



# Mindtree

A Larsen & Toubro Group Company

## EtherMind Bluetooth 5.2

*Comprehensive, production proven and qualified Bluetooth Stack and Profiles IP*

### Introduction

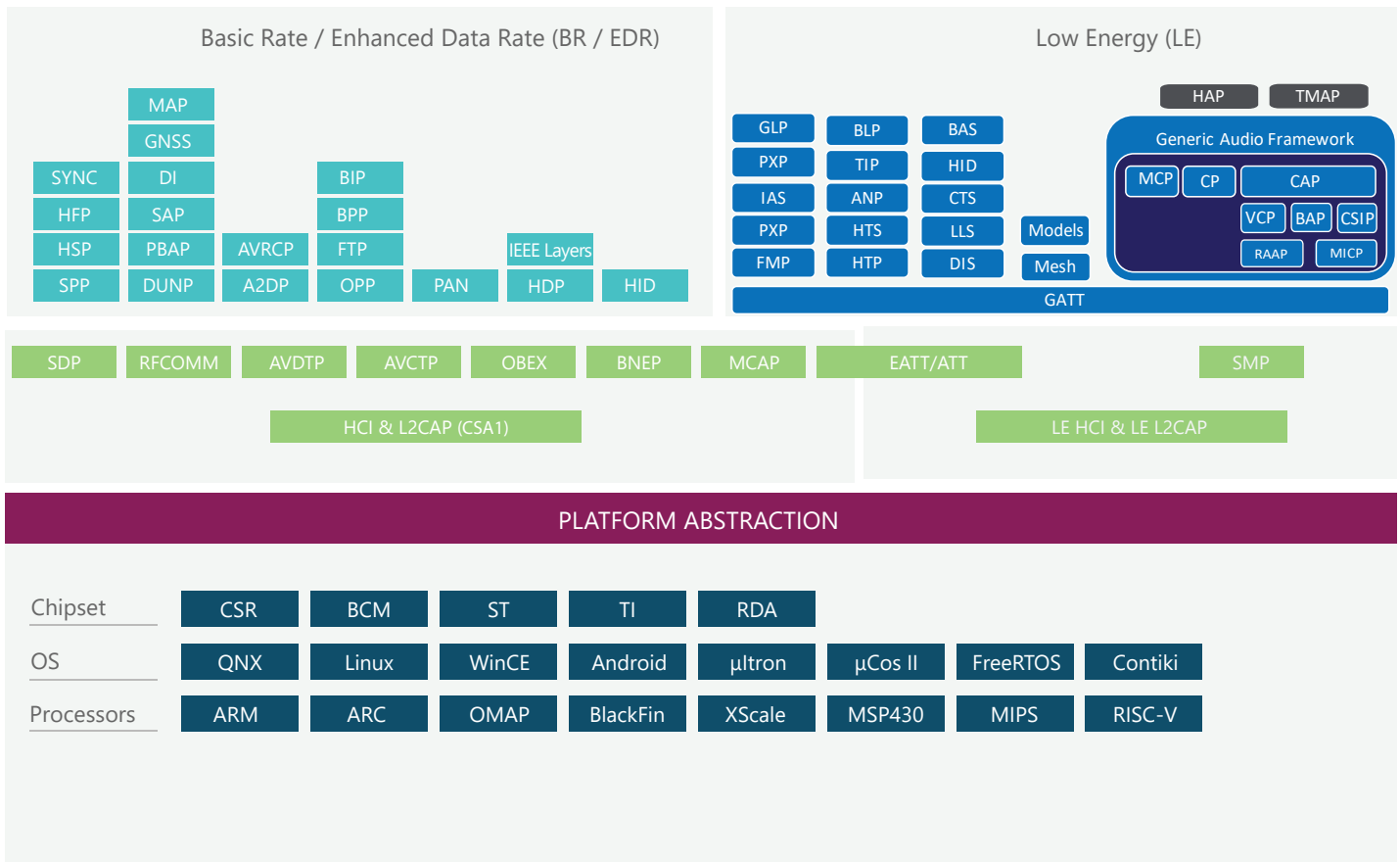
Mindtree is acknowledged by the Bluetooth SIG as one of the creators of the Bluetooth version 4.x and 5.x specification. We have been building and Licensing Bluetooth IP solutions since 2000, over the years, we have consistently certified generations of our silicon and software IP by the Bluetooth SIG.

