL PUSC zone?	OK	NOK
3	Has the BS generated UL grants for each MS in the appropriate UL PUSC zone?	OK	NOK
Observations			

8.15.2.3 Data Transfer

Test Description			
Identifier:	**TD_SC2A1_MIMO_DAT_02**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from each MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to each MS been transferred correctly?	OK	NOK
Observations			

8.16 Scenario 2B0 – Beam Forming with DL AMC with Dedicated Pilots and UL AMC

Test scenario behaviour	
Ref	11.8.3.7.16 [2]
Goal	Verify DL and UL data transfer when Beam Forming with UL AMC and DL AMC with Dedicated Pilots is activated.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 1 MS+ 1 BS
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Beam Forming: Enable. - UL zone type: AMC2x3 zone. - DL zone type: AMC2x3 zone. - Dedicated pilots in AMC2x3 zone: Enable. - CQI Channel for physical CINR Feedback: Enable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows (BS shall send DSA-REQ to the MS to establish the Service Flow and BS may activate the Service Flow using DSC-REQ request). - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. 5) BS allocates Fast feedback channel for MS. **(Table 7.1 / item 2).** 6) Carry out DL and UL data transfer in the AMC zone and Beam Forming is activated, via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criteria	Successful data transfer in UL and DL.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.16.1 Network Entry procedure

8.16.1.1 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC2BO_BF_SBC_00**		
Description:	Verify the successful completion of basic capabilities negotiation with AMC zone and Beam Forming supported.		
Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - SS Modulator for MIMO support TLV: Capable of single antenna transmission, OFDMA SS Permutation support: AMC 2x3 support, - Are TLVs defined appropriate to the required device capabilities?	OK	NOK
2	BS sends SBC-RSP - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.16.2 User Data Transfer

8.16.2.1 MAP

Test Description			
Identifier:	**TD_SC2BO_BF_DAT_00**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends UL-MAP or compressed UL-MAP to the MS with - OFDMA uplink ZONE IE format, - PAPR reduction/Safety zone/Sounding zone allocation IE(), - UL_Sounding_Command_IE() - HARQ_UL_MAP_IE()+ UL HARQ Chase Sub-Burst IE() with ACK Disable = 1 or direct UL allocation to UIUC1 to 10	OK	NOK
1	BS sends DL-MAP or compressed DL-MAP to the MS with - OFDMA downlink STC_DL_Zone IE format indicating dedicated pilots, - HARQ_DL_MAP_IE()+ DL HARQ Chase Sub-Burst IE() with ACK Disable = 1	OK	NOK
2	BS sends UL-MAP, compressed UL-MAP, or UCD to the MS with - Fast Feedback Allocation IE orfast-feedback region TLV. - CQICH Allocation IE, allocating the fast-feedback slots.	OK	NOK
3	BS sends UCD to the MS with - Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.	OK	NOK
4	MS sends physical CINR report as indicated in the CQICH Allocation IE.	OK	NOK
Observations			

8.16.2.2 Data grants for the MS

Test Description			
Identifier:	**TD_SC2BO_BF_DAT_01**		
Description:	Verify the generation of data grants for the MS in the UL/DL AMC zone.		
Pre-test conditions:	Successful network entry.		
Step	**Test Sequence**	**Result**	
1	Are MAP message sent in the DL PUSC zone?	OK	NOK
2	Has the BS sent DL data for the MS in the appropriate DL AMC zone?	OK	NOK
3	Has the BS generated UL grants for each MS in the appropriate UL AMC zone?	OK	NOK
Observations			

8.16.2.3 Data Transfer

Test Description			
Identifier:	**TD_SC2BO_BF_DAT_02**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.17 Scenario 2B1 – Beam Forming with DL PUSC with Dedicated Pilots and UL PUSC without channel rotation

Test scenario behaviour	
Ref	11.8.3.7.16 [2]
Goal	Verify DL and UL data transfer when Beam Forming with UL PUSC without channel rotation and DL PUSC with dedicated Pilots is activated.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 1 MS+ 1 BS
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Beam Forming: Enable. - UL zone type: PUSC zone without channel rotation. - DL zone type: PUSC zone. - Dedicated pilots in PUSC zone: Enable. - CQI Channel for physical CINR Feedback: Enable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum® Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. 5) BS allocates Fast feedback channel for MS. **(Table 7.1 / item 2).** 6) Carry out DL and UL data transfer in the PUSC zone and Beam Forming is activated, via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criteria	Successful data transfer in UL and DL.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.17.1 Network Entry procedure

8.17.1.1 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC2B1_BF_SBC_00**		
Description:	Verify the successful completion of basic capabilities negotiation with PUSC zone without channel rotation and Beam Forming supported.		
Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs, - SS Modulator for MIMO support TLV: Capable of single antenna transmission, - Are TLVs defined appropriate to the required device capabilities?	OK	NOK
2	BS sends SBC-RSP - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.17.2 User Data Transfer

8.17.2.1 MAP

Test Description			
Identifier:	TD_SC2B1_BF_DAT_00		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends UL-MAP or compressed UL-MAP to the MS with - OFDMA uplink ZONE IE format, PAPR reduction/Safety zone/Sounding zone allocation IE(), - UL_Sounding_Command_IE() - HARQ_UL_MAP_IE()+ UL HARQ Chase Sub-Burst IE() with ACK Disable = 1 or direct UL allocation to UIUC1 to 10.	OK	NOK
1	BS sends DL-MAP or compressed DL-MAP to the MS with - OFDMA downlink STC_DL_Zone IE format indicating dedicated pilots - HARQ_DL_MAP_IE()+ DL HARQ Chase Sub-Burst IE() with ACK Disable = 1,	OK	NOK
2	BS sends UL-MAP, compressed UL-MAP, or UCD to the MS with - Fast Feedback Allocation IE or fast-feedback region TLV. - CQICH Allocation IE, allocating the fast-feedback slots.	OK	NOK
3	BS sends UCD to the MS with - Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.	OK	NOK
4	MS sends physical CINR report as indicated in the CQICH Allocation IE.	OK	NOK
Observations			

