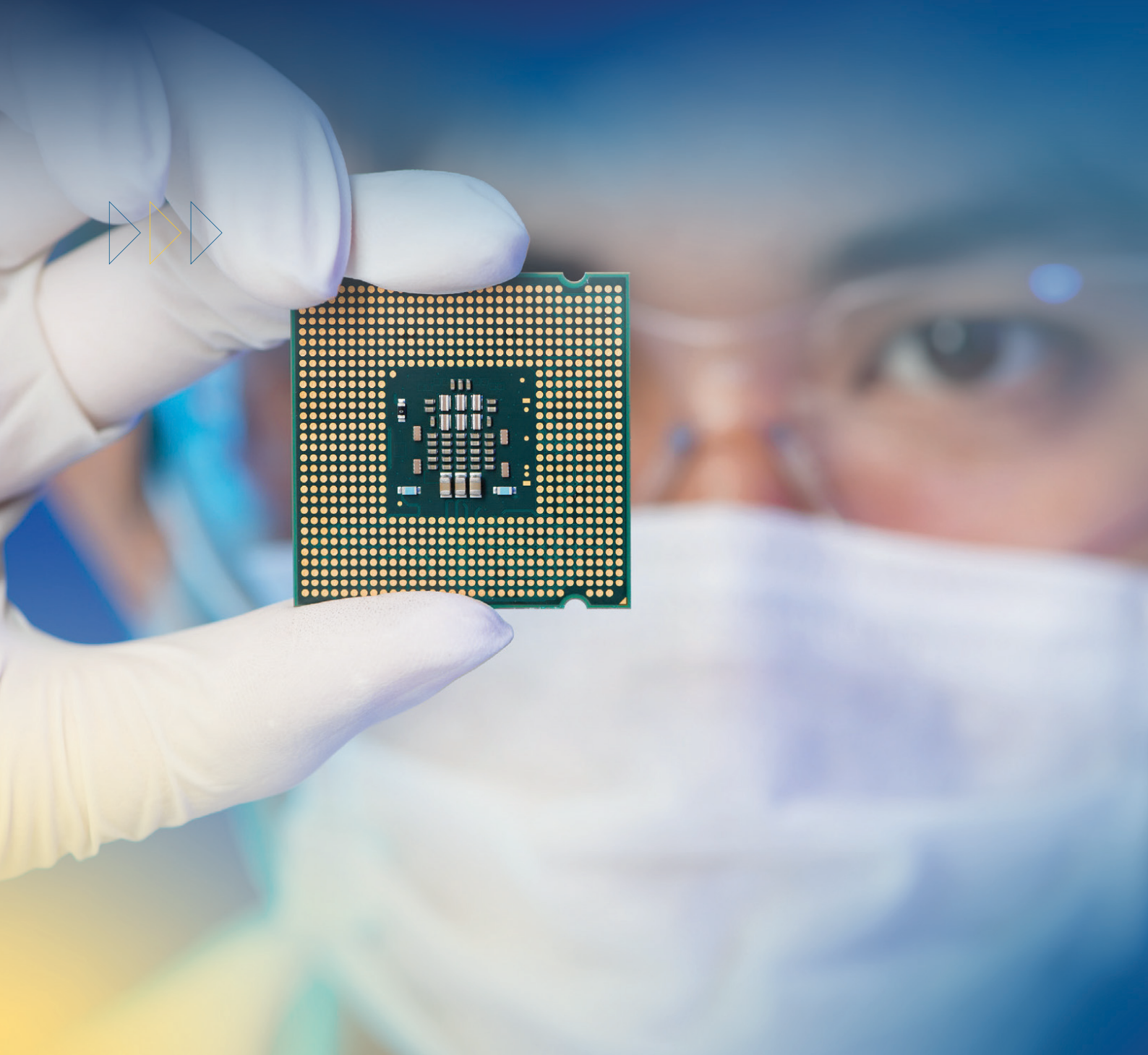
Brochure

LTIMindtree

LTIMindtree IEEE 802.15.4 MAC and PHY Semiconductor IP

Designed for High performance, low footprint
Interoperable across all major solutions.



Semiconductor companies today, license Intellectual Property (IP) from third party suppliers and integrate it into their Chips, to hit the market faster. In such a scenario, building the right System-on-Chip (SoC) depends on appropriate selection and integration of the IP. LTIMindtree, a leading provider of Short Range wireless IP for the last 22 years, has developed an IP based on IEEE 802.15.4-2011 specifications. LTIMindtree's Wireless IP for IEEE 802.15.4 MAC and PHY is designed to suit the needs of semiconductor companies. By partnering with us, companies can accelerate their product development lifecycle, thereby achieving faster time-to-market for their products.

Why LTIMindtree 802.15.4 IP?

