

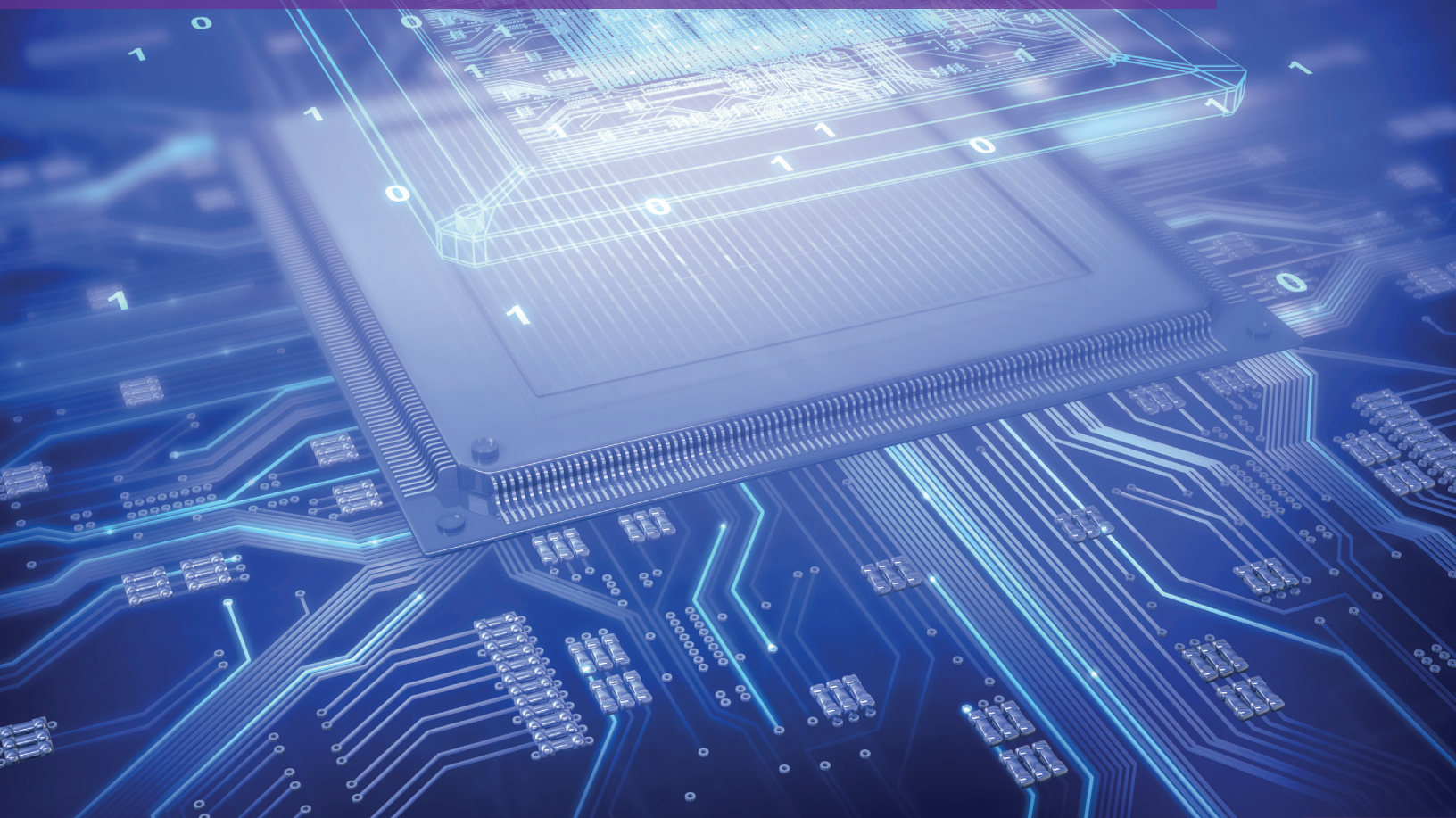


# Mindtree

*Welcome to possible*

## BlueLitE Bluetooth® low energy 4.2

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



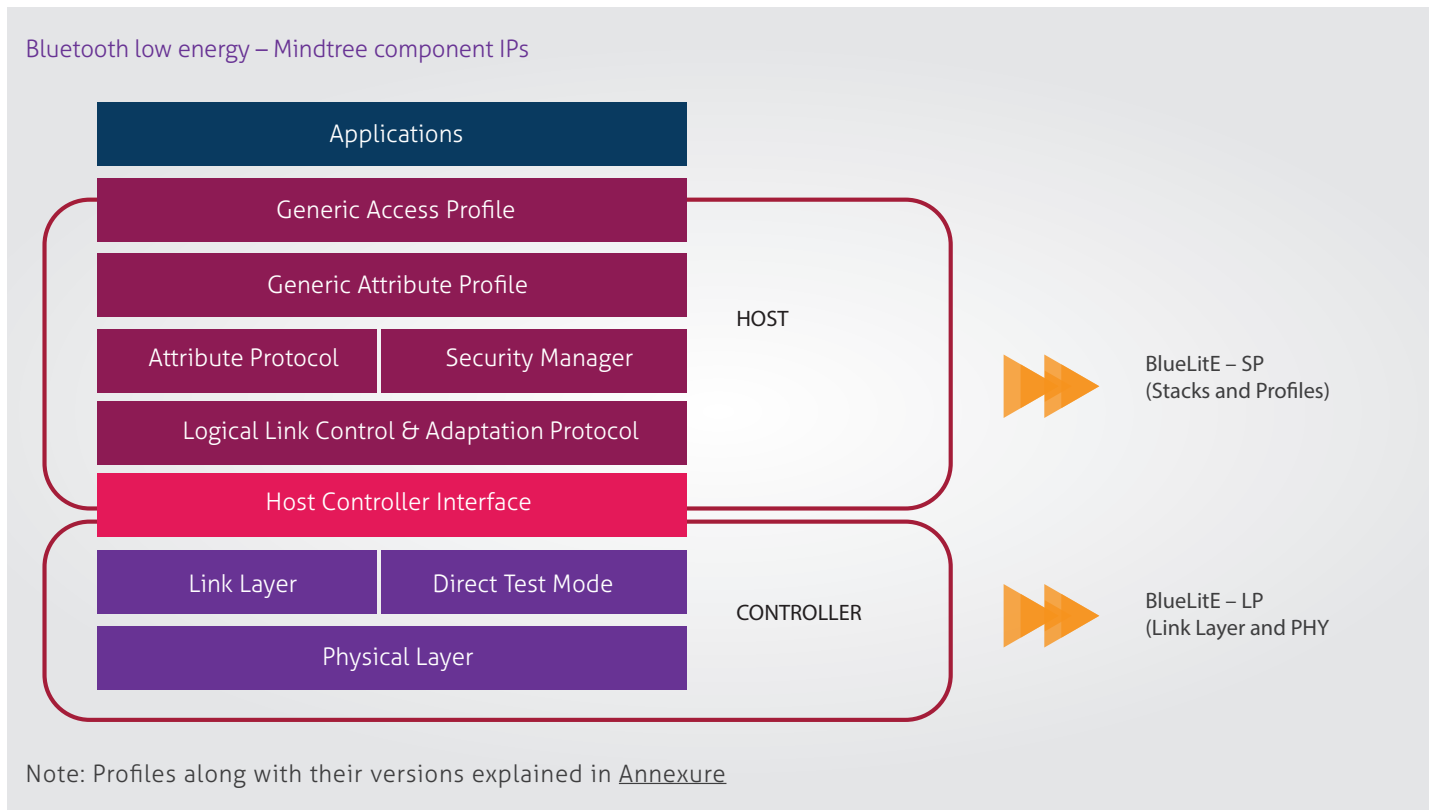
### Introduction

BlueLitE is Mindtree's Bluetooth low energy Semiconductor IP, which supports Bluetooth 4.2 specification. Mindtree has invested over 500 person-years in Bluetooth technology since the year 2000. We have implemented several Bluetooth specification and certified them (please visit [Bluetooth SIG](#) and search for Mindtree). There is no single IP provider other than Mindtree that can claim this long term commitment to Bluetooth technology. Mindtree is the first company in the world to qualify for Bluetooth low energy 4.2 (D025119).

