



Test and Certification Committee (TCC)

**Protocol Implementation Conformance Statement (PICS)
for MAC layer of Echonet Lite Profile**

Revision 0v09

1 Notices

1.1 Copyright

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1.2 Revision History

Table 1.21 List of Revision History

Version	Date	Author	Comments
0v00	2013-12-03	Olga Kozeruk	Initial draft
0v01	2013-12-13	Olga Kozeruk	Deleted "N/A" column from "Status" column
0v02	2013-12-19	Olga Kozeruk	Removed footnote 9 and changed the numbering accordingly.
0v03	2013-12-20	Olga Kozeruk	Removed Irrelevant items
0v04	2013-12-26	Olga Kozeruk	Editorial changes
0v05	2014-01-31	Olga Kozeruk	The O.1 and O.2 footnotes were changed.
0v06	2015-06-12	Olga Kozeruk, Toyoyuki Kato	Addition of definitions for HAN device.
0v07	2015-09-02	Toyoyuki Kato, Olga Kozeruk	<ul style="list-style-type: none"> • Added of MLF 6.1, 7.1, 22.1, 22.2 • Modified of MLF 6, 18, 22, 23, 24. • Changed referenced standard version to 2v06 (Wi-SUN-Echonet-Profile-2v06) • Removed MLF23 and MLF24 and updated the numbering accordingly • Editorial changes.
0v08	2016-07-13	Fumihide Kojima, Hideyuki Kuribayashi, Keiichi Teramoto, Koichi Sato, Noriyuki Sato, Takashi Asai, Toyoyuki Kato, Olga Kozeruk	<ul style="list-style-type: none"> ♦ Revision of Wi-SUN logo on the front page. ♦ Reassignment of the item number to FD type in sub-clause 10.2. ♦ Addition of Relay support (RS) type in sub-clause 10.3. ♦ Addition of Sleep support (SL) type in sub-clause 10.4. ♦ Update of [Wi-SUN-ENET] specified in sub-clause 3.1. ♦ Renumbering the item numbers in tables throughout this document, to make them identical with ENETTPS.

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Version	Date	Author	Comments
			◆ Modification of the other part according to changes above.
0v09	2017-03-24	Toyoyuki Kato	◆ Reflecting "R4" defined in 10.3 into 10.4 and 10.5.

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3 References

3.1 Normative references

This section lists the normative references that define partial specifications of this standard or ones that are related to the standard.

This document is to recommend that any update in those references should be reflected in the subsequent implementations according to the standard.

[802.15.4] IEEE Std. 802.15.4-2011, IEEE Standard for Information Technology - Telecommunications and Information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs), June 2011.

[802.15.4e] IEEE Std. 802.15.4g-2012, Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs) - Amendment 3: Physical Layer (PHY) Specifications for Low-Data-Rate, Wireless, Smart Metering Utility Networks, March 2012.

[Wi-SUN-ENET] 20160617-Wi-SUN-Echonet-Profile2v08.doc, webftp.wi-sun.org.

3.2 Informative References

None

4 Abbreviations and Special Symbols

4.1 Abbreviations

ED	energy detection
FD	functional device
FFD	full-function device
HEMS	Home Energy Management System
HAN	Home Area Network
PAN	Personal Area Network
PHY	physical
PICS	protocol implementation conformance statement
PSDU	PHY service data unit
RFD	reduced-function device
SM	Smart Meter
SUN	smart utility network
TCWG	Test and Certification Working Group

4.2 Special Symbols

M	Mandatory
O	Optional
O.I	Optional, but support of at least one of the group of options labeled O.I is required.
N/A	Not applicable
X	Prohibited
I	Ignore (not tested)
“item”	Conditional, status dependent upon the support marked for the “item”

5 Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given standard. Such a statement is called a protocol implementation conformance statement (PICS).

5.1 Scope

This document provides the protocol implementation conformance statement (PICS) proforma for MAC part of Wi-SUN Echonet Lite profile defined in sections “3.7 Recommended usage for single-hop smart meter-HEMS network”, “3.8 Recommended usage for single-hop home area network (HAN) among devices”, “3.9 Recommended usage for multi-hop home area network employing relay device” and “3.10 Recommended usage for home area network among devices with an extension of sleeping end device support” of [Wi-SUN-ENET]. The following table provides more detailed scope of this document.

