Test Report

No B41-19-BP-I1

PRIME Certification Tests Cases for Service Nodes

EQUIPMENT UNDER TEST	SINGLE-PHASE METER WITH INTEGRATED PRIME Power Line Communications
MODEL	S212
FIRMWARE VERSION	00-3983c
CERTIFICATION SCOPE	Prime v1.3.6 Profile 4 – Electricity Meter with PRIME PHY and PRIME MAC

Responsible for tests	Smart Data & Protocol Laboratory Manager
	
Ibone Garcia-Borreguero	Marta Castro

Author: Ibone García-Borreguero. Responsible for tests
Reviewer: Marta Castro. Smart Data & Protocol Laboratory Manager

NOTE: This test report shows the detailed information associated with the Test Report Summary no. B41-19-BP-I1 summary

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1.- EQUIPMENT UNDER TEST IDENTIFICATION

Unit:	SINGLE-PHASE METER WITH INTEGRATED PRIME Power Line Communications
Model:	S212
Trade Mark:	Sagemcom
Serial Number:	M1: SAG1950030026 (MAC: 00:80:E1:82:4E:7B)
Manufacturer:	Sagemcom

The sample was selected and delivered by the applicant.

Equipment characteristics declared by the applicant:

Device type	SINGLE-PHASE METER WITH INTEGRATED PRIME Power Line Communications
BaudRate	57600
Firmware version	00-3983c
Applicable Optional tests	PHY layer test cases MAC layer test cases Convergence layer test cases

SUMMARY OF TEST RESULTS

PHY LAYER		
2.2 PHY Test Cases: Functional Category		
2.2.1	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. D8PSK	PASS
2.2.2	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV,PPDU length 256 bytes. D8PSK+CC	PASS
2.2.3	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. DBPSK	PASS
2.2.4	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120dBuV, PPDU length 256 bytes. DBPSK+CC	PASS
2.2.5	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. Modulation type: DQPSK	PASS
2.2.6	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. QPSK+CC	PASS
2.2.7	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec (2Ohm) and output level 120 dBuV, PPDU length 256 bytes.DBPSK	PASS
2.2.8	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec (2Ohm) and output level 120 dBuV, PPDU length 256 bytes. D8PSK+CC	PASS
2.2.9	Verify error free communication (0.2% FER) (checking the complete frame payload) when receiving input signal of 122 dBuV. (DUT is in reception state). Modulation type: D8PSK	PASS
2.4 PHY Test Cases: Signal Quality category		
2.4.1	Verify that the EVM of the received signal at output level is above 17dB.	PASS
2.4.2	Verify that the EVM of the transmitted signal output level is above 17dB.	PASS
2.5 PHY Test Cases: Regulatory category		
2.5.1	PHY Test Cases: Regulatory category	PASS
MAC LAYER		
3.2 MAC Test Cases: Service Node Start-up		
3.2.1	Service node start-up (forcing the reception of beacons).	PASS
3.2.2	Service node start-up (No PNPDUs are transmit when DUT receives BPDUs).	PASS
3.2.3	Service node start-up (Tx rate of PNPDUs reduced by factor of received PNPDUs).	PASS

3.2.4	Service node start-up (PNPDU generation latency and transmission parameters).	PASS
3.2.5	Service Node start-up (RANDOMness in the transmission of PNPDUs)	PASS
3.2.6	Service Node start-up (seeking promotion of DUT).	PASS
	3.3 MAC Test Cases: Channel Access	
3.3.1	Channel access- Shared Contention Period. Channel is idle	PASS
3.3.2	Channel access- Shared Contention Period. Channel is occupied.	PASS
3.3.3	Channel access- Contention Free Period.	PASS
3.3.4	Channel access-Adaptation to frame structure change (FRA)	PASS
	3.4 MAC Test Cases: Service Node MAC specific procedures	
3.4.1	Registration accepted (Base Node available when DUT powers up).	PASS
3.4.2	Registration accepted (Base Node not available when DUT powers up).	PASS
3.4.3	Registration accepted (DUT connected to a Switch node and the Switch node is connected to the Base Node).	PASS
3.4.4	Unregistering process initiated by a terminal node.	PASS
3.4.5	Unregistering process initiated by the Base node.	PASS
3.4.6	Promotion process initiated by the base node.	PASS
3.4.7	Promotion process initiated by the service node DUT.	PASS
3.4.8	Switching process: 2 levels of switching (DUT1 as a level 1 switch).	PASS
3.4.9	Switching process: 2 levels of switching (DUT as a level 2 switch).	PASS
3.4.10	Switching functions: BPDU transmisión	PASS
3.4.11	Switching functions: BPDU updates from FRA control packet	PASS
3.4.12	Promotion rejected by the base node.	PASS
3.4.13	Demotion process initiated by the base node.	PASS
3.4.14	Keep-Alive process (response from DUT).	PASS
3.4.15	Keep-Alive process (timeout and disconnect).	PASS
3.4.16	Keep-Alive process (changes in Keep Alive timeout).	PASS
3.4.17	Connection establishment initiated by the Base node.	PASS
3.4.18	Connection establishment initiated by the Service node.	PASS
3.4.19	Connection establishment rejected by the Base node.	PASS