- Reduced development risk
- 20+ years of experience in building and licensing wireless IP
- Robust and interoperable across all major solutions
- Optimized implementation
- Enables product companies engineer low-footprint

Protocol supported: IEEE 802.15.4-2011

IP Maturity

- Meets all specification requirements
  Licensed to top semiconductor companies
  In Production

Supported Software Stacks

- Zigbee
- RF4CE
- Thread

To view the video demo of our 802.15.4 IP **click here**

Faster time-to-market

- Well-defined platform abstraction layer for easy and risk-free porting and integration
- Highly customizable for product-specific optimization and differentiation
- Strong software credentials for building reference designs and sample applications

Reduced product costs

- One-stop-shop for 802.15.4 solution
- Optimized use of resources for low footprint, gate count
- Flexible support during product development life cycle

LTIMindtree offering in 802.15.4

IEEE 802.15.4 has two IP components – IEEE 802.15.4 (MAC & PHY) and Software Stack. Currently, LTImindtree offers IP for MAC and PHY layers.

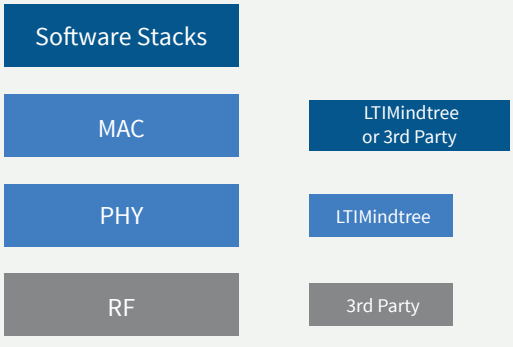


Fig 1: IEEE 802.15.4 Stack

LTIMindtree IEEE 802.15.4 MAC & PHY

LTIMindtree 802.15.4 IP is a hardware-firmware co-design. Time-critical functions are handled in the hardware, while protocol logics are implemented in firmware to offer greater flexibility.

