



LLC Remote V15.0.0 – Release Notes

Release Package Content:

llc-remote/ ./install.sh . /load . /Makefile	Top level ./install.sh script to setup buildenv Top level. /load script to load FW and Driver Top level Makefile to build package Target directory for LLC executable to run on PC
├─ bin │ └─ plugin	
├─ bsp	
│ ├── app/gpsd	GPSd 3.8 Source Package for libgps.so.20
│ └─ app/libpcap	LIBPCAP 1.8.1 Source Package for libpcap.so.20
├─ cohda	
│ ├── app	
│ │ ├── llc	Source Directory of LLC user-space executable
│ │ │ ├── lib	Source Directory of libLLC.so library
│ │ │ └─ plugin	
│ │ │ ├── powerdet	LLC Plugin 'Powerdet' provided as reference
│ │ │ ├── rx	LLC Plugin 'RX' provided as reference
│ │ │ ├── sec	LLC Plugin 'SEC' provided as reference
│ │ │ ├── simtdapi	LLC Plugin 'SimTDAPI' provided as reference
│ │ │ └─ tx	LLC Plugin 'TX' provided as reference
│ │ └─ test	
│ └─ pktbuf	Code for working packet buffers in user-space
├─ kernel	
│ ├── drivers	
│ │ └─ cohda	
│ │ ├── llc	Source Code of CW-LLC.ko Kernel Driver
│ │ └─ pps	Source Code of CW-PPS.ko kernel Driver
│ └─ include	Top-level Include directory for LLC-API.h
│ ├── cohda/llc	Reference to ../linux/cohda/llc
│ └─ linux/cohda/llc	llc-api.h, llc.h
├─ qnx	Not yet functional for this release
│ └─ drivers/llc	
│ └─ drivers	
4.4.0-122-generic_x86_64 3.13.0-144-generic_i686	Target directory for compiled cw-llc.ko Binary CW-LLC.ko prebuilt on Cohda SDK for 64 / 32 bit host respectively
├─ images	Directory with SDR Firmware and SBL Images
└─ nxp	
│ ├── app	
│ │ ├── llc-example	Example how-to-interface in User Space (libLLC)
│ │ ├── llc-gui	Simple GUI (not updated)
│ │ └─ llc-net	Example UDP2LLC proxy application
│ └─ kernel/dotstub	Example how-to-interface at Kernel Level
└─ tool/ftdi	Utility to Download SDR Firmware over FTDI SPI (no libmpsse incl.)

Note on version numbering

The SDR Firmware and LLC Driver is developed by Cohda Wireless Pty, as a subcontractor of NXP Semiconductors N.V.



The Release process of the Firmware binary and the associated LLC Remote Driver implementation is combined with the major release of the Cohda MKx Software Development Kit, which follows the numbering $X.Y$ where $X=\{11, 12, 13, 14, 15..\}$ and $Y=\{0, 1, 2, 3\}$. The latest release is 15.0.0. The previous release is 14.0.1.

NXP repackages the Firmware and Driver as a standalone package called 'LLC Remote', and includes independent examples and tools. The LLC Remote package follows numbering $X.Y.Z$, where X and Y match the Cohda SDK, and Z indicates NXP custom updates. Updates to Z will have the same $X.Y$ Firmware and API definition. See section 'NXP Customization Package' below for Z update specifics.

[Quick Start Instructions \(NXP Evaluation Kit on native Linux PC\)](#)

Copy package archive into target Linux development environment.

Extract package, for example to `~/work/`.

```
tar -xzf V2X_LLC_Remote_V<X.Y. Z>.tar.gz -C ~/work
```

Change into extract directory

```
cd ~/work/llc-remote
```

Run `install.sh` script (optional for new Development Environment; requires internet connection for installing packages)

```
./install.sh
```

Run `MAKE` to compile for active kernel

```
make
```

With Evaluation Kit connected (and VM USB connections in place if required), please run. `/load` script to detect V2X Modem & download if required. Select option 4 to download `SDRMK5Dual.bin`.

```
./load

root@MKx-SDK:/home/duser/SVN/llc-remote/llc-remote# ./load
Load SAF5X00 firmware via DFU-util
** NOTE: dfu-util may fail under VMWare; you may need to unplug your board after
download and restart. /load **
1] DFUBootLoader.bin
2] SDRMK5Dual.bin
3] SDRMK5DualSPI.bin
4] SDRMK5Single.bin
```

In case of VM environment, repeat the step above until fully loaded. As the USB device changes roles, ensure that the (new) devices can automatically get connected. Once the device is properly detected, the `/load` will output the following (kernel version will match your machine):

```
For 32-bit machine:

./load

0
echo loading cw-llc module for kernel 3.13.0-143-generic_i686
cw_llc                178291 0
```



```
1
LLC 4
For 64-bit machine:
. /load
0
Echo loading cw-llc module for kernel 4.4.0-122-generic_x86_64
cw_llc          131072 0
LLC 4
```