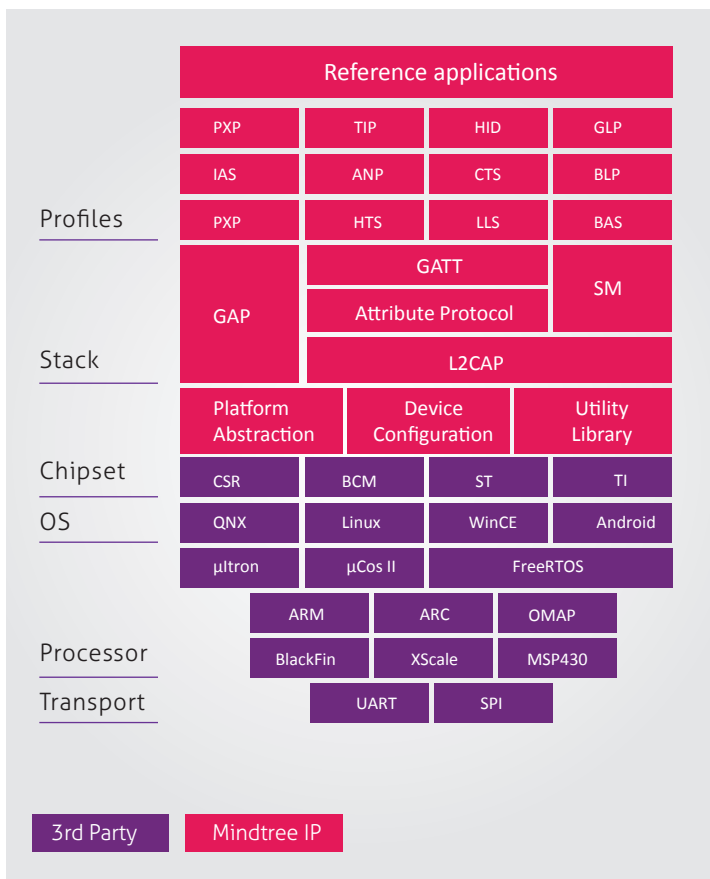
BlueLitE IP is proven in Silicon for all the modules namely Link Layer, Digital PHY and Stack & Profile. We have licensed our IP to 10+ customers across geographies which includes few of the top 10 semiconductor companies in the world. BlueLitE customers, such as LAPIS Semiconductor has started mass production of the 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

Bluetooth low energy has two component IPs - BlueLitE-LP (Link layer and PHY) and BlueLitE-SP (Stack and Profiles)



