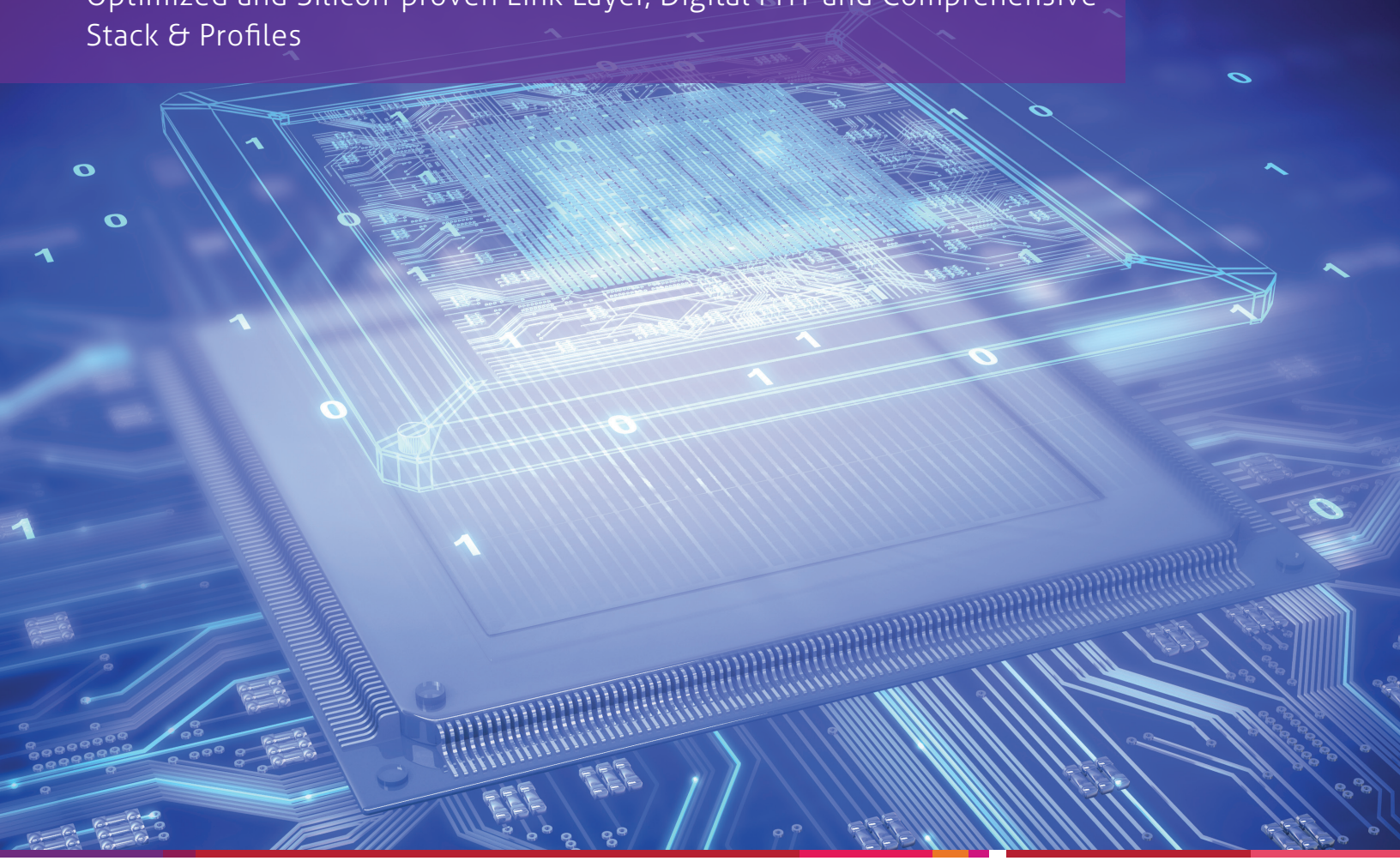
Mindtree
Welcome to possible

BlueLitE Bluetooth® low energy 5.1

Optimized and Silicon-proven Link Layer, Digital PHY and Comprehensive Stack & Profiles



