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Table of Contents

1 INTRODUCTION 1

1.1 Scope 1

1.2 Requirements Language 1

1.3 Structure of This Document 1

1.4 Acknowledgements 1

2 REFERENCES 3

2.1 Wi-SUN 3

2.2 IEEE 4

2.3 ANSI/TIA 4

2.4 IETF 4

3 DEFINITIONS AND ACRONYMS 6

3.1 Definitions 6

3.2 Acronyms 6

4 TECHNICAL REQUIREMENTS 9

4.1 General 9

4.2 Reliability Targets 9

4.3 Adjacent Node Time Synchronization 9

4.4 PHY Layer 9
4.4.1 Regional Requirements 9
4.4.2 Data Rates 9

4.5 Data Link Layer 9
4.5.1 Frequency Hopping 9
4.5.2 Routing and Forwarding 10

4.6 Network Layer 10

4.7 Transport Layer 10

4.8 Security 10

5 ARCHITECTURE 12

5.1 Overview 12

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5.2 Upper Layer Considerations 14

5.3 Transport Service 14
5.3.1 General Principles 14
5.3.2 Node Behavior 14

5.4 Network Service 14
5.4.1 General Principles 14
5.4.2 Node Behavior 15

5.5 Data Link Service 15
5.5.1 General Principles 15
5.5.2 Node Behavior 15

5.6 PHY Service 21
5.6.1 General Principles 21
5.6.2 Node Behavior 22

5.7 Security 22

6 SPECIFICATION 23

6.1 Transport Layer 23
6.1.1 Operation 23

6.2 Network Layer 23
6.2.1 Constants 23
6.2.2 Data Structures 23
6.2.3 Operation 24

6.3 Data Link Layer 33
6.3.1 Constants 33
6.3.2 Data Structures 37
6.3.3 LLC Operation 58
6.3.4 MAC Operation 61
6.3.5 Service Access Points 75

6.4 PHY Layer 80
6.4.1 Operating Modes 81
6.4.2 Preamble Length 81
6.4.3 Radio Specifications 81

6.5 Security 81
6.5.1 Public Key Infrastructure 82
6.5.2 FAN Access Control and Group Key Placement 83
6.5.3 Node to Node Pairwise (N2NP) Authentication and Key Generation 92
6.5.4 Frame Security 125
6.5.5 Node Hardening 129
6.5.6 State Maintenance Through Power Cycling 129

7 APPENDIX A – TR51 CHANNEL FUNCTION 130

7.1 Random Number Generation 130

7.2 Channel Table Calculation 130

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7.3 Calculating the First Element and Step Size 132

7.4 Computation of Hopping Sequence Channel Table. 133

8 APPENDIX B - UNICAST FRAME EXCHANGE EXAMPLES 135

8.1 Directed Frame Exchange: 135
8.1.1 Unacknowledged Data 135
8.1.2 Acknowledged Data 135

8.2 Extended Directed Frame Exchange: 136
8.2.1 Qualified Frame Exchange 136
8.2.2 Multi-Packet Frame Exchange 137
8.2.3 Frame Exchange with Initial Data 138
8.2.4 Bi Directional Frame Exchange 139

9 APPENDIX C DIRECT HASH CHANNEL FUNCTION 141

9.1 Example Usage of Jenkins Hash 141

9.2 The Jenkins Hash 142

9.3 Examples 146

10 APPENDIX D FAN IPV6 ADDRESSING ARCHITECTURE 148

11 APPENDIX E UNICAST / BROADCAST / DISCOVERY EXAMPLE 149

12 APPENDIX F IPV6 NEIGHBOR DISCOVERY OPTIMIZATIONS. 152

13 APPENDIX G FRAME COUNTER, FRAME SEQUENCE NUMBER, AND MPX-IE TRANSACTION ID 153

14 APPENDIX H UNICAST TIMING CALCULATION EXAMPLE 154

14.1 Node1 Timing Calculations 154

14.2 Node2 Timing Calculations 155

15 APPENDIX J FAN NODE BOOTSTRAP MESSAGING FLOW 156

16 APPENDIX K EAPOL TARGET SELECTION 157

17 APPENDIX L KEY REINSTALLATION ATTACK (KRACK) 158

18 APPENDIX M PHYSICAL LAYER 160

18.1 PHY Specification 160
18.1.1 PPDU Format 160
18.1.2 Modulation and Coding 160

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18.1.3 Symbol rate and Modulation Index 160
18.1.4 Frequency Bands and Channel Parameters 161
18.1.5 FEC 163
18.1.6 Data Whitening 163

