Intelligraphics Qualcomm Atheros Windows 8.1 CCXv4 Product Specification

Document Information

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Approvals

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Revision History

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1	Oct 31, 2014	Scott E. Lawson	Initial draft
	Nov 4, 2014	Hari H Sharma	Review and additions

1 Introduction

This is the product specification for the Intelligraphics Qualcomm Atheros AR9000 series Win 8.1 CCX WLAN software.

1.1 Purpose

This purpose of this document is to describe in detail the functionality and features provided by the software.

1.2 Terms, Acronyms and Abbreviations

Below are the terms, acronyms, and abbreviations used within this document.

Term, Acronym, Abbreviation	Definition
WEC 7	Windows Embedded Compact 7

2 Supported Hardware and Operating Systems

Only the following hardware and operating systems will be supported:

Target Operating System:
Win 8.1

Target Platform:
x86,x64

Target Hardware:
AR928x,AR938x, AR958x Qualcomm Atheros chipsets

Tool Chain:
Visual Studio 2008

WEC7 Platform builder plug-in for VS2008 for WEC7

2.1 Included Items

The following items are included:

- WLAN miniport driver (.dll and .reg files)
- WLAN firmware (binary only)
- Configuration utility (binary only)
- CCX extensions:
    1. CCX service extension Library is part of IHV Dll
    2. LEAP (EAP HOST Method .dll and .reg files)
    3. EAP-FAST (EPA Host Method .dll and .reg files)
    4. PEAP (EAP Host Method .dll and .reg files)
    5. OPTIONAL: EAP-TTLS (EAP Host Method .dll and .reg files) (available for an additional license fee)
- Release notes
- Installation scripts
- Test logs

3 Functional Requirements

The section listed below outlines the functions and features provided by the solution. Many of these functions are configurable through a graphical user interface.

3.1 Wi-Fi Standards

The solution supports the following Wi-Fi standards:

- 802.11a/b/g/n
- 802.11h (Spectrum and Transmit Power Management Extensions)
- 802.11i (WPA2)

3.2 Supported Data Rates

The solution supports the following data rates:

802.11a (OFDM)	6,9,12,18,24,48 and 54 Mbps
802.11b (DSSS)	1,2,5.5. and 11 Mbps
802.11g (OFDM)	6,9,12,18,24,36 and 54 Mbps
802.11n (OFDM, 20-MHz channel width)	14, 29,58, 87, 116, 130 and 144 Mbps
802.11n (OFDM, 40-MHz channel width)	30, 60, 90, 120, 180, 240, 270, 300 Mbps

3.3 Channel Width

The solution supports the following channel widths:

- 20 MHz for all 802.11 a/b/g data rates
- 20 or 40 MHz for 802.11n data rates

3.4 CCXv4

CCXv4 is supported.

3.5 Ad-Hoc

The client radio can be placed into the Ad-Hoc mode of operation with open or WEP encryption (40 or 128 bit). Ad-hoc mode is only available on the active 2.4 GHz channels. The active 2.4 GHz channels are determined by the currently set regulatory domain.

3.6 Security Options

The solution supports various security options that can be categorized as 802.1x extensible authentication protocols (EAP), security standards and key provisioning.

3.6.1 802.11x Extensible Authentication Protocols

The following 802.1x extensible authentication protocols (EAP) are supported:

- EAP Fast
- EAP TLS
- PEAP GTC
- PEAP MSCHAPv2
- PEAP TLS
- LEAP
- EAP TTLS (OPTIONAL - available for an additional license fee)
- PEAP TLS (PEAP TLS)

3.6.2 Security Standards

The following security standards are supported:

- WEP
- WPA2 (AES)
- WPA- AES
- WPA2 – PSK – TKIP
- WPA2-TKIP

3.6.3 Key Provisioning

The following key provisioning standards are supported:

- Static WEP (40 and 128 bit)
- PSK (for WPA and WPA2)

3.7 CCKM

The WLAN driver supports CCKM with both WPA and WPA2.

3.8 PMK Caching

The WLAN driver supports both standard and opportunistic PMK caching using WPA2.

4 Configuration Utility

The configuration utility displays status information about the connection, allows the user to control specific WLAN radio and network settings and allows the user to manage preconfigured connection settings using configuration profiles.

4.1 Connection Status Indicators

The configuration utility provides a connection status indicators that display the following information:

- Connection status (connected or disconnected)
- SSID
- BSSID
- RSSI
- SNR
- Channel
- Receive data rate
- Security information
- MAC address of the client radio
- IP address of the device

4.2 Radio and Network Settings

4.2.1 Radio On/Off

This setting controls powering the WLAN radio on and off.

