



ZigBee Smart Energy Solutions



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Telegesis ZigBee Smart Energy

ZigBee Smart Energy is the only global wireless standard among Utilities, technology suppliers and Manufacturers. The ZigBee Smart Energy profile has been driven by the increasing cost of energy and the need for energy efficiency has seen ZigBee Smart Energy being adopted by a growing number of Utilities and Manufacturers. This rapid adoption has also meant a growing requirement for companies to offer products compliant with ZigBee Smart Energy.

Our aim has always been to make it easy to integrate ZigBee into designs, both from a hardware and firmware perspective. To achieve this goal, Telegesis has developed hardware in the form of a range of fully certified ZigBee modules based around ZigBee SoC's from Ember and Embedded Firmware using an easy to use AT style command interface.

Developing a ZigBee Smart Energy solution from scratch is not a task to be undertaken lightly. Integrating hardware and firmware and then successfully navigating the approvals process is complex and time consuming.

Telegesis offers detailed and expert support to customers wishing to design products that will operate on the ZigBee Smart Energy or Home Automation profiles by offering approved hardware and firmware packages.

This short form is designed to give you an overview of ZigBee Smart Energy, compatible Telegesis products and ideas on how Telegesis can help you get your ZigBee Smart energy product to market quicker and easier.

Working with Telegesis means you are working with a company that is focused and dedicated to ZigBee. With over four years experience, Telegesis has designed and produced three generations of ZigBee module and developed a range of innovative firmware to simplify the design and application of ZigBee systems.



About ZigBee Smart Energy

ZigBee Smart Energy (ZSE) is a profile defined by the ZigBee Alliance and forms a collection of device descriptions and functions that allow energy providers to manage and monitor energy loads to optimise consumption. Telegesis believes ZSE is the key to monitoring and controlling energy use in domestic and business environments and we have been actively developing embedded firmware based on this profile since 2008 and have successfully developed many ZSE solutions for customers and ourselves.

Experience

Telegesis has extensive experience in all aspects of ZSE Hardware, Firmware and the approvals process needed to offer a ZSE compliant end product and developed firmware and Hardware products for every one of the ZSE product classes.

As an example, we have extensive experience with In Premise Displays (IPD) ranging from developing firmware for a host processor to enable communication with ZSE firmware embedded in our ETRX modules through to firmware to drive the IPD display.

Telegesis offers an AT Command Set for IPD firmware including full ZSE certification and Certicom security keys. To demonstrate the excellent functionality of our hardware and firmware we have embedded this Firmware into our own ETRX2USB stick making it qualified as a Product under ZigBee Alliance rules which has enabled us to take the unit successfully through ZSE certification.

Telegesis has recently successfully completed a project for an UK OEM porting firmware to our new ETRX357 module, adding a number of clusters including Time and Simple Metering. We designed and manufactured a bespoke carrier board, and fully managed the successful Smart Energy Profile certification process.

Telegesis has ongoing assignments for a comprehensive suite of developments from several International Utilities which include the development of an Energy Service Interface ESI, and ZigBee Smart Energy compliant Meters.

These multi year projects also include interfacing to proprietary protocols and include extensive testing and approval. These projects have been specified, developed and managed by Telegesis including several variations on route.

Telegesis has proven ZigBee experience in:-

- Scoping and specifying ZigBee Smart Energy projects
- Developing Hardware
- Developing Firmware
- Managing ZigBee Alliance compliance testing
- Competence in working with and obtaining Certicom security keys
- Managing the delivery of projects on time and to budget

ZigBee Smart Energy Skill Set

Telegesis has extensive experience with ZigBee and ZigBee Smart Energy. If you are considering designing a Smart Energy compliant product Telegesis is ideally placed to assist you bring your ZigBee Smart Energy product to market in the quickest time with the lowest risk.