Introduction

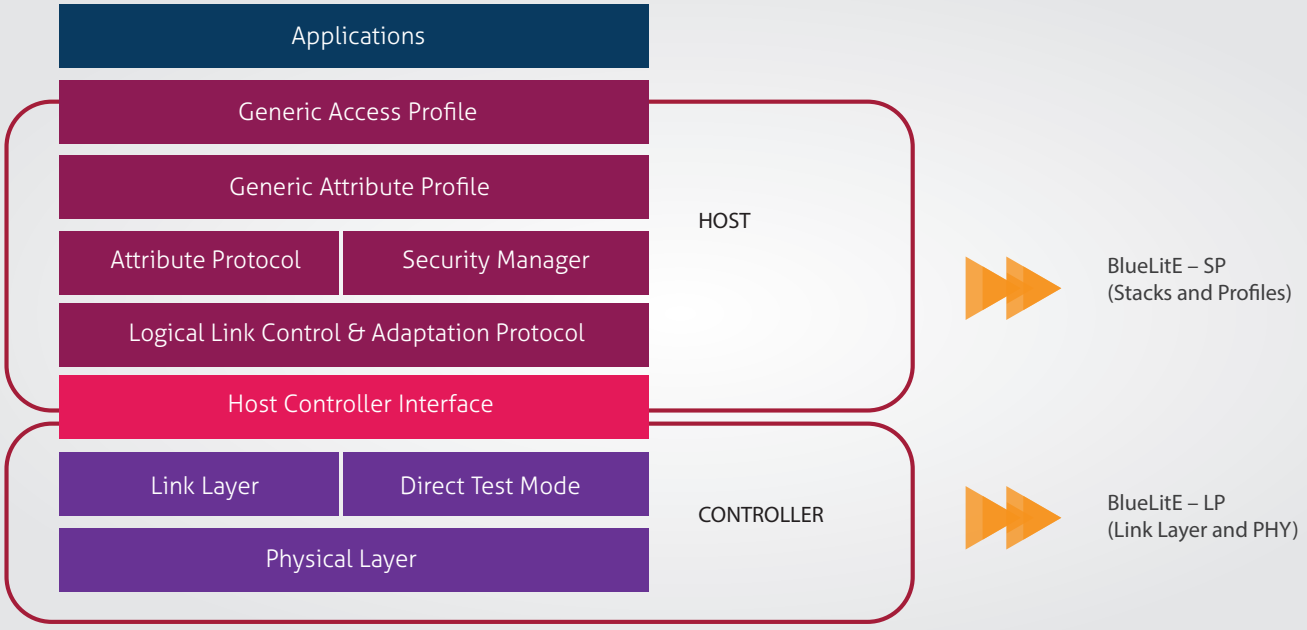
BlueLitE is Mindtree's Bluetooth low energy Semiconductor IP, which supports Bluetooth 5.1 specification. Mindtree has invested over 500 person-years in Bluetooth technology since the year 2000. We have implemented several Bluetooth specification and certified them (Bluetooth SIG - search for Mindtree).
As an IP provider, Mindtree is one of the few companies that is committed to Bluetooth technology. Mindtree is the first company in the world to qualify for Bluetooth LE 4.2 and first company in the world to qualify for full featured Bluetooth LE 5 with TCRL2 specifications.

BlueLitE IP is proven in Silicon for all the modules—Link Layer, Digital PHY, Stack and Profile. We have licensed our IP to more than 15 customers with 25+ design wins which includes few of the top ten semiconductor companies in the world. BlueLitE customers, such as LAPIS Semiconductor has started mass production of Bluetooth low energy chipsets (ML7105 and ML7125). Cypress Semiconductor, another major Mindtree customer has also started mass production based on our 4.1 Bluetooth low energy Solution.

