

Release Notes

Sterling 60

Version 8.6.0.12

This document provides release notes for the following Sterling 60 radio software packages:

- backports-laird-8.6.0.12
- laird-sterling60-firmware-sdio-sdio-8.6.0.12
- laird-sterling60-firmware-sdio-uart-8.6.0.12
- laird-sterling60-firmware-pcie-uart-8.6.0.12
- laird-sterling60-firmware-pcie-usb-8.6.0.12
- laird-sterling60-firmware-usb-uart-8.6.0.12
- laird-sterling60-firmware-usb-usb-8.6.0.12
- sterling_suppllicant-arm-8.6.0.12
- sterling_suppllicant-x86-8.6.0.12
- sterling_suppllicant-src-8.6.0.12
- lrd-network-manager-src-8.6.0.12

This document also includes all previously distributed release notes.

Release notes are a summary of new and enhanced features, resolved issues, and known issues that are not resolved in this version. Consult the User's Guide for details on the features of this software release.

- [Software Version 8.6.0.12](#)
- [Software Version 8.5.0.7](#)
- [Software Version 8.3.0.16](#)
- [Software Version 8.2.0.17](#)
- [Software Version 8.1.0.11](#)
- [Software Version 7.1.0.9](#)
- [Software Version 7.0.0.242](#)
- [Software Version 7.0.0.139](#)
- [Software Version 7.0.0.84](#)
- [Software Version 7.0.0.52](#)
- [Software Version 6.0.0.138](#)
- [Software Version 6.0.0.92](#)
- [Software Version 5.0.0.17](#)
- [Software Version 3.5.5.94](#)
- [Software Version 3.5.5.14](#)
- [Software Version 3.5.5.4](#)

SOFTWARE VERSION 8.6.0.12

Released July 2021

Software part number: ST60LXLT1-210714

OS: Linux, Android 7, 8, 9 and 10

New or Enhanced Features

- Includes backports-laird-8.6.0.12 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.2 to 5.4. Updated kernel to 5.4.114. (18847)
- Includes Sterling 60 radio firmware builds 8.6.0.12 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 5.5.41.5 for SDIO, 5.4.41.5 for PCIe, and 5.6.41.5 for USB.
- Bluetooth firmware has been updated to the latest from NXP – new firmware version is 16.146.10.p3. (18631)
- Includes Linux Sterling supplicant builds 8.6.0.12 for ARM and x86 – Sterling supplicant version is 94.7.0.3.
- Includes Laird NetworkManager build 8.6.0.12 which is based on NetworkManager version 1.22.16
- Includes support for Android 7 and Android 8 with the SDIO/UART and PCIe/UART variants.
- Includes support for Android 9 with the SDIO/UART, SDIO/SDIO, PCIe/UART, PCIe/USB, USB/UART and USB/USB variants.
- Adds support for Android 10 with the SDIO/UART, SDIO/SDIO, PCIe/UART, PCIe/USB, USB/UART and USB/USB variants.

- Requires the use of mfg tools package version 8.6.0.12. Please contact Laird Connectivity Support for access to the updated tools package.

Resolved Issues

Driver

- Resolved Frag Attack vulnerabilities. Includes fixes for CVE-2020-24586, CVE-2020-24587, CVE-2020-24588 and CVE-2020-26147. (19152)
- Fixed an issue that could cause permanent RX failure after firmware recovery. This issue would result in repeated driver reset if null_scan_count was non-zero. (18645)

Supplicant

- Enabled TLS1.2 when using EAP-FAST and EAP-TTLS. (18529, 18832)
- Addressed Linux supplicant security vulnerability CVE 2021-1. See <https://w1.fi/security/2021-1/> for additional detail. (18805)

NetworkManager

- Made a change to disable wpa-eap-sha256 and wpa-psk-sha256 if wifi-sec.pmf is disabled. (18886)

Bluetooth

- Fixed an issue on 60 series radios using SDIO that could result in Bluetooth connections dropping when Wi-Fi powersave was enabled and short connection supervision timeout was in use. (14254)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation.
- 60 Series firmware fails to load when configured for USB/USB operation on hosts that do not support EHCI. There is no work around; root cause is under investigation. (16523)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)
- 60 series PCI: Driver may trigger a machine check or fail to restart in rare cases when recovering from a hang condition. (17392)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 8.5.0.7

Released April 2021

Software part number: ST60LXLT1-210407

OS: Linux, Android 7, 8, 9 and 10

New or Enhanced Features

- Includes backports-laird-8.5.0.7 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.2 to 5.4.
- Includes Sterling 60 radio firmware builds 8.5.0.7 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 5.5.38.5 for SDIO, 5.4.38.5 for PCIe, and 5.6.38.5 for USB.
- Includes Linux Sterling supplicant builds 8.5.0.7 for ARM and x86 – Sterling supplicant version is 94.7.0.3.
- Includes Laird NetworkManager build 8.5.0.7 which is based on NetworkManager version 1.22.16
- Includes support for Android 7 and Android 8 with the SDIO/UART and PCIe/UART variants.
- Includes support for Android 9 with the SDIO/UART, SDIO/SDIO, PCIe/UART and PCIe/USB variants.
- Adds support for Android 10 with the SDIO/UART, SDIO/SDIO and PCIe/UART variants.
- Requires the use of mfg tools package version 8.5.0.7. Please contact Laird Connectivity Support for access to the updated tools package.