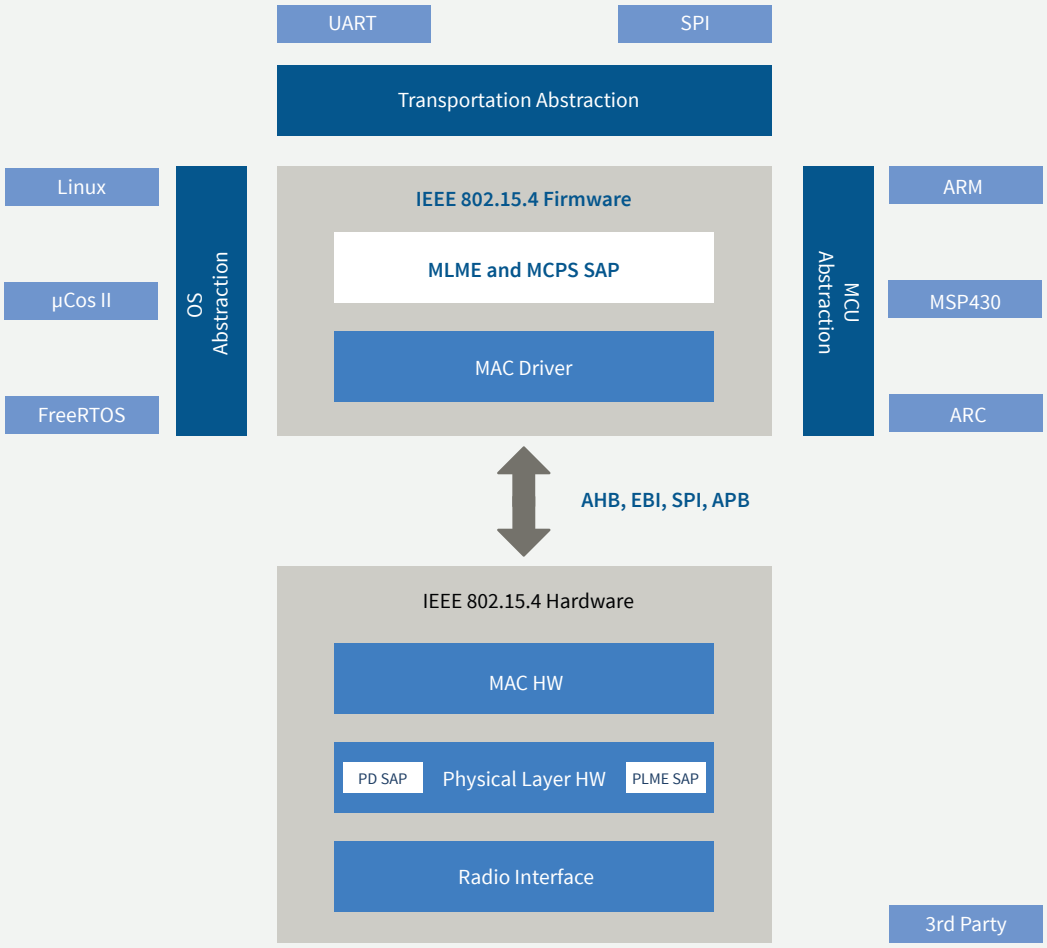


Fig 2: Architecture for LTIMindtree IEEE 802.15.4 MAC & PHY

LTIMindtree IEEE 802.15.4 MAC

Our MAC implementation is fully compliant with IEEE 802.15.4-2011 MAC specifications.
We support all mandatory and optional features.
Some of the features of our MAC implementation are:

- Association and disassociation
- Beacon management
- Channel access
- Frame validation and acknowledgement
  All defined security mechanisms.

MAC operates in two different modes based on the specification:

- Beacon enabled
- Non-beacon enabled

LTIMindtree, currently, supports the non-beacon enabled mode.

LTIMindtree 802.15.4 - PHY

Our PHY implementation is fully compliant with IEEE 802.15.4-2011 PHY specification.
LTIMindtree has implemented 802.15.4 digital PHY for 2.4 GHz ISM band which easily integrates with customer‘s Radio front end. It supports modulation/demodulation, Automatic Gain Control (AGC), Energy detection(ED), Link quality identification (LQI) and channel selection/assessment (CCA) algorithms.

LTIMindtree 802.15.4 – PHY supports:

- Frequency Band : 2.4 GHz (ISM/Worldwide)
- Data rate : 250 kbps (over the air)
- Coding : Direct Sequence Spread Spectrum
- Modulation : Offset-QPSK

For information related to Receiver Sensitivity, Channel Selection Filter attenuation requirement, Carrier offset, Carrier drift, clock drift and other related parameters,
write to us at wireless.ip@ltimindtree.com

Key advantages of LTIMindtree IEEE 802.15.4 PHY

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

LTIMindtree IEEE 802.15.4 MAC and PHY Deliverables

MAC Layer Deliverables

1. Delivery of MAC hardware RTL
2. C-test cases for MAC hardware
3. MAC firmware
4. Hardware build and other shell scripts (Unix/Linux)
5. Firmware make file for Windows
6. Documentation
   a. MAC Architecture document
   b. MAC software programmer manual
   c. MAC IP user guide
7. FPGA synthesis & PAR scripts for LTIMindtree FPGA platform.

PHY (Modem) Deliverables

1. RTL source code in Verilog for digital PHY (modem) for both transmitter and receiver.
2. ASIC Synthesis and STA scripts for EDA tool flow
3. RTL Simulation Environment
4. Test Suite for integrated MAC and PHY
5. Test scripts
6. Documentation

Software Deliverables

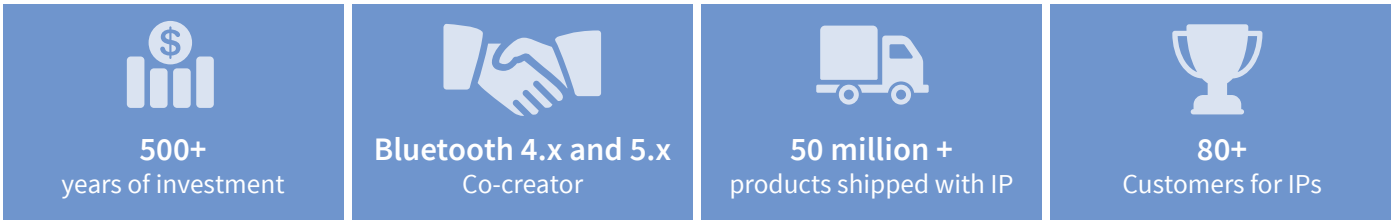
1. MAC firmware C source code targeted at Cortex M4 + RVDS compiler
2. Source code of sample application to illustrate the use of APIs
3. API Documentation

Note: Customers may opt for the CPU of their choice.
LTIMindtree generally implements for Cortex M4.

