Product Brief – JenNet-IP Network Protocol Stack

Low-Power Wireless IP Networking for the 'Internet of Things'

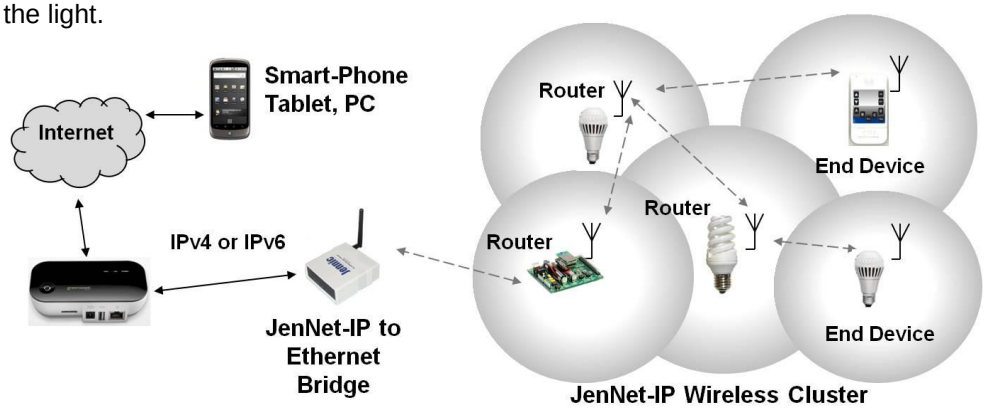
Overview

JenNet-IP is an IP-based networking solution enabling the 'Internet of Things'. Using an enhanced 6LoWPAN network layer as defined by the IETF, it targets ultra low power IEEE802.15.4 based wireless networking for residential and industrial applications. With a "mesh-under" networking approach, it places NXP's industry proven JenNet network layer at the heart of the platform, to provide a self-healing, highly robust and scalable network backbone, to serve wireless networks with an excess of 500 nodes.

Supported on the JN5148 wireless microcontroller, the solution offers an ultra low power platform for product development. An elegant and extensible user Management Information Base (MIB) API provides a flexible approach to device management and control, enabling applications developers to easily and expediently carry out product development using industry familiar methodologies.

Network Diagram

The following diagram shows a Smartphone controlling a lighting network via the internet. The Smartphone application sends MIB commands to lights via IP through the internet cloud, the home gateway into a wireless IP network. The lights run an application on a wireless microcontroller to interpret the MIB commands and control the light.



Benefits

- IP is the foundation of the Internet and globally accepted
- Open standards approach by the IEEE, IEFT communities
- Low Power, low cost, large node networking
- Seamless integration of smart wireless devices with existing IP
- 2.4GHz global solution and coexists with Wi-Fi, Bluetooth.
- Industry familiar APIs and interfaces

Applications

Residential/Smart Home

- A/V RF Remote Control
- Smart Lighting
- Healthcare in the Home
- Security, fire, access control
- Smart Energy

Industrial

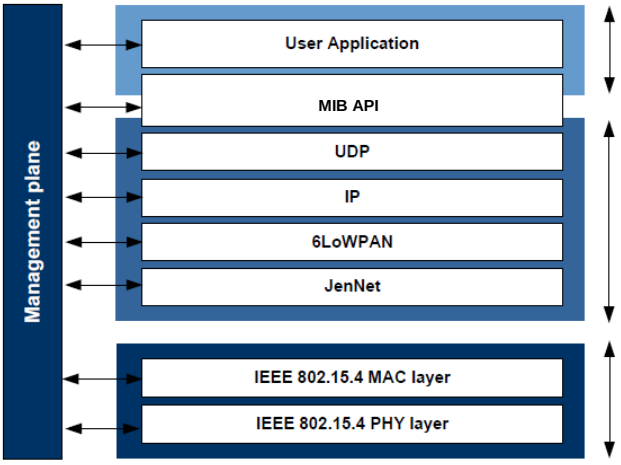
- Asset Management
- Commercial/Industrial Lighting
- Building Control
- Environment Monitoring
- Smart Energy

Features

- Self-healing and re-shaping tree network
  - Proven at network sizes over 500 nodes
  - Highly robust
  - Easily scalable
- IP-based networking enabling the 'Internet of Things'
- Gateway or non-gateway options, supporting
  - Connection to the Internet, or
  - Standalone operation
- Low power option for low standby applications
- MIB API
  - Easy-to-use
  - Elegant
  - Extensible
- "Mesh-under" approach allows
  - Routing layer optimisation to low power wireless link
  - Minimises number of packet buffers
- Highly secure
  - 128-bit AES encryption, with
  - Secure authentication and device joining
- Over-Network Download, future proofs:
  - Device applications
  - Network upgrades
- Low memory footprint, less than 128 kbytes
- Low cost of ownership
  - Small memory footprint
  - Low development complexity
  - License-free
  - Compliance-free

Network Stack Architecture

JenNet-IP is architectured to support the requirements of low power, low cost wireless devices for residential and industrial applications. Using open standard components such as IEEE802.15.4 MAC and PHY, 6LoWPAN, IP and UDP it enables developers to work with readily understood technologies.



The MIB API and NXP's proven JenNet self-healing tree networking provide the enhancements to make the open architecture useable, whilst offering simple, familiar mechanisms for management and control of devices.

MIB API

The MIB API provides an easy-to-use table-orientated method for communicating between IP-based devices both inside and outside the wireless network. MIBs represent the control and status attributes of devices; in essence describing the way in which the device can be controlled and how it can report status events and conditions. Example of the MIB of a light bulb would be to control on/off, dim and monitor power usage.

The MIB API is based upon the SNMP model and so supports SET and GET commands to configure MIB settings, and a TRAP primitive to report status events and conditions.

JenNet

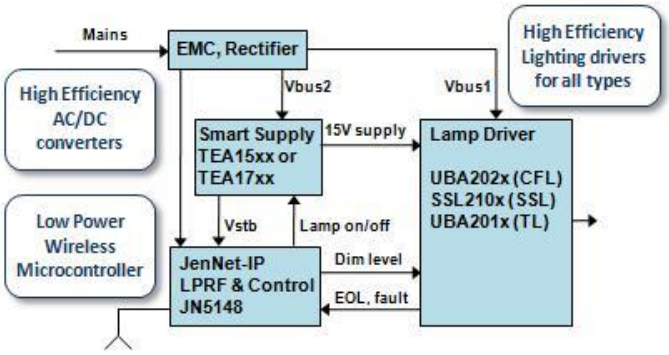
JenNet provides a "mesh-under" networking approach, offering a self-healing, self-forming, scalable and robust networking layer to serve the requirements of industrial and residential environments. With a low memory footprint of less than 128 kbytes, implementation optimised to the JN5148 wireless microcontroller, license-free and compliance-free it provides a truly cost effective solution with low total cost of ownership.

Example Application: CFL Light bulb

The electronic components of a light bulb comprise a lamp driver, power supply and a JN5148 wireless microcontroller. The antenna is printed on the PCB and connects directly to the JN5148. The wireless microcontroller has a low power consumption of 15mA in radio transmit and 17.5mA in radio receive, and a few nA in sleep with multi-year battery life.

The application firmware running on the microcontroller controls the bulb and monitors its power consumption – this is subsequently communicated to a local wireless JenNet-IP bases energy monitor or via the internet to a centralised building management system.

Application firmware is developed in 'C' using NXP's JN5148 license free Eclipse IDE and GNU based C/C++



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