8.17.2.2 Data grants for the MS

Test Description			
Identifier:	**TD_SC2B1_BF_DAT_01**		
Description:	Verify the generation of data grants for the MS in the UL/DL PUSC zone.		
Pre-test conditions:	Successful network entry.		
Step	**Test Sequence**	**Result**	
1	Are MAP message sent in the DL PUSC zone?	OK	NOK
2	Has the BS sent DL data for the MS in the appropriate DL PUSC zone?	OK	NOK
3	Has the BS generated UL grants for each MS in the appropriate UL PUSC zone?	OK	NOK
Observations			

8.17.2.3 Data Transfer

Test Description			
Identifier:	**TD_SC2B1_BF_DAT_02**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.18 Scenario 2AB0 – DL PUSC with dedicated pilot with MIMO Matrix A and UL PUSC with Collaborative SM

Test scenario behaviour	
Ref	11.8.3.7.5, 11.8.3.7.6 [2]
Goal	Verify DL and UL data transfer between BS and 2 MS when DL PUSC with dedicated pilot with Matrix A MIMO and UL PUSC with Collaborative SM is activated.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 2 MS+ 1 BS
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - DL 2-antenna STC matrix A: Enable. - DL zone type. PUSC. - Dedicated pilots in PUSC zone: Enable. - UL Single-antenna Collaborative SM: Enable. - UL zone type. PUSC. - CQI Channel for physical CINR Feedback: Enable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for all MSs and each MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MSs are switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MSs. 3) Carry out the Network Entry procedure for each MS simultaneously. 4) Carry out 1 DL and 1 UL BS initiated BE service flow for each MS simultaneously. 5) BS allocates Fast feedback channel for each MS. **(Table 7.1 / item 2).** 6) Carry out for each MS simultaneously: DL data transfer with 2-antenna STC matrix A and dedicated pilot, and UL data transfer with Single-antenna Collaborative SM, via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).
Pass verdict criteria	Successful data transfer in UL and DL.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.18.1 Network Entry procedure

8.18.1.1 Capabilities Negotiation

Test Description			
Identifier:	**TD_SC2AB0_MIMO_SBC_00**		
Description:	Verify the successful completion of basic capabilities negotiation with Matrix A MIMO and Collaborative SM support.		
Pre-test conditions:	Successful completion of initial ranging.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more SBC-REQ - not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs, - indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs - SS Demodulator for MIMO support TLV: 2-Antenna STC Matrix A, - SS Modulator for MIMO support TLV: Capable of single antenna transmission, Capable of collaborative SM with one antenna, - Are TLVs defined appropriate to the required device capabilities?	OK	NOK
2	BS sends SBC-RSP - With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.18.2 User Data Transfer

8.18.2.1 MAP

Test Description			
Identifier:	**TD_SC2AB0_MIMO_DAT_00**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends UL-MAP or compressed UL-MAP to each MS with - MIMO UL Basic IE or HARQ_UL_MAP_IE()+ UL HARQ Chase Sub-Burst IE() with ACK Disable = 1 - OFDMA uplink ZONE IE format, PAPR reduction/Safety zone/Sounding zone allocation IE(), - UL_Sounding_Command_IE()	OK	NOK
2	BS sends DL-MAP or compressed DL-MAP to each MS with MIMO DL Basic IE or HARQ_DL_MAP_IE()+ MIMO DL Chase HARQ Sub-Burst IE() with ACK Disable = 1 OFDMA downlink STC_DL_Zone IE format indicating dedicated pilots,	OK	NOK
3	BS sends UL-MAP, compressed UL-MAP, or UCD to each MS with - Fast Feedback Allocation IE or fast-feedback region TLV. - CQICH Allocation IE, allocating the fast-feedback slots.	OK	NOK
4	BS sends UCD to each MS with - Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.	OK	NOK
5	MS sends physical CINR report as indicated in the CQICH Allocation IE.	OK	NOK
Observations			

8.18.2.2 Data grants for the MS

Test Description			
Identifier:	**TD_SC2AB0_MIMO_DAT_01**		
Description:	Verify the generation of data grants for the MS in the UL/DL PUSC zone.		
Pre-test conditions:	Successful network entry.		
Step	**Test Sequence**	**Result**	
1	Are MAP message sent in the DL PUSC zone?	OK	NOK
2	Has the BS sent DL data for each MS in the appropriate DL PUSC zone?	OK	NOK
3	Has the BS generated UL grants for each MS in the appropriate UL PUSC zone?	OK	NOK
Observations			

8.18.2.3 Data Transfer

Test Description			
Identifier:	**TD_SC2AB0_MIMO_DAT_02**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from each MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to each MS been transferred correctly?	OK	NOK
Observations			

8.19 Scenario 2AB1 – DL PUSC with dedicated pilot with Matrix B MIMO and UL PUSC with Collaborative SM

Test scenario behaviour	
Ref	11.8.3.7.5, 11.8.3.7.6 [2]
Goal	Verify DL and UL data transfer between BS and 2 MS when DL PUSC with dedicated pilot with Matrix B MIMO and UL PUSC with Collaborative SM is activated.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 2 MS+ 1 BS
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - DL 2-antenna STC matrix B: Enable. - DL zone type. PUSC. - Dedicated pilots in PUSC zone: Enable. - UL Single-antenna Collaborative SM: Enable. - UL zone type. PUSC. - CQI Channel for physical CINR Feedback: Enable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for all MSs and each MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MSs are switched off. BS remains on.

Test process	1) Start the monitor message capture, if available.
	2) Switch on the MSs.
	3) Carry out the Network Entry procedure for each MS simultaneously.
	4) Carry out 1 DL and 1 UL BS initiated BE service flow for each MS simultaneously.
	5) BS allocates Fast feedback channel for each MS. **(Table 7.1 / item 2).**
	6) Carry out for each MS simultaneously:
	    DL data transfer with 2-antenna STC matrix B and dedicated pilot,
	    and UL data transfer with Single-antenna Collaborative SM,
	    via freestyle BE (such as FTP) data transfer (5 minute transfer for some stability evaluation).

