



Wi-SUN Alliance

PHY Working Group (PHYWG)

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

Revision 1V04

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27
28
29
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Table of Contents

| | | |
|----|-------|---|
| 1 | | |
| 2 | 1 | NOTICE 4 |
| 3 | 1.1 | Copyright 4 |
| 4 | 1.2 | Release History 4 |
| 5 | 2 | REFERENCES 5 |
| 6 | 2.1 | Normative References 5 |
| 7 | 2.2 | Informative References 5 |
| 8 | 3 | ABBREVIATIONS AND SPECIAL SYMBOLS 6 |
| 9 | 3.1 | Abbreviations 6 |
| 10 | 3.2 | Special Symbols 6 |
| 11 | 4 | INTRODUCTION 7 |
| 12 | 4.1 | Scope 7 |
| 13 | 4.2 | Purpose 7 |
| 14 | 5 | INSTRUCTIONS FOR COMPLETING THE PICS PROFORMA 8 |
| 15 | 5.1 | PHY Certification Category Identification 8 |
| 16 | 6 | IDENTIFICATION OF THE IMPLEMENTATION 10 |
| 17 | 7 | IDENTIFICATION OF THE PROTOCOL 12 |
| 18 | 8 | GLOBAL STATEMENT OF CONFORMANCE 13 |
| 19 | 9 | PICS PROFORMA TABLES 14 |
| 20 | 9.1 | Major Capabilities for the PHY 14 |
| 21 | 9.1.1 | PLP Capabilities 14 |
| 22 | 9.1.2 | RF Capabilities 14 |

Table of Figures

23 No table of figures entries found.

Table of Tables

| | | |
|----|---------|----------------------------------|
| 24 | TABLE 1 | LIST OF REVISION HISTORY 4 |
|----|---------|----------------------------------|

PHY Working Group (PHYWG)

| | | |
|---|---|----|
| 1 | TABLE 2 - CERTIFICATION CATEGORY IDS FOR 800MHZ REGIONS | 8 |
| 2 | TABLE 3 - CERTIFICATION CATEGORY IDS FOR 900MHZ REGIONS | 8 |
| 3 | TABLE 4 – PHY PACKET | 14 |
| 4 | TABLE 5 – RADIO FREQUENCY (RF) | 14 |
| 5 | | |

1 Notice

1.1 Copyright

The contents of this document are Copyright © Wi-SUN Alliance™ and are strictly confidential. No information contained herein may be supplied to any other party without prior written permission from an authorised Wi-SUN Alliance representative.

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
7 3: 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
3 statement of which capabilities and options have been implemented for a given standard.
4 Such a 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 |

PHY Working Group (PHYWG)

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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: BP35C5

IUT version: 1.0

System under test (SUT) identification

SUT name: BP35C5 Evaluation Board

Software Version: 15

Hardware Version: 1.0

Operating system (optional): N/A

Wi-SUN Profile Identification

Profile name supported (FAN/HAN/JUTA): FAN

Certification Category Identification

Category ID supported: 9a, 10

Product supplier

Name: ROHM Co., Ltd.

Address: 21 Saiin, Mizozaki-cho, Ukyo-ku Kyoto 615-8585 Japan

Telephone number: +81-75-321-1294

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Additional information: _____

Client

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16 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
6 3: 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 | | x | |
| PLP 2 | Reception of PPDU packets | 11 [A1] | M | M | M | | x | |
| PLP3 | PSDU size | 11.2 [A1] | M Up to 2047 octets | M Up to 255 octets | M Up to 255 octets | | x | |

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 | | x | | |
| RF1.2 | SUN-FSK Generic PHY | 20.3 [A1, A2, A3] | O | O | O | x | | | |

PHY Working Group (PHYWG)

| Item number | Item description | Reference | Status | | | Support | | | Comments |
|-------------|--|-------------------|------------------|------------------|------------------|---------|---|--|----------|
| | | | | | | | | | |
| RF1.3 | Transmit and receive using CSM | 10.1 [A1, A2, A3] | M | M** | O | | x | | |
| RF1.4 | At least one of the bands given in Table 3 | 5.2.2 [A4] | M | M | M | | x | | |
| RF1.5 | Support of 920 MHz band in Table 3 | 5.2.2 [A4] | O.1 | M | M | | x | | |
| RF1.6 | Support of channel plan in Table 3 | 5.2.2 [A4] | M | M | M | | x | | |
| 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 | | x | | |
| 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 | | x | | |
| 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 | x | | | |
| 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 | | x | | |

PHY Working Group (PHYWG)

| Item number | Item description | Reference | Status | | | Support | | | Comments |
|-------------|--|---------------------|----------------------|----------------------|----------------------|---------|---|--|----------|
| | | | | | | | | | |
| 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 | x | | | |
| 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 | x | | | |
| 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 | x | | | |
| 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 | | x | | |
| 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 | | x | | |
| 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 | x | | | |

1 * For FAN Profile, Operating Mode #3 is mandatory if the band supports channel spacing
2 of 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