Resolved Issues

Driver

- Resolved a 60 radio driver issue on Android that caused an AP to fail to show up in the scan list of the Android device after the AP had been restarted. (18629)

Firmware

- Fixed an issue on the 60 Series that caused the USB interface to stop responding if the USB device was disabled via a Set Configuration (0) operation or bus reset after the firmware had been loaded. This could have occurred during a soft reboot or device unbind/bind operation if power was not removed from the radio. (16578)
- Fixed an issue on 60 series radios using SDIO interface that could result in complete TX failure when configured in AP mode and streaming to multiple clients. (17547)
- Fixed an issue that caused the 60 series radio to fail to initialize on some CPUs when strapped for USB/USB due to an incorrect handshake. (17693)

Supplicant

- Addressed Linux supplicant security vulnerability CVE 2020-2. See <https://w1.fi/security/2020-2/> for additional detail. (18449)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation.
- 60 Series firmware fails to load when configured for USB/USB operation on hosts that do not support EHCI. There is no work around; root cause is under investigation. (16523)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)
- 60 series PCI: Driver may trigger a machine check or fail to restart in rare cases when recovering from a hang condition. (17392)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 8.3.0.16

Released January 2021

Software part number: ST60LXLT1-210129

OS: Linux, Android 7, Android 8, Android 9

New or Enhanced Features

- Includes backports-laird-8.3.0.16 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 5.4. (14688)
- Includes Sterling 60 radio firmware builds 8.3.0.16 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 8.5.35.55 for SDIO, 5.4.36.5 for PCIe, and 5.6.35.5 for USB.
- Includes Linux Sterling supplicant builds 8.3.0.16 for ARM and x86 – Sterling supplicant version is 94.7.0.2.
- Includes Laird NetworkManager build 8.3.0.16 which is based on NetworkManager version 1.22.16 (17655)
- Includes support for Android 7 and Android 8 with the SDIO/UART and PCIe/UART variants.
- Includes support for Android 9 with the SDIO/UART, SDIO/SDIO, PCIe/UART and PCIe/USB variants.
- Requires the use of mfg tools package version 8.3.0.16. Please contact Laird Connectivity Support for access to the updated tools package.

Resolved Issues

Driver

- The 60 radio in AP mode no longer fails to transmit beacons if the WPA IE contains more than one pairwise cipher. (11764)
- Fixed an issue that could cause a kernel warning message or connectivity failure on some platforms using the 60 Series USB interface during TX packet completion handling. (15367)
- Fixed an issue on the 60 Series radio using the PCIE WLAN interface that could cause a kernel exception at very high downstream rates. (16903)
- Fixed an issue that could cause a crash on 64bit host platforms that do not provide a 32 bit DMA bus address for PCIe. Note that a 32 bit DMA bus address is required; this fix just eliminates the crash. The failure only occurred on host platforms that indicated support for 32 bit DMA bus addresses, then did not provide one. (17219)
- Fixed an issue that prevented AP mode from operating correctly after a driver initiated an internal restart following error detection. (18295)

Firmware

- Fixed an issue that caused the 60 series Wi-Fi radio to fail to remain in powersave during idle periods. This only affected radios using the SDIO interface. (17930)

- Resolved an issue that could cause the Wi-Fi radio to periodically stop passing data packets. (18219)

NetworkManager

- Fixed an issue that would prevent auto connecting to an AP which had previously been tried, but not successfully connected to. (17952)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation.
- The WLAN USB interface will stop responding if the USB device is disabled via a Set Configuration(0) operation or bus reset after the firmware has been loaded successfully. These scenarios would include a soft reboot or a device unbind/bind operation. Root cause is under investigation, work around is to ensure that the radio undergoes a hardware reset prior to any operation that would result in a USB bus reset. (16578)
- 60 Series firmware fails to load when configured for USB/USB operation on hosts that do not support EHCI. There is no work around; root cause is under investigation. (16523)
- 60 series radio may stop transmitting when configured in AP mode with a high number of clients connected and in active operation. Root cause is under investigation. (17547)
- 60 Series radio fails to initialize on some CPUs, including nVidia Tegra, when using the USB/USB configuration due to an incorrect handshake packet. (17693)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)
- 60 series PCI: Driver may trigger a machine check or fail to restart in rare cases when recovering from a hang condition. (17392)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 8.2.0.17

Released October 2020

Software part number: ST60LXLT1-201014

OS: Linux, Android 7, Android 8, Android 9

New or Enhanced Features

- Includes backports-laird-8.2.0.17 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 5.4. (14685)
- Includes Sterling 60 radio firmware builds 8.2.0.17 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 5.5.32.5 for SDIO, 5.4.32.5 for PCIe, and 5.6.32.5 for USB. (17354,17507)

- Includes Linux Sterling supplicant builds 8.2.0.17 for ARM and x86 – Sterling supplicant version is 94.7.0.2.
- Includes Laird NetworkManager build 8.2.0.17 which is based on NetworkManager version 1.22.15 ()
- Includes support for Android 7 and Android 8 with the SDIO/UART and PCIe/UART variants.
- Includes support for Android 9 with the SDIO/UART, SDIO/SDIO, PCIe/UART and PCIe/USB variants.
- Requires the use of mfg tools package version 8.2.0.17. Please contact Laird Connectivity Support for access to the updated tools package.