18.2 PHY RF Requirements 163
18.2.1 Transmit Spectral Mask 163

18.3 Regional Considerations 163
18.3.1 Brazil Region 163

18.4 PHY Test Mode Requirements 164

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Table of Figures

FIGURE 5-1 COMMUNICATIONS REFERENCE MODEL 12
FIGURE 5-2 SAMPLE LAYER 3 ROUTED FAN 13
FIGURE 5-3 SAMPLE LAYER 2 ROUTED FAN 14
FIGURE 5-4 UPPER LAYER PROTOCOL DISPATCH 16
FIGURE 5-5 UNICAST FREQUENCY HOPPING 19
FIGURE 5-6 BROADCAST FREQUENCY HOPPING 20
FIGURE 5-7 BROADCAST AND UNICAST SCHEDULES 21
FIGURE 6-1 EAPOL RELAY DATAGRAM 24
FIGURE 6-2 ADDRESS REGISTRATION 32
FIGURE 6-3 PA FRAME FORMAT 37
FIGURE 6-4 PA FRAME CONTROL FORMAT 37
FIGURE 6-5 PAS FRAME FORMAT 38
FIGURE 6-6 PAS FRAME CONTROL FORMAT 38
FIGURE 6-7 PC FRAME FORMAT 38
FIGURE 6-8 PC FRAME CONTROL FORMAT 39
FIGURE 6-9 PCS FRAME FORMAT 39
FIGURE 6-10 PCS FRAME CONTROL FORMAT 39
FIGURE 6-11 ULAD FORMAT 40
FIGURE 6-12 ULAD FRAME CONTROL FORMAT 40
FIGURE 6-13 ACKNOWLEDGEMENT FRAME FORMAT 41
FIGURE 6-14 ACKNOWLEDGEMENT FRAME CONTROL FORMAT 41
FIGURE 6-15 EAPOL FRAME FORMAT 42
FIGURE 6-16 EAPOL FRAME CONTROL FORMAT 42
FIGURE 6-17 WI-SUN HEADER IE 44
FIGURE 6-18 UNICAST TIMING IE 44
FIGURE 6-19 FRAME TYPES 44
FIGURE 6-20 BROADCAST TIMING IE 45
FIGURE 6-21 FLOW CONTROL IE 45
FIGURE 6-22 RSL IE 46
FIGURE 6-23 MHDS-IE 46
FIGURE 6-24 VENDOR EXTENSION IE 46
FIGURE 6-25 WI-SUN PAYLOAD IE 47
FIGURE 6-26 UNICAST SCHEDULE IE 48
FIGURE 6-27 BROADCAST SCHEDULE IE 48
FIGURE 6-28 CHANNEL INFORMATION FIELDS 48
FIGURE 6-29 EXCLUDED CHANNEL RANGES FIELD 50
FIGURE 6-30 CHANNEL MASK BIT ORDER ILLUSTRATION (TRANSMIT ORDER … LEFT TO RIGHT) 51
FIGURE 6-31 VENDOR EXTENSION IE 51
FIGURE 6-32 PAN IE 51
FIGURE 6-33 NETWORK NAME IE 52
FIGURE 6-34 PAN VERSION IE 52
FIGURE 6-35 GTK HASH IE 53
FIGURE 6-36 L2 MESH PDU STRUCTURE AND FORMAT 56
FIGURE 6-37 L2 MESH PDU HEADER STRUCTURE AND FORMAT 56
FIGURE 6-38 L2 MESH PDU HEADER MHD-CONTROL FIELD FORMAT 56
FIGURE 6-39 L2 MESH PDU HEADER ADDRESS LIST STRUCTURE AND FORMAT 56
FIGURE 6-40 L2 MESH PDU DATA STRUCTURE AND FORMAT 57
FIGURE 6-41 L2 MESH PDU DATA ELEMENT STRUCTURE AND FORMAT 57
FIGURE 6-42 STATE TRANSITION DIAGRAM FOR DFE 63
FIGURE 6-43 STATE TRANSITION DIAGRAM FOR EDFE 64
FIGURE 6-44 FAN JOIN STATES 72
FIGURE 6-45 SERVICE ACCESS POINTS (SAP) 76
FIGURE 6-46 AUTHENTICATION AND GROUP KEY ACQUISITION FLOWS 84

