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Spec No: 002-14844

Spec Title: AN214844 - CYW43XX: ADJACENT CHANNEL INTERFERENCE DAEMON

Replaced by: NONE

AN214844

CYW43XX: Adjacent Channel Interference Daemon

Associated Part Family: CYW43XX

This Application Note describes the Adjacent Channel Interference (ACI) daemon that is part of the Wireless LAN (WLAN) media driver distribution.

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1 Introduction

This Application Note describes the Adjacent Channel Interference (ACI) daemon that is part of the Wireless LAN (WLAN) media driver distribution.

2 Cypress Part Numbering Scheme

Cypress is converting the acquired IoT part numbers from Broadcom to the Cypress part numbering scheme. Due to this conversion, there is no change in form, fit, or function as a result of offering the device with Cypress part number marking. The table provides Cypress ordering part number that matches an existing IoT part number

Table 1. Mapping Table for Part Number between Broadcom and Cypress

Broadcom Part Number	Cypress Part Number
BCM43XX	CYW43XX

3 IoT Resources

Cypress provides a wealth of data at http://www.cypress.com/internet-things-iot to help you to select the right IoT device for your design, and quickly and effectively integrate the device into your design. Cypress provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates. Customers can acquire technical documentation and software from the Cypress Support Community website (http://community.cypress.com/).

4 Description

The ACI daemon operation is described below.

4.1 Modules and Files

The ACI module is controlled by the WLAN source. The ACI daemon is contained in a single file:
src/aci/aci/wl_aci_linux.c

4.2 Conditional Invocation

The ACI daemon can be run at start-up and may be also be run manually from the AP console with the command “wl_aci”, which has the advantage of informational output on channel switches printed on the AP console.

5 Randomized Initial Channel Selection

In the case where there are multiple APs using the ACI algorithm within detection distance of each other, they may end up choosing the same channel that all of them perceive as optimal. This, in turn, triggers the ACI algorithm, which detects the other APs as interference and tries to switch channels.

To minimize this effect after start-up, the ACI daemon makes its initial channel selection randomly from among the available channels that meet the criteria for reliable wireless communication.

6 ACI Detection

6.1 Active/Passive Scanning

After start-up, the ACI daemon running on the AP performs the following processing:

1. Verify that the driver is loaded.
2. Determine the current band and select an “acceptable” channel.
3. Determine whether a station is associated.
4. Perform an active/passive scan of all the channels.
5. “Score” each channel and store the score in a list.

If no station is associated with the AP, the ACI daemon repeats the process described above at 3-second intervals until a station associates. If no station is associated, the AP is free to scan all channels. If a station is associated, the scan is restricted to one channel at a time.

When a station associates, the ACI daemon checks the score of the current channel and begins scanning individual channels at user-defined intervals.

The AP will only stay on each channel being scanned for a few milliseconds. If active scan is allowed, the AP can send out probe requests and get responses. If only passive scan is allowed, the AP must spend some more time on the channel being scanned, as listening to beacons is its only source of information. Channel dwell time is always in milliseconds.

The AP uses the scan information to update each channel’s score.

ACI makes the decision to change channels only if:

- The packet error rate in the current channel exceeds the PER threshold.
- Non-WiFi EMI is detected on the current channel (i.e., the current channel glitch counter exceeds the glitch threshold).
- An “optimal” or “better” channel is available. An “optimal” channel is a channel which is free of detected interference and has no occupants in the target or adjacent channels. A “better” channel is a channel with fewer current occupants, less adjacent channel interference, or a higher transmission power.

If ACI decides to switch to a new channel, it sends out a Channel Switch Announcement (CSA) to the stations associated with the AP before it switches.

7 Feature Settings

The ACI daemon incorporates some configurable features to facilitate operation in various customer environments, testing and evaluation. All of these features can be set through the table inside the wl_aci_linux.c file.

7.1 aci_glitch_threshold

This variable may be set to decimal integer values from 200 to 5000.

For example: The `wl_glitch_threshold` determines the AP’s sensitivity to non-WiFi EMI. When the current channel’s glitch count exceeds this threshold, the AP searches for and switches to a clear channel if one is available.

The default value is 2000.

7.2 aci_excluded_channels

This variable may be set to a comma-separated list of up to eight integer channel numbers. If the variable is set to one or more valid 5G channel numbers, the ACI daemon removes the channel(s) from the valid channel list. It does not consider the channel as a candidate when searching for new channel, and if the current channel is set to an excluded channel and a station is associated, it forces a channel switch.

The default value is “140, 108, 38, 42, 116, and 124”.

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7.3 aci_preferred_channels

This variable may be set to a comma-separated list of up to twelve integer channel numbers. If the variable is set to one or more valid 5G channel numbers, the ACI daemon considers the channel(s) for a channel switch before searching the remainder of the channels in the band.

7.4 aci_auto_channel

This variable may be set to “on” or “off”. If set to “on”, the AP automatically switches channels when interference is detected. If set to “off”, the AP continues to detect interference but does not switch channels.

The default value is “on”.

7.5 aci_info_prints

This variable may be set to “on” or “off”. If set to “on”, and the ACI daemon is invoked from the console, it prints information about channel switches.

The default value is “on”.

7.6 aci_debug_prints

This variable may be set to “on” or “off”. If set to “on”, and the ACI daemon is invoked from the console, it prints debug information about the channel map and any interference detected.

7.7 aci_scan_sleep_secs

This variable may be set to decimal integer values from 1 to 10. It determines the scan frequency (in seconds) when a station is associated with the AP.

7.8 aci_def_ap_ipaddr

This variable may be set to an IPV4 IP address string in decimal dot notation. It must be set to the LAN address used by the AP; otherwise, the station will be unable to send interference information to the AP.

The default is “192.168.1.1”, which corresponds to the default AP LAN address.

7.9 aci_pref_dfs

This variable may be set to “true” or “false”. If set to “true”, the AP searches 5G DFS channels for a clear channel before searching other channels in the band.

The default value is “false”.

7.10 aci_exclude_dfs

This variable may be set to “true” or “false”. If set to “true”, the AP avoids using 5G DFS channels.

The default value is “false”.

7.11 aci_dfs_scan_type

This variable may be set to “passive” or “active”. If set to “passive”, the AP and clients performs passive (listening) scans on DFS channels. If set to “active”, the AP and clients perform active scans by sending broadcast probes on DFS channels.

7.12 aci_reuse_dfs

This variable may be set to “true” or “false”. If set to “false”, ACI does not choose a DFS channel, except at initial channel selection. If set to “true”, ACI considers using a DFS channel, even after initial channel selection.

The default value is “false”.

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Document History Page

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Rev.	**ECN No.**	**Orig. of Change**	**Submission Date**	**Description of Change**
**	–	–	10/12/2010	43XX-AN1100-R: Initial release
*A	5461636	UTSV	10/04/2016	Updated to Cypress template.
*B	5839180	AESATMP8	07/31/2017	Updated Cypress Logo and Copyright.
*C	6793875	KEMA	01/31/2020	Obsolete document.

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