Country Code Configuration for Embedded Wireless Modules

silex
technology

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Silex Radio Modules on Linux Platforms

Linux allows changing regulatory domains in compliance with regulatory restrictions worldwide, including the US FCC. Devices use the operating system regulatory domain setting to operate in the domain in a compliant manner. This is in accordance with the FCC part 15 country code selection knowledge base publication number 594280. **Please note Silex radio certifications are subject to certain operating restrictions. Be sure you understand the restrictions, including the proper country configuration, to avoid being out of compliance in the use of your device.**

Linux/Android Driver

About iw tool

iw is a nl80211 based CLI configuration utility for linux and radio modules with a driver (does not apply to intelligent modules). The old tool, iwconfig, which uses Wireless Extensions interface, is deprecated and it is recommended to switch to iw.

Getting iw

Release tarballs of iw are available here: http://kernel.org/pub/software/network/iw/

Alternatively, you can download iw from git: http://git.kernel.org/?p=linux/kernel/git/jberg/iw.git

Build Requirements

- libnl >= libnl1
- libnl-dev >= libnl-dev-1
- pkg-config

Using iw requires you to have libnl, the first working version is 1.0 pre8 as this release introduced genl, Generic Netlink, which nl80211 relies on. If your distribution's libnl is a wrong version, then you will have to download and compile libnl. (http://www.infradead.org/~tgr/libnl/). [2]

User's Guide

To see the regulatory domain your computer is using now, enter the following command as root user:

iw reg get

Example output:

 # iw reg get
country 00:
(2402 - 2472 @ 40), (3, 20)
(2457 - 2482 @ 20), (3, 20), PASSIVE-SCAN, NO-IBSS
(2474 - 2494 @ 20), (3, 20), NO-OFDM, PASSIVE-SCAN, NO-IBSS
(5170 - 5250 @ 40), (3, 20), PASSIVE-SCAN, NO-IBSS
(5735 - 5835 @ 40), (3, 20), PASSIVE-SCAN, NO-IBSS

To tell the kernel which wireless regulatory domain you wish to use, enter the following command as root user:

iw reg set ISO_3166-1_alpha-2

where ISO_3166-1_alpha-2 is the 2-character code for the country you are in. You can find the list of ISO 3166-1 alpha-2 codes on the Wikipedia page ISO 3166-1 alpha-2.

For example, to set the country code for UK, the following command would be used:

 # iw reg set GB

The output:

 # iw reg get
country GB:
(2402 - 2482 @ 40), (N/A, 20)
(5170 - 5250 @ 40), (N/A, 20)

(5250 - 5330 @ 40), (N/A, 20), DFS

(5490 - 5710 @ 40), (N/A, 27), DFS[3]

It is the OEM product developer's responsibility to provide a mechanism for configuring the domain for their product.

If the OEM product developer is using a Silex radio and an existing Silex certification, it is their responsibility to comply with all conditions of the grant. For units to be sold in the United States, it must not be possible for the end user to change the domain to a non-US value which could allow operation on channels prohibited in the US.

The manufacturer is further responsible to ensure the product is configured properly for the country to which it will be shipped.

SX-590

The SX-590-2700-WWR supports 802.11d. Regions that are supported include Europe, Japan, and Canada. The SX-590-2700-US supports the United States. Countries outside of these regions may require custom firmware and certification.

If there is a need to change the country code, the following commands are used. Please refer to the SX-590 manual on how to access the command console.

SH NW DOMLIST

Displays a list of valid regulatory domains.

SH NW DOMLIST

Supported regulatory domains:

WWR US DE JP

SET NW REGDOMAIN

This command sets the regulatory domain for the wireless LAN radio.

SET NW REGDOMAIN [WWR | US | DE | JP]

SH NW REGDOMAIN will show the currently configured regulatory domain.

Country	Command
WWR (World Wide Region)	*SET NW REGDOMAIN WWR*
United States	*SET NW REGDOMAIN US*
Europe (DE is used for all EU countries, as their requirements have been harmonized)	*SET NW REGDOMAIN DE*
Japan	*SET NW REGDOMAIN JP*

SX-590-2700-US Notes:

<u>If the current setting is US, the domain cannot be changed.</u>

The SX-590-2700-US supports the United States. Countries outside of these regions would require custom firmware and certification.

The SX-590-2700-US does not support 802.11d. Please refer to our blog post: [802.11d to be banned as of Jan 1st, 2015](#).

The default value is dependent on the model ordered.

Country	Model
United States / Canada	SX-590-2700-US
World Wide Region	SX-590-2700-WWR

It is the OEMs responsibility to set the domain appropriately for the destination country.

If using a Silex certification, the OEM must be compliant with all the conditions of certification grant for the target destination.

SX-ULPGN / SX-59HLS

To set the country code for the SX-ULPGN and the SX-59HLS, the Silex AT command application will be used. The Silex AT command application is a modem-like UART control command set for both modules. The Silex AT command works just like a modem. It is intended to connect to a host system with UART and works as serial-to-Wi-Fi media converter. Silex AT command runs on one of the three UART ports of QCA4010/QCA4012. The default is UART1(HS UART), at 115200bps, 8bit, no parity, 1 stop bit, no flow control. Please refer to the **AT Command Specifications** of SX-ULPGN or SX-59HLS for more information.

3-7 ATWREG=<value or ?>

Query or Set the current country codes.

Country	Command
United States (FCC/IC)	*ATWREG=80000348*
JP (MIC)	*ATWREG=80000188*
DE (CE)	*ATWREG=80000114*

The value, if successful, is automatically saved in the profile and NVRAM. This command is only available in releases x.y.2, where .2 is the last digit of the firmware revision. By default when it is x.y.2, atwreg? returns 80000348 which is US. Only country codes in the format 80000xxx are accepted; however only JP, DE, and US are supported (please refer to table shown above).

It is imperative that a reset happens after issuing this command. An ATZ command immediately following this command needs to occur or instability may arise.

Possible Result code:

OK (0) : Successful.

ERROR (4) : Error, unable to set

It is the responsibility of the OEM to ensure compliance with all conditions if using Silex certifications. In particular, the OEM product must ensure if the module is to be configured for US use that the end user cannot change the regulatory setting/the country code.

SX-ULPAN (SPI and UART)

SPI

Region Code Configuration

Wmiconfig--set_regdomain <regcode>

Country	Command
United States (Default)	*wmiconfig --set_regdomain 0x80000348*
Japan	*wmiconfig --set_regdomain 0x80000188*
WWR (World Wide Region)	*wmiconfig --set_regdomain 0x4000006a*

Source: SX-ULPAN-2401 SPI Command & API Specifications

UART

Set/Get Regdomain Code

ATWREG=<regcode>

Country	Command
United States (Default)	*ATWREG=0x80000348*
Japan	*ATWREG=0x80000188*
WWR (World Wide Region)	*ATWREG=0x4000006a*

Source: SX-ULPAN-2402 UART Command Functional Specifications

References

1. [Changing regulatory domains in Linux](#)

2. [About iw](#)

3. [Setting the wireless regulatory domain in Linux on your laptop](#)

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Revision History

Revision	Date	By	Notes
A	06/26/2019	D.Fu	Initial release.
B	08/02/2019	D.Fu	Corrections and Formatting
C	08/27/2019	D.Fu	Formatting
D	08/30/2019	D.Fu	Updated Table of Contents