

ZigBee Stack for a Chip Maker

About Jennic

Jennic is a fabless semiconductor company leading the wireless connectivity revolution into new applications. Its expertise in systems and software combined with world class RF and digital chip design provides low cost, highly integrated silicon solutions for the low power short range wireless data market with a focus on the IEEE802.15.4 and ZigBee standards. The company's products include state-of-the-art low power wireless microcontrollers, transceivers and low cost development platforms. Headquartered in Sheffield, UK, and employing over 60 people, Jennic is privately held and has a track record of successful silicon chip development for wireless applications over the last nine years.

Opportunity

Jennic has already developed a variety of products for wireless applications, based on IEEE 802.15.4. ZigBee is an open global standard providing wireless networks based on the IEEE 802.15.4. ZigBee targets reliable, cost-effective and low-power applications in wireless monitoring and control. The fast-growing ZigBee market presented an opportunity to make a single chip device for ZigBee-compatible devices.

ZigBee is based upon stack architecture that is made up of a set of blocks called layers. Each layer provides a specific set of services for the layer above. IEEE 802.15.4 standard defines the lower two layers: the physical (PHY) layer and the medium access control (MAC) layer. The ZigBee Alliance builds on this foundation by providing the network (NWK) layer and the framework for the application layer. The stack must be ported into the chip to make it ZigBee-compatible.

Challenge

Writing stack software requires a significant investment of time and resources. On average, it takes a team of 5-10 developers close to one year to develop a fully functional stack layer such as MAC or NWK. Jennic's expertise did not include ZigBee stack development, and it would take considerable time and resources to write a working stack from scratch. Early entry into the ZigBee market could be achieved through partnership with a company specializing in ZigBee stack development.

Requirements

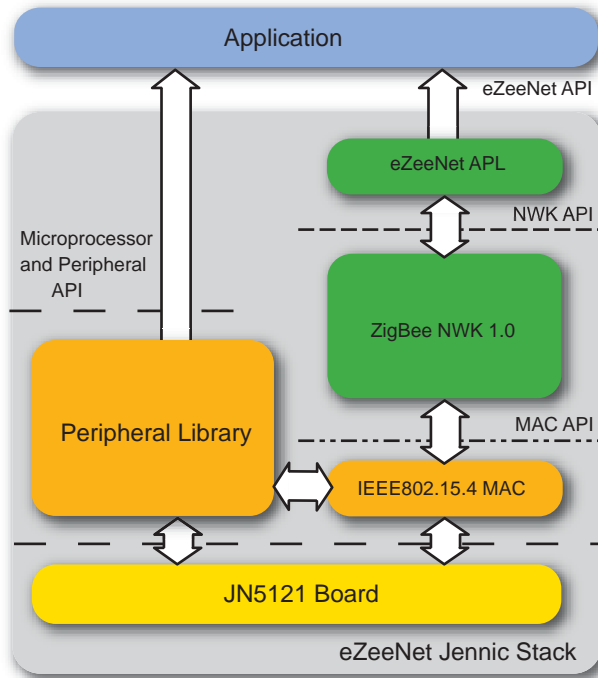
To present a competitive solution for the building and industrial monitoring applications' market, the stack software must have the following characteristics:

- **ZigBee-compatibility:** It should support ZigBee networks;
- **Low Memory Profile:** The stack should meet limited memory resources requirements;
- **Easy Development Environment:** It should provide an easy development environment for various applications, using MAC IEEE 802.15.4, ZigBee NWK and a simple API.

Solution

Jennic selected Luxoft Labs/MeshNetics™ as one of its strategic partners to adapt its eZeeNet stack for Jennic HW platform.

MeshNetics™ eZeeNet stack is a private profile, based on ZigBee NWK1.0 with simplified ZigBee NWK1.0 - compliant API. Its NWK API allows developing ZigBee 1.0 NWK compliant applications with simple networking functionality. eZeeNet Profile is an almost ready-to-use application covering major Jennic boards' features like wireless communications, humidity, temperature and light sensors, LEDs, UART.



The stack components are:

- Jennic's JN5121 board compliant with the IEEE802.15.4 standard
- Jennic's IEEE 802.15.4 MAC and H/W API Library
- Fully implemented ZigBee NWK 1.0 layer
- Private eZeeNet profile



eZeeNet is a step towards fully ZigBee 1.0 compliant architecture. Although eZeeNet has a number of limitations from ZigBee 1.0 specs, eZeeNet ZDK has more predictable and short time-to-market, plus considerably lower memory footprint.

Successful Implementation

Customized eZeeNet stack was successfully ported into Jennic chip, and a family of wireless evaluation and developer kits was created. The whole development cycle took less than three months. From the wireless network developer's point of view, the eZeeNet-based evaluation kit offers the following opportunities:

- Developer can utilize MAC IEEE 802.15.4 to develop simple peer-to-peer applications, requiring minimum memory.
- Developer can utilize ZigBee NWK 1.0 functionality by developing ZigBee NWK 1.0 compliant applications using simplified NWK 1.0 API.
- Developers can create eZeeNet applications "on-the-fly" by simply customizing the eZeeNet profile. Although eZeeNet API is not as flexible as NWK API, the development is extremely fast.

Achieved Benefits

Both Jennic and Luxoft Labs achieved tangible benefits through their partnership. Jennic accomplished a successful entry into ZigBee market of industrial and commercial applications, saving considerable time and resources, while Luxoft Labs expanded its stack's portability to one of the industry's leading platforms

"Luxoft has quickly and successfully used their knowledge of wireless networking and software development to port their network stack onto Jennic's single chip wireless microcontroller" said Peter Wotton - Product Marketing Manager, Jennic, "Enabling Jennic to complete their product offering and gain entry to this rapidly developing market."

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