3.4.20	Connection closing initiated by the Base node.	PASS
3.4.21	Connection closing initiated by the Service node.	PASS
3.4.22	File transfer process (unicast).	PASS
3.4.23	File transfer process (multicast).	PASS
3.4.24	Error in the firmware upgrade process.	PASS
CONVERGENCE LAYER		
4.2 CL Test Cases: 4-32 Connection establishment		
4.2.1	Correct establishment and disconnection of 4-32 link	PASS
4.3 CL Test Cases: DLMS traffic over 4-32 connection		
4.3.1	CS4-32 is able to pass valid DLMS payload between the meter and the test system.	PASS
4.3 CL Test Cases: 4-32 parameter integrity		
4.4.1	Test that CS4-32 integrity parameter is verified at the DUT.	NA

For more detailed information about the test results see Annex I

2.- APPLICANT

Adrien NAHLOVSKY

SAGEMCOM

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3.- PLACE OF RECEPTION AND EXECUTION OF THE TESTS

The reception of the equipment took place in the Smart Data & Protocol Laboratory of TECNALIA, in Derio (Spain).

The performing of the test took place in Smart Data & Protocol Laboratory of TECNALIA, in Derio (Spain).

4.- STANDARDS AND TEST PROCEDURES EMPLOYED

Standards:

- Draft Specification for PoweRline Intelligent Metering Evolution. PRIME-Specification v.1.3.6.
- EN 50065-1 (2001): “Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz. Part 1: General requirements, frequency bands and electromagnetic disturbances”.
- EN 50065-2-3 (2003) + A1 (2005): “Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz. Part 2-3: Immunity requirements for mains communications equipment and systems operating in the range of frequencies of 3 kHz to 95 kHz and intended for use by electricity suppliers and distributors”.
- EN 50065-7 (2001): “Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz. Part 7: Equipment impedance”.

Testing procedures:

- PRIME Certification. Test Cases version 1.2

5.- CONCLUSIONS

In view of the results and in the test conditions expressed in the present report, the tested sample of:

Unit:	SINGLE-PHASE METER WITH INTEGRATED PRIME Power Line Communications
Model:	S212
Trade Mark:	Sagemcom
Serial Number:	M1: SAG1950030026 (MAC: 00:80:E1:82:4E:7B)
Manufacturer:	Sagemcom

✓ **COMPLIES** with PHY layer, MAC layer and Convergence layer tests cases defined by PRIME Alliance in its PRIME Certification. Test Cases version 1.2 based on PRIME-Specification v.1.3.6.

- This test report is granted on account of tests made at location of TECNALIA, in Derio (Spain).
- The results of the present report apply only to the samples tested and the moment and conditions under which the measurements were performed.
- The complete results, including remarks and limitations, are laid down in ANNEX I of this report.