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FIGURE 6-47 SHARED SECRET INITIATION 93
FIGURE 6-48 - UML ASSOCIATION MANAGEMENT STATE MACHINE 97
FIGURE 6-49 - STATE MACHINE SHAPES KEY 97
FIGURE 6-50 - START STATE TRANSITIONS 99
FIGURE 6-51 - ASSOCIATIONWAIT STATE TRANSITIONS 100
FIGURE 6-52 - ACKWAIT STATE TRANSITIONS 100
FIGURE 6-53 - SESSIONVALID STATE TRANSITIONS 101
FIGURE 6-54 - COMMON TRANSITIONS 102
FIGURE 6-55 ESTKEYTRUST PROCEDURE FLOW 103
FIGURE 6-56 START STATE TRANSITIONS PART 1 106
FIGURE 6-57 START STATE TRANSITIONS - PART 2 107
FIGURE 6-58 SESSIONPENDING1 STATE TRANSITIONS 108
FIGURE 6-59 SESSIONPENDING2 STATE TRANSITIONS 110
FIGURE 6-60 SESSIONVALID STATE TRANSITIONS 111
FIGURE 6-61 SESSIONOPEN STATE TRANSITIONS 112
FIGURE 6-62 COMMON TRANSITIONS 113
FIGURE 6-63 NEWASSOCIATION MESSAGE 115
FIGURE 6-64 ASSOCIATIONRESPONSE MESSAGE 116
FIGURE 6-65 ASSOCIATIONACK MESSAGE 117
FIGURE 6-66 GETCERTS MESSAGE 118
FIGURE 6-67 SENDCERTS MESSAGE 118
FIGURE 6-68 CLOSEASSOCIATION MESSAGE 119
FIGURE 6-69 NS SHARED SECRET INITIATION 120
FIGURE 6-70 NS SHARED SECRET RESPONSE 120
FIGURE 6-71 SM SPECIFIC ERROR MESSAGE 123
FIGURE 6-72 GTK CYCLING 128
FIGURE 8-1 DFE NON-ACKNOWLEDGED EXCHANGE 135
FIGURE 8-2 DFE ACKNOWLEDGED EXCHANGE 136
FIGURE 8-3 EDFE QUALIFIED FRAME EXCHANGE 137
FIGURE 8-4 EDFE 2 MULTI-PACKET DATA EXCHANGE 138
FIGURE 8-5 EDFE FRAME EXCHANGE WITH INITIAL DATA 139
FIGURE 8-6 EDFE BI-DIRECTIONAL FRAME EXCHANGE 140
FIGURE 15-1 JOINING NODE BOOTSTRAP MESSAGING FLOW (L3 ROUTING) 156

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Table of Tables

TABLE 6-1 NETWORK LAYER CONSTANTS 23
TABLE 6-2 DATA LINK LAYER CONSTANTS 33
TABLE 6-3 MULTIPLEX IDS 54
TABLE 6-4 INFORMATION ELEMENT REQUIREMENTS FOR FRAMES 55
TABLE 6-5 MLME-WS-ASYNC-FRAME.REQUEST PARAMETERS 79
TABLE 6-6 MLME-WS-ASYNC-FRAME.CONFIRM PARAMETERS 80
TABLE 6-7 MLME-WS-ASYNC-FRAME.INDICATION PARAMETERS 80
TABLE 6-8 - PREAMBLE LENGTHS PER OPERATING MODES 81
TABLE 6-9 - RADIO SPECIFICATION 81
TABLE 6-10 AUTHENTICATION AND PMK INSTALLATION FLOW 87
TABLE 6-11 PTK AND GTK INSTALLATION FLOW 90
TABLE 6-12 GROUP KEY UPDATE FLOW 91
TABLE 18-1 - PHY OPERATING MODES AND SYMBOL RATES 161
TABLE 18-2: SUPPORTED FREQUENCY BANDS AND CHANNEL PARAMETERS 161
TABLE 18-3: EXCLUDED CHANNELS IN BRAZIL 163