Product Features

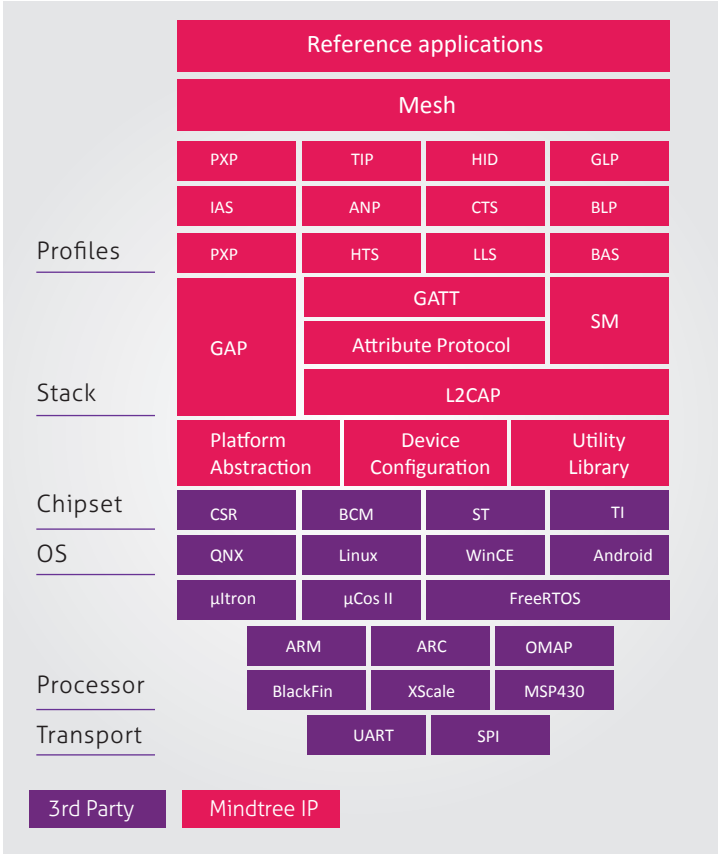
BlueLitE IP has two component IPs—BlueLitE-LP (Link Layer and PHY) and BlueLitE-SP (Stack and Profiles).

