



ZigBee[®]
Control your world

ZigBee RF4CE Specification Version 1.01

ZigBee Document 094945r00ZB

January, 2010

Sponsored by: ZigBee Alliance

Accepted by This document has been accepted for release by the ZigBee Alliance Board of Directors

Abstract The ZigBee RF4CE specification describes the protocol infrastructure and services available to applications operating on the ZigBee RF4CE platform

Keywords RF4CE, Stack, Network, Application, Discovery, Pairing, Security

January, 2010

Copyright © 1996-2010 by the ZigBee Alliance.

2400 Camino Ramon, Suite 375, San Ramon, CA 94583, USA

<http://www.zigbee.org>

All rights reserved.

Permission is granted to members of the ZigBee Alliance to reproduce this document for their own use or the use of other ZigBee Alliance

Notice of use and disclosure

The ZigBee Specification is available to individuals, companies and institutions free of charge for all non-commercial purposes (including university research, technical evaluation, and development of non-commercial software, tools, or documentation). No part of this specification may be used in development of a product for sale without becoming a member of ZigBee Alliance.

Copyright © ZigBee Alliance, Inc. (2008). All rights Reserved. This information within this document is the property of the ZigBee Alliance and its use and disclosure are restricted.

Elements of ZigBee Alliance specifications may be subject to third party intellectual property rights, including without limitation, patent, copyright or trademark rights (such a third party may or may not be a member of ZigBee). ZigBee is not responsible and shall not be held responsible in any manner for identifying or failing to identify any or all such third party intellectual property rights.

This document and the information contained herein are provided on an “AS IS” basis and ZigBee DISCLAIMS ALL WARRANTIES EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO (A) ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OF THIRD PARTIES (INCLUDING WITHOUT LIMITATION ANY INTELLECTUAL PROPERTY RIGHTS INCLUDING PATENT, COPYRIGHT OR TRADEMARK RIGHTS) OR (B) ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE OR NONINFRINGEMENT. IN NO EVENT WILL ZIGBEE BE LIABLE FOR ANY LOSS OF PROFITS, LOSS OF BUSINESS, LOSS OF USE OF DATA, INTERRUPTION OF BUSINESS, OR FOR ANY OTHER DIRECT, INDIRECT, SPECIAL OR EXEMPLARY, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY KIND, IN CONTRACT OR IN TORT, IN CONNECTION WITH THIS DOCUMENT OR THE INFORMATION CONTAINED HEREIN, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH LOSS OR DAMAGE. All Company, brand and product names may be trademarks that are the sole property of their respective owners.

The above notice and this paragraph must be included on all copies of this document that are made.

ZigBee Alliance, Inc.

2400 Camino Ramon, Suite 375

San Ramon, CA 94583

3	1	Introduction	1
4	1.1	Definitions	1
5	1.2	Conformance levels	1
6	1.3	Abbreviations	1
7	1.4	Conventions	2
8	1.4.1	Number formats	2
9	1.4.2	Transmission order	2
10	1.4.3	Timing values	3
11	1.4.4	Message sequence charts	3
12	1.4.5	Reserved values	3
13	1.5	References	3
14	2	General description	4
15	2.1	Introduction	4
16	2.2	Network topology	4
17	2.3	Architecture	5
18	2.4	The ZigBee RF4CE NWK layer	6
19	2.4.1	2.4GHz band frequencies	6
20	2.4.2	Frequency agility	6
21	2.4.3	Node initialisation	7
22	2.4.4	Power saving	7
23	2.4.5	NWK frames	7
24	2.4.6	Transmission options	8
25	2.4.7	Discovery	8
26	2.4.8	Pairing	8
27	2.4.9	Security	9
28	2.5	The ZigBee RF4CE application layer	9
29	2.6	Concept of primitives	9
30	3	Network layer specification	11
31	3.1	NWK layer service specification	11
32	3.1.1	NWK layer data service	11
33	3.1.2	NWK layer management service	16
34	3.2	NWK frame formats	51
35	3.2.1	General NWK frame format	51
36	3.2.2	Format of individual frame types	53
37	3.3	NWK command frames	55
38	3.3.1	Discovery request command frame	56
39	3.3.2	Discovery response command frame	58
40	3.3.3	Pair request command frame	60
41	3.3.4	Pair response command frame	63
42	3.3.5	Unpair request command frame	65
43	3.3.6	Key seed command frame	66
44	3.3.7	Ping request command frame	67

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.