ANNEX I. TEST RESULTS

Place: Smart Data & Protocol Laboratory in TECNALIA

Electronic devices Laboratory in TECNALIA

Climatic conditions: 19 ºC 44% H.R. 1014 mbar

Responsible: Ibone Garcia-Borreguero

Used instruments:

	Measurement instruments
X	*SW CURRENT CURRENT PRIME audition v1.2.3ct*
	✓ *PRIME AUDITION TOOL*
X	*HW CURRENT*
	✓ *BASE NODE (MAC 00:80:E1:00:00:57)*
	✓ *AUX1 (MAC 00:80:E1:00:00:5D)*
	✓ *AUX1 (MAC 00:80:E1:00:00:63)*
	✓ *AUX2 (MAC 00:80:E1:00:00:5F)*
	✓ *SNIFFER*
X	*EL092142 – LISN*
X	*EL092017 – LISN PRIME*
X	*FILTERS WITH VARIABLE ATENUATION*
X	*EL052008 - CLIMATIC CHAMBER*
X	*EL022011 - DIGITAL OSCILLOSCOPE*
X	*EL082055 – AISOLATING TRANSFORM*
	Data registers storage place
PRIME laptop	*/home/conftester/Resultados/CLIENTES/Sagem_SN212-136/*

Results:

A1. PHY layer

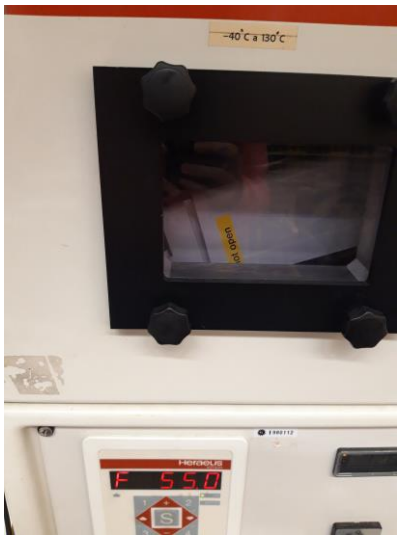
A1. 1.1Test setup

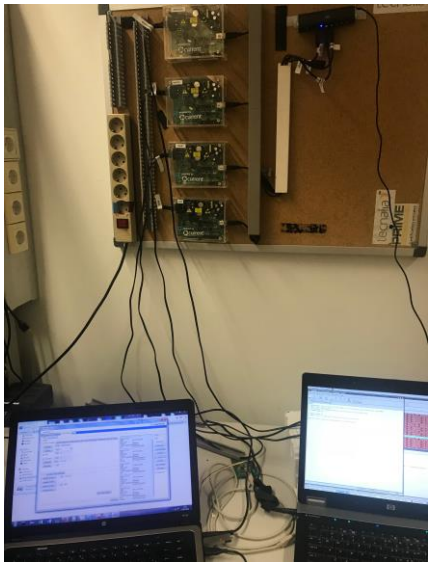
DUT connections:

- Serial Port:
  - to manage the DUT
  - connected to auxiliary PC to configure the DUT in different modes (PHY tx, PHY rx)
  - to access to PIB values with Vendor Tool in auxiliary PC

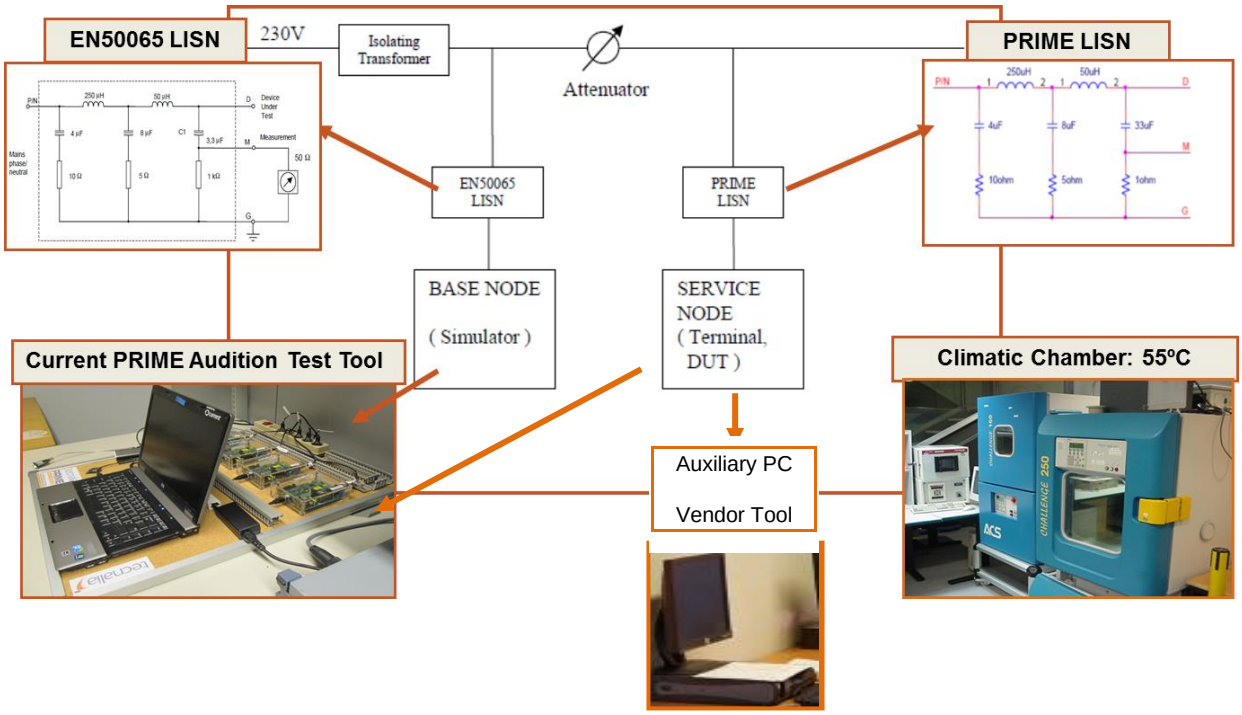
Auxiliary PC with the following Software:

