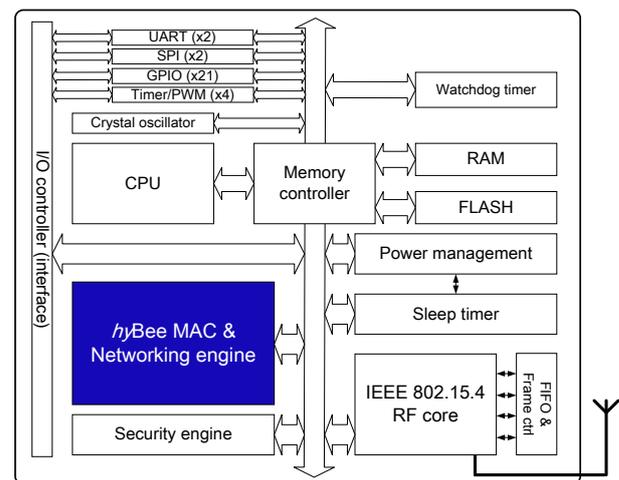


HB2200

An innovative IEEE 802.15.4/ZigBee full-compliant SoC for massive low-power IoT connectivity

HB2200 is an innovative “IoT connectivity” system-on-chip (SoC) quite suitable for the construction of low-power large-scale wireless sensor networks (WSNs) in 2.4 GHz ISM band. It has a built-in *hyBee* MAC and networking engine that innovatively resolves major shortfalls of IEEE 802.15.4 and ZigBee, while providing full backward compatibility with IEEE 802.15.4 and ZigBee®. The built-in *hyBee* MAC and networking engine supports large-scale self-network construction in a multi-hop structure, while maintaining network operation quite stable even in the presence of harsh co-channel interference (e.g., WLANs). The robustness to co-channel interference makes the power consumption of HB2200 very low even in harsh operation environments. HB2200 has fast and energy efficient self-healing capability in multi-hop networking environments. It can directly replace the role of conventional low-power IoT connectivity SoCs such as ZigBee, Bluetooth, BLE and Z-Wave.

HB2200 SoC block diagram



HB2200 key features

- ARM Cortex-M0 core processor
- Built-in *hyBee* MAC and Networking engine
- Flash: 128 Kbytes
- RAM: 32 Kbytes
- Two SPI ports (master and slave)
- Two full-duplex UART ports
- Watchdog timer
- Power management with a sleep timer
- AES-128 security engine
- Low power consumption
 - Active mode: TX 17.5 mA and RX 16mA
 - Standby (RF, RAM, FLASH off): 5.1uA
 - Sleep (standby mode + slow clock off): 2.4uA
 - Power down (sleep mode + digital circuit off): 0.1uA

RF/ Analog module

- High performance RF-CMOS 2.4 GHz IEEE 802.15.4 compliant RF transceiver
- Receiver sensitivity of -95dBm and 3dBm max. input level
- Programmable output power: 0dBm typical and 40dB TX power control range

hyBee MAC and Networking engine

- Secure self-networking of up to 2,000+ nodes in a multi-hop cluster-tree structure
- Stable network performance with low power consumption even in harsh interference environments
- Fast self-healing as in mesh-network environments
- High network scalability in multi-hop networking environments
- Alleviation of packet collision and hidden node problem in high-density network environments
- Full backward compatibility with IEEE 802.15.4 and ZigBee in 2.4GHz ISM band