Modes of Licensing LTIMindtree IEEE 802.15.4 IP

Modes of Licensing	Availability
Standalone 802.15.4 MAC and PHY	Available
802.15.4 + BlueLitE Bluetooth low energy combo solution	Available

LTIMindtree Wireless IP credentials

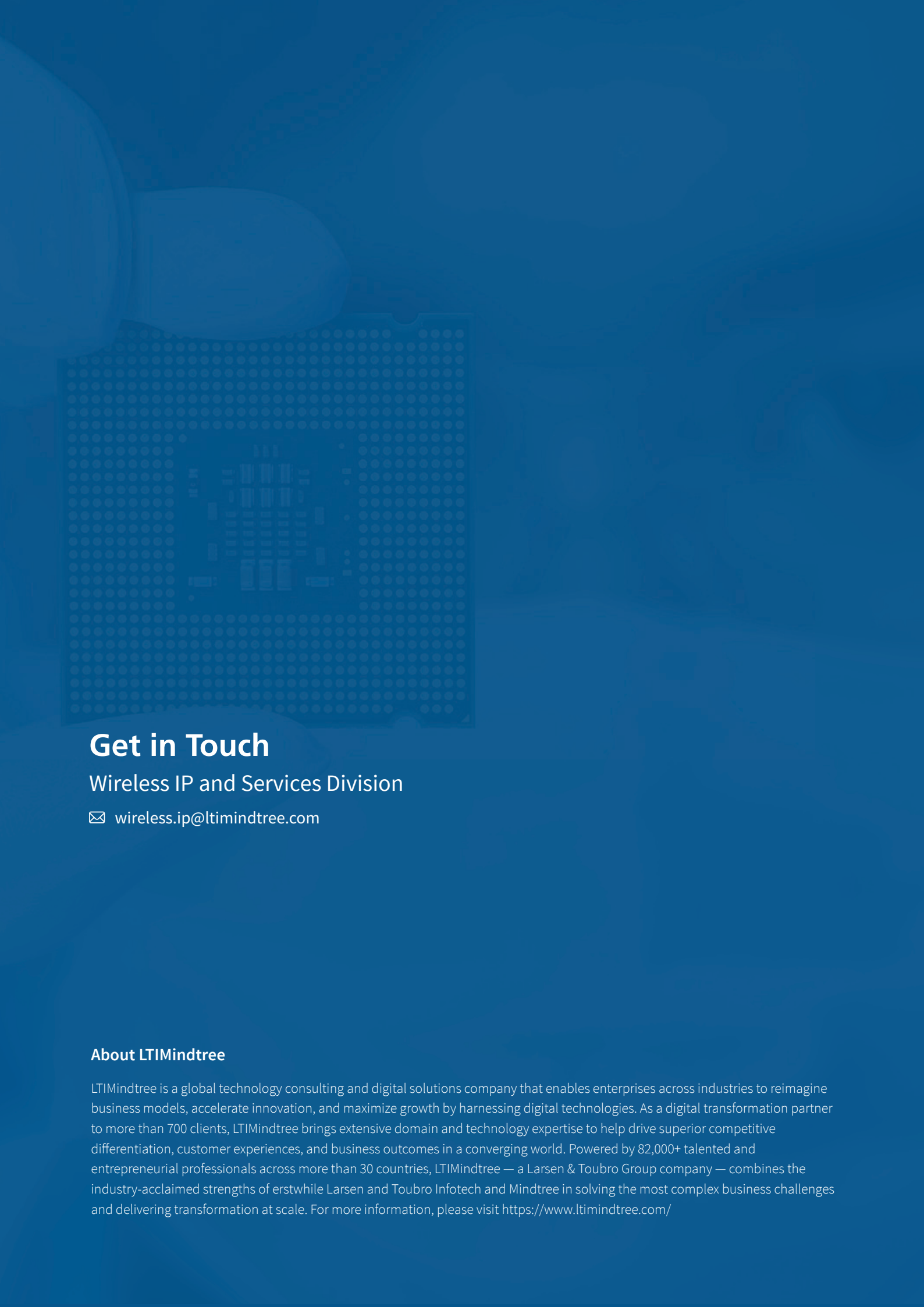


So, are you ready with your product design?

Write to us at wireless.ip@ltimindtree.com and we will schedule a meeting for you

Appendix :

Abbrevations	Discription
MLE	MAC sublayer management entity
MCPS	MAC common part sublayer service access point
PD SAP	PHY data service access point
PLME-SAP	Physical layer management entity service access point
RF	Radio Frequency
QPSK	Quadrature Phase Shift Keying



Get in Touch

Wireless IP and Services Division

✉ wireless.ip@ltimindtree.com

About LTIMindtree

LTIMindtree is a global technology consulting and digital solutions company that enables enterprises across industries to reimagine business models, accelerate innovation, and maximize growth by harnessing digital technologies. As a digital transformation partner to more than 700 clients, LTIMindtree brings extensive domain and technology expertise to help drive superior competitive differentiation, customer experiences, and business outcomes in a converging world. Powered by 82,000+ talented and entrepreneurial professionals across more than 30 countries, LTIMindtree — a Larsen & Toubro Group company — combines the industry-acclaimed strengths of erstwhile Larsen and Toubro Infotech and Mindtree in solving the most complex business challenges and delivering transformation at scale. For more information, please visit https://www.ltimindtree.com/