



Wi-SUN Alliance

PHY Working Group (PHYWG)

**Protocol Implementation Conformance Statement (PICS)
for Wi-SUN PHY**

Revision 1V04

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1 Notice

1.1 Copyright

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1.2 Release History

Table 1 List of Revision History

Revision	Date	Author	Comments
0V00	19 June 2012	Chin-Sean Sum	Initial draft.
0V01	3 Aug. 2012	Chin-Sean Sum and Phil Beecher	Completion of WG ballot 1. Modified based on circulation within TCWG group.
1V00	25 Feb. 2013	Chin-Sean Sum	Release of the first official revision.
1V01	14 Feb. 2014	Chin-Sean Sum	Modification in accordance to development in Echonet Profile
1V02	20 Feb. 2014	Chin-Sean Sum	Modification in accordance to development in Echonet Profile
1V03_RC1	29 Aug 2018	Kunal Shah	Modifications to align with PHY TPS and Wi-SUN profiles
1V03_RC2	5 Oct 2018	Kunal Shah	Updated profile related information as discussed during the PHYWG call
1V03_RC3	25 Jan 2019	Kunal Shah	Clean version of the document with editorial touch up
1V03_RC4	5 April 2019	Kunal Shah	Updated based on the agreed proposed resolutions from the ballot comments
1V04	22 April 2019	Kunal Shah	Accepted all changes per comments and resolutions with editorial touch up

1 **2 References**

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3 **2.1 Normative References**

4 [A1] IEEE Std 802.15.4-2015, "IEEE Standard for Low-Rate Wireless Personal Area
5 Networks (WPANs)", <https://standards.ieee.org/findstds/standard/802.15.4-2015.html>

6 [A2] IEEE Std. 802.15.4u, IEEE Standard for Low-Rate Wireless Networks - Amendment 3:
7 Use of the 865 MHz to 867 MHz Band in India

8 [A3] IEEE Std. 802.15.4v, IEEE Standard for Low-Rate Wireless Networks, Amendment 5:
9 Enabling/Updating the Use of Regional Sub-GHz Bands,
10 <https://standards.ieee.org/develop/project/802.15.4v.html>

11 [A4] Wi-SUN PHY Technical Profile Specification (Latest Revision)

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13 **2.2 Informative References**

14 [B1] Wi-SUN TCWG Documentation Overview.

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3 Abbreviations and Special Symbols

3.1 Abbreviations

CSM	common signaling mode
FEC	forward error correction
FAN	Field Area Network
HAN	Home Area Network
JUTA	Japan Utility Telemetry Association
TCC	Test and Certification Committee
SUN-FSK	Smart utility network frequency shift keying
PHY	physical
PICS	protocol implementation conformance statement
PLP	PHY layer packet
PPDU	PHY protocol data unit
PSDU	PHY service data unit
RF	radio frequency
SUN	smart utility network
TCWG	Test and Certification Working Group

3.2 Special Symbols

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

1 **4 Introduction**

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

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6 **4.1 Scope**

7 This document provides the protocol implementation conformance statement (PICS)
8 proforma for standard specification [A1], [A2], [A3] & [A4].

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10 **4.2 Purpose**

11 The supplier of a protocol implementation claiming to conform to standard specification
12 [A2] shall complete the following PICS proforma and accompany it with the information
13 necessary to identify fully both the supplier and the implementation.

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

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5 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.

A PICS which conforms 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.

5.1 PHY Certification Category Identification

Category identification provides which region(s) and frequency band(s) the implementation is claimed to conform. Regions that covers frequency bands from 863-928 MHz are shown below in Table 2 and Table 3.

Table 2 - Certification Category IDs for 800MHz Regions

Certification Category ID	Frequency Bands (MHz)	Regions Covered
1	863-870	Europe (EU1) Only
2	865-867	India Only
3	866-869	Singapore (SG1) Only
4	870-876	Europe (EU2) Only
5	863-876	EU1, EU2, India, Singapore (SG1)
6	863-870	EU1, India, Singapore (SG1)
7	863-876	EU1, EU2
8	865-869	India, Singapore (SG1)

Table 3 - Certification Category IDs for 900MHz Regions

Certification Category ID	Frequency Bands (MHz)	Regions Covered
9a	902-928	North America
9b	902-928	Mexico
10	902-907.5 & 915-928	Brazil Only