- Vendor Tool called “ST PrimeGUI 1.3.6 Rev 3695”: to manage and configure the DUT through the optical port in PHY mode.





The setup of the PHY layer tests is the following one:



DUT needs to be configured in PHY reception and PHY transmission mode.

PHY reception mode:

- Connect optical port to the auxiliary PC: configure the DUT with vendor specific SW “ST PrimeGUI” in PHY reception mode
- Start the test with “Current PRIME Audition Test Tool”

- Read the PIB Rx Total Count with “Current PRIME Audition Test Tool”.

PHY transmission mode:

- Connect optical port to the auxiliary PC: configure the DUT with vendor specific SW “ST PrimeGUI” in PHY transmission mode
- Start the test with “Current PRIME Audition Test Tool”
- Trigger the transmission with the Vendor Tool

A1. 1.2. Test results

CODE	DESCRIPTION	RESULT	EXPECTED	STAT.	COMMENTS
	2.2 PHY Test Cases: Functional Category				
2.2.1	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. D8PSK	2000	at least 1996 frames	PASS	Sample: M1
2.2.2	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV,PPDU length 256 bytes. D8PSK+CC	2000	at least 1996 frames	PASS	Sample: M1
2.2.3	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. DBPSK	2000	at least 1996 frames	PASS	Sample: M1
2.2.4	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120dBuV, PPDU length 256 bytes. DBPSK+CC	2000	at least 1996 frames	PASS	Sample: M1
2.2.5	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the	2000	at least 1996 frames	PASS	Sample: M1

	LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. Modulation type: DQPSK				
2.2.6	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. DQPSK+CC	2000	at least 1996 frames	PASS	Sample: M1
2.2.7	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec (2Ohm) and output level 120 dBuV, PPDU length 256 bytes.DBPSK	1999	at least 1996 frames	PASS	Sample: M1
2.2.8	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec (2Ohm) and output level 120 dBuV, PPDU length 256 bytes. D8PSK+CC	1998	at least 1996 frames	PASS	Sample: M1
2.2.9	Verify error free communication (0.2% FER) (checking the complete frame payload) when receiving input signal of 122 dBuV. (DUT is in reception state). Modulation type: D8PSK	1999	at least 1996 frames	PASS	Sample: M1
2.4 PHY Test Cases: Signal Quality category					
2.4.1	Verify that the EVM of the received signal at output level of 120 dBuV is above 17dB.	17.96 dB	>17 dB	PASS	Sample: M1
2.4.2	Verify that the EVM of the transmitted signal output level of 120 dBuV is above 17dB.	17.96 dB	>17 dB	PASS	Sample: M1

A1. 1.3. PHY Test Cases: Regulatory category

DUT is EN50065-1, EN50065-2-3 and EN50065-7 compliant in order to be PRIME compliant.