Network type	Device Role Type	reference section in [Wi-SUN-ENET]	Sleeping end device support	Relay support	Note
Single-hop smart meter-HEMS network	Coordinator	3.7	No	No	
	End device		No	No	
Single-hop HAN	Coordinator	3.8	No	No	
	End device		No	No	This device can connect to Extended HAN Coordinator
Extended HAN	Coordinator	3.9 and 3.10	Yes	Yes	
	Relay device		Yes	Yes	
	End device	3.9	No	Yes	
	Sleeping end device	3.9 and 3.10	Yes	Yes	

5.2 Purpose

The supplier of a protocol implementation claiming to conform to MAC part of profile specification [Wi-SUN-ENET] shall complete the following PICS proforma and accompany it with the information necessary to identify fully both the supplier and the implementation.

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The PICS is in the form of answers to a set of questions in the PICS proforma. The questions in a proforma consist of a systematic list of protocol capabilities and options as well as their implementation requirements. The implementation requirement indicates whether implementation of a capability is mandatory, optional, conditional or irrelevant depending on options selected. When a protocol implementer answers questions in a PICS proforma, they would indicate whether an item is implemented or not, and provide explanations if an item is not implemented.

6 Instructions for Completing the PICS Proforma

If a given implementation is claimed to conform to a particular standard, the actual PICS proforma to be filled in by a supplier shall be technically equivalent to the text of the PICS proforma in this document, and shall preserve the numbering and naming and the ordering of the PICS proforma.

PICS which conform to this document shall be a conforming PICS proforma completed in accordance with the instructions for completion given in this document.

The main part of the PICS is a fixed-format questionnaire, divided into tables. Answers to the questionnaire are to be provided in the rightmost column, either by simply marking an answer to indicate a restricted choice (such as Yes or No), or by entering a value, set, or range of values.

7 Identification of the Implementation

Implementation under test (IUT) identification

IUT name: MIRUECO mini

IUT version: 3.100

System under test (SUT) identification

SUT name: MIRUECO mini

Software Version: 5.10A

Hardware Version: 3.100

Operating system (optional): _____

Applicant

Name: Mediotec co.,Ltd

Address: 1-28-11, Shinjyuku, Shinjyukuku, Tokyo, 160-0022, Japan

Telephone number: +81-3-3226-5500

Facsimile number: _____

Email address: nakamura@mediotec.co.jp

Additional information: _____

8 Identification of the Protocol

This PICS proforma applies to standards given in the following:

- Wi-SUN-Echonet-Profile[Wi-SUN-ENET]
Version: Wi-SUN-Echonet-Profile-2v08

9 Global Statement of Conformance

Requirement	Support
Are all mandatory features implemented?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Note -- Answering 'No' indicates non-conformance to the specified protocol standard. Non-supported mandatory capabilities are to be identified in the following tables, with an explanation by the implementer explaining why the implementation is non-conforming.

The supplier will have fully complied with the requirements for a statement of conformance by completing the statement contained in this sub-clause. However, the supplier may find it helpful to continue to complete the detailed tabulations in the sub-clauses that follow.

10 PICS Proforma Tables

The following tables are composed of the detailed questions to be answered, which make up the PICS proforma.

10.1 Profile usage (PU) types

Item number	Item description	Reference	Status	Support	
				Yes	No
PU1	Single-hop smart meter-HEMS network	[Wi-SUN-ENET] 3.7	O.1		✓
PU2	Single-hop HAN	[Wi-SUN-ENET] 3.8	O.1	✓	
PU3	Extended HAN	[Wi-SUN-ENET] 3.9, 3.10	O.1		✓

O.1: Optional, but one and only one of the features described in PU1 , PU2 and PU3 is required to be implemented. Devices under test supporting multiple Profile usages must submit separate PICS for each profile usage and must be tested separately.