Execute llc version to check the connection

```
./bin/llc version
WISPA Variant: TEF5100
WISPA Version: 0x0
PCB Version: 1
PCB Load: 5
Boot Pins: 0x4
SDR Firmware: 69189
SDR Revision Date: 2018-01-22 12:14
SDR Build Date: 2018-01-22 12:15
Security Accel.: No
Antenna Mask: 3
Radio B Present: 1
Last Reset Source: External (36, 1024)
Last Reset Source: External (53, 1024)
Last Reset Source: External (54, 1024)
```

SDR Firmware Functionality (based on NXP/Cohda SDR Release 14.0)

Firmware image details

Image filename	Size	SHA1 checksum	SDR Tag
DFUBootLoader.bin	405068	5ab005ad4402f6e2ed676e7e4095c307e53661f0	n/a
SDRMK5Dual.bin	436316	b7a5bea1982bcaab924c4fa7f73704859be22522	69189
SDRMK5DualSPI.bin	446924	9e7b94fb5ca17665d5b830f9129b8d02310071e7	unknown
SDRMK5Single.bin	423996	e2ef57dc2e4226190c4eddd3a70a1776473d3853	69189
FastBootFlash.usb	6484	A1AD1EB2DAFDABF0015355D8BA1A17455D79D0A8	n/a
FastBootSpi.usb	4856	ED688285E5BE9BB78F239323E0D5798730EB777D	n/a

Firmware Change List

1. DSRC radio firmware:
 - Improved ECDSA accelerator throughput



- Removed possible PA_EN glitches which impacted newer Skyworks front-end modules
- Minor correction to Medium Busy Time measurement

Known issues and planned updates (Releases 15.1 or 16.0)

1. DSRC radio module:
 - Carrier sense threshold during the acquisition of a frame cannot be set higher than -75 dBm
 - Minimum backoff count is max (3, AIFSN) slots
 - Auto-calibration of transmit IQ imbalance and DC offset for Antenna 2 is only supported for the later MK5 modules (Product code = CWP-HWA-MK5M-WW00302 and later, i.e. for PCB_LOAD >= 4).
 - 20MHz mode not supported
 - Transmit power range limited to -10 to 23 dBm. 23.7dBm is the last reported power with class C mask but higher power can be achieved as class B on request.
 - Transmission of 64QAM data rates should be kept to < 22 dBm output power to maximize receiver performance.
 - TXOP duration parameters are currently ignored
2. LLC SPI version unsupported in this release due to kernel change:
 - SDRMK5DualSPI.bin provided with release but untested.

API Changes (llc-api.h):

1. Updated the SAF5x00 ECDSA verification message definitions to include key de-compression & re-construction
2. 32/64bit agnostic client API
3. Added a device number to the MKx_Init() method to support multi-SAF5x00 operation

Known limitations



CW-LLC Kernel Driver

Functionality changes

1. Added Security command SW return codes
2. Change in LLC_Start functionality
3. Change in LLC_TxCnf functionality
4. Adding LLC netdev's work descriptor

libLLC User-space library

Functionality Changes

1. Adding ipv6 functionality
2. Change interface name to cw-llcx (x= 0, 1)
3. New LLC device structure in llc-lib.h
4. Change in name of LLC state storage structure
5. New Per MKx structure in llc-lib.h
6. Change of API in MKx_Init (uint8_t DevId, tMKx **ppMKx) from MKx_Init (struct MKx **ppMKx)

Known limitations

LLC User Space application + Plugins

Additions:

1. New plugins for bridge
2. dump, loop, mem, ping, raw, rcap, udpfwd, udptester plugin removed
3. DSRC radio driver (LLC) - Dual USB radio support

Usage of dual interface cw-llc0 and cw-llc1 is as below:

llc -help

Usage: llc [OPTION...] COMMAND [COMMAND OPTIONS...]

-i 0|1 MKx interface number (default 0)

Changes:

Known limitations:

1. majority of plugins only delivered in binary format

Other

1. Added uBlox patch to gpsd-3.8
2. Libpcap to build without Error flags



NXP Customization Package

CW-LLC Kernel Driver

Additions

Fixes

1. Removing i686 flag for 32-bit compilation errors in llc-firmware.c
2. Fix bug with d_printf (%d, size_t) in llc-spi.c
3. Kernel fix for 4.10+ in llc-ipv6.c llc-monitor.c, llc-pseudo.c and llc-netdev.c
4. Adding lptthread library for plugins simtdapi, sec, powered in Makefile

Improvements / API changes

Changes for 15.0.0

Planned changes 15.0.1

1. Add support Build for QNX 6.6.0 (include plugins)
2. Add support Build for Android (include plugins)
3. Supply patch for access 32-bit library on 64-bit environment (android)
4. Cleanup Make files
5. Rearranging Make file as per user / kernel space and per platform dependent blocks.

Planned changes 16.0.0

1. Suitable for armhf64
2. Analysis and improvement of libLLC/CW-LLC software overhead