Resolved Issues

Driver

- Resolved an issue where a kernel panic could occur up to 60 minutes after the radio driver is unloaded. (17168)
- Resolved issue where the driver, typically under heavy RX load, may hang indefinitely during shutdown or device recovery. (17096)

Firmware

- Resolved an issue which prevented the 60 Series radio rate adaptation from working. (16995)
- Modified the starting data rate to start in the middle of the rate index (16995)
- Resolved issues that prevented RTS packets from being sent under certain conditions or caused RTS packet tx power to be low. (17110)
- Added channel 144 support for the KCC regulatory domain. (16957)
- Reduced SIP FCC, IC and WW channel 100 power for OFDM rates 6-18 to ensure regulatory compliance. (17335)
- Fixed an issue that could cause the 60 Series radio to hang and reset when operating as an AP streaming data to multiple clients simultaneously with AMPDU aggregation in effect. (17011)
- Fixed an issue that cause the station to disconnect and reconnect when an encrypted deauth/disassoc packet failed decryption. Management packets that fail decryption are now dropped. (17171)
- Resolved an issue that could cause the AP RSNIE to have invalid (zero) contents in some AP mode configurations. (17065)

Supplicant

- Updated the Sterling Linux supplicant build options to build with openssl-1.0.2 and disable wext support. (15923)
- Addressed Linux supplicant security vulnerability CVE 2020-1. See <https://w1.fi/security/> for additional detail. (16808)

NetworkManager

- Updated networkmanager with the latest commits from upstream branch nm-1-22. (17091)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation.
- The WLAN USB interface will stop responding if the USB device is disabled via a Set Configuration(0) operation or bus reset after the firmware has been loaded successfully. These scenarios would include a soft reboot or a device unbind/bind operation. Root cause is under investigation, work around is to ensure that the radio undergoes a hardware reset prior to any operation that would result in a USB bus reset. (16578)
- 60 Series firmware fails to load when configured for USB/USB operation on hosts that do not support EHCI. There is no work around; root cause is under investigation. (16523)
- 60 series radio may stop transmitting when configured in AP mode with a high number of clients connected and in active operation. Root cause is under investigation. (17547)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)
- 60 series PCI: Driver may trigger a machine check or fail to restart in rare cases when recovering from a hang condition. (17392)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 8.1.0.11

Released July 2020

Software part number: ST60LXLT1-200702

OS: Linux, Android 7, Android 8, Android 9

New or Enhanced Features

- Includes backports-laird-8.1.0.11 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 5.4. (14685)
- Includes Sterling 60 radio firmware builds 8.1.0.11 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 5.5.29.5 for SDIO, 5.4.29.5 for PCIe, and 5.6.29.5 for USB.
- Includes Linux Sterling supplicant builds 8.1.0.11 for ARM and x86 – Sterling supplicant version is 94.7.0.0.
- Includes Laird NetworkManager build 8.1.0.11 which is based on NetworkManager version 1.22.14 (16601, 16757)
- Includes support for Android 7 and Android 8 with the SDIO/UART and PCIe/UART variants.
- Includes support for Android 9 with the SDIO/UART, SDIO/SDIO, PCIe/UART and PCIe/USB variants.
- Requires the use of mfg tools package version 8.1.0.11. Please contact Laird Connectivity Support for access to the updated tools package.

Resolved Issues

Driver

- Fixed an issue that could cause USB WiFi driver to stop receiving packets after starting TX aggregation. (16802)

Firmware

- Updated the regulatory powers for the SIPT and M2 versions of the 60 radio. (16623)
- Removed channel 144 (5720) from AU (Australia) channel list to conform with Laird Connectivity regulatory certificate. (16480)

Supplicant

- Enabled the "-f" flag in the supplicant to support output to a log file. (16455)

NetworkManager

- nmcli now accepts channel 144 when configuring 802-11-wireless.channel. (16218)
- When the channels scanned by NM are limited using wifi.frequency-list, prevented NM from scanning unconfigured channels when NM is disabling the connection. (16640)

Bluetooth

- Driver support for the 60 SDIO and USB Bluetooth interfaces on Android are now available via the backports package. (16608, 16683)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation.
- The WLAN USB interface will stop responding if the USB device is disabled via a Set Configuration(0) operation or bus reset after the firmware has been loaded successfully. These scenarios would include a soft reboot or a device unbind/bind operation. Root cause is under investigation, work around is to ensure that the radio undergoes a hardware reset prior to any operation that would result in a USB bus reset. (16578)
- 60 Series firmware fails to load when configured for USB/USB operation on hosts that do not support EHCI. There is no work around; root cause is under investigation. (16523)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 7.1.0.9

Released April 2020

Software part number: ST60LXLT1-200403

OS: Linux, Android 7, Android 8, Android 9

New or Enhanced Features

- Includes backports-laird-7.1.0.9 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.19.
- Includes Sterling 60 radio firmware builds 7.1.0.9 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 5.5.27.5 for SDIO, 5.4.27.5 for PCIe, and 5.6.27.5 for USB.
- Includes Linux Sterling supplicant builds 7.1.0.9 for ARM and x86 – Sterling supplicant version is 94.6.0.2.
- Includes support for Android 7, Android 8 and Android 9 with the SDIO/UART and PCIe/UART variants.

Resolved Issues

Driver

- Fixed an issue that could cause RX/TX failure after firmware reload in rare cases. (14289)
- Fixed an issue that could cause a kernel panic when the lrdmwl usb driver was unloaded. (14764)
- Fixed several minor memory leaks that could occur primarily under error conditions. (15809)
- Radio information is now available in sysfs (e.g. /sys/class/net/wlan0/device/lrd/info) and in debugfs (e.g. /sys/kernel/debug/ieee80211/phy0/lrdwifi/info). (15929)
- Fixed an issue that could cause the lrdmwl USB interface to stop receiving packets under heavy memory load conditions. Improved USB RX performance on resource constrained devices. (15941)
- Fixed an issue that could cause a kernel panic during roam under rare conditions. (16344)

Firmware

- Resolved an issue that caused the radio firmware to stop responding during a channel change in some cases, resulting in a command timeout detected by the driver. (13743)

Supplicant

- Updated the Sterling Linux supplicant build options to build with openssl-1.0.2 and disable wext support. (15923)

Bluetooth

- Bluetooth USB/USB firmware has been updated to address Erratum 11838 (KNOB vulnerability). This issue was resolved for all other Summit 60 variants in the previous release. (15497)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation.