We can help in three ways:

Hardware

Telegesis is the World's largest supplier of Ember based ZigBee modules and our customers gain real benefits by using our ZigBee modules. We have a long track record of helping customers design in ZigBee functionality without the need for specialist RF and embedded skills. Using our range of Market leading ZigBee modules our customers get their ZSE solutions to market faster, reduce engineering and design costs allowing them to focus on their core strengths.

Our modules use the latest Ember ZigBee SoC's, are fully compliant with the ZigBee Smart Energy profile and are already used in multiple Smart Energy applications such as Meters, In Premise Displays and Energy Service Interface units.

ZigBee Smart Energy Firmware

Telegesis has delivered Smart Energy firmware since 2008. We now have one of the industry's largest teams of ZigBee Hardware and Firmware engineers and have completed multiple ZSE projects.

We can supply our modules pre-loaded with ZigBee Smart Energy Firmware. Telegesis provides a Smart Energy Suite of AT commands which make building a smart energy device easier for those companies which would prefer to keep their design in-house.

However, we can also help in designing and developing ZigBee Smart Energy products for custom requirements. If you require assistance with either Hardware or Firmware we offer a range of design services centred on ZigBee Smart energy which includes hardware integration of our modules and custom Smart Energy firmware. Please contact us to discuss your requirements.

It is mandatory that all ZSE products implement Certicom ECC security. We have a close relationship with Certicom which gives us detailed application knowledge of this technology and enables us to provide low licence rates for our customers.

Smart Energy Device Certification

All ZSE end products must be certified compliant by an accredited certification lab. Telegesis has extensive experience working with customers to approve their ZigBee Smart Energy devices and we can offer help and guidance to ensure that your product passes certification.



ZigBee
Control your world

If you are adding a ZigBee Smart Energy product to your range then Telegesis can provide a clear pathway to a finished solution with our unique combination of module hardware & ZigBee software expertise.



Device Classifications

ZigBee Smart Energy identifies eight device types that report energy consumption by users and allow utilities to manage loads. Telegesis has Hardware and firmware experience with all of these blocks.

1. Energy Service Interface

The Energy Service Interface is the gateway between the energy supply company communication network and the metering and energy management devices within the home. It routes messages to and from relevant end points. It may be a standalone device or could be installed within a meter, thermostat, or In-Premise Display. It may also contain another non-ZigBee communication module such as GPRS or a broadband Internet connection.

2. Metering Device

The Metering end device is a Meter (electricity, gas, water, heat, etc.) fitted with a ZigBee device. Depending on what's being metered, the device may be capable of immediate requested reads or will autonomously send readings periodically. A Metering end device may also be capable of communicating certain status indicators (e.g. battery low, tamper detected).

3. In-Premise Display Device

The In-Premise Display device relays energy consumption data to the user via a graphical or text display. The display may or may not be interactive. At least one of the following should be displayed: current energy usage, a history over selectable periods, pricing information, or text messages. The display may also show critical pricing information to advise the customer when peaks are due to occur so that they can take appropriate action.

4. Load Controller

The Load control block is able to receive demand response and load control (DRLC) messages to supply power to a load or drop a load for a specific time period. Examples of this type of block would be loads such as water heaters, water pumps, or lighting.

5. Programmable Communicating Thermostat (PCT) Device

The PCT is a thermostat that is responsible for controlling a large load such HVAC equipment. Although it can optionally pick up data relating to meter consumption, pricing and announcement messaging, its primary requirement for ZSE is that it be able to react to Demand Response Load Control events requested by the utility.

6. Range Extender Device

The Range Extender is a simple device which acts as a router to extend ZigBee Smart Energy networks in difficult or large environments. Range Extenders shall only be used if the product is not intended to have any other application.

7. Smart Appliance Device

Smart Appliance devices connected to a ZigBee Smart Energy network can participate in energy management activities. When Utilities initiate a demand response or pricing event, the appliance can actively inform customers via in Premise displays of when or how energy is being used. A typical scenario could include; Washing appliance switching to cold water during periods of higher energy costs, Washer / Dryer / Oven / Hot Water Heater reporting cycle status or Over temperature conditions in Freezers and Refrigerators.