10.2 Functional device (FD) types

Item number	Item description	Reference	Status	Support	
				Yes	No
FD1	FFD	[802.15.4] 5.1	O.2	✓	
FD2	RFD	[802.15.4] 5.1	O.2		✓
FD3	Support of 64 bit IEEE address	[802.15.4] 5.2.1.1.6	M	✓	
FD8	SUN PHY device	[802.15.4g] 8.1	M	✓	
FD9	PSDU size up to 255 octets	[Wi-SUN-ENET] 3.6.2, 3.7.2	M	✓	

O.2: Optional, but one and only one of the features described in FD1 and FD2 is required to be implemented. Devices under test supporting multiple Functional Device types must submit separate PICS for each device type and must be tested separately.

10.3 Device Role type (R)

Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No
R1	Coordinator	[Wi-SUN-ENET] 3.6.1	FD1:O.3 FD2:X	FD1:O.4 FD2:X	FD1:O.5 FD2:X	✓	
R2	Relay device	[Wi-SUN-ENET] 3.9.1	X	X	FD1:O.5 FD2:X		✓
R3	End device	[Wi-SUN-ENET] 3.6.1	FD1:O.3 FD2:M	FD1:O.4 FD2:M	FD1:X FD2:O.6		✓
R4	Sleeping end device	[Wi-SUN-ENET] 3.10.1	X	X	FD1:X FD2:O.6		✓

O.3, O.4: Optional, but one and only one of the features described in R1 and R3 is required to be implemented. Devices under test supporting multiple Functional Device types must submit separate PICS for each device type and must be tested separately.

O.5: Optional, but one and only one of the features described in R1 and R2 is required to be implemented. Devices under test supporting multiple Functional Device types must submit separate PICS for each device type and must be tested separately.

O.6: Optional, but one and only one of the features described in R3 and R4 is required to be implemented. Devices under test supporting multiple Functional Device types must submit separate PICS for each device type and must be tested separately.

10.4 Relay support (RS) types

Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No
RS1	Relay endpoint	[Wi-SUN-ENET] 3.9.3.1.1, 3.9.3.2.3	X	X	R1, R3, R4: M R2: X		✓
RS2	Relay intermediate	[Wi-SUN-ENET] 3.9.3.3	X	X	R1, R3, R4: X R2: M		✓

10.5 Sleep support (SL) types

Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No

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Item number	Item description	Reference	Status			Support	
SL1	Sleeping device	[Wi-SUN-ENET] 3.10.1, 3.10.3, 3.10.6.1	X	X	R1, R2: X R3: O R4: M		✓
SL2	Sleeping support	[Wi-SUN-ENET] 3.10.1, 3.10.3, 3.10.6.1	X	X	R1, R2: M R3, R4: X		✓

10.6 MAC sub-layer functions

Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No
MLF1	Transmission of data	[802.15.4] 6.3	M	M	M	✓	
MLF1.1	Purge data	[802.15.4] 6.3.4, 6.3.5	I	I	SL2: M		✓
MLF2	Reception of data	[802.15.4] 6.3	M	M	M	✓	
MLF2.2	Control of PHY receiver	[802.15.4] 6.2.9	I	I	I		✓
MLF3	Beacon management	[802.15.4] 5	M	M	M	✓	
MLF3.1	Transmit beacons	[802.15.4] 5, 5.1.2.4	FD1:M FD2: X	FD1:M FD2: X	FD1:M FD2:X	✓	
MLF3.1.1	Transmit Capability Notification IE	[Wi-SUN-ENET] 3.8.3.1, 3.10.3.2.1	X	O ¹	M		✓
MLF3.2	Receive beacons	[802.15.4] 5, 6.2.4	M	M	M	✓	
MLF3.2.1	Receive Capability Notification IE	[Wi-SUN-ENET] 3.8.3.1, 3.10.3.2.1	X	M ²	M	✓	
MLF4	Channel access mechanism	[802.15.4] 5, 5.1.1	M	M	M	✓	
MLF6	Frame validation	[802.15.4] 6.3.3, 5.2, 5.1.6.2	M	M	M	✓	

¹ All flags must be set to zero in the IE.

² This feature is required for the compatibility purpose only and the content of the received IE should not be used for any network configuration or routing purposes.