## BlueLitE Stack and Profiles

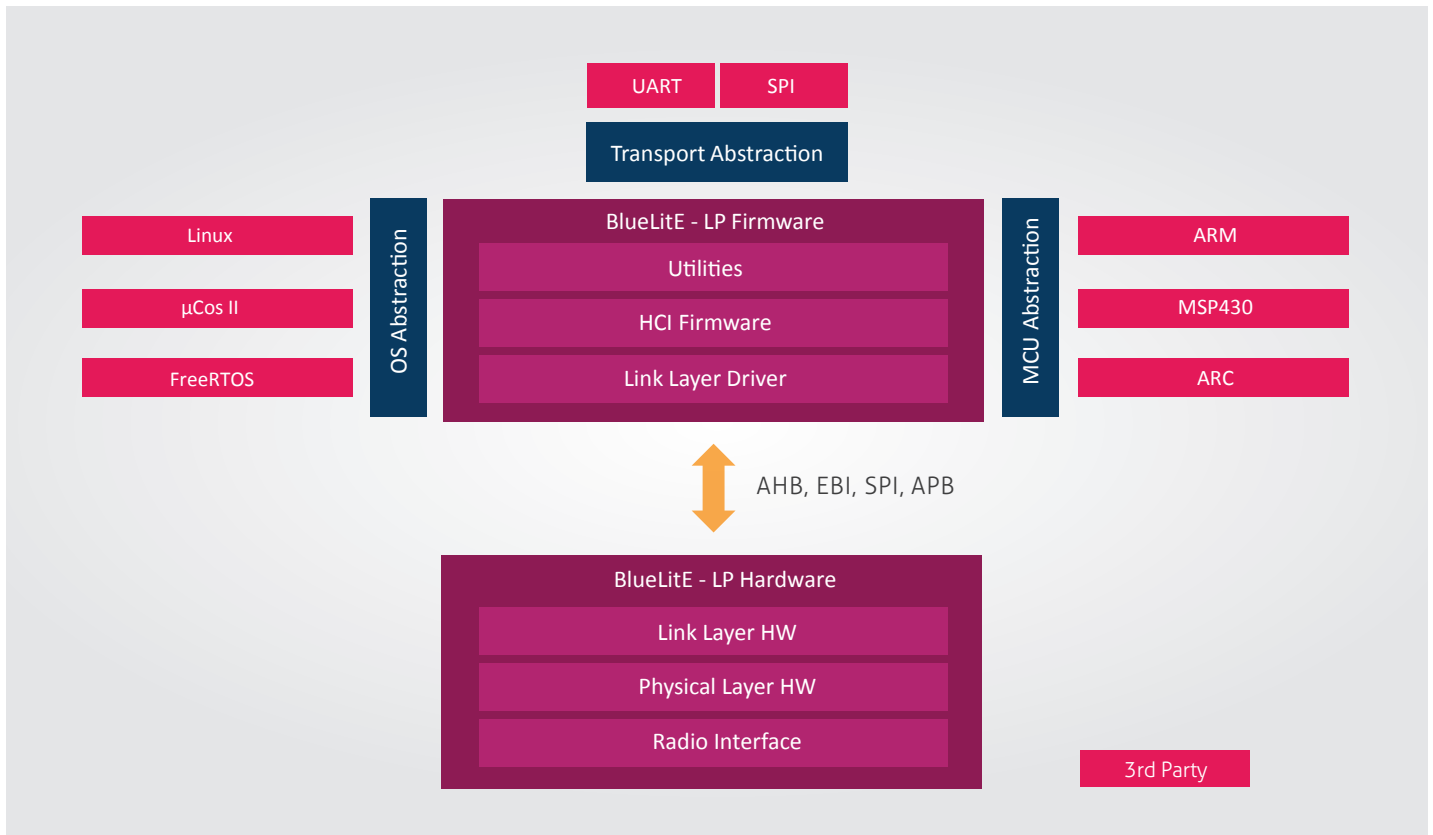


BlueLitE-SP (Stack and Profiles) is designed to be easily portable across a variety of processors, Chipsets, Transport and OSs.

### Key advantages of BlueLitE-SP

- Supports all mandatory and optional features
- Supports all adopted profiles and services
- Architected for low memory footprint
- Portable across 8/16/32-bit microcontrollers
- Application development framework for all implemented profiles
- BQB-qualified
- Interoperability tested at Unplug Fest (UPF) events.
- Clean abstraction layers for OS, transport and microcontrollers for easy integration into required platforms
- ANSI C code that enables easy portability across processors 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



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), implemented in hardware, performs the GFSK modulation, demodulation, AGC and RSSI measurements.

### Key advantages of BlueLitE Link Layer

- Supports all mandatory and optional features
- Supports all device roles and states
- Architected for very low power and low footprint
- Integrated power management
- Portable for 8/16/32-bit microcontrollers
- OS and MCU abstraction layers for portability to any SoC platform
- Support for multiple processor bus and flexible RF interface
- BQB-qualified

### Key advantages of BlueLitE Digital PHY

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

## Key Benefits

### Reduced development risk

- Robust, interoperable and optimized implementation

- Helps product companies engineer low-footprint and low-power applications

### Faster time-to-market

- Total Bluetooth low energy solution comprising of Link Layer, Digital PHY and Stack and Profile modules
- 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

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

## Deliverables

### BlueLite Link Layer Deliverables

- RTL for Link Layer hardware compliant with core specifications 4.2 (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 makes 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.

**Note:** The following features of Bluetooth low energy Single Mode will be supported

- Compliant to core specifications 4.2
- Supports all device states – advertising, scanning, initiating and connection

- Support for white list and duplicate filtering
- Hardware AES encryption

### BlueLitE Stack and Profile Deliverables

- C code for core specifications version 4.2, consisting of following layers:
  - LE HCI
  - LE L2CAP
  - LE GAP
  - LE SM
  - GATT
  - ATT
- Profiles for single mode Bluetooth core specifications 4.2
- 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.

**50+**

Proposal wins with IP

**35 mn+**

Products shipped with IP

**500+**

Person-years of investment

**40 +**

Unplug Fests attended

Co-creator of

**4.0 & 4.1**  
specifications

**5** Offshore development  
centers for top OEMs

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<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

### ABOUT MINDTREE

Mindtree [NSE: MINDTREE] delivers digital transformation and technology services from ideation to execution, enabling Global 2000 clients to outperform the competition. "Born digital," Mindtree takes an agile, collaborative approach to creating customized solutions across the digital value chain. At the same time, our deep expertise in infrastructure and applications management helps optimize your IT into a strategic asset. Whether you need to differentiate your company, reinvent business functions or accelerate revenue growth, we can get you there. Visit [www.mindtree.com](http://www.mindtree.com) to learn more.