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 7.0.0.242

Released December 2019

Software part number: ST60LXLT1-191216

OS: Linux, Android 7, Android 8, Android 9

New or Enhanced Features

- Includes backports-laird-7.0.0.242 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.19.
- Includes Sterling 60 radio firmware builds 7.0.0.242 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 8.5.24.55 for SDIO, 5.4.24.1 for PCIe, 8.6.24.55 for USB/UART and 5.6.23.4 for USB/USB.
- Includes Linux Sterling supplicant builds 7.0.0.242 for ARM and x86 – Sterling supplicant version is 94.6.0.1, which has been updated to bring in changes from WPA Supplicant 2.9 (15807)
- Includes support for Android 7 and Android 8 with the SDIO/UART and PCIe/UART variants.
- Includes support for Android 9 for the PCIe/UART variant.

Resolved Issues

Driver

- Resolved SDIO command execution errors when going into suspend/resume. (15149)

Supplicant

- Addressed Linux and Android supplicant security vulnerabilities CVE2019-6 and CVE2019-7. See <https://w1.fi/security/> for additional detail. (15089)

NetworkManager

- As connections are deleted, /var/lib/NetworkManager/dhclient-<uuid>-wlan0.lease files are no longer left behind. (11744)

Bluetooth

- Bluetooth firmware has been updated to address Erratum 11838 (KNOB vulnerability) for all Sterling 60 variants except USB/USB. This issue will be addressed in the USB/USB Bluetooth firmware in a future release. (15497)
- Changed the default BLE connection supervision timeout to 5 seconds. This value can be overridden via debugfs if desired (/sys/kernel/debug/bluetooth/hci0/supervision_timeout). The default supervision timeout was changed to prevent the BLE radio from occasionally being blocked from transmitting for brief periods of time, primarily in connections with iOS-based devices. (14254, 15077)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- The radio firmware can suffer a complete RX/TX failure after the firmware is loaded in rare cases. The only known recovery is a hardware reset to the radio. The root cause is under investigation. Added lrdmwl module parameter to enable a work-around for this issue. This work-around should only be used on platforms that implement a hardware reset to the radio module. Module param for lrdmwl.ko is **null_scan_count**. Default value is **0**. If null_scan_count exists and is non-zero, the driver checks up to that number of scans to see if any packets are received. If no packets are received by that number of scans, the driver triggers recovery logic. (14289)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The radio firmware may stop responding during a channel change in rare cases, resulting in a command timeout detected by the driver. The driver will recover by resetting the radio module. **Note** - The reset recovery depends on the host platform implementing GPIO based reset control for SDIO or USB Wi-Fi interfaces as recommended in the datasheet. Contact Laird for more details on implementation. (13743)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

SOFTWARE VERSION 7.0.0.139

Released October 2019

Software part number: ST60LXLT1-191005

OS: Linux, Android 7, Android 8, Android 9

New or Enhanced Features

- This software release is a production quality release for the Sterling 60 SDIO, PCIe and USB radios. Previous software releases had only included support for the Sterling 60 USB radio as engineering quality releases. Both the USB/UART and USB/USB variants are considered production quality with this release. (14496)
- Includes backports-laird-7.0.0.139 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.19.
- Includes Sterling 60 radio firmware builds 7.0.0.139 for Wi-Fi/Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, USB/UART and USB/USB. Sterling 60 radio firmware is version 8.5.23.55 for SDIO, 5.4.23.1 for PCIe, 8.6.23.55 for USB/UART and 5.6.23.4 for USB/USB.
- Includes Linux Sterling supplicant builds 7.0.0.139 for ARM and x86.
- Includes support for Android 7 and Android 8.
- Adds Android 9 support for the PCIe/UART radio.
- Adds support for Antenna Adjust power configuration feature. This feature can be used to unconditionally reduce maximum transmit power levels in order to meet regulatory requirements on a particular platform. Contact Laird for more details if this functionality is required. (14823)
- Adds support for ETSI EN 300 440. (14785)

Resolved Issues

Firmware

- An issue which sometimes made it difficult for the 60 radio to get an IP address after connecting to a .11ac AP on a 40 or 80 MHz channel has been resolved. (14747)
- Resolved an issue that caused Wi-Fi throughput to drop significantly during a BLE scan, if the Wi-Fi signal strength was weak. (14317)
- The Sterling 60 radio configured for AP mode now allows 12 clients to be connected to the AP at one time. (14444)

Driver

- Fixed an issue that caused the radio to fail to indicate that it was going off-channel prior to doing a background scan. (14911)
- Fixed an issue that prevented the PCI based driver from reloading successfully after having previously been loaded. (14874)
- Fixed an issue in the PCI driver that caused the WW regulatory domain to be used instead of one configured in OTP if a driver reload occurred without an intervening power cycle. (14735)
- 40MHz bandwidth support on the 2.4GHz band has been disabled. (14896)
- Fixed an issue that prevented TKIP countermeasures from working correctly (14895)
- Added support for the USB driver to recover from firmware hang via gpio based reset. (12802) Requirements to implement this feature:

- 1) GPIO must be connected to PMU_EN signal (SIP) or W_DISABLE1 signal (M.2).
- 2) GPIO must be high in order for the radio to be powered, therefore must be initialized high prior to driver load
- 3) Driver must be configured with GPIO number either via module parameter or devicetree configuration.

Module parameter (lrdmwl_usb):

reset_pwd_gpio=<gpio number>

Devicetree:

Add USB device node (see kernel documentation for binding details)

Node must contain reset-gpios property specifying gpio number.