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Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No
MLF7	Acknowledged frame delivery	[802.15.4] 5, 6.3.3, 5.2.1.1.4, 5.1.6.4	M	M	M	✓	
MLF8	Association and disassociation	[802.15.4] 5, 6.2.2, 6.2.3, 5.1.3	I	I	I		✓
MLF9	Security	[802.15.4] 7	M	M	M	✓	
MLF9.1	Unsecured mode	[802.15.4] 7	M	M	M	✓	
MLF9.2	Secured mode	[802.15.4] 7	M	M	M	✓	
MLF9.2.1	Data encryption	[802.15.4] 7	M	M	M	✓	
MLF9.2.2	Frame integrity	[802.15.4] 7	M	M	M	✓	
MLF10.1	ED	[802.15.4] 5.1.2.1, 5.1.2.1.1	FD1:M FD2: I	FD1:M FD2: I	FD1:M FD2: I	✓	
MLF10.2	Active scanning	[802.15.4] 5.1.2.1.2	FD1:O ³ FD2:M	FD1:OError! Bookmark not defined. FD2:M	FD1,RS2:M FD1,RS1:OError! Bookmark not defined. FD2:M	✓	
MLF10.4	Orphan scanning	[802.15.4] 5.1.2.1, 5.1.2.1.3	I	I	I		✓
MLF13	Store one transaction	[802.15.4] 5.1.5	I	I	SL1: X SL2: M		✓

³ FD1 must have capability to respond to the Active scanning performed by other devices.

Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No
MLF15	MPM for all coordinators when operating at more than 1% duty cycle	[802.15.4g] 5.1.13	I	I	I		✓
MLF18	EBR capability	[802.15.4e] 5.3.7.2	MLF10.2: M ⁴	MLF10.2:MError! Bookmark not defined.	MLF10.2:MError! Bookmark not defined.	✓	
MLF18.2	Transmission of Capability Notification IE in EBR	[Wi-SUN-ENET] 3.7.6.1, 3.8.6.1, 3.8.3.1, 3.10.3.2.1	X	FD1:X FD2:O	FD1, RS1: X FD1,RS2: M FD2:M		✓
MLF18.3	Reception of Capability Notification IE in EBR	[Wi-SUN-ENET] 3.8.3.1, 3.10.3.2.1	X	M ⁵	M	✓	
MLF24	Relay support in HAN	[Wi-SUN-ENET] 3.9.3.1	X	X	M		✓

10.7 MAC frames

Item number	Item description	Reference	Status			Support	
			PU1	PU2	PU3	Yes	No
MF1	Beacon	[802.15.4] 5.2.2.1	M	M	M	✓	
MF2	Data	[802.15.4] 5.2.2.2	M	M	M	✓	
MF3	Acknowledgment	[802.15.4] 5.2.2.3	M	M	M	✓	
MF4	Command	[802.15.4] 5.2.2.4	M	M	M	✓	

4 FD1 must have capability to respond to the EBR.

5 All flags must be set to zero in the IE.

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Item number	Item description	Reference	Status			Support	
MF4.1	Association request	[802.15.4] 5.2.2.4, 5.3.1	I	I	I		✓
MF4.2	Association response	[802.15.4] 5.2.2.4, 5.3.2	I	I	I		✓
MF4.3	Disassociation notification	[802.15.4] 5.2.2.4, 5.3.3	I	I	I		✓
MF4.4	Data request	[802.15.4] 5.2.2.4, 5.3.4	I	I	SL1,SL2: M		✓
MF4.4.1	Transmission	[802.15.4] 5.2.2.4, 5.3.4	I	I	SL1: X SL2: M		✓
MF4.4.2	Reception	[802.15.4] 5.2.2.4, 5.3.4	I	I	SL1: M SL2: X		✓
MF4.6	Orphaned device notification	[802.15.4] 5.2.2.4, 5.3.6	I	I	I		✓
MF4.7	Beacon request	[802.15.4] 5.2.2.4, 5.3.7	M	M	M	✓	
MF4.8	Coordinator realignment	[802.15.4] 5.2.2.4, 5.3.8	I	I	I		✓
MF5	2-octet FCS	[802.15.4g] 5.2.1.9	M	M	M	✓	