Pass verdict criteria	Successful data transfer in UL and DL.
Final Verdict	**PASS** **FAIL**
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.19.1 Network Entry procedure

8.19.1.1 Capabilities Negotiation

<table>
<tr>
<td colspan="4" align="center">Test Description</td>
</tr>
<tr>
<td>Identifier:</td>
<td colspan="3">TD_SC2AB1_MIMO_SBC_00</td>
</tr>
<tr>
<td>Description:</td>
<td colspan="3">Verify the successful completion of basic capabilities negotiation with Matrix B MIMO and Collaborative SM support.</td>
</tr>
<tr>
<td>Pre-test conditions:</td>
<td colspan="3">Successful completion of initial ranging.</td>
</tr>
<tr>
<td align="center">Step</td>
<td align="center">Test Sequence</td>
<td colspan="2" align="center">Result</td>
</tr>
<tr>
<td align="center">1</td>
<td>MS sends 1 or more SBC-REQ

- not more than PIC_SBC_REQ_MAX_RETRIES of SBC-REQs,
- indicating the support of the following capabilities using OFDMA Parameters Set and/or individual TLVs
- SS Demodulator for MIMO support TLV: 2-Antenna STC Matrix B,
- SS Modulator for MIMO support TLV:
Capable of single antenna transmission,
Capable of collaborative SM with one antenna,
- Are TLVs defined appropriate to the required device capabilities?</td>
<td align="center">OK</td>
<td align="center">NOK</td>
</tr>
<tr>
<td align="center">2</td>
<td>BS sends SBC-RSP

- With valid TLVs that are present in the SBC-REQ appropriate for the Wave capabilities,
and with values that do not enable a feature disabled/not supported by MS.</td>
<td align="center">OK</td>
<td align="center">NOK</td>
</tr>
<tr>
<td colspan="4">Observations

</td>
</tr>
</table>

8.19.2 User Data Transfer

8.19.2.1 MAP

Test Description			
Identifier:	**TD_SC2AB1_MIMO_DAT_00**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	BS sends UL-MAP or compressed UL-MAP to each MS with - MIMO UL Basic IE or HARQ_UL_MAP_IE()+ UL HARQ Chase Sub-Burst IE() with ACK Disable = 1 - OFDMA uplink ZONE IE format, PAPR reduction/Safety zone/Sounding zone allocation IE(), - UL_Sounding_Command_IE()	OK	NOK
2	BS sends DL-MAP or compressed DL-MAP to each MS with - MIMO DL Basic IE or HARQ_DL_MAP_IE()+ MIMO DL Chase HARQ Sub-Burst IE() with ACK Disable = 1 - OFDMA downlink STC_DL_Zone IE format indicating dedicated pilots.	OK	NOK
3	BS sends UL-MAP, compressed UL-MAP, or UCD to each MS with - Fast Feedback Allocation IE or fast-feedback region TLV. - CQICH Allocation IE, allocating the fast-feedback slots.	OK	NOK
4	BS sends UCD to each MS with - Size of the CQICH_ID field. In case of default value, the BS doesn't need to send the size of the CQICH_ID field.	OK	NOK
5	MS sends physical CINR report as indicated in the CQICH Allocation IE.	OK	NOK
Observations			

8.19.2.2 Data grants for the MS

Test Description			
Identifier:	**TD_SC2AB1_MIMO_DAT_01**		
Description:	Verify the generation of data grants for the MS in the UL/DL PUSC zone.		
Pre-test conditions:	Successful network entry.		
Step	**Test Sequence**	**Result**	
1	Are MAP message sent in the DL PUSC zone?	OK	NOK
2	Has the BS sent DL data for each MS in the appropriate DL PUSC zone?	OK	NOK
3	Has the BS generated UL grants for each MS in the appropriate UL PUSC zone?	OK	NOK
Observations			

8.19.2.3 Data Transfer

Test Description			
Identifier:	**TD_SC2AB1_MIMO_DAT_02**		
Description:	Verify the successful completion of data transfer in UL and DL for 5 minutes, with UL data transfer at the same time for MS1 and MS2 to test collaborative SM functionality.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from each MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to each MS been transferred correctly?	OK	NOK
Observations			

8.20   Scenario 2C0 – PHS IPv4

Test scenario behaviour	
Ref	6.3.14.7 [2], 11.13.19 [2]
Goal	Verify DL/UL UDP/IPv4 streams when IPv4 Header suppression is enabled.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Compressed-IPv4-Header: Disable. - PHS: Enable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service flow with classifier (Based on IP address/port number) and associated PHS rules.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure with negotiation of PHS support. 4) Carry out 1 DL and 1 UL BS initiated service flow defining a PHS rule by adding a new service flow using DSA-REQ with PHS rule or creating a PHS rule to an existing service flow using DSC messages. 5) Carry out DL and UL data transfer with PHS activated a) via UDP/IPv4 streaming (5 minute transfer for some stability evaluation).
Pass verdict criterion	Successful DL/UL data transfer with PHS activated.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.20.1 Network Entry procedure

8.20.1.1 Registration

Test Description			
Identifier:	**TD_SC2C0_PHS_REG_00**		
Description:	Verify the PHS support during registration.		
Pre-test conditions:			
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES REG-REQs, - PHS TLV indication PHS support.	OK	NOK
2	BS sends REG-RSP - with TLVs that are present in the REG-REQ, and with values that do not enable a feature disabled by MS, - confirming PHS support.	OK	NOK
Observations			

8.20.2 Traffic Connection Establishment

8.20.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC2C0_PHS_DSA_00**		
Description:	Verify the definition of PHS during traffic connection establishment as in TD_SC2C1_PHS_DSA_00_List.		
Pre-test conditions:	Registration completed.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ or DSC-REQ,, - not more than PIC_DSx_REQ_MAX_RETRIES DSA-REQs, - PHS Rule TLV defining at least, PHSI value referencing the suppressed byte string, the header information to be suppressed, and total number of bytes in the header to be suppressed and then restored in a service flow that uses PHS, - Packet classification rule TLV defining at least the Associated PHSI value for the UL SF.	OK	NOK
2	MS sends 1 or more DSA-RSP or DSC-RSP - not more than PIC_DSx_RSP_MAX_RETRIES DSA-RSPs or DSC-RSPs.	OK	NOK
3	BS sends DSA-ACK or DSC-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