Example:

```
&usb2 {
    status = "okay";
    #address-cells = <1>;
    #size-cells = <0>;
    wifi@2{
        compatible = "usb1286,204e";
        reg = <2>;
        reset-gpios = <&pioA 31 GPIO_ACTIVE_LOW>;
    };
};
```

Backports

- Resolved an issue with backports that prevented building 60 series drivers for kernels earlier than 3.10. (14884)

Supplicant

- PMF is now enabled for the Sterling 60 radio. (14948)

NetworkManager

- Fixed an issue that prevented the 60 radio from auto-connecting to an AP that had only WPA-PSK-SHA256 or WPA-EAP-SHA256 key management enabled. (15061)

Bluetooth

- Resolved an issue where the 60 radio would sometimes not successfully complete a BLE connection to a device with which it was bonded. This was only observed when the connection was initiated by an iOS device. (14224)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- The radio firmware can suffer a complete RX/TX failure after the firmware is loaded in rare cases. The only known recovery is a hardware reset to the radio. The root cause is under investigation. Added lrdmwl module parameter to enable a work-around for this issue. This work-around should only be used on platforms that implement a hardware reset to the radio module. Module param for lrdmwl.ko is **null_scan_count**. Default value is **0**. If null_scan_count exists and is non-zero, the driver checks up to that number of scans to see if any packets are received. If no packets are received by that number of scans, the driver triggers recovery logic. (14289)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication

timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used.
nmcli con modify profile 802-1x.auth-timeout 2000000 (13383)

- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

Bluetooth

- The BLE radio is occasionally blocked from transmitting for brief periods of time. The cause is unknown but thought to be related to BT/WiFi coexistence. This can cause a BLE connection to be dropped depending on the connection supervision timeout.

This issue is primarily observed in connections with iOS-based devices, which initiate connections with a supervision timeout of 730ms by default. This issue is not observed when connected to Android devices, which use a connection supervision timeout of 5 seconds by default.

Recommend using a connection supervision timeout of 5 seconds to ensure BLE connection stability. (14254)

SOFTWARE VERSION 7.0.0.84

Released March 2019

Software part number: ST60LXLT1-190629

OS: Linux, Android 7, Android 8

New or Enhanced Features

- This software release is a production quality release for the Sterling 60 SDIO and PCIe radios. The software packages also include support for the Sterling 60 USB radio, but is only included as an engineering quality release.
- Includes backports-laird-7.0.0.84 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.19.
- Includes Sterling 60 radio firmware builds 7.0.0.84 for Wi-Fi and Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, and USB/UART. 60 series firmware is updated to version 8.5.21.55 for SDIO, 5.4.21.1 for PCIe and 8.6.21.55 for USB.
- Includes Linux Sterling supplicant builds 7.0.0.84 for ARM and x86.
- Includes support for Android 7 and Android 8.

Resolved Issues

Firmware

- Fixed an issue that caused a PCI bus access to the 60 Series radio to hang on some platforms after multiple warm reboots. (14296)
- Fixed an issue that caused PCI Function Level Reset to fail occasionally on some platforms (14261)

Driver

- Fixed an issue that could cause a kernel stack dump to occur if the firmware was reset while under heavy load (14293)
- Fixed an issue that could cause the driver to hang at unload in some circumstances (14354)
- Added support to driver for mfg_mode module parameter. If mfg_mode exists and is set to 1, the driver will be forced into manufacturing mode and will attempt to load manufacturing firmware using the request_firmware() API. This allows firmware to be located in non-standard locations and retrieved with the support of a user mode helper if the platform is so configured (14252)

Supplicant

- Added fixes to address CVE reported on EAP-PWD and SAE. Reference: CVE2019-1 through CVE2019-5 - <https://w1.fi/security/>

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- The radio firmware can suffer a complete RX/TX failure after the firmware is loaded in rare cases. The only known recovery is a hardware reset to the radio. The root cause is under investigation. Added `lrdmwl` module parameter to enable a work-around for this issue. This work-around should only be used on platforms that implement a hardware reset to the radio module. Module param for `lrdmwl.ko` is **`null_scan_count`**. Default value is **0**. If `null_scan_count` exists and is non-zero, the driver checks up to that number of scans to see if any packets are received. If no packets are received by that number of scans, the driver triggers recovery logic. (14289)
- Wi-Fi throughput drops significantly during a BLE scan if the Wi-Fi signal strength is weak. (14317)
- The Sterling 60 radio configured for AP mode currently only allows 11 clients to be connected to the AP at one time. (14444)
- MU-MIMO is currently disabled on the 60 series radios. SU-MIMO is supported. (14541)
- The 60 radio will sometimes have difficulty getting an IP address after connecting to an .11ac AP on a 40 or 80 MHz channel with less than a strong signal. (14747)

Driver

- The output of the command **`iw wlan0 link`** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- The capability to recover from a radio firmware crash is not currently supported the USB interface. (12802)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **`nmcli con modify profile 802-1x.auth-timeout 2000000`** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **`p2p_disabled=1`** to the `wpa_supplicant.conf` file. (14292)

Bluetooth

- The 60 radio sometimes will not complete a BLE connection successfully to a device with which it is bonded. This has only been observed when the connection is initiated by an iOS device. (14224)
- The BLE radio is occasionally blocked from transmitting for brief periods of time. The cause is unknown but thought to be related to BT/WiFi coexistence. This can cause a BLE connection to be dropped depending on the connection supervision timeout.

This issue is primarily observed in connections with iOS-based devices, which initiate connections with a supervision timeout of 730ms by default. This issue is not observed when connected to Android devices, which use a connection supervision timeout of 5 seconds by default.