- According to Test reports

Test	Report identification	PRIME FW version	Serial number of the tested DUT
Bandwidth	SAG-QUAPRD-0061-S212.Determination.of.bandwidth-02.00	00-3925c	1950030051
Output level	SAG-QUAPRD-0062-S212.Determination.of.output.level-02.00	00-3925c	1950030051
Conducted radioelectric disturbances	SAG-QUAPRD-0042-S212.Emission.Perturbations.conduites.01.00	00-3925c	1950030022
Radiated radioelectric disturbances	Test_report_SagemCom-0073-2019 §5.a	00-3925c	1950030011
Electrostatic discharges immunity	Test_report_SagemCom-0073-2019 §5.b	00-3925c	1950030051
Radiofrequency electromagnetic fields immunity	Test_report_SagemCom-0073-2019 §5.c	00-3925c	1950030011
Electrical fast transient immunity	Test_report_SagemCom-0073-2019 §5.e	00-3925c	1950030035
Surge immunity	Test-report-Sagemcom-020-2020	00-3983c	1950020677
Conducted disturbances induced by RF fields immunity	Test_report_SagemCom-0073-2019 §5.f	00-3925c	1950030051
Power frequency magnetic fields immunity	Test_report_SagemCom-0073-2019 -a §5.h	00-3925c	1950030051
AC power voltage dips, interruptions and variations immunity	SAG-QUAPRD-0037-S212.Immunity.to.voltage.dips.and.short.interruptions-02.00	00-3925c	1950030051
Narrow band interference immunity	Test_report_SagemCom-0073-2019 §5.g	00-3925c	1950030051
Measurements of equipment impedance	SAG-QUAPRD-0059-S212.Impedance.in.PLC.bandwitdh-02.00	00-3925c	1950030013

of the SAGEMCOM CERTLabs

- **COMPLIES** with EN 50065-1:2011.
- **COMPLIES** with EN 50065-2-3:2003+A1:2005.
- **COMPLIES** with EN 50065-7:2001.

A2.MAC layer

A2.1.1Test setup

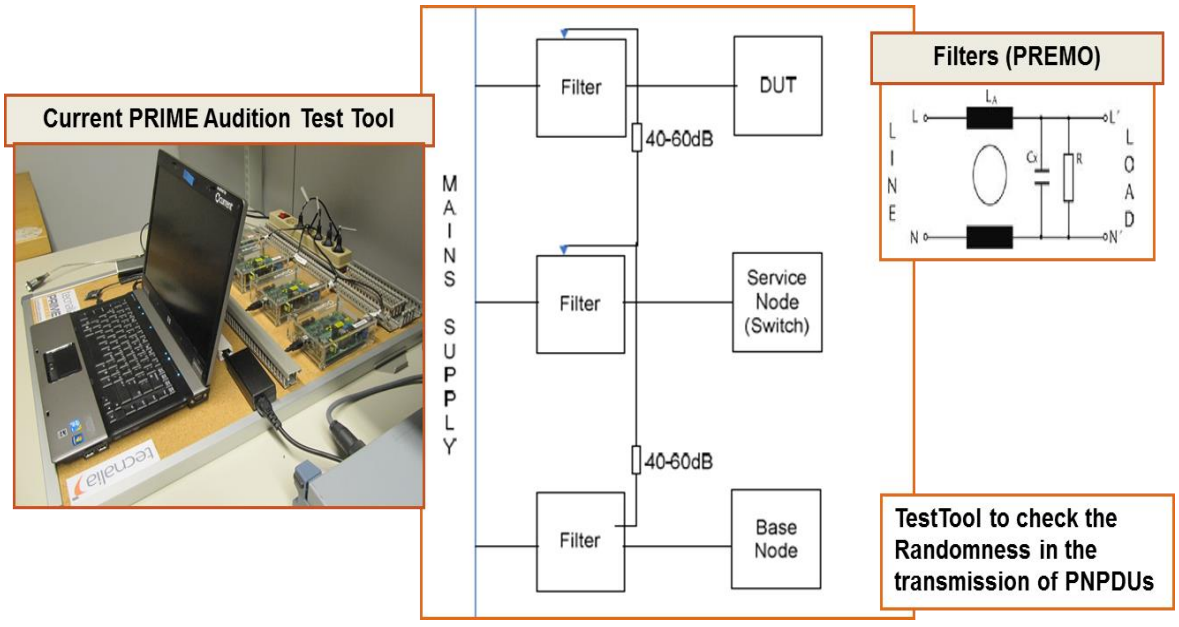
DUT Connections:

- Serial connection:
  - to manage the DUT
  - to access to PIB values with Current PRIME Testing Tool
  - connected to Current PRIME Audition Test Tool

Auxiliary PC with the following Software:

- Vendor Tool ST PrimeGUI: to manage and configure the DUT.