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1 Introduction

1.1 Scope

This document defines the technical implementation and behavior of a Wi-SUN Field Area Network which fulfills the marketing requirements specified in [MRD]. With the details presented in this document, an implementer is enabled to construct an interoperable and certifiable implementation of the Wi-SUN FAN.

1.2 Requirements Language

Requirements are specified using the terminology and conventions as described in [RFC2119]. Requirements key words described in [RFC2119] must be capitalized.

1.3 Structure of This Document

The FAN Technical Profile Specification is developed in an iterative process as described in [FWGDP]. A brief overview of each TPS section is provided below. Unless noted otherwise, all sections are informative.

1. Introduction. Self-explanatory.
2. References. Self-explanatory.
3. Definitions and Acronyms. Self-explanatory.
4. Technical Requirements (normative). This section defines the requirements which must be met by the Specification section. It defines what functionality must be provided by the TPS. It does not define the technical specifics of how the Technical Requirements are met, nor test cases required to verify that functionality.
5. Architecture. Overview of the design and operation of the FAN.
6. Specification (normative). The technical specifics of how the mechanisms of the FAN are to be implemented. Normative clauses within this section require corresponding test case coverage be incorporated into the Wi-SUN FAN Compliance and Interoperability Test Plans.
7. Appendix A. (normative). Description of the TR51 Channel Function.
8. Appendix B. Unicast Frame Exchange examples.
9. Appendix C. (normative). Description of the Direct Hash Channel Function.
10. Appendix D. Guidance for FAN IPv6 Addressing Architecture.
11. Appendix E. Unicast / Broadcast / Discovery Example.
12. Appendix F. Description of IPv6 Neighbor Discovery Optimizations.
13. Appendix G. Description of Frame Counter, Frame Sequence Number, and MPX-IE Transaction ID interaction.
14. Appendix H. Unicast Timing Calculation Example.
15. Appendix J. FAN Node Bootstrap Messaging Flow.
16. Appendix K. EAPOL Target Selection.
17. Appendix L. Key Reinstallation Attack.

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3 Definitions and Acronyms

3.1 Definitions

Authenticator	See [IEEE802.1X].
Asynchronous frame	A frame that is transmitted using the MLME-WS-ASYNC-FRAME mechanism.
Broadcast frame	A frame transmitted by a node to the layer 2 broadcast address using the node's broadcast schedule.
Directed frame	A frame transmitted to a specific layer 2 unicast address using the target node's unicast schedule.
Dwell Interval	Time (duration) that a node has designated for frame exchange on a given channel when frequency hopping.
Exponentially Weighted Moving Average.	Given a sequence of values X(t=0, 1, 2, 3, …), EWMA(t) is defined as S(X(t)) + (1-S)(EWMA(t-1)). … where … Smoothing Factor 0 < S < 1 EWMA(0) = X(0).
Floor	floor(x) returns the largest number not greater that x whose number is an integer.
Target (verb)	The action of transmitting a frame on a neighbor node's unicast listening schedule at a specific time. The neighbor node is known as the targeted node.

3.2 Acronyms

6LoWPAN	IPv6 over Low power Wireless Personal Area Networks.
AEAD	Authenticated Encryption with Associated Data.
AR	Acknowledge Request. See [IEEE802.15.4].
BR	Border Router. Synonymous with 6LBR. See [RFC6775].
BSI	Broadcast Schedule Identifier.
CA	Certificate Authority
CBC	Cipher Block Chaining.
CCA	Clear Channel Assessment.
CCM	Counter with CBC-MAC.
CMAC	Cipher based MAC.
CRC	Cyclic Redundancy Check.
CSMA	Carrier Sense Multiple Access.
DAO	Destination Advertisement Object. See [RFC6550].

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