4.2.2 CCX Enable/Disable

This setting enables or disables CCX.

4.2.3 CCKM Enable/Disable

This setting enables or disables CCKM.

4.2.4 Power Save Mode Enable/Disable

This setting enables or disables power save mode.

4.2.5 Data Rate Selection

The configuration utility has the ability to enable only specific data rates. For example, the data rate may be fixed at 54 Mbps while in 802.11g mode.

4.2.6 Adjustable Roaming Parameters

The WLAN utility has adjustable roaming parameters that allow the user to configure when the WLAN radio will roam from one access point to another. The decision to roam is determined by comparing RSSI values and differences in signal between the access points. Upon roaming, other settings determine the minimum amount of time to maintain the connection before roaming again.

4.2.6.1 RSSI Value

The RSSI value is used to determine when the current connection has degraded such that the software should begin scanning for a better access point to which it will move the connection (roam).

4.2.6.2 RSSI Difference

The WLAN radio has an adjustable parameter that prevents the radio from roaming unless the signal from the new access point is better by some minimum value than the existing access point.

4.3 Network Profiles

The configuration utility allows the user to create network profiles that can be used to quickly set up a connection. The user will have the capability to:

- Create or delete a profile
- Edit a profile's settings
- Select the profile to be used

4.3.1 Network Profile Settings

The following parameters can be set within each network profile:

- Profile name
- SSID
- Ad-hoc
  - Enable/Disable
  - Selected Channel
- Security type
- Security sub-parameters:
  - Username
  - Password
  - Key
  - Certificate
- A flag indicating whether to connect to this profile automatically
- A flag indicating that the specified SSID is hidden

The user can also order the connection priority of each network profile.

4.4 Utility Password

The configuration utility provides a way to password protect all settings. The administrator must first enter a password in the utility before any configuration changes to the radio can be made.

4.5 Error Logging

The WLAN driver logs detected errors as follows:

- Critical error messages are sent to the default debug log and debug output
- Non-critical messages are sent to the debug output

5 Protected Management frame support

Driver has support for management frame protection as needed for Win 8.1 certification requirement. Wi-Fi CERTIFIED WPA2 with Protected Management Frames provides a WPA2-level of protection for unicast and multicast management action frames. Unicast management actions frames are protected from both eavesdropping and forging, and multicast management action frames are protected from forging. WPA2 with Protected Management Frames augments WPA2 privacy protections already in place for data frames with mechanisms to improve the resiliency of mission-critical networks.

6 Pre-Certification Testing

6.1.1 CCXv4

CCXv4 pre-certification testing will be performed so that the solution passes CCXv4 certification.

6.1.2 Wi-Fi Alliance

Pre-certification testing will be performed so that the solution passes Wi-Fi Alliance Enterprise certification with the following security types:

Classification	Program
Connectivity	Wi-Fi Certified a,b,g,n
Optimization	WMM
Security	WPA - Enterprise, Personal WPA2 - Enterprise, Personal EAP Types EAP-TLS PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC EAP-FAST
Wi-Fi Certified n	2.4GHz, 5GHz Tx 2 tested Spatial Streams 2.4 GHz Rx 2 tested Spatial Streams 2.4 GHz Tx 2 tested Spatial Streams 5 GHz Rx 2 tested Spatial Streams 5 GHz Short Guard Interval 40 MHz operation in 2.4 GHz, with coexistence mechanisms 40 MHz operation in 5 GHz
Management frame protection	Enables support for protection of unicast and multicast management action frames

Note: The solution passes all Wi-Fi Alliance standards including Protected Management Frames.

From Wi-Fi Alliance: Protected Management Frames: Wi-Fi CERTIFIED WPA2 with Protected Management Frames extends WPA2 protection to unicast and multicast management action frames, which will play an increasing role in emerging applications.

7 Compliance/Approvals

7.1 Regulatory Domains

The solution supports the regulatory domains listed below. All regulatory channel and scanning requirements have been followed based on the requirements outlined in each of the regulatory domains listed below and the transmit power will be set based on the selected domain.

- FCC
- ETSI
- TELEC
- KCC

Since this is an indoor/outdoor device, it should be treated as a device that can transmit signals outdoors. This means that UNII-1 channels use passive scanning and not active scanning.

7.2 Radio Calibration and Testing

The TI modules are already calibrated, so there is no need to perform additional radio calibration. A Linux utility is available that can be used by test labs for the testing of regulatory modes.

7.3 2.4 Only Mode

In some countries the 5GHz mode of operation is not allowed. A setting is available through the registry that disallows the use of channels in the 5GHz band. This setting is not accessible from the user interface.