Mindtree's EtherMind Dual Mode Stack and Profiles has been widely licensed to numerous semiconductor companies and OEMs across the globe. Today EtherMind is licensed to more than 60+ customers. The v5.2, v5.1, v5, v4.x and v2.1+EDR IP has been licensed to Multiple OEMs such as Garmin, LG, QNX, Panasonic and Logitech. Semiconductor companies including Intel, Texas Instruments and Rohm have also licensed our EtherMind IP.

EtherMind Bluetooth low energy Stack and Profiles has been hardened in many consumer devices including mobile phones and mono headsets as it simplifies maintenance, builds reliable functioning and takes a holistic view to increase quality of service (QoS).

Mindtree's Bluetooth Stack and Profiles supports all the mandatory as well as optional features of the Bluetooth core stack and the profiles. EtherMind is optimized for embedded applications and offer significant savings in hardware "Bill of Materials". EtherMind requires just 1/10th the memory of competitive stacks that have been designed for PC and mobile phone applications

# EtherMind Bluetooth 5.2 – Product Features



## KEY ADVANTAGES

### Complete Bluetooth 5.2 Protocol Stack and profiles

- Bluetooth LE Audio Profiles and Services( Annexure 1)
- Bluetooth LE Profiles( Annexure 2)
- Classic Bluetooth Profiles( Annexure 3)

### Proven interoperability

- Proven at different Unplug Fests
- Tested for interoperability with more than 200 smart phone models

### Easy portability

- 8/16/32 bit MCUs – ARM, ARC, OMAP, Blackfin, Xscale, MSP430 etc.
- Operating systems – QNX, Windows CE, Android, FreeRTOS, MQX, etc.
- Bluetooth chipsets – CSR, TI, BCM, ST

### Modular configurable architecture

- Non-blocking architecture – enables multiple parallel operations
- Two task or single task mode UART, USB, 3-wire, SDIO and software transport
- Over-the-air firmware (FOTA) upgrade
- Feature/compilation flags to enable/disable features of Core Stack, Profiles and Role

### Low memory footprint

- Typical Dual Mode Stack & Profiles (RAM) ~25KB
- Typical Dual Mode Stack & Profiles (Flash) ~240 KB
- Sizes include the core Stack, typical Audio Profiles such as A2DP, AVRCP, HFP, PBAP,MAP and SBC encoder

## KEY BENIFITS

### Easy Maintenance

- Bug fixes can be easily integrated into the IP

### Reduced development risk

- Robust, interoperable and optimized implementation
- Leverages 19+ years of experience helping product companies engineer low- footprint products
- Complete implementation in ANSI C code to enable easy portability across processors of choice
- Platform and operating system (OS)-agnostic
- Proven portability across Mindtree as well as third party Bluetooth Stack

### Reduced product costs

- The low memory footprint of EtherMind reduces product BOM due to decreased Flash and ROM requirement.
- Highly configurable to suit the product needs of OEMs and enables further optimizations

### Competitive differentiation

- All mandatory and optional feature support; all mode support; extensive profile support
- 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

### KEY DELIVERABLES

- Classic Bluetooth and Bluetooth low energy Stack for core specification 5.2
- Bluetooth Profiles
  - Bluetooth LE Audio Profiles
  - Traditional Profiles
  - GATT-based specifications
- Source code for core stack, profiles and abstraction layers.
- Modification rights for abstraction layers. This enables customers to integrate EtherMind Stack onto the target platform easily.
- Source code of sample application to illustrate the use of APIs
- Documentation
  - EtherMind architecture document
  - EtherMind software programmer manual
  - EtherMind IP user guide

## Annexure 1 - Bluetooth LE Audio Profiles and Services

Profile	Specification Name
HAP	Hearing Aid Profile
TMAP	Telephony and Media Audio Profile
<b>Generic Audio Framework</b>	
MCP & MCS	Media Control Profile & Media Control Service
CCP & TBS	Call Control Profile & Telephony Bearer Service
<b>CAP(Common Audio Profile)</b>	
VCP, VCS, VOCS, AICS	Volume Control Profile <ul style="list-style-type: none"><li>• Volume Control Service</li><li>• Volume Offset Control Service</li><li>• Audio Input Control Service</li></ul>
MICP, MICS, AICS	Microphone Control Profile <ul style="list-style-type: none"><li>• Microphone Control Service</li><li>• Audio Input Control Service</li></ul>
RAAP, & RAAS	Routing Active Audio Profile & Routing Active Audio Service
CSIP & CSIS	Coordinated Set Identification Profile & Coordinated Set Identification Service
BAP, ASCS, BASS, PACS	Basic Audio Profile <ul style="list-style-type: none"><li>• Audio Stream Control Service</li><li>• Broadcast Audio Scan Service</li><li>• Publish Audio Stream Service</li></ul>