TD_SC2C0_PHS_DSA_00_List			
Nr.	**Stimulate the BS to use the following parameters**	**Status**	**Run**	**Result**
1	UL DSA-REQ			
2	DL DSA-REQ			

8.20.3 User Data Transfer

8.20.3.1 Data Transfer

Test Description			
Identifier:	**TD_SC2C0_PHS_DAT_00**		
Description:	Verify the successful completion of data transfer in UL and DL.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. PHS Rule is defined and activated for each SF.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.21   Scenario 2C1 – PHS IPv6

Test scenario behaviour	
Ref	6.3.14.7 [2], 11.13.19 [2]
Goal	Verify DL/UL UDP/IPv4 streams when IPv6 Header suppression is enabled.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Compressed-IPv6-Header: Disable. - PHS: Enable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	6) Start the monitor message capture, if available. 7) Switch on the MS. 8) Carry out the Network Entry procedure with negotiation of PHS support. 9) Carry out 1 DL and 1 UL BS initiated service flow defining a PHS rule by adding a new service flow using DSA-REQ with PHS rule or creating a PHS rule to an existing service flow using DSC messages. 10) Carry out DL and UL data transfer with PHS activated a) via UDP/IPv6 streaming (5 minute transfer for some stability evaluation).
Pass verdict criterion	Successful DL/UL data transfer with PHS activated.

Final Verdict	**PASS**			**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.					

8.21.1 Network Entry procedure

8.21.1.1 Registration

Test Description			
Identifier:	**TD_SC2C1_PHS_REG_00**		
Description:	Verify the PHS support during registration.		
Pre-test conditions:			
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES REG-REQs, - PHS TLV indication PHS support.	OK	NOK
2	BS sends REG-RSP - with TLVs that are present in the REG-REQ, and with values that do not enable a feature disabled by MS, - confirming PHS support.	OK	NOK
Observations			

8.21.2 Traffic Connection Establishment

8.21.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC2C1_PHS_DSA_00**		
Description:	Verify the definition of PHS during traffic connection establishment as in TD_SC2C1_PHS_DSA_00_List.		
Pre-test conditions:	Registration completed.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ or DSC-REQ,,,, - not more than PIC_DSx_REQ_MAX_RETRIES DSA-REQs, - PHS Rule TLV defining at least, PHSI value referencing the suppressed byte string, the header information to be suppressed, and total number of bytes in the header to be suppressed and then restored in a service flow that uses PHS, - Packet classification rule TLV defining at least the Associated PHSI value.	OK	NOK
2	MS sends 1 or more DSA-RSP or DSC-RSP - not more than PIC_DSx_RSP_MAX_RETRIES DSA-RSPs or DSC-RSPs.	OK	NOK
3	BS sends DSA-ACK or DSC-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

TD_SC2C1_PHS_DSA_00_List			
Nr.	**Stimulate the BS to use the following parameters**	**Status**	**Run**	**Result**
1	UL DSA-REQ			
2	DL DSA-REQ			

8.21.3 User Data Transfer

8.21.3.1 Data Transfer

Test Description			
Identifier:	**TD_SC2C1_PHS_DAT_00**		
Description:	Verify the successful completion of data transfer in UL and DL.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. PHS Rule is defined and activated for each SF.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.22   Scenario 2D0 – ROHC UDP/IPv4 streams

This testing for ROHC requires NWG support in their release 1.5. This test case is kept for reference in this document and may need review before implementation.

Test scenario behaviour	
Ref	5.2.7 [2], 6.3.14.7 [2]
Goal	Verify DL/UL UDP/IPv4 streams when a Packet Classification Rule for ROHC-Compressed-IP-Header is defined and no PHS rule is defined.
Wave	Reference only for W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Compressed-IPv4-Header: Enable. - PHS: Disable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure with ROHC support. 4) Carry out 1 DL and 1 UL BS initiated BE service flow with ROHC support. 5) Carry out DL and UL data transfer a) via UDP/ROHC-compressed IPv4 streaming (5 minute transfer for some stability evaluation).
Pass verdict criterion	Successful DL/UL data transfer with ROHC activated.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.22.1 Network Entry procedure

8.22.1.1 Registration

<table>
<tr><td colspan="4" align="center">Test Description</td></tr>
<tr><td>Identifier:</td><td colspan="3">TD_SC2D0_ROHC_REG_00</td></tr>
<tr><td>Description:</td><td colspan="3">Verify the successful completion of registration with ROHC support.</td></tr>
<tr><td>Pre-test conditions:</td><td colspan="3">Successful completion of basic capabilities negotiation. No authentication is required.</td></tr>
<tr><td align="center">Step</td><td align="center">Test Sequence</td><td colspan="2" align="center">Result</td></tr>
<tr><td align="center">1</td><td>MS sends 1 or more REG-REQ

- not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs,
- with Classification/PHS options and SDU encapsulation support TLV indicating Packet, IP (v4 or v6) with ROHC header compression. REG messages do not contain classification, PHS or ROHC params TLV</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td align="center">2</td><td>BS sends REG-RSP

- with response set to OK.
- with valid TLVs that are present in the REG-REQ are in the appropriate Wave,
and with values that do not enable a feature disabled/not supported by MS.</td><td align="center">OK</td><td align="center">NOK</td></tr>
<tr><td colspan="4">Observations

</td></tr>
</table>

8.22.2 Traffic Connection Establishment

8.22.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC2D0_ROHC_DSA_00**		
Description:	Verify the successful completion of service flow establishment as in TD_SC2D0_ROHC_DSA_List.		
Pre-test conditions:	Successful completion of registration and 1 DL and 1 UL Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ - not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs, - Service Flow Scheduling Type set to BE, - Request/transmission policy TLV indicating no suppression of payload headers, - CS specification TLV indicating Packet, IP with header ROHC compression, - ROHC Parameter Payload TLV.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs, - confirming the requested settings.	OK	NOK
3	BS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

TD_SC2D0_ROHC_DSA_List				
Nr.	**Stimulate the BS to use the following parameters**	**Status**	**Run**	**Result**
1	UL DSA-REQ			
2	DL DSA-REQ			

8.22.3 User Data Transfer

8.22.3.1 Data Transfer

Test Description			
Identifier:	**TD_SC2D0_ROHC_DAT_00**		
Description:	Verify the successful completion of data transfer for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number. IP Header compression is enabled.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.23   Scenario 2D1 – ROHC UDP/IPv6 streams

This testing for ROHC requires NWG support in Release 1.5. This test case is kept for reference in this document and may need review before implementation.