8. Prepayment Terminal

The Prepayment Terminal device will allow utility customers or other users such as sub-metered tenants to pay for consumption in discrete increments. Prepayment devices will accept payment via such routes as credit card or code entry, display remaining balances, and alert the user of a balance approaching zero, and may perform some of the other functions of the In-Premise Display.



Telegesis Smart Energy Product Range



ETRX357 and ETRX351

The ETRX3 series is the latest generation of advanced ZigBee modules from Telegesis and the first module family on the market to feature the latest ARM® Cortex M-3 SOC's from Ember the EM357 and EM351.

ETRX3 series modules have a footprint of just 19mm x 25mm for both standard and long range PA/LNA versions which represents a 40% reduction in size compared to the Telegesis ETRX2 range. ETRX3 modules are available with an on board antennae or a Hirose U.FL connector to allow connection of external antennae.



ETRX3USB

The latest addition to the Telegesis product line is based on the ETRX357 ZigBee module. It brings the functionality and performance of the ETRX3 family but in a USB Stick form factor. For fast production development the device features the Telegesis AT Command line interface which allows quick integration of ZigBee Technology into almost any product with a USB port.



ETRX2USB

The ETRX2USB is a high performance, low power 2.4GHz ZigBee transceiver in a USB stick form factor.

Based on the Ember EM250, It provides a cost effective method of adding ZigBee capability to any device which employs USB. For fast production development the device features the Telegesis AT Command line interface which allows quick integration of ZigBee Technology.



ETRX-UMI

The first ZigBee module on the market meeting the new UMI (Universal Metering Standard). UMI is a new, low power hardware interface standard developed by Cambridge Consultants to simplify and ease the design of Smart Meters.



ETRX2

The Telegesis ETRX2 is a low power, 2.4GHz band ZigBee module based on the Ember EM250 ZigBee transceiver. Utilising Ember Znet firmware the ETRX2 enables a designer add powerful wireless networking capability to your products and quickly bring them to market.



ETRX Router

The Telegesis Router enables increased distance between nodes in a ZigBee Smart Energy network.

If the distance between two nodes is too great for communication to be established, place one or more Routers in-between and the ZSE mesh can be established.



ETRX2USB-IPD

Designers seeking to produce a ZigBee Smart Energy compliant In Premise Display can significantly simplify this process with the Telegesis ETRX2USB-IPD.

The second USB stick in the kit acting as a "mock meter" has basic but functional firmware to aid the design process. Embers application builder was used to generate firmware to act as a basic ZigBee Smart Energy meter sending random readings every few seconds. A simple Demo application is also included in the kit as is the source code.

Telegesis is now shipping our successful ETRX2USB ZigBee USB stick pre loaded with ZigBee Smart Energy In Premise Display (IPD) firmware. In addition we can also supply our USB stick loaded with Certicom test certificates for demonstration purposes or with full Certicom certificates for use in production applications.

Embedding IHD firmware in other products

Our ZigBee Smart Energy firmware can also be supplied embedded in our standard ETRX modules or even in our ZigBee CF card for use in a PDA.

We have also added an AT command layer on top of the ZSE IPD firmware so that your host application can easily control the ETRX2USB-IPD.

However, please note that the same firmware in a module would not be classed as an end product because it will be integrated into, for example a physical display which then becomes an end product. A resulting new design would need to be re-tested and certified. However, this process is greatly simplified as the design would be use a pre-approved Telegesis ZigBee module.

Telegesis has received full certification from the ZigBee Alliance on the ETRX2USB-IPD as an approved ZigBee Smart energy In-Premise Display. The ZigBee Smart Energy (ZSE) profile requirement calls for the inclusion of Certicom certificates for extra security. These can only be supplied after a product has passed certification.