The setup of the MAC layer tests is the following one:



A1. 1.2. Test results

CODE	DESCRIPTION	RESULT	EXPECTED	STAT.	COMMENTS
	3.2 MAC Test cases: Service Node Start-up				
3.2.1	Service node start-up (forcing the reception of beacons).	Successful registration process	Successful registration process	PASS	Sample: M1
3.2.2	Service node start-up (No PNPDUs are transmit when DUT receives BPDUs).	No PNPDUs detected	No PNPDUs detected	PASS	Sample: M1

3.2.3	Service node start-up (Tx rate of PNPDUs reduced by factor of received PNPDUs).	x <= macMaxPromotionPdu y <= x/2 z <= x/3	x <= macMaxPromotionPdu y <= x/2 z <= x/3	PASS	Sample: M1
3.2.4	Service node start-up (PNPDU generation latency and transmission parameters).	Successful registration process	Successful registration process	PASS	Sample: M1
3.2.5	Service Node start-up (RANDOMness in the transmission of PNPDUs)	lack of order in the frames received	Randomness in the transmission of PNPDUs verifying the lack of order	PASS	Sample: M1
3.2.6	Service Node start-up (seeking promotion of DUT).	Successful registration process	Successful registration process	PASS	Sample: M1
3.3 MAC Test Cases: Channel Access					
3.3.1	Channel access- Shared Contention Period. Channel is idle	No data sent during CFP	No data sent during CFP	PASS	Sample: M1
3.3.2	Channel access- Shared Contention Period. Channel is occupied.	MacCSMAChBusyCount > MacCSMAFailCount	PIB statistical attribute id 0x44 (MacCSMAFailCount) and 0x45 (MacCSMAChBusyCount). Confirm the following relation to be true: MacCSMAChBusyCount > MacCSMAFailCount	PASS	Sample: M1
3.3.3	Channel access- Contention Free Period.	No data during CFP	No data during CFP	PASS	Sample: M1
3.3.4	Channel access-Adaptation to frame structure change (FRA)	No data in new CFP or in new Beacon Slots	No data in new CFP or in new Beacon Slots	PASS	Sample: M1
3.4 MAC Test Cases: Service Node MAC specific procedures					
3.4.1	Registration accepted (Base Node available when DUT powers up).	Successful registration process	Successful registration process	PASS	Sample: M1
3.4.2	Registration accepted (Base Node not available when DUT powers up).	Successful registration process	Successful registration process	PASS	Sample: M1

3.4.3	Registration accepted (DUT connected to a Switch node and the Switch node is connected to the Base Node).	Successful registration process	Successful registration process	PASS	Sample: M1
3.4.4	Unregistering process initiated by a terminal node.	Successful unregistering process	Successful unregistering process	PASS	Sample: M1
3.4.5	Unregistering process initiated by the Base node.	Successful unregistering process	Successful unregistering process	PASS	Sample: M1
3.4.6	Promotion process initiated by the base node.	Successful promotion process	Successful promotion process	PASS	Sample: M1
3.4.7	Promotion process initiated by the service node DUT.	Successful promotion process	Successful promotion process	PASS	Sample: M1
3.4.8	Switching process: 2 levels of switching (DUT1 as a level 1 switch).	Successful switching process	Successful switching process	PASS	Sample: M1
3.4.9	Switching process: 2 levels of switching (DUT as a level 2 switch).	Successful switching process	Successful switching process	PASS	Sample: M1
3.4.10	Switching functions: BPDU transmisión	Successful BPDU transmission	Successful BPDU transmission	PASS	Sample: M1
3.4.11	Switching functions: BPDU updates from FRA control packet	Successful BPDU update	Successful BPDU update	PASS	Sample: M1
3.4.12	Promotion rejected by the base node.	Promotion rejected	Promotion rejected	PASS	Sample: M1
3.4.13	Demotion process initiated by the base node.	Successful demotion process	Successful demotion process	PASS	Sample: M1
3.4.14	Keep-Alive process (response from DUT).	Successful keep alive process	Successful keep alive process	PASS	Sample: M1
3.4.15	Keep-Alive process (timeout and disconnect).	Successful keep alive process	Successful keep alive process	PASS	Sample: M1
3.4.16	Keep-Alive process (changes in Keep Alive timeout).	Successful keep alive process	Successful keep alive process	PASS	Sample: M1