Recommend using a connection supervision timeout of 5 seconds to ensure BLE connection stability. (14254)

SOFTWARE VERSION 7.0.0.52

Released March 2019

Software part number: ST60LXLT1-190329

OS: Linux, Android 7, Android 8

New or Enhanced Features

- This software release is a production quality release for the Sterling 60 SDIO radio. The software packages also include support for Sterling 60 PCIe and USB radios, but are only included as engineering quality releases.

- Includes backports-laird-7.0.0.52 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.19.
- Includes Sterling 60 radio firmware builds 7.0.0.52 for Wi-Fi and Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB, and USB/UART. 60 series firmware is updated to version 8.5.20.55 for SDIO, 5.4.20.1 for PCIe and 8.6.20.55 for USB.
- Includes Linux Sterling supplicant builds 7.0.0.52 for ARM and x86.
- Includes support for Android 7 and adds support for Android 8, but Android 8 support is only included as an engineering quality release.

Resolved Issues

Firmware

- Added support for device recovery in case of PCI firmware hang. (12801)
- Allow SIPT version 1.0 radios to operate with 2 Wi-Fi MAC addresses. (14001)
- Added USB firmware support for Power Save.
- Regulatory update for Japan channel 14.
- Resolved issues that could result in a firmware command timeout under heavy traffic load.

Driver

- Fixed an issue that could cause a crash while SDIO driver was restarting. (13978)
- Changed default PCIe interrupt mode from legacy IRQ to MSI. This allows the PCI interface to work correctly by default on platforms that do not properly handle legacy interrupts and MSI interrupts simultaneously. (14131)
Note - the interrupt mode is configurable with the following `lrldmwl_pcie` module parameter:
`pcie_intr_mode = 0`; Legacy IRQ
`pcie_intr_mode = 1`; MSI (new default)
- Resolved an SDIO driver hang which could occur during driver unload. (14160)
- Fixed an issue that could cause firmware to hang on attempt to go into power save in rare cases (14271)
- Fixed an SDIO driver issue that could cause a crash in the `softirq` handler during firmware recovery. (14298)
- Resolved a hang on SDIO radio wakeup during device recovery. (14304)
- Resolved issues with USB shutdown.
- Fixed an issue with multiple USB adapter instances.

Supplicant

- Updated Sterling Supplicant to align with `wpa_supplicant` version 2.7. (14013)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of a connected client may appear low. (11842)
- The radio firmware can suffer a complete RX/TX failure after the firmware is loaded in rare cases. The only known recovery is a hardware reset to the radio. The root cause is under investigation. Added `lrldmwl` module parameter to enable a work-around for this issue. This work-around should only be used on platforms that implement a hardware reset to the radio module. Module param for `lrldmwl.ko` is **`null_scan_count`**. Default value is **0**. If `null_scan_count` exists and is non-zero, the driver checks up to that number of scans to see if any packets are received. If no packets are received by that number of scans, the driver triggers recovery logic. (14289)
- On some devices, the PCIe firmware reload following a PCI function level reset fails if the reset completion time exceeds 100 milliseconds. The failure occurs if the PCIe root complex does not return `0xFFFFFFFF` on a configuration space read that is not completed successfully. The PCIe root complex in iMX processors is known to behave in this way. This issue can be worked around by patching the PCI driver in the kernel to extend the delay that occurs after a function level reset from 100 ms to 500 ms. See the function `pcie_flr()` at `drivers/pci/pci.c` in recent versions of the Linux kernel, and `pci_flr_wait()` in older kernels. (14261)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- The capability to recover from a radio firmware crash is not currently supported the USB interface. (12802)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used. **nmcli con modify profile 802-1x.auth-timeout 2000000** (13383)
- On Android 8, the supplicant is repeatedly killed if the driver is advertising p2p capabilities. The workaround is to disable p2p by adding the configuration **p2p_disabled=1** to the wpa_supplicant.conf file. (14292)

Bluetooth

- The 60 radio sometimes will not complete a BLE connection successfully to a device with which it is bonded. This has only been observed when the connection is initiated by an iOS device. (14224)
- The BLE radio is occasionally blocked from transmitting for brief periods of time. The cause is unknown but thought to be related to BT/WiFi coexistence. This can cause a BLE connection to be dropped depending on the connection supervision timeout.

This issue is primarily observed in connections with iOS-based devices, which initiate connections with a supervision timeout of 730ms by default. This issue is not observed when connected to Android devices, which use a connection supervision timeout of 5 seconds by default.

Recommend using a connection supervision timeout of 5 seconds to ensure BLE connection stability. (14254)

SOFTWARE VERSION 6.0.0.138

Released December 2018

Software part number: ST60LXLT1-181217

OS: Linux, Android 7

New or Enhanced Features

- This software release is a production quality release for the Sterling 60 SDIO radio. The software packages also include support for Sterling 60 PCIe and USB radios, but are only included as engineering quality releases.
- Includes backports-laird-6.0.0.138 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.14.
- Includes Sterling 60 radio firmware builds 6.0.0.138 for Wi-Fi and Bluetooth combinations SDIO/SDIO, SDIO/UART, PCIe/UART, PCIe/USB and USB/UART. 60 series firmware is updated to version 8.5.18.50 for SDIO, 8.4.18.50 for PCIe and 8.6.18.50 for USB.
- Includes Linux Sterling supplicant builds 6.0.0.138 for ARM and x86.
- Adds support for Android 7
- Adds support for channel 165 in the Korea regulatory domain.
- Adds ad-hoc mode support

Resolved Issues

Firmware

- Resolved an issue when setting multiple WEP keys with different length keys. (13718)
- Updated the Bluetooth firmware to address a security vulnerability. Please refer to the statement from the [Cert Coordination Center](#) for additional information.