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11	915-928	Australia/ New Zealand Only
12	915-918	Philippines Only
13	917-923.5	Korea Only
14	919-923	Malaysia Only
15	920.5-924.5	China Only
16	920-928	Japan Only
17	920-925	Hong Kong, Singapore (SG2), Thailand, Vietnam
18a	902-928	North America, Mexico, Brazil, Australia/ New Zealand, Philippines, Korea, Malaysia, China, Hong Kong, Singapore (SG2), Thailand, Vietnam, Japan
18b	902-928	North America, Mexico, Brazil, Australia/ New Zealand, Philippines, Korea, Malaysia, China, Hong Kong, Singapore (SG2), Thailand, Vietnam
18c	902-928	North America, Mexico, Brazil, Australia/ New Zealand, Philippines, Korea, Malaysia, Hong Kong, Singapore (SG2), Thailand, Vietnam
18d	902-928	North America, Brazil
19a	915-928	Philippines, Korea, Malaysia, China, Hong Kong, Singapore (SG2), Thailand, Vietnam, Japan, Australia/ New Zealand
19b	915-928	Philippines, Korea, Malaysia, China, Hong Kong, Singapore (SG2), Thailand, Vietnam, Australia/ New Zealand
19c	915-928	Philippines, Korea, Malaysia, Hong Kong, Singapore (SG2), Thailand, Vietnam, Australia/ New Zealand
19d	902-928	Mexico, Philippines, Korea, Malaysia, Hong Kong, Singapore (SG2), Thailand, Vietnam, Australia/ New Zealand

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6 Identification of the Implementation

Implementation under test (IUT) identification

IUT name: _____ CC13x2R/P _____

IUT version: _____ 2.0 _____

System under test (SUT) identification

SUT name: _____ CC1352R _____

Software Version: _____ 0x2205 _____

Hardware Version: _____ 2.0 _____

Operating system (optional): _____

Wi-SUN Profile Identification

Profile name supported (FAN/HAN/JUTA): _____ PHY Layer for FAN Profile _____

Certification Category Identification

Category ID supported: _____ 5 _____

Product supplier

Name: _____ Texas Instruments _____

Address: _____ 12500 TI Blvd, Dallas TX 75243 _____

Telephone number: +14692318527

Facsimile number: _____

Email address: _____ talmholt@ti.com

Additional information: _____

Client

Name: _____ Texas Instruments

Address: _____ See above

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1 Telephone number: ____ See above

2 Facsimile number: _____

3 Email address: _____ See above

4 Additional information: _____

5 _____

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7 **PICS contact person**

8 Name: _____ Thomas Almholt

9 Address: _____ 12500 TI BLVD, DALLAS TX 75243, USA

10 Telephone number: _____ +12145674516 / +14692318527

11 Facsimile number: _____

12 Email address: _____ talmholt@ti.com

13 Additional information: _____

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1 7 Identification of the Protocol

2 This PICS proforma applies to standards given in the following:

3 [A1] IEEE Std 802.15.4-2015, "IEEE Standard for Low-Rate Wireless Personal Area
4 Networks (WPANs)", <https://standards.ieee.org/findstds/standard/802.15.4-2015.html>

5 [A2] IEEE Std. 802.15.4u, IEEE Standard for Low-Rate Wireless Networks - Amendment 3:
6 Use of the 865 MHz to 867 MHz Band in India

7 [A3] IEEE Std. 802.15.4v, IEEE Standard for Low-Rate Wireless Networks, Amendment 5:
8 Enabling/Updating the Use of Regional Sub-GHz Bands,
9 <https://standards.ieee.org/develop/project/802.15.4v.html>

10 [A4] Wi-SUN PHY Technical Profile Specification (Latest Revision)

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8 Global Statement of Conformance

The implementation described in this PICS proforma meets all of the mandatory requirements of the referenced standards:

[A1] IEEE Std 802.15.4-2015, "IEEE Standard for Low-Rate Wireless Personal Area Networks (WPANs)", <https://standards.ieee.org/findstds/standard/802.15.4-2015.html>

[A2] IEEE Std. 802.15.4u, IEEE Standard for Low-Rate Wireless Networks - Amendment 3: Use of the 865 MHz to 867 MHz Band in India

[A3] IEEE Std. 802.15.4v, IEEE Standard for Low-Rate Wireless Networks, Amendment 5: Enabling/Updating the Use of Regional Sub-GHz Bands, <https://standards.ieee.org/develop/project/802.15.4v.html>

[A4] Wi-SUN PHY Technical Profile Specification (Latest Revision)

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 subclause. However, the supplier may find it helpful to continue to complete the detailed tabulations in the subclauses that follow.