Bluetooth low energy – Mindtree component IPs



Note: Profiles along with their versions explained in Annexure

BlueLitE Stack and Profiles

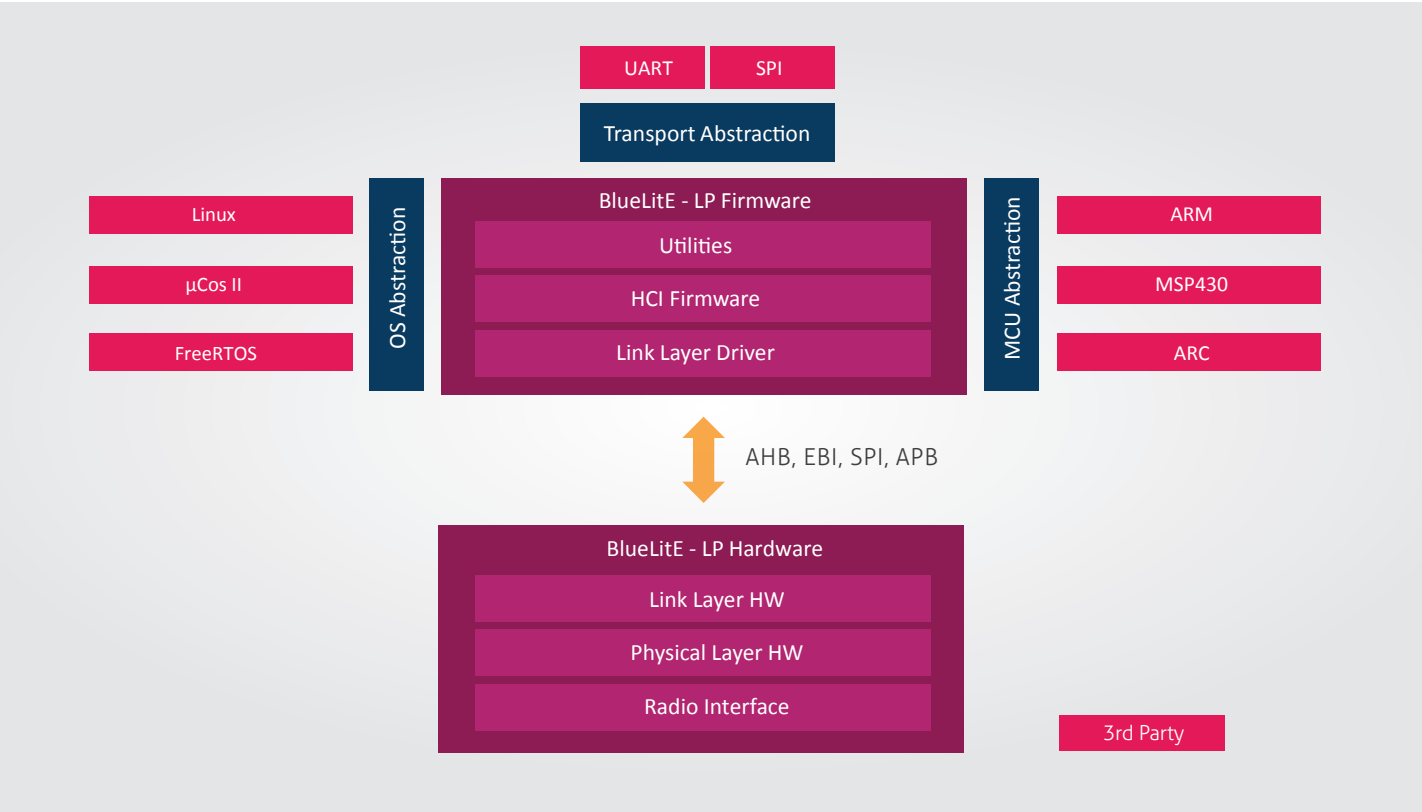


BlueLitE-SP (Stack and Profiles) is designed to be easily portable across a variety of processors, chipsets, transport and OS.

Key advantages of BlueLitE-SP

- Clean abstraction layers for OS, transport and microcontrollers for easy integration into required platforms
- ANSI C code which enables easy portability to processor of choice
- Modular configurable architecture
  - Feature/compilation flags for core Stack and Profiles
  - Runtime/compile time tunable parameters
- Testability support in design

BlueLitE Controller and Digital PHY



BlueLitE Link Layer is a hardware-firmware co-design. Time-critical functions are handled in the hardware and protocol logics are implemented in firmware. Physical Layer (PHY) is implemented in hardware, performs the GFSK modulation, demodulation, AGC and RSSI measurements.

Key advantages of BlueLitE Link Layer

- High degree of configurability based on target application
- Designed for portability across 8-bit/16-bit/32-bit processors
- Firmware is architected for low foot-print and high latency tolerance
- Optimized memory architecture
- Built-in power management module for ultra-low power consumption
- Flexible interfaces for easy integration with third party modem/RF

Key advantages of BlueLitE Digital PHY

- High performance modem
- Configurable architecture based on RF front end
- Optimized gate count
- Easily customizable

Key Benefits

Reduced development risk

- Robust, interoperable and optimized implementation
- Leverages over 19 years of experience in helping product companies engineer low- footprint and low-power applications

Faster time-to-market

- Total Bluetooth low energy solution comprising of modules—Link Layer, Digital PHY, Stack and Profile
- Well-defined platform Abstraction Layer for easy and risk-free porting and integration
- Highly customizable for product-specific optimization and differentiation

Reduced product costs

- Optimized use of resources for low footprint, gate count and MIPS
- Bluetooth-specific power management for ultra-low power consumption
- Backed by solid documentation

Competitive differentiation

- Supports all mandatory and optional features; supports all modes; extensive profile support
- One-stop-shop for total solution in Bluetooth low energy
- Flexible support in various stages of development and productization cycle
- Helps customers win business by adding new profiles, feature licensing and providing support in selling

Bluetooth low energy 5.1 and 5 Key Features

- 5.1 Features
  - DF-AoA/AoD
  - GATT Caching
  - Periodic Adv Sync transfer/ Control length extension
  - Minor Functional Enhancements #1
- 5.0 Features
  - 2 Mbps
  - Advertising length extension
  - Long range feature
  - Channel selection #2