Driver

- Resolved warnings during PCIe driver unload. (13592)
- Added support for loading PCIe manufacturing firmware (13236)
- Fixed an issue that prevented packet transmission on big-endian platforms using the PCI WLAN interface. (13611)
- Fixed an issue that could cause the driver to stop transmitting under periods of heavy load. (13776)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of connected client may appear low. (11842)
- USB firmware is only operational in CAM mode. Power Save must be disabled when using Wi-Fi USB firmware.

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- The capability to recover from a radio firmware crash is not currently supported for PCIe or USB interfaces. (12801, 12802)
- UAPSD is not fully supported in this 60 series release (11979)

Supplicant

- When failing to connect to a wireless network with an 802.1x profile, so that an authentication timeout is triggered, subsequent connection attempts may experience an authentication timeout that is shorter than the full authentication timeout period. This can be caused by a conflict in Network Manager and Supplicant timeout values. A workaround is to set the NM 802-1x.auth-timeout to a large value so that the supplicant 802-11-wireless.auth-timeout value will be used.
nmcli con modify profile 802-1x.auth-timeout 2000000 (13383)

SOFTWARE VERSION 6.0.0.92

Released September 2018

Software part number: ST60LXLT1-180927

OS: Linux

New or Enhanced Features

- This software release is a production quality release for the Sterling 60 SDIO radio. The software packages also include support for Sterling 60 PCIe and USB radios, but are only included as engineering quality releases.
- Includes backports-laird-6.0.0.92 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers for Linux kernels 3.0 to 4.14.
- Includes laird-60-radio-firmware-6.0.0.92 – 60 series firmware package. 60 series firmware is updated to version 2.5.10.3 for SDIO, 2.4.10.3 for PCIe and 2.6.10.3 for USB.
- Includes Sterling supplicant builds 6.0.0.92 for ARM and x86.
- Added support for the Australia regulatory domain. (13120)
- Backports: added USB support to lrdmwl and sterling60 defconfigs

Resolved Issues

Firmware

- Added support for the Australia regulatory domain. (13120)

Driver

- Resolved a memory leak in RSSI averaging. (12975)

- Changed lrd_nlattrs to start at 1 because some net link libraries discard attributes that are 0. This change makes the driver incompatible with older versions of the mfg60n tools. Please contact Laird support as cs-support@lairdtech.com for updated versions of the mfg60n tools. (13280)
- Resolved a race condition that could occur under heavy transmit load in low signal conditions that could result in a kernel panic. (13062)
- Fixed an issue that caused a kernel panic on some 64bit architectures. (13086)
- Fixed several TX aggregation issues to improve stability and performance. (13067)
- Added support for MSI interrupts via a module parameter (disabled by default). This works around an issue on host PCIe implementations such as those from NXP that do not correctly handle legacy and MSI interrupts simultaneously. MSI interrupt support is enabled by setting `pcie_intr_mode=1` as a module parameter to `lrdmwl_pcie`. (12632)
- Resolved an issue which prevented multiple instances of a PCIe or USB adapter from operating simultaneously. (13443)

Supplicant

- Modified the supplicant package to resolve issues in some build environments. Removed the libraries and inner rootfs.tar from the supplicant package. (13267)

Known Issues

Firmware

- Occasionally when using AP mode, the RSSI of connected client may appear low. (11842)

Driver

- The output of the command `iw wlan0 link` always displays the bitrate as the lowest data rate for the connected frequency band. (10679)

SOFTWARE VERSION 5.0.0.17

Released June 2018

Software part number: ST60LXLT1-180621

OS: Linux

New or Enhanced Features

- Includes backports-laird-5.0.0.17 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers
- Includes laird-sterling-60-5.0.0.17 – 60 series firmware package. 60 series firmware is updated to version 2.5.8.3 for SDIO and 2.4.8.3 for PCIe
- Includes Sterling supplicant builds 5.0.0.17 for ARM and x86.
- Added support for recovering the SDIO radio when the radio is no longer responding to SDIO accesses. (11298)

Resolved Issues

Firmware

- When connected on the 2.4 GHz band, QoS Null packets will now rate shift down to 1 Mbps if necessary. (12829)
- An issue that could prevent a QoS Null packet from being sent in response to the TIM being set at the AP, while WoWLAN is enabled, has been resolved. (13049)
- An issue which caused a firmware command timeout under low signal conditions with WoWLAN enabled has been resolved. (13051)

Driver

- Resolved an issue that could cause a crash in the kernel timer handler. (13006)

Known Issues

Firmware

- When using WLAN PCIE interface on ARM platform no scan results are returned from the radio and radio appears to be inoperable. (12632)
- While suspended with the WoWLAN NL80211_WOWLAN_TRIG_ANY trigger enabled, the 60 radio may stop responding to trigger events if the QoS Null data packet sent by the 60 radio to the AP to retrieve buffered packets is max retried due to a lack of response from the AP. (12991)
- Occasionally when using AP mode, the RSSI of connected client may appear low. (11842)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)