Test scenario behaviour	
Ref	5.2.7 [2], 6.3.14.7 [2]
Goal	Verify DL/UL UDP/IPv6 streams when a Packet Classification Rule for ROHC-Compressed-IP-Header is defined and no PHS rule is defined.
Wave	Reference only for W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Compressed-IPv6-Header: Enable. - PHS: Disable. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure with ROHC support. 4) Carry out 1 DL and 1 UL BS initiated BE service flow with ROHC support. 5) Carry out DL and UL data transfer a) via UDP/ROHC-compressed IPv6 streaming (5 minute transfer for some stability evaluation).
Pass verdict criterion	Successful DL/UL data transfer with ROHC activated.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.23.1 Network Entry procedure

8.23.1.1 Registration

Test Description			
Identifier:	**TD_SC2D1_ROHC_REG_00**		
Description:	Verify the successful completion of registration with ROHC support.		
Pre-test conditions:	Successful completion of basic capabilities negotiation. No authentication is required.		
Step	**Test Sequence**		**Result**
1	MS sends 1 or more REG-REQ - not more than PIC_MAX_REG_REQ_RETRIES of REG-REQs, - with Classification/PHS options and SDU encapsulation support TLV indicating Packet, IP (v4 or v6) with ROHC header compression. REG messages do not contain classification, PHS or ROHC params TLV	OK	NOK
2	BS sends REG-RSP - with response set to OK. - with valid TLVs that are present in the REG-REQ are in the appropriate Wave, and with values that do not enable a feature disabled/not supported by MS.	OK	NOK
Observations			

8.23.2 Traffic Connection Establishment

8.23.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC2D1_ROHC_DSA_00**		
Description:	Verify the successful completion of service flow establishment as in TD_SC2D1_ROHC_DSA_List.		
Pre-test conditions:	Successful completion of registration and 1 DL and 1 UL Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ - not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs, - Service Flow Scheduling Type set to BE, - Request/transmission policy TLV indicating no suppression of payload headers, - CS specification TLV indicating Packet, IP with header ROHC compression, - ROHC Parameter Payload TLV.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs, - confirming the requested settings.	OK	NOK
3	BS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

TD_SC2D1_ROHC_DSA_List				
Nr.	**Stimulate the BS to use the following parameters**	**Status**	**Run**	**Result**
1	UL DSA-REQ			
2	DL DSA-REQ			

8.23.3 User Data Transfer

8.23.3.1 Data Transfer

Test Description			
Identifier:	**TD_SC2D1_ROHC_DAT_00**		
Description:	Verify the successful completion of data transfer for 5 minutes.		
Pre-test conditions:	1 UL and 1 DL Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.24 Scenario 2E0 – MS initiated Service Flow Establishment and Deletion

Test scenario behaviour	
Ref	6.3.14.7 [2], 6.3.14.8 [2]
Goal	Verify MS initiated Service Flow Creation/Deletion.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - Service Flows Classification Rule: Based on IP address/port number. - For this test, BS1 should have the ranging region within the first three symbols in the uplink frame and BS2 should have the ranging region not in the first three symbols in the uplink frame in order to ensure that the MS can properly transmit with a flexible frame structure.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.

Test process	1) Start the monitor message capture, if available.
	2) Switch on the MS.
	3) Carry out the Network Entry procedure.
	4) Carry out 1 DL and 1 UL BS initiated BE service flow
	5) Carry out 1 DL and 1 UL MS initiated UGS service flow. **(Table 7.1 / item 17).**
	6) Carry out UGS DL and UGS UL data transfer.
	7) Carry out BE DL and BE UL data transfer.
	   a) via the PING procedure: Host behind the BS pings the MS or pings the host behind the MS (depending on the type of MS)
	                               Host behind the MS pings or the MS itself (depending on the type of the MS) the host behind the BS.
	8) Carry out MS initiated service flow deletion.

Pass verdict criterion	Successful exchange of UGS DL/UL data transfer, followed by successful exchange of BE Ping Traffic, followed by indication that all Service Flows are down.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.24.1 MS initiated Service Flow Creation

Test Description			
Identifier:	**TD_SC2E0_RLC_DSA_00**		
Description:	Verify the successful completion of service flow establishment as in TD_SC2E0_RLC_DSA_List.		
Pre-test conditions:	Successful completion of registration.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more DSA-REQ **(Table 7.1 / item 17)** - not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs.	OK	NOK
2	BS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs.	OK	NOK
3	MS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

	TD_SC2E0_RLC_DSA_List			
Nr.	**Stimulate the MS to use the following parameters**	**Status**	**Run**	**Result**
	DSA-REQ (for UL SF)			
1	Service Flow Scheduling Type set to USG	m	Yes/No	
	DSA-REQ (for DL SF)			
2	Service Flow Delivery ServiceType set to USG	m	Yes/No	

8.24.2 UGS Data Transfer

Test Description			
Identifier:	**TD_SC2E0_RLC_DAT_00**		
Description:	Verify the successful completion of UGS data transfer for 5 minutes.		
Pre-test conditions:	1 UGS UL and 1 UGS DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number.		
Step	**Test Sequence**	**Result**	
1	Has the data from the MS to the BS been transferred correctly?	OK	NOK
2	Has the data from the BS to the MS been transferred correctly?	OK	NOK
Observations			

8.24.3 MS initiated Service Flow Deletion

Test Description			
Identifier:	**TD_SC2E0_RLC_DSD_00**		
Description:	Verify the successful completion of service flow deletion		
Pre-test conditions:	Successful PING procedure.		
Step	**Test Sequence**	**Result**	
1	MS sends 1 or more DSD-REQ **(Table 7.1 / item 16)** - not more than PIC_DSx_REQ_MAX_RETRIES of DSD-REQs, - with SFID of service flow.	OK	NOK
2	BS sends 1 or more DSD-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSD-RSPs.	OK	NOK
Observations			

