NXP JenNet-IP network protocol stack

Wireless IP network for building automation and the "Internet of Things"

Based on 6LoWPAN, this low-power wireless command and control solution is optimized for lighting and building automation. It enables internet connectivity with low latency and the ability to control groups and set scenes.

Features

▶ Gateway or non-gateway configurations
▶ Low latency and support for groups and scenes
▶ Highly robust, self-healing, and re-shaping tree network for up to 500 nodes
▶ Easy-to-use "JIP" API based on SNMP supports all device types
▶ "Mesh-under" approach for reduced latency and optimal routing for low-power wireless links
▶ Advanced security with 128-bit AES encryption, secure authentication and device joining
▶ Over-network upgrades for future-proof device applications and network updates
▶ Low memory footprint (< 128 Kbytes)
▶ Low cost of ownership

Key benefits

▶ Low-power, low-cost, large-node networking
▶ Optimized for lighting and building automation
▶ Seamless integration of smart wireless devices
▶ Universally accepted IP protocol

▶ Global 2.4 GHz solution coexists with Wi-Fi and Bluetooth
▶ Uses standards supported by IEEE and IETF

Applications

▶ Smart home: smart lighting, home automation, in-home healthcare, RF remote control, security, fire, access control
▶ Commercial building/industrial: lighting, building control, environment monitoring, smart energy

JenNet-IP builds on the IETF 6LoWPAN standard to add a "mesh-under" networking approach provided by NXP's industry-proven JenNet network layer. The combination provides a self-healing, highly robust, and scalable tree solution for networks of up to 500 nodes. An easy-to-use and powerful Management Information Base (MIB) API, called "JIP," provides a highly effective application layer for interoperable device management and control, so developers can create products for a wide range of applications. JenNet-IP is tailored for use on NXP JN5168 and JN5164 wireless microcontroller chips.

Network stack architecture

JenNet-IP is designed to support the requirements of low-power, low-cost wireless devices for residential and industrial applications, particularly lighting and building automation. Using open-standard components such as IEEE802.15.4, 6LoWPAN, IP, and UDP, it lets developers work with readily understood technologies. The JIP API and NXP's proven JenNet self-healing tree networking stack support open architectures while offering simple, familiar mechanisms for device management and control.

JIP MIB API

The JIP MIB API provides an easy-to-use, table-oriented method for managing communications with IP-based devices inside and outside the wireless network. MIBs represent the control and status attributes of devices, describing the way each device can be controlled and how it can report status events and conditions. The MIB of a light bulb, for example, would include functions to control on/off, dim, and monitor power usage. The JIP API is based on the SNMP model and supports SET and GET commands to configure MIB settings.

JenNet

JenNet uses a "mesh-under" networking approach that creates a self-healing, self-forming, scalable, and robust networking layer to serve the requirements of industrial and residential environments. License- and compliance-free, it is a cost-effective solution that uses a small memory footprint (< 128 kbytes).
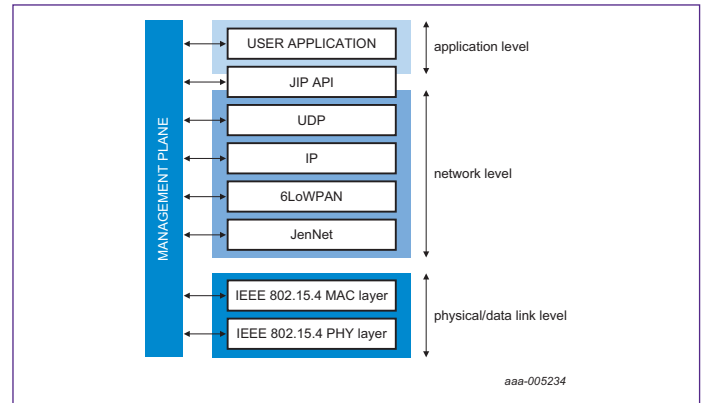
Example application: LED lightbulb

The electronic components of a light bulb comprise a lamp driver, power supply, and a JN5168 wireless microcontroller. The antenna is printed on the PCB and connects directly to the JN5168. The wireless microcontroller consumes very little power– only 15mA in radio transmit and 17mA in radio receive, and just 100 nA in deep sleep – for a remote control with multi-year battery life.
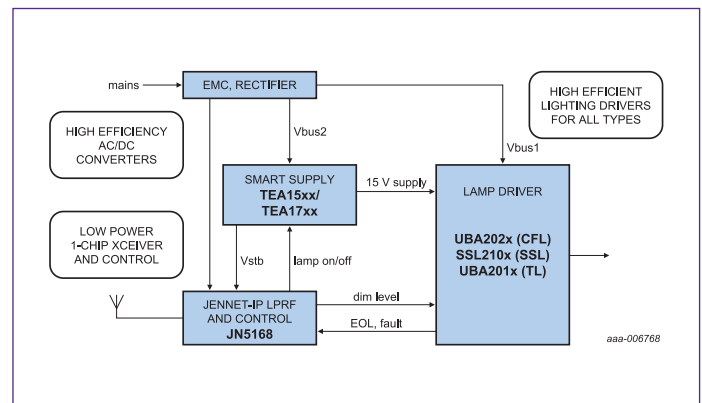
The application firmware running on the microcontroller controls the bulb and monitors its power consumption. This information is then communicated, via the internet or a local wireless JenNet-IP based energy monitor, to a centralised building management system.

Application firmware is developed in 'C' using NXP's license-free JN516x toolchain, which uses an Eclipse IDE and GNU-based C/C++ compiler/linker.

JenNet-IP stack layers

aaa-005234

Sample application: LED light bulb

aaa-006768

JN516x Block Diagram

aaa-005424