SOFTWARE VERSION 3.5.5.94

Released June 2018

Software part number: ST60LXLT1-180605

OS: Linux

New or Enhanced Features

- Includes backports-laird-3.5.5.94 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers
- Includes laird-sterling-60-3.5.5.94 – 60 series firmware package. 60 series firmware is updated to version 2.5.8.1 for SDIO and 2.4.8.1 for PCIe
- The Sterling supplicant is now included as a part of Sterling product releases. (11897)
- Support for SISO mode operation has been added to support single antenna applications. (12219, 12391) SISO mode can be enabled by configuring the module parameter SISO_mode=<value>. Valid values are:
 - 0: Disable (Default)
 - 1: Ant0 (Wi-Fi antenna)
 - 2: Ant1 (Shared Wi-Fi and Bluetooth antenna)
- Added support for recovering the SDIO radio when a firmware command timeout is detected. (11298)
- Added reset logic to the SDIO driver to support suspend/resume. (11299)
- Support for the Laird Manufacturing Utility (LMU) has been added to the 60 series radios (SDIO only). (11300)
- Support for the Laird Regulatory Utility (LRU) has been added to the 60 series radios (SDIO only). (11301)
- The 60 radio can now be configured for a specific regulatory domain using LMU. In addition to WW, currently supported regulatory domains are FCC, IC, ETSI, KCC, JP and CN. (11728, 12441)
- Support for WoWLAN has been added (SDIO only). (12134) The following WoWLAN triggers are supported:
 - NL80211_WOWLAN_TRIG_ANY - loss of association or RX of any unicast 802.11 packet
 - NL80211_WOWLAN_TRIG_DISCONNECT - loss of association
 - NL80211_WOWLAN_TRIG_NET_DETECT - SSID detected
- Support for 802.11w has been enabled. (11350)

Resolved Issues

Firmware

- Resolved an issue with the 60 radio firmware which caused the signal strength reported by iw to be unstable. (11700)
- Resolved multiple cases where the 60 radio firmware could become unresponsive, resulting in command timeouts, under high traffic load conditions or in roaming scenarios. (11698, 11775, 12866)
- Resolved an issue with the 60 radio firmware that caused it to stop transmitting packets, resulting in a failure to connect to a wireless network. (12538)
- When configured for simultaneous Client and AP mode, the 60 radio no longer stops sending traffic when large amounts of data are sent simultaneously over both interfaces. (12764)

- QOS Null packets are no longer sent only at 24 Mbps, but will now also be sent at lower legacy rates as needed. (12829)

Driver

- The 60 radio is no longer slow to connect on DFS channels. (11701)
- Added functionality to allow the setting of TX power using upper layer tools such as iw. (11614)
- The WPA2 KRACK vulnerability has been resolved. (12160)
- Resolved an "skb allocation failure" error, which occurred under heavy RX load, by removing a driver flag which limited the number of buffers that could be allocated. (12498)
- The 60 radio will now connect to an AP that is not including the SSID in beacons and is operating on a DFS channel. (12712)
- Resolved a kernel panic caused by start/stop of the Block Ack timer. (13011)

Supplicant

- The WPA2 KRACK vulnerability has been resolved. (12106)

Backports

- Invalid options in the sterling60 and bluetooth defconfigs for CPTCFG_BT_LE and CPTCFG_BT_RFCOMM_TTY have been corrected. (11610)
- When building backports using the bluetooth or sterling60 defconfigs, the Bluetooth usb driver will now successfully build. (11711)

Bluetooth

- An issue where Bluetooth could cause the Wi-Fi firmware to become unresponsive while roaming has been resolved. (12612)
- An issue where heavy Bluetooth traffic could cause the Wi-Fi firmware to become unresponsive has been resolved. (12617)

Known Issues

Firmware

- When using WLAN PCIE interface on ARM platform no scan results are returned from the radio and radio appears to be inoperable. (12632)
- While suspended with the WoWLAN NL80211_WOWLAN_TRIG_ANY trigger enabled, the 60 radio may stop responding to trigger events if the QoS Null data packet sent by the 60 radio to the AP to retrieve buffered packets is max retried due to a lack of response from the AP. (12991)
- Occasionally when using AP mode, the RSSI of connected client may appear low. (11842)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)

SOFTWARE VERSION 3.5.5.14

Released September 2017

Software part number: 60LXLT1-170914

OS: Linux

New or Enhanced Features

- backports-laird-3.5.5.14 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers
- laird-sterling-60-3.5.5.14 –60 series firmware package
- 60 series firmware is updated to version 8.5.2.20 for SDIO and 8.4.2.20 for PCIe

Resolved Issues

Firmware

- An issue causing the 60 radio to incorrectly retry packets sent at .11b rates is resolved. (11757)

Driver

- The 60 radio now connects on channel 165. (11703)
- When configured with a static WEP key, the radio now uses the configured transmit key rather than always using key index 0. (11639)
- The 60 radio in AP mode no longer fails to transmit beacons if the WPA IE contains more than one pairwise cipher. (11764)

Known Issues

Firmware

- The 60 radio is sometimes slow to connect on DFS channels, particularly when the AP is configured for 40 MHz or 80 MHz channels. (11701)

Driver

- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)

Backports

- When building backports using the bluetooth or sterling60 defconfigs, the Bluetooth USB driver does not build. (11711)

SOFTWARE VERSION 3.5.5.4

Released July 2017

Software part number: 60LXLT1-170728

OS: Linux

New or Enhanced Features

- Initial 60 series release
- backports-laird-3.5.5.4 – 60 series backports package with support for building Wi-Fi and Bluetooth drivers
- laird-sterling-60-3.5.5.4 –60 series firmware package

Known Issues

Firmware

- The 60 radio is sometimes slow to connect on DFS channels, particularly when the AP is configured for 40 MHz or 80 MHz channels. (11701)

Driver

- The 60 radio does not currently connect on channel 165. (11703)
- The output of the command **iw wlan0 link** always displays the bitrate as the lowest data rate for the connected frequency band. (10679)
- When configured with a static WEP key, the radio always uses key index 0 as the transmit key regardless of which WEP key is configured. (11639)

Backports

- When building backports using the bluetooth or sterling60 defconfigs, the Bluetooth USB driver does not build.(11711)