lumenradio
Creating Connectivity for a Better Tomorrow

MiraOS™
for industrial sensor networks

OPERATING SYSTEM FOR EMBEDDED PRODUCTS

LumenRadio's operating system MiraOS enables a large-scale and easy-to-install wireless mesh network. Our patented technologies enable ultra-reliable and Future-Proof connectivity with unparalleled features for the most challenging IoT applications. MiraOS comes with an integrated radio stack and can operate with any radio technology and on any radio chip.

See the building blocks of MiraOS on the other side

MiraOS is developed for harsh industrial applications, offering state of the art technology for low power mesh networks combining Ultra-Low energy with extreme reliability and accuracy.

With unique features for Industrial IoT applications MiraOS is the perfect fit and will take your wireless sensor networks to another level.

- Ultra-reliable large scale mesh communication with more than 1000 nodes in one sensor network
- Full IPv6 Support
- High-precision time synchronization (<50µs across the network) enables extremely accurate time-stamping of sensor data
- Ultra-low deterministic power consumption, enabling battery-powered meshed sensors
- Low-energy firmware over the air (FOTA)
- Easy commissioning using NFC or Bluetooth concurrent means low installation cost and high flexibility
- Industrial life cycle support
- Open application layer for customer development

WHY MIRA FOR INDUSTRY?

For industrial sensor networks such as the ones used for predictive maintenance solutions, wired sensors have until now been the only reliable alternative with disadvantages such as expensive cables, hours of installation work and limitation in scalability.

Wireless sensors in a perfectly applied mesh network, running on battery or energy harvesting technology is today even more reliable and robust than wired solutions. MiraOS enables countless different sensors mounted wirelessly anywhere in a harsh industrial environment.

LOW ENERGY MESH

Ultra-low energy mode, enabling meshed communication between battery-powered sensors. Mira mesh architecture is tailored for harsh industrial applications and offers one of a kind possibility to build large self-healing networks consisting of more than 1000 nodes.

RELIABILITY & ROBUSTNESS

MiraOS industrial configuration is developed with focus on reliability and robustness. Our patented Cognitive Coexistence technology makes your product Future-Proof as it will coexist along with other wireless technologies, not being interfered or causing interference.

EASY COMMISSIONING

MiraOS is developed for easy scaling and commissioning and comes with best in class firmware upgrade over the air (FOTA) functionality. This means easier installation, lower installation cost, increased flexibility and improved profitability as the machine service will be optimally managed.

Building blocks of MiraOS

Application OS

End user application hosting in OS | Multi-threading | Task Scheduling | Kernel Clock

Mesh Network

Network formation	Automatic, self healing, self optimizing Mix&Match formation™ (Ultra-low energy mixed configuration formation)
Network roles	Border router (Gateway), Routing/Ultra Low Energy routing (Meshing), Ultra-Low Energy non routing (Leaf)

>10000 units network size | <5ms latency/hop

IPv6

- 6LoWPAN
- Up to 8 UDP sockets
- CoAP support

Security

- AES128-CCM (Counter with CBC-MAC)
- Separate Commissioning Key

Standard drivers

- Dali driver
- Dali Mesh driver
- DMX driver
- DMX Mesh Driver
- Others on request

Low Energy

- 10 years on coin cell battery for leaf nodes
- 3 years on coin cell battery for meshing nodes
- >15 years on AA battery for meshing nodes

Resource Requirements

- < 150kB Flash
- < 40kB SRAM
- > Cortex M0 @ 40MHz

Hardware Abstraction Layer

- GPIO driver
- UART driver
- SPI driver
- I2C driver
- NFC driver
- ADC driver
- FrontEnd driver for long range options

Reliability

- Cognitive Coexistence
- Adaptive FDMA
- TSCH (Time Syncronized Channel Hopping)
- <+/-5µs time sync precision/hop
- CSMA/CD
- Link Layer Ack

Device Management

- FOTA for Routing devices
- FOTA for low energy battery devices
- FOTA external CPU
- Network QoS metrics

Commissioning

- NFC commissioning
- BLE commissioning

MSS

- BLE beacon
- BLE
- Bluetooth Mesh

Chipset support

nRF 52832 | nRF 52840 | TI CC2538 | NXP MKW41x | nRF 52810 | EFR32xx | TI CC13xx | Others: On request

MiraOS v2.1

Available standard feature | Planned feature, not available yet

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With patented ultra-reliable technologies for wireless connectivity, LumenRadio offer radio modules and an operating system that can be integrated straight into their customers products.

CONTACT

Sweden – Headquarters

LumenRadio AB
Svangatan 2B
416 68 Göteborg

+46 31 301 03 70
sales@lumenradio.com

Germany – Sales office

LumenRadio Deutschland GmbH
Mergenthalerallee 10-12
D-65760 Eschborn, Frankfurt

+49 6102 812 003
sales@lumenradio.com

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