Deliverables

BlueLitE Link Layer deliverables

- RTL for Link Layer hardware compliant with Bluetooth low energy version 5.1 core specifications (Single mode)
- C test cases for verification of Link Layer hardware
- C code for Link Layer firmware
- Hardware build and other shell scripts (Unix/Linux)
- Firmware make file for Windows
- Documentation
  - BlueLitE Link Layer architecture document
  - BlueLitE Link Layer software programmer manual
- BlueLitE Link Layer IP user guide
- FPGA synthesis and PAR scripts for Mindtree FPGA platform.
- Compliant to core specifications version Bluetooth low energy 5.1
- Supports all device states – advertising, scanning, initiating and connection
- Support for white list and duplicate filtering
- Hardware AES encryption

BlueLitE modem deliverables

- RTL for digital PHY (modem)
  - Supports 1Mbps, 2Mbps and long range data rates
- ASIC synthesis and STA scripts
- RTL simulation environment
- Test suite for integrated BlueLitE Link Layer and BlueLitE PHY
- Test scripts
- Documentation

BlueLitE Stack and Profile deliverables

- C code for Bluetooth low energy version 5.1 core specifications, consisting of following layers:
- LE HCI
- LE L2CAP
- LE GAP
- LE SM
- GATT
- ATT
- Profiles for single mode Bluetooth low energy
- Source code of sample application to illustrate the use of APIs
- Documentation

Bluetooth Leadership Credentials

MIndtree is a pioneer in Bluetooth IP licensing and providing engineering services for semiconductor companies and OEMs.

80+
Customers for Bluetooth IPs

50 mn+
Products shipped with IP

500+
Person-years of investment

40 +
Unplug Fests attended

Co-creator of
4.x & 5.x
specifications

4/5
Top Microprocessor companies are Licensees

Contact Mindtree

25 Independence Blvd. suite 401
Warren, NJ 07059 United States

+1 908 604 8080

Partha De,
Director

Partha.De@mindtree.com

http://www.mindtree.com/blueLitE

http://www.mindtree.com/solutions/bluetooth-technology

Annexure – BlueLitE Profiles

Profile	Specification Name	Profile version Number
ANP / ANS	Alert Notification Profile & Service	1
AIOP / AIOS	Automation IO Profile & Service	1
BAS	Battery Service	1
BCS	Body Composition Service	1
BLP	Blood Pressure Profile & Service	1
BMS	Bond Management Service	1
CGMP / CGMS	Continuous Glucose Monitoring Profile & Service	1.0.1
CPP / CPS	Cycling Power Profile & Service	1.1
CSCP / CSCS	Cycling Speed and Cadence Profile & Service	1
CTS	Current Time Service	1.1
DIS	Device Information Service	1.1
ESP & ESS	Environmental Sensing Profile & Service	1
FMP	Find Me Profile	1
GLP & GLS	Glucose Profile & Service	1
HIDS	HID Service	1
HOGP	HID over GATT Profile	1
HPS	HTTP Proxy Service	1
HRP / HRS	Heart Rate Profile & Service	1
HTP / HTS	Health Thermometer Profile & Service	1
IAS	Immediate Alert Service	1
IPS	Indoor Positioning Service	1
IPSP	Internet Protocol Support Profile	1
LLS	Link Loss Service	1.0.1
LNP / LNS	Location and Navigation Profile & Service	1
NDCS	Next DST Change Service	1
OTP / OTS	Object Transfer Profile & Service	1
PASP / PASS	Phone Alert Status Profile & Service	1
PXP	Proximity Profile	1.0.1
PLXP / PLXS	Pulse Oximeter Profile & Service	1
RSCP / RSCP	Running Speed and Cadence Profile & Service	1
RTUS	Reference Time Update Service	1
ScPP / ScPS	Scan Parameters Profile & Service	1
TDS	Transport Discovery Service	1

TIP	Time Profile	1
TPS	Tx Power Service	1
UDS	User Data Service	1
WSP / WSS	Weight Scale Profile & Service	1