9 PICS Proforma Tables

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

9.1 Major Capabilities for the PHY

The requirements for the PHY capabilities are described in this section.

9.1.1 PLP Capabilities

The requirement for the PLP is described in Table 4.

Table 4 – PHY packet

Item number	Item description	Reference	Status			Support		
			FAN	HAN	JUTA	N/A	Yes	No
PLP 1	Transmission of PPDU packets	11 [A1]	M	M	M		Yes	
PLP 2	Reception of PPDU packets	11 [A1]	M	M	M		Yes	
PLP3	PSDU size	11.2 [A1]	M Up to 2047 octets	M Up to 255 octets	M Up to 255 octets		Yes	

9.1.2 RF Capabilities

The requirements for the PHY RF capabilities are described in Table 5.

Table 5 – Radio frequency (RF)

Item number	Item description	Reference	Status			Support			Comments (Other supported modes)
			FAN	HAN	JUTA	N/A	Yes	No	
RF1	SUN PHYs								
RF1.1	SUN-FSK	5 [A4] & 20 [A1, A2, A3]	M	M	M		Yes		
RF1.2	SUN-FSK Generic PHY	20.3 [A1, A2, A3]	O	O	O	N/A			

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Item number	Item description	Reference	Status			Support			Comments (Other supported modes)
			FAN	HAN	JUTA	N/A	Yes	No	
RF1.3	Transmit and receive using CSM	10.1 [A1, A2, A3]	M	M**	O		Yes		
RF1.4	At least one of the bands given in Table 3	5.2.2 [A4]	M	M	M		Yes		
RF1.5	Support of 920 MHz band in Table 3	5.2.2 [A4]	O.1	M	M	N/A			
RF1.6	Support of channel plan in Table 3	5.2.2 [A4]	M	M	M		Yes		
RF2	SUN PHY operating modes								
RF2.1	Operating mode #1a or #1b for at least one of the frequency bands from 863 MHz to 928 MHz in Table 2 and Table 3	Annex B [A4]	RF1.4 & RF1.5: M	RF1.4 & RF1.5: O	RF1.4 & RF1.5:O		Yes		
RF2.2	Operating mode #3 or #2a for at least one of the frequency bands from 863 MHz to 928 MHz in Table 2 and Table 3	Annex B [A4]	RF1.4: M*	RF1.4 & RF1.5: O	RF1.4 & RF1.5:O		Yes		
RF2.3	Additional Operating modes in Table 2	5.2.1 [A4]	RF1.4 & RF1.5: O	RF1.4 & RF1.5: O	RF1.4 & RF1.5: O	N/A			

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Item number	Item description	Reference	Status			Support			Comments (Other supported modes)
			FAN	HAN	JUTA	N/A	Yes	No	
RF2.4	Operating mode #2b in 920 MHz band in Table 2 and Table 3	Annex A [A4]	RF1.4: O	RF1.5: M	RF1.5:M	N/A			
RF2.5	Operating mode #1b, 3, #4b and #5 in 920 MHz band in Table 2 and Table 3	5.2.2 [A4]	RF2.1: O	RF1.5: O	RF1.5:O	N/A			
RF3	SUN-FSK Options								
RF3.1	SUN-FSK FEC	5.3 [A4]	RF1.1: O RF1.2: O	RF1.1: O RF1.2: O	RF1.1: O RF1.2: O	N/A			
RF3.2	SUN-FSK interleaving	20.3.5 [A1, A2, A3]	RF1.1: O RF1.2: O	RF1.1: O RF1.2: O	RF1.1: O RF1.2: O	N/A			
RF3.3	SUN-FSK data whitening	5.4 [A4]	RF1.1: M RF1.2: M	RF1.1: M RF1.2: M	RF1.1: M RF1.2: M		Yes		
RF3.4	FCS Length support for 4-octet	Annex A , B & D	RF1.1: M RF1.2: M	RF1.1: O RF1.2: O	RF1.1: O RF1.2: O		Yes		
RF3.5	FCS Length support for 2-octet	Annex A , B & D	RF1.1: O RF1.2: O	RF1.1: M RF1.2: M	RF1.1: M RF1.2: M	N/A			

1 * For FAN Profile, Operating Mode #3 is mandatory if the band supports channel spacing of
2 at least 400 kHz and Operating Mode #2a is mandatory where spectrum is limited to a
3 maximum 200 kHz channel spacing

4 ** For HAN Profile, if mode #1 is not supported, CSM is not supported