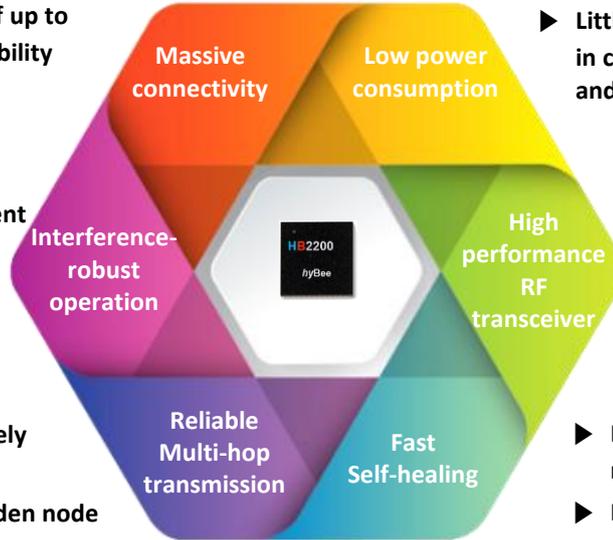
Application areas

- Commercial large-scale low-power wireless sensor networks
- Electronic shelf labeling (ESL) systems
- Intelligent building/factory management systems
- Logistics systems
- Automotive management
- Smart energy systems (e.g., smart plugs, smart meters, ESS)
- Smart home networking

Appendix

Key properties of HB2200

- ▶ Network self-organization of up to **2000+** nodes with high scalability
- ▶ Fast interference management without interrupting normal network operation
- ▶ Stable operation in harsh interference environments
- ▶ Reduced congestion in densely networked environments
- ▶ Significant alleviation of hidden node problem

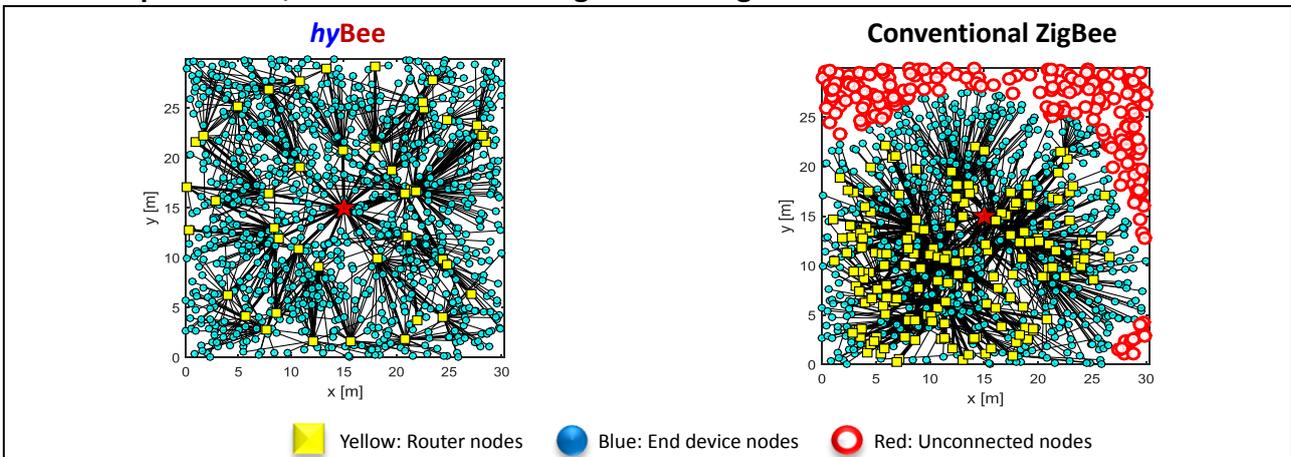


- ▶ Little change of power consumption in change of operating environments and the presence of interference
- ▶ 95dB link budget with 0dBm output power
- ▶ Data rates of up to 2Mbps
- ▶ Fast network recovery almost like a mesh network
- ▶ Reliable network maintenance with minimal power consumption

Comparison of IoT connectivity protocols

	hyBee	ZigBee	Z-Wave	BLE	6LoWPAN
Massive connectivity	O	X	X	X	X
Interference-robustness	Very high	Low	Low	Med	Low
Network scalability	High	Low	Low	Low	Low
Operating power consumption	Low	High	High	Med	High
Practical max. network size	2,000+	50+	20+	10+	200+

A snap-shot of 1,000 nodes networking in a rectangular area



hyBee stands for hyper ZigBee and is the registered trademark of hyBee Inc.
 For more information, visit <https://www.hybees.com> or contact to info@hybees.com