



Date: August 11, 2015

To Whom It May Concern

Regarding: Methods used for limiting WLAN transmit frequency range in the USB1 FC Wireless adapter

The purpose of this letter is to describe the methods used to limit the operating frequency of the WLAN transmitter in the Fluke USB1 FC wireless adapter. The operating channels are limited to channels 1 through 11 the 2.4GHz ISM band for 20MHz channel bandwidth, 1 through 7 for 40MHz high channel bandwidth, and 5 through 11 for 40MHz low channel bandwidth. These channel limitation are enforced using the following methods:

**Restricted access to WLAN configuration tools:**

As the device is configured from the factory, it is impossible for any third party (users, installers, integrators, service personnel, etc.) to gain access to any parameters through the user interface which can configure the device to operate on WiFi channels 12, 13, or 14. Furthermore, Fluke provides no means for a third party to configure the device through an authorized software modification or by network configuration to allow the device to operate on WiFi channels 12, 13, or 14. The only known means to access to the parameters that configure access to WiFi channels 12, 13, or 14 is restricted through the use of an SSL cryptographic key, which is only provided to authorized personnel.

**Use of the Linux Central Regulatory Domain Agent (CRDA) to enforce FCC regulatory permissions:**

The host for the USB1 FC uses the Linux operating system, and implements CRDA to enforce FCC regulatory permissions. The wireless core driver (cfg80211) will only be allowed to initiate transmission on a given channel if the *entire channel bandwidth* is contained within the frequency range defined by the CRDA. For the USB1 FC, the allowed frequency range is coded in the firmware as a minimum 2402 MHz and a maximum of 2472 MHz. For each operating mode, cfg80211 will only enable channels that fall completely within this range, Tables 1-3 define the enabled and disabled channels for the 20 MHz (HT20), 40 MHz low , (HT40-) and 40 MHz high, (HT40+) operating modes

WLAN Channel	Center frequency Of 20MHz channel (MHz)	Bandwidth at 20MHz (HT20) (MHz)	Channel availability for CRDA range 2402-2472 MHz
1	2412	2402-2422	Enabled
2	2417	2407-2427	Enabled
3	2422	2412-2432	Enabled
4	2427	2417-2437	Enabled
5	2432	2422-2442	Enabled
6	2437	2427-2447	Enabled
7	2442	2432-2452	Enabled
8	2447	2437-2457	Enabled
9	2452	2442-2462	Enabled
10	2457	2447-2467	Enabled
11	2462	2452-2472	Enabled
12	2467	2457-2477	Disabled (2477MHz > 2472 MHz)
13	2472	2462-2482	Disabled (2482MHz > 2472 MHz)
14	2484	2474-2494	Disabled (2494MHz > 2472 MHz)

Table 1: 20MHz (HT20)

WLAN Channel	Center frequency of 40MHz channel (MHz)	Bandwidth at 40MHz low (HT40-) (MHz)	Channel availability for CRDA range 2402-2472 MHz
1	2402	2382-2422	Disabled (2382MHz < 2402 MHz)
2	2407	2387-2427	Disabled (2387MHz < 2402 MHz)
3	2412	2392-2432	Disabled (2392MHz < 2402 MHz)
4	2417	2397-2437	Disabled (2397MHz < 2402 MHz)
5	2422	2402-2442	Enabled
6	2427	2407-2447	Enabled
7	2432	2412-2452	Enabled
8	2437	2417-2457	Enabled
9	2442	2422-2462	Enabled
10	2447	2427-2467	Enabled
11	2452	2432-2472	Enabled
12	2467	2437-2477	Disabled (2477MHz > 2472 MHz)
13	2472	2442-2482	Disabled (2482MHz > 2472 MHz)
14	2484	2454-2494	Disabled (2494MHz > 2472 MHz)

Table 2: 40MHz low (HT40-)

WLAN Channel	Center frequency of 40MHz channel (MHz)	Bandwidth at 40MHz high (HT40+) (MHz)	Channel availability for CRDA range 2402-2472 MHz
1	2422	2402-2442	Enabled
2	2427	2407-2447	Enabled
3	2432	2412-2452	Enabled
4	2437	2417-2457	Enabled
5	2442	2422-2462	Enabled
6	2447	2427-2467	Enabled
7	2452	2432-2472	Enabled
8	2447	2437-2477	Disabled (2477MHz > 2472 MHz)
9	2452	2442-2482	Disabled (2482MHz > 2472 MHz)
10	2457	2447-2487	Disabled (2487MHz > 2472 MHz)
11	2462	2452-2492	Disabled (2492MHz > 2472 MHz)
12	2467	2457-2497	Disabled (2497MHz > 2472 MHz)
13	2472	2462-2502	Disabled (2502MHz > 2472 MHz)
14	2484	2474-2514	Disabled (2514MHz > 2472 MHz)

Table 3: 40MHz high (HT40+)

A detailed description of the processing rules applied by the CRDA is available here:

[https://wireless.wiki.kernel.org/en/developers/regulatory/processing\\_rules](https://wireless.wiki.kernel.org/en/developers/regulatory/processing_rules)

Sincerely,



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