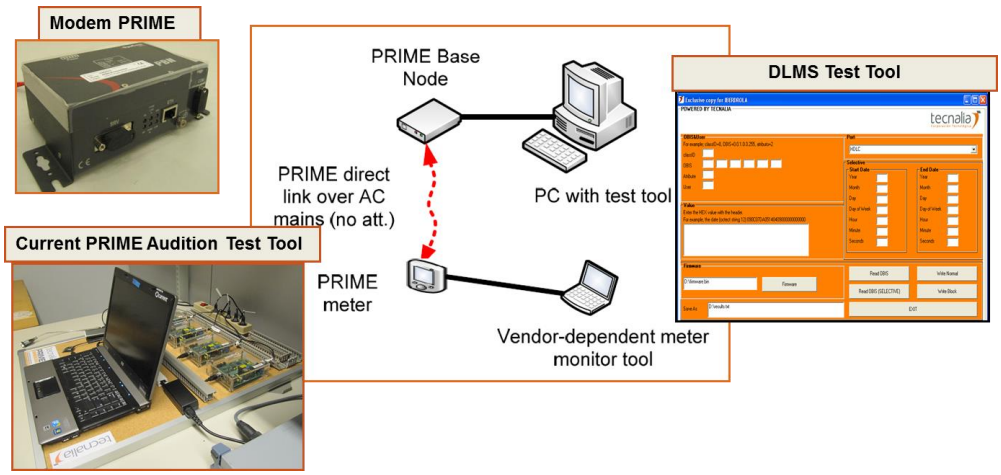
3.4.17	Connection establishment initiated by the Base node.	Successful keep alive process	Successful keep alive process	PASS	Sample: M1
3.4.18	Connection establishment initiated by the Service node.	Successful connection stablishment	Successful connection stablishment	PASS	Sample: M1
3.4.19	Connection establishment rejected by the Base node.	Connection stablishment rejected	Connection stablishment rejected	PASS	Sample: M1
3.4.20	Connection closing initiated by the Base node.	Successful connection closing	Successful connection closing	PASS	Sample: M1
3.4.21	Connection closing initiated by the Service node.	Successful connection closing	Successful connection closing	PASS	Sample: M1
3.4.22	File transfer process (unicast).	Successful file transfer (unicast)	Successful file transfer (unicast)	PASS	Sample: M1
3.4.23	File transfer process (multicast).	Successful file transfer (multicast)	Successful file transfer (multicast)	PASS	Sample: M1
3.4.24	Error in the firmware upgrade process.	Firmware error detected	Firmware error detected	PASS	Sample: M1

A.3. Convergence layer

A.3.1.1 Test setup - DUT Connections:

- Serial port:
    - to access to PIB values with Current PRIME Audition Test Tool
    - connected to Current PRIME Audition Test Tool
- Start the test with “DLMS Test Tool” from Tecnalia and read/write several DLMS OBIS code

The setup of the Convergence layer tests is the following one:



A.3.1.2 Test results

CODE	DESCRIPTION	RESULT	EXPECTED	STAT.	COMMENTS
4.2 CS Test Cases: 4-32 Connection establishment					
4.2.1	Correct establishment and disconnection of 4-32 link	Successful 4-32 connectión stablishment	Successful 4-32 connectión stablishment	PASS	Sample: M1
4.3 CS Test Cases: DLMS traffic over 4-32 connection					
4.3.1	CS4-32 is able to pass valid DLMS payload between the meter and the test system.	Valid DLMS payload	Valid DLMS payload	PASS	Sample: M1
4.4 CS Test Cases: 4-32 parameter integrity					
4.4.1	Test that CS4-32 integrity parameter is verified at the DUT.		Successful 4-32 parameter integrity	N/A	Skipping this test from the certification.