8.25   Scenario 2F0 – RT-VR/NRT-VR

Test scenario behaviour	
Ref	6.3.20 [2]
Goal	Checks that QoS characteristics of the RT-VR service and NRT-VR service are not damaged by any simultaneous transmission through a BE service flow.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Disable. - HARQ: Disabled. If a HARQ MAP IE is used to specify the burst, the HARQ MAP IE used to specify the burst shall set ACK disable = 1. - Any non- HARQ DL/UL connection is established by including HARQ Service Flows field (TLV Type = [145/146].44) set to '0' (non-HARQ) or by omitting the HARQ Service Flows field (which means default value 'non-HARQ'. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 UL NRT-VR and 1 UL RT-VR and 1 UL BE Service Flows are Pre-Provisioned at the BS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MS is switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MS. 3) Carry out the Network Entry procedure. 4) Carry out 1 DL and 1 UL BS initiated BE service flow. 5) Carry out 1 UL NRT-VR and 1 UL RT-VR. (**Table 7.1 / Item 18 and Item 19.** 6) Carry out simultaneous UL data transfer.
Pass verdict criterion	Verify the successful UL data transfer of the RT-VR service when having a simultaneous UL transmission through a BE service flow. Verify the successful UL data transfer of the NRT-VR service when having a simultaneous UL transmission through a BE service flow.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.25.1 Traffic Connection Establishment

8.25.1.1 RT-VR Service Flow Provisioning

<table>
<tr><td colspan="4" align="center">Test Description</td></tr>
<tr><td>Identifier:</td><td colspan="3">TD_SC2F0_RLC_DSA_00</td></tr>
<tr><td>Description:</td><td colspan="3">Verify the successful completion of BS initiated RT-VR service flow establishment.</td></tr>
<tr><td>Pre-test conditions:</td><td colspan="3">X</td></tr>
<tr><td align="center">Step</td><td align="center">Test Sequence</td><td colspan="2" align="center">Result</td></tr>
<tr>
<td align="center">1</td>
<td>BS sends 1 or more DSA-REQ

- to define an UL service flow,
- with Service Flow Scheduling Type set to rtPS,
- with Maximum Latency,
- with Minimum Reserved Traffic Rate,
- with Maximum Sustained Traffic Rate,
- Traffic Priority,
- with Request/Transmission Policy,
- unsolicited polling interval,
- not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs.</td>
<td align="center">OK</td>
<td align="center">NOK</td>
</tr>
<tr>
<td align="center">2</td>
<td>MSs send 1 or more DSA-RSP

- not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs.</td>
<td align="center">OK</td>
<td align="center">NOK</td>
</tr>
<tr>
<td align="center">3</td>
<td>BS sends DSA-ACK to each MS

- Confirmation Code set to OK.</td>
<td align="center">OK</td>
<td align="center">NOK</td>
</tr>
<tr><td colspan="4">Observations

</td></tr>
</table>

8.25.1.2 NRT-VR Service Flow Provisioning

Test Description			
Identifier:	**TD_SC2F0_RLC_DSA_00**		
Description:	Verify the successful completion of BS initiated NRT-VR service flow establishment.		
Pre-test conditions:	X		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DSA-REQ - to define an UL service flow, - with Service Flow Scheduling Type set to nrtPS, - with Minimum Reserved Traffic Rate, - with Maximum Sustained Traffic Rate, - Traffic Priority, - with Request/Transmission Policy, - not more than PIC_DSx_REQ_MAX_RETRIES of DSA-REQs.	OK	NOK
2	MSs send 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES of DSA-RSPs.	OK	NOK
3	BS sends DSA-ACK to each MS - Confirmation Code set to OK.	OK	NOK
Observations			

8.25.2 User Data Transfer

8.25.2.1 RT-VR Data Transfer

Test Description			
Identifier:	**TD_SC2F0_RLC_DAT_00**		
Description:	Verify the successful data transfer of the data delivery services RT-VR.		
Pre-test conditions:	1 UL RT-VR service flow established and 1 UL BE service flow established.		
Step	**Test Sequence**	**Result**	
1	Has the UL data been transferred correctly on the RT-VR service when having a simultaneous UL transmission through a BE service flow?	OK	NOK
Observations			

8.25.2.2 NRT-VR Data Transfer

Test Description			
Identifier:	**TD_SC2F0_RLC_DAT_01**		
Description:	Verify the successful data transfer of the data delivery services NRT-VR.		
Pre-test conditions:	1 UL NRT-VR service flow established and 1 UL BE service flow established.		
Step	**Test Sequence**	**Result**	
1	Has the UL data been transferred correctly on the NRT-VR service when having a simultaneous UL transmission through a BE service flow?	OK	NOK
Observations			

8.26   Scenario 2G0- BS initiated Handover

Test scenario behaviour	
Ref	6.3.22 [2]
Goal	Verify BS initiated handover (Inter FA (different frequencies))
Wave	W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - SBS and TBS transmit on different frequencies - TX Power Level: SBS Medium, TBS Initially Off. - ARQ: Optional. - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum® Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - TPC mode: Open loop. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the SBS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number. - For this test, the vendor must enable that BS initiated HO will occur before the MS will initiate a HO **(Table 7.1 / item 23)**.
Initial State	MS is deregistered from BSs. MS is switched off. BSs remain on. SBS does not coordinate association between MS and TBS.

Test process	1) Start the monitor message capture, if available.
	2) Switch on the MS.
	3) Carry out the Network Entry procedure and create UL and DL service flows.
	4) Ensure the target BS is on. (TX Power Level: SBS and TBS medium level.)
	5) Use the DCD for BS and attenuate the Serving BS signal such that it is lower than that of the target BS, but still high enough so that trigger condition at the MS for HO is not met. (This is done in order to avoid MS initiated handover.) Now the BS should initiate the handover. Alternatively, Trigger handover initiation at the Serving BS **(Table 7.1 / item 23)**.
	6) Carry out DL and UL data transfer via the PING procedure:
	    Host behind the target BS pings the MS or pings the host behind the MS (depending on the type of MS)
	    Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the target BS.