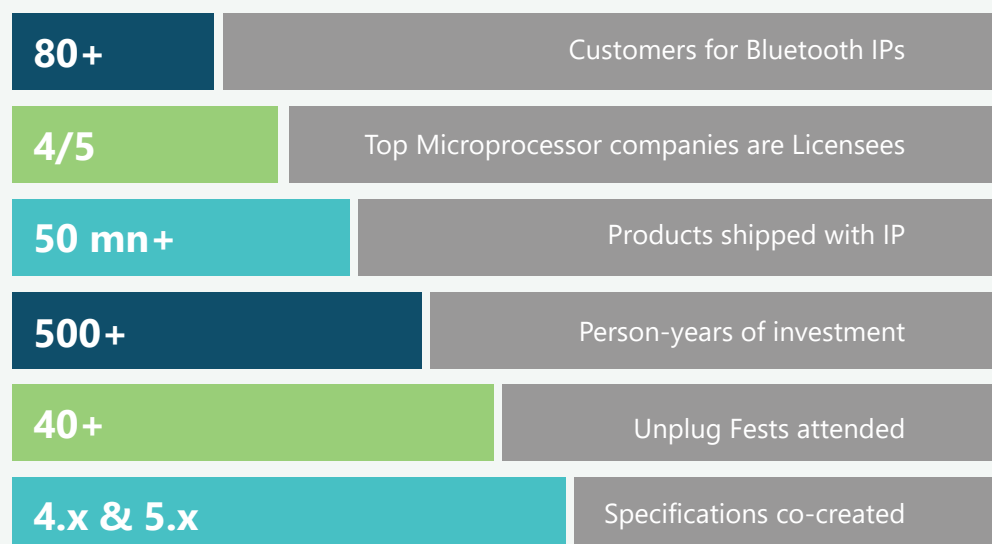
## Annexure 2 – Bluetooth Low Energy Profiles

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

## Annexure 3 – Classic Bluetooth Profiles

Profile	Specification Name	Profile version Number
A2DP	Advanced Audio Distribution Profile	1.3.2
AVRC	Audio / Video Remote Control Profile	1.6.2
BIP	Basic Imaging Profile	1.2.1
BPP	Basic Printing Profile	1.2
CTN	Calendar Tasks and Notes Profile	1.0.1
DI	Device Identification Profile	1.3
DUN	Dial-up Networking Profile	1.2
FTP	File Transfer Profile	1.3.1
GAVDP	Generic Audio / Video Distribution Profile	1.3
GNSS	Global Navigation Satellite System Profile	1.0
GOEP	Generic Object Exchange Profile	2.1.1
HDP	Health Device Profile	1.1
HFP	Hands-Free Profile	1.7.2
HID	Human Interface Device Profile	1.1.1
HSP	Headset Profile	1.2
MAP	Message Access Profile	1.4.2
MPS	Multi Profile Specification	1.0
OPP	Object Push Profile	1.2.1
PAN	Personal Area Networking Profile	1.0
PBAP	Phone Book Access Profile	1.2.3
SAP	SIM Access Profile	1.1.1
SPP	Serial Port Profile	1.2
SYNCH	Synchronization Profile	1.2.1

## Bluetooth Leadership Credentials



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

## Contact Mindtree



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## About Mindtree

Mindtree [NSE: MINDTREE] is a global technology consulting and services company, helping enterprises marry scale with agility to achieve competitive advantage. "Born digital," in 1999 and now a Larsen & Toubro Group Company, Mindtree applies its deep domain knowledge to 300+ enterprise client engagements to break down silos, make sense of digital complexity and bring new initiatives to market faster. We enable IT to move at the speed of business, leveraging emerging technologies and the efficiencies of Continuous Delivery to spur business innovation. Operating in 18 countries and over 40 offices across the world, we're consistently regarded as one of the best places to work, embodied every day by our winning culture made up of over 21,000 entrepreneurial, collaborative and dedicated "Mindtree Minds."