Telegesis IHD AT Command Set overview

The SE IHD AT Command Set has been developed by Telegesis to provide a simple AT-style command interface to implement the In Premise Display compliant with the Zigbee Smart Energy Application Profile.

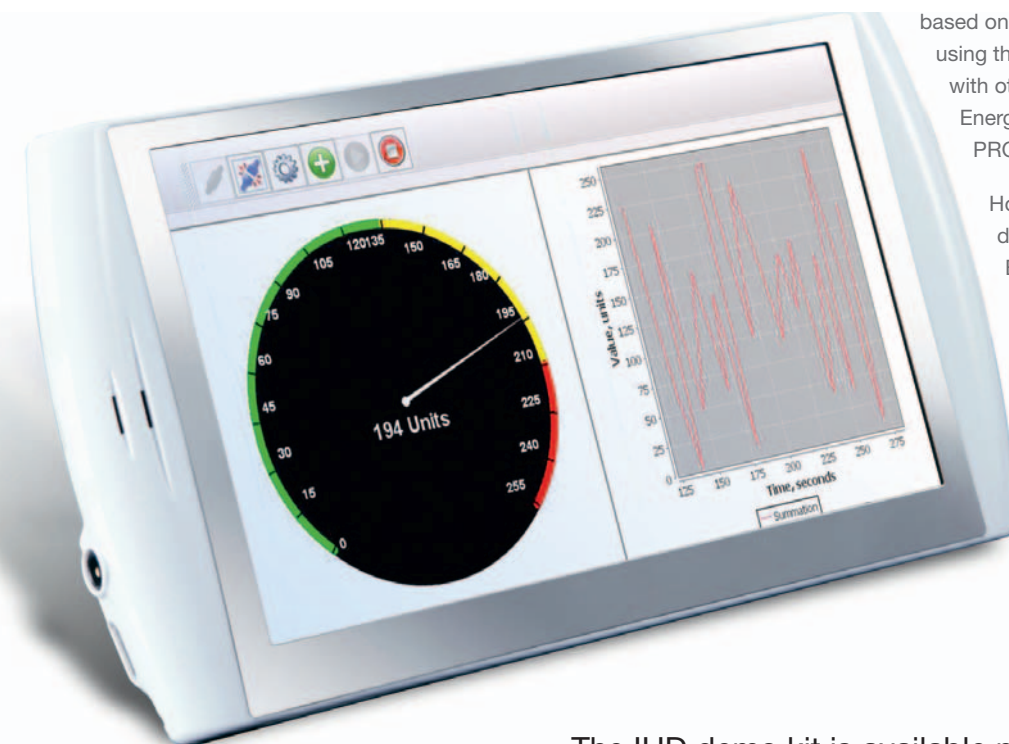
IHD Demo Kit

Telegesis has released a Demo kit with all component parts needed to evaluate this system. The kit comprises:

The AT-Command interface enables quick development of an In Premise Display and can shorten the time to market significantly. Developers can design and build ZigBee Smart Energy compliant products without the need for embedded firmware.

- ETRX2USB stick preloaded with the ZSE IHD firmware and Certicom test certificate.
- USB stick with a basic "mock meter" firmware
- A demo application to run on a PC and it's source code

The SE IHD R1xx AT-Command line Interpreter is based on the Zigbee Smart Energy R15 specification using the ZigBee PRO feature set. Interoperability with other devices that implement the Smart Energy Application Profile and use the ZigBee PRO feature set is guaranteed.



However SE IHD R1xx is not compatible with devices that do not implement the Smart Energy Profile. Also it is not compatible with earlier versions of ZigBee.

To simplify communication with the Telegesis modules, an AT-style command set, similar to the industry standard Hayes modem control language, is used. Each command must be preceded by the "AT" or "at" prefix..

The IHD demo kit is available now. Please contact us for pricing and technical information.

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