Pass verdict criterion	Successful handover from SBS to TBS and PING procedure with TBS.

Final Verdict	**PASS**		**FAIL**	

If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.

8.26.1 Neighbor Advertisement

Test Description			
Identifier:	**TD_SC2G0_BS_GHF_ADV_00**		
Description:	Verify the Neighbor Advertisement and UL-MAPs of SBS and TBS.		
Pre-test conditions:	Successful completion of initial network entry.		
Step	**Test Sequence**	**Result**	
1	SBS and TBS send MOB_NBR-ADV.	OK	NOK
2	TBS sends UL-MAP with Fast ranging IE with HO ID or MS's MAC address.	OK	NOK
Observations			

8.26.2 Scanning

	Test Description		
Identifier:	**TD_SC2G0_BS_GHF_SCN_00**		
Description:	Verify the successful completion of allocation of a group of scanning intervals and the use of the scanning intervals.		
Pre-test conditions:	X		

Step	Test Sequence	Result	
1	MS sends 1 or more MOB_SCN-REQ - unsolicited, - with Scanning Type indicating Scanning without Association.	OK	NOK
2	SBS sends MOB_SCN-RSP - granting a scanning interval.	OK	NOK
	OR		
1	BS sends DCD - defining a trigger condition with action value 0x3.	OK	NOK
2	MS sends 1 or more MOB_SCN-REQ - because trigger condition is met, - with Scanning Type indicating Scanning without Association.	OK	NOK
3	SBS sends MOB_SCN-RSP - granting a scanning interval.	OK	NOK
	OR		
1	SBS sends MOB_SCN-RSP - with Scanning Type indicating Scanning without Association, - granting a scanning interval.	OK	NOK
Observations			

8.26.3 Scan Report

	Test Description		
Identifier:	**TD_SC2G0_BS_GHF_SCNRPT_00**		
Description:	Verify the successful completion of Scan reporting only if Trigger Conditions are met.		
Pre-test conditions:	X		

Step	Test Sequence	Result	
1	BS sends DCD - defining a trigger condition with action value 0x1	OK	NOK
2	MS sends MOB_SCN-REP - because trigger condition is met,	OK	NOK
Observations			

8.26.4 Handover Decision

Test Description			
Identifier:	**TD_SC2G0_BS_GHF_HOD_00**		
Description:	Verify the successful completion of BS initiated Handover Decision.		
Pre-test conditions:	Successful completion of initial network entry. MS received Neighbor Advertisement from Serving BS.		
Step	**Test Sequence**	**Result**	
1	If required trigger handover initiation at the Serving BS **(Table 7.1 / item 23)**. BS sends MOB_BSHO-REQ - indicating the target BS.	OK	NOK
Observations			

8.26.5 Handover Initiation

Test Description			
Identifier:	**TD_SC2G0_BS_GHF_NWE_00**		
Description:	Verify the successful completion of Handover Initiation from serving BS to target BS with network entry.		
Pre-test conditions:	MS has been instructed to handover from serving BS to target BS.		
Step	**Test Sequence**	**Result**	
1	MS sends optionally a MOB_HO-IND to serving BS - With HO_IND_type = 0b00 (serving BS release) - MS moves to target BS and synchronizes to DL signal	OK	NOK
2	MS sends Handover CDMA ranging codes in the Initial Ranging Interval to the target BS and sends RNG-REQ or MS sends RNG-REQ message using the received Fast Ranging IE.		
3	MS finishes Network Entry with TBS and the BS updates the CIDs.	OK	NOK
Observations			

8.26.6 Handover Verification

8.26.6.1 PING

Test Description			
Identifier:	**TD_SC2G0_BS_GHF_DAT_00**		
Description:	Verify the successful completion of data transfer via the PING procedure.		
Pre-test conditions:	1 UL and 1 DL BE Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Host behind the target BS pings the MS or pings the host behind the MS (depending on the type of the MS). - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
2	Host behind the MS or the MS itself (depending on the type of the MS) pings the host behind the target BS. - The CID of the UL MAC PDU (EchoRequest) is the Transport Cid of the UL Service Flow. - The CID of the DL MAC PDU (EchoReply) is the Transport Cid of the DL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.27   Scenario 2G1– Drop of Target BS During Handover

Test scenario behaviour	
Ref	6.3.22 [2]
Goal	Verify behavior for Drop of Target BS During BS initiated Handover.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing.
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - ARQ: Optional. - HARQ: Optional. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - TPC mode: Open loop. - SS Management: Unmanaged. - 1 DL and 1 UL BE Service Flows are Pre-Provisioned at the SBS for this MS and the MS can support the Pre-Provisioned Service Flows. - Service Flows Classification Rule: Based on IP address/port number. - The test has to finish before the Resource_Retain_Timer expires.
Initial State	MS is deregistered from BSs. MS is switched off. BSs remain on. SBS does not coordinate association between MS and TBS.

Test process	1) Start the monitor message capture, if available.
	2) Switch on the MS.
	3) Carry out the Network Entry procedure and create UL and DL service flows.
	4) Ensure the target BS is on.
	5) Now, BS or MS initiated handover is possible.
	
	In the case of BS initiated handover:
	
	6) Use the DCD for BS and attenuate the Serving BS signal such that it is lower than that of the target BS, but still high enough so that trigger condition is not met. (This is done in order to avoid MS initiated handover.) Alternatively, trigger handover initiation at the Serving BS **(Table 7.1 / item 23)**.
	
	In the case of MS initiated handover:
	
	7) Attenuate the Serving BS signal in order to trigger handover initiation or use a manual command at the MS. **(Table 7.1 / item 12 or Item 13).**
	8) During handover, when MS starts network entry with TBS, drop the signal of the TBS. (One option is to disconnect instead the receiver path only of the TBS for this test)
	9) Bring up SBSs signal in order to allow network re-entry with SBS.
	10) Carry out DL and UL data transfer via the PING procedure:
	    Host behind the serving BS pings the MS or pings the host behind the MS (depending on the type of MS) and
	    Host behind the MS or the MS itself (depending on the type of the MS pings the host behind the serving BS.

