Mira version 2.7.1 Release Notes

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2.7.1

Bugfix

MiraUSB would be bricked with DFU packages from 2.7.0

If MiraUSB was updated by a DFU package from 2.7.0, or if the gateway updated it with new software, it would be bricked. This is now fixed.

2.7.0

Bugfixes

Slow FOTA flash writes on nRF fixed

When writing a large memory area to flash, while high rate networking or concurrent bluetooth was active, it would sometimes take an unexpectedly long time to complete. This has now been fixed.

I2C using pins on port 1 on nRF now works

Using I2C pins on nRF GPIO port 1 previously did not work. Now it does.

Incorrect stack overflow warning not generated

MiraOS 2.6.2's linkscript for nRF52 caused `__StackLimit` to have an incorrect value. That could cause stack overflow checking code to incorrectly assume the stack had overflown. It was possible to add special C code as a workaround, but this has now been corrected so the workaround is no longer needed.

Downstream routes establishing faster after root reboot

Following a reboot of a root, the root didn't request necessary information from the network in order to rebuild the downstream routes. This made all downstream routes very slow to reestablish. This is now fixed, but a known issue remains. See known issues for details.

Time synchronization improved

Due to timing issues, time synchronization events could intermittently fail. Generally, networks have redundancy in their synchronization and are not affected, but particularly vulnerable nodes could lose synchronization. This is now fixed, increasing general network stability. However, this compromises current consumption in certain configurations. **An increase of about 2 uA can be seen in slow rate MKW41z targets.**

Features

USB serial port driver for nRF52840

Mira now implements an API for using the USB peripheral in the nRF52840 chipset as a serial port.

Gateway

Border Gateway over USB

The border gateway can now use a USB serial connection between the host software and the Radio on a Stick (RoaS) instead of a UART serial connection. This enables hardware design with nRF52840 chipsets as USB devices to run as a RoaS with the border gateway. The RoaS needs a special USB bootloader to work with the border gateway host, which is also included in 2.7.0. The host can automatically detect the USB device and therefore serial ports do not need to be specified. [MiraUSB](#) is a LumenRadio product using this feature.

Border Gateway host software in .deb package for Raspberry Pi

The software and dependencies for running the Border Gateway host is now packaged in a `.deb` package. This enables an easy one line install which also sets up the host in a system service that auto-restarts. It currently supports the raspberry pi platform.

Packet sniffer

A special packet sniffer firmware is now included in the tools directory. It is a firmware which joins the network of the specified credentials without sending anything and records all packets it can hear in the network. The script `mira_sniffer.py` receives packets from the sniffer over a UART or USB serial port and creates a .pcap file viewable in wireshark. Dissectors for wireshark are also included. The `.dfu` package is compatible with [MiraUSB](#), turning it into a sniffer when flashed with nrfutil.

Second UART driver for nRF52840 - TX only

The UART API now supports a second UART ID (1) on the nRF52840 chipset, which can be used in parallel with the existing UART ID (0). The `UART ID=1` uses the `NRF_UARTE1` peripheral. It can, however, only be used for *outputting* serial data, which is good for debug/log output.

ICMPv6 messages

Mira now supports the reception of ICMPv6 messages through callbacks. Through this API Mira notifies the application with different variations of destination unreachable errors. See the documentation for more information.

Multichan MAC layer

Mira can be built with a different MAC layer, called Multichan. It is compatible with Mira V1 and is an always on radio protocol. It is only recommended to be used in very specific applications

where power is of little concern and routing isn't needed. Contact LumenRadio if you are interested.

Dynamic amount of UDP sockets

The network configuration struct, `mira_net_config_t,` now holds an optional argument, `max_connections`. This specifies how many `mira_net_udp_connections` can be used. The default value is 8. Increasing this number will increase RAM consumption.

mira_net_get_ll_address() function added

Returns the node's link-local address.

Packet filter

A packet filter has been implemented for testing purposes. This makes a node ignore packets from specific addresses, helping in forcing certain topologies. It is only recommended to be used for testing, as the routing algorithms rely on information from all neighbors to efficiently route packets.

MWA_N3 support

Mira now supports the new MWA_N3 radio module. The module has a configuration named "`MWA_N3`" and can be configured via the configure_module.py tool.

Flash read/write API

Mira now implements an API to read, write and erase any internal flash page. See the documentation for more details.

DMA2 free on MKW41Z

The DMA2 IRQ is no longer used on NXP MKW41Z, leaving it free for application code.

Updates

C89 deprecated

Mira version 2.7.0 has dropped support for C89 and might not compile with this version.

Python 3.9 supported

Python tools and modules now support python 3.9

mira_net_* and mira_diag_* API new error behavior

In previous versions the `mira_net_*` and `mira_diag_*` API allowed calling functions before `mira_net_init()`. This sometimes worked, and sometimes didn't.

The API now returns `MIRA_ERROR_NOT_INITIALIZED` for the following functions if they are called before calling mira_net_init. The previous behavior is written below them.

- `mira_net_get_actual_txpower`
    - 2.6.2: Success, gets actual txpower.
- `mira_net_set_antenna`
    - 2.6.2: Success, sets antenna.
- `mira_net_set_high_power`
    - 2.6.2: Success, sets high power.
- `mira_net_set_low_power`
    - 2.6.2: Success, sets low power.
- `mira_net_set_txpower`
    - 2.6.2: Success, sets tx power.
- `mira_net_time_get_tick_length`
    - 2.6.2: Success, gets tick length 0.
- `mira_net_time_schedule`
    - 2.6.2: Success.
- `mira_diag_mac_set_packet_logger`
    - 2.6.2: Success.
- `mira_diag_mac_set_packet_filter`
    - 2.6.2: N/A (Not present).
- `mira_diag_mac_get_statistics`
    - 2.6.2: Error 1 (`MIRA_ERROR_UNKNOWN`).
- `mira_diag_net_get_topology`
    - 2.6.2: Error 2 (`MIRA_ERROR_NOT_SUPPORTED`).

Gateway host included in archive on downloads site

The gateway host had a separate download link on dl.lumenradio.com. It is now included in the archive instead.

Known issues

Risk of long times for downstream route establishment during network startup

During startup of a network, information from all nodes is gathered at the root in order for it to establish downstream routes. This information can get lost for individual nodes due to packet loss, and is only present on slow intervals. This introduces risk of individual nodes taking a long time to be routable from the root. This affects all previous Mira versions.