Pass verdict criterion	After drop of signal of TBS, successful network re-entry with SBS.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.27.1 Network re-entry with Serving BS

Test Description			
Identifier:	**TD_SC2G1_GHF_DTB_00**		
Description:	Verify the reaction of MS to the drop of target BS during Handover.		
Pre-test conditions:	MS has done handover from serving BS to target BS and target BS drops.		
Step	**Test Sequence**	**result**	
1	MS synchronizes to Serving BS.	OK	NOK
2	MS sends MOB_HO-IND to serving BS in case Resource Retain Timer does not expired. - with HO_IND_Type = 0b01 (Handover cancel).	OK	NOK
Observations			

8.27.2 Network re-entry Verification

8.27.2.1 PING

Test Description			
Identifier:	**TD_SC2G1_GHF_DAT_00**		
Description:	Verify the successful completion of data transfer via the PING procedure.		
Pre-test conditions:	1 UL and 1 DL BE Service Flow is established.		
Step	**Test Sequence**	**Result**	
1	Host behind the serving BS pings the MS or pings the host behind the MS (depending on the type of the MS). - The CID of the DL MAC PDU (EchoRequest) is the Transport Cid of the DL Service Flow. - The CID of the UL MAC PDU (EchoReply) is the Transport Cid of the UL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
2	Host behind the MS or the MS itself (depending on the type of the MS) pings the host behind the serving BS. - The CID of the UL MAC PDU (EchoRequest) is the Transport Cid of the UL Service Flow. - The CID of the DL MAC PDU (EchoReply) is the Transport Cid of the DL Service Flow. - Is the PING procedure successfully completed?	OK	NOK
Observations			

8.28 Scenario 2M0 – Multi-BS MBS

Test scenario behaviour	
Ref	6.3.23 [2]
Goal	Verify the use of Multi-BS MBS with 1 BS sending in the MBS_Zone in a P2MP configuration.
Wave	W2
Configuration	Basic Test Configuration for IOT Testing - 2 MS+ 1 BS
Test Condition	- Frequency channel: Middle. - TX Power Level: Medium. - Single-BS access: Disable. - Multi-BS access: Enable. - MAC layer Encryption for multicast connection: Disable. - Upper layer encryption; Disable. - ARQ: Not Applicable. - HARQ: Not Applicable. - Authentication: Optional. If authentication is used, the method shall be one of those specified in NWG WiMAX Forum Network Architecture, Stage 3 document, v1.1.1, section 4.4.1.2.2 or 4.4.1.2.3. - SS Management: Unmanaged. - 1 DL BE Service Flow is Pre-Provisioned at the BS for all MSs and each MS can support the Pre-Provisioned Service Flow. - Service Flows Classification Rule: Based on IP address/port number.
Initial State	MS is deregistered from BS. MSs are switched off. BS remains on.
Test process	1) Start the monitor message capture, if available. 2) Switch on the MSs. 3) Carry out MBS data transfer. 4) Carry out the Network Entry procedure for each MS simultaneously. 5) Trigger 1 DL BS initiated MBS service flow for each MS simultaneously or trigger 1 DL MS initiated MBS service flow **(Table 7.1 / item 21 or item 22).**
Pass verdict criterion	Successful reception of MBS contents at each MS.
Final Verdict	**PASS**		**FAIL**	
If the Final Verdict is evaluated to FAIL, then the error is reported in the appropriate TD below.	

8.28.1 MAP

Test Description			
Identifier:	**TD_SC2M0_MBS_ACQ_00**		
Description:	Verify the broadcast of MBS relevant information.		
Pre-test conditions:	Multi-BS MBS supported.		
Step	**Test Sequence**	**Result**	
1	BS sends DL-MAP or compressed DL-MAP to each MS with - MBS MAP IE, which may be omitted even if MBS_MAP message is present in the DL frame. BS sends MBS_MAP message	OK	NOK
2	BS sends DCD to each MS with - MBS zone identifier list.	OK	NOK
Observations			

8.28.2 Traffic Connection Establishment

8.28.2.1 Service Flow Provisioning

Test Description			
Identifier:	**TD_SC2M0_MBS_DSA_00**		
Description:	Verify the BS initiated establishment of a MBS connection for multiple MBS content.		
Pre-test conditions:	Registration completed.		
Step	**Test Sequence**	**Result**	
1	BS sends 1 or more DL DSA-REQ, - not more than PIC_DSx_REQ_MAX_RETRIES DSA-REQs, - MBS service TLV indicating Multi-BS-MBS, - MBS Zone Identifier TLV, - MBS contents IDs TLV indicating at least 1 MBS contents ID and the MBS contents ID matches a Logical Channel ID included in the Extended MBS_DATA_IE.	OK	NOK
2	MS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES DSA-RSPs.	OK	NOK
3	BS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
	Or	OK	NOK
1	MS sends 1 or more DL DSA-REQ, - not more than PIC_DSx_REQ_MAX_RETRIES DSA-REQs, - MBS service TLV indicating Multi-BS-MBS, - no MBS Zone Identifier TLV, - no MBS contents IDs TLV.	OK	NOK
2	BS sends 1 or more DSA-RSP - not more than PIC_DSx_RSP_MAX_RETRIES DSA-RSPs, - MBS service TLV indicating Multi-BS-MBS, - MBS Zone Identifier TLV, - MBS contents IDs TLV indicating at least 1 MBS contents ID and the MBS contents ID matches a Logical Channel ID included in the Extended MBS_DATA_IE.	OK	NOK
3	MS sends DSA-ACK - Confirmation Code set to OK.	OK	NOK
Observations			

8.28.3 User Data Transfer

8.28.3.1 Data Transfer

Test Description			
Identifier:	**TD_SC2M0_MBS_DAT_00**		
Description:	Successful reception of MBS contents at each MS.		
Pre-test conditions:	1 MBS DL Service Flow is established. The classification rule for mapping the CID is based on IP address/port number.		
Step	**Test Sequence**	**Result**	
1	Has the data from the BS to each MS been transferred correctly?	OK	NOK
Observations			