Plugwise in a business environment

Plugwise is a user-friendly energy management system for the business market. It measures the electric consumption of each electrical outlet and enables you to manually or automatically switch the appliances on and off based on a time schedule.

Overview of the Plugwise system

The Plugwise system consists of the following components:

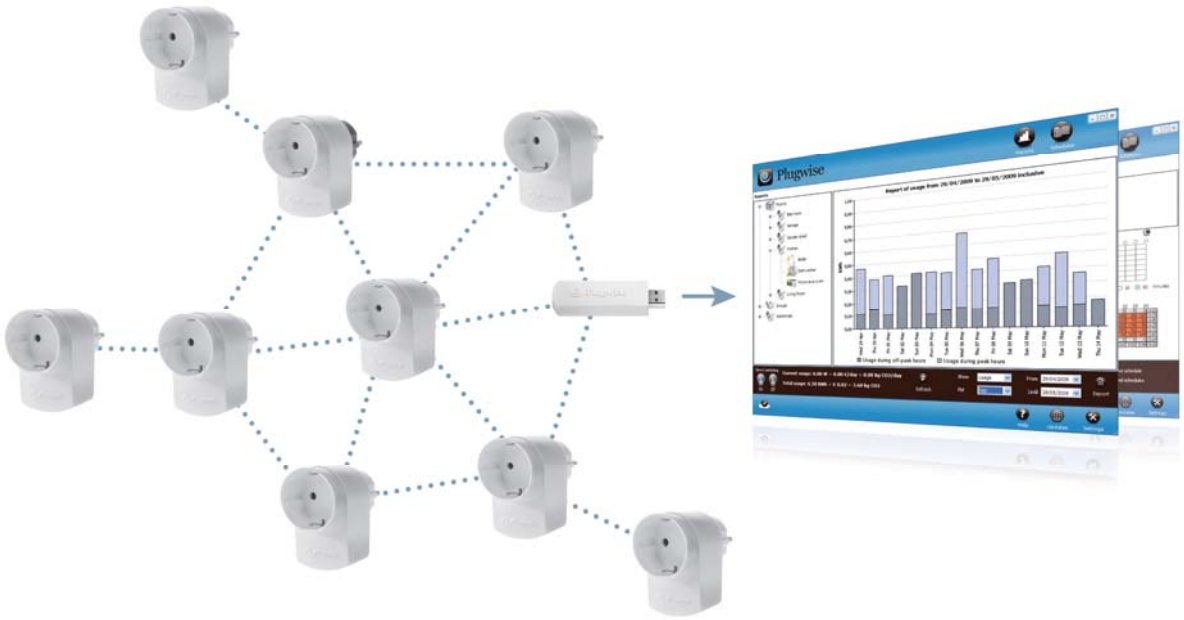

Figure 1: Basic elements of the Plugwise system

Circle

The Circle is the base element of the Plugwise system. It is plugged in between an electrical outlet and the plug of an appliance. This smart plug can measure, switch, send, receive and route. The measured energy consumption is stored in the plug itself and wirelessly transmitted to the Source if requested.

Circle+

On top of the basic functions of the Circle, the Circle+ also functions as network coordinator of the Plugwise network.

Stick

This special USB stick functions as the system's antenna. It allows wireless communication between the Circles and the Circle+ via a USB port of a PC.

Source

Source is the application with which the Plugwise system can be configured, controlled and analyzed. It provides clear overviews of the electricity consumption and allows ad hoc as well as automatic switching through time schedules. Source is supported by Windows XP, Windows Vista and Windows 7.

The Plugwise network

The internal communication between these components is facilitated by the ZigBee Pro protocol. ZigBee is an open standard for wireless short distance and low power connections. That is why such a network is also known as a "whisper network".
Besides sending and receiving, the Circles and Circle + also act as routers and hence serve as a gateway to all other plugs. In case of break-down or temporary inaccessibility of a plug, the communication will be rerouted to the least resistant route. This is known as mesh network or self-healing network.

Although it uses the same radio frequency as Wi-Fi, the ZigBee is in no way related to Wi-Fi, nor to DECT-telephones and microwave ovens that also use the 2.4 GHz band.

For more information regarding the ZigBee protocol: ZigBee Alliance website (www.zigbee.org).

Impact on your business network

The ZigBee Pro protocol, which is being used between the nodes, doesn't use TCP/IP or other standard network protocols. Therefore, no data can leak to e.g. LANs - only data requested by the Plugwise application are recognized and transmitted to the application by the Stick. Furthermore, every Plugwise network is locked with a 128 bit AES encryption, which also prevents the Plugwise networks to read each other's data traffic.

It is impossible to access your company network through the Plugwise system.

Circles *only* communicate with other Circles and with the Circle+. The Stick is the only other equipment that can communicate with the Circles and with Circle+.
Also, the communication handled by the Stick is filtered. This means that the Stick only transmits messages to Circles and the Circle+ that are part of the Plugwise communication protocol. This ensures that the Plugwise system is only used to control and read *Plugwise* ZigBee products.

Multiple Plugwise networks

A Plugwise network contains max. 64 Circles and 1 Circle+. Should a building require more Circles, multiple Plugwise networks need to be installed.
The Plugwise application 'Source' bundles all these physical Plugwise networks into one logical system. Therefore the operation is not affected when Circles of various networks are placed in one room. In Source, this room can be treated and controlled as one system.

Communication with a Plugwise network is done through the Plugwise USB stick, aka 'Stick'. Each network has its own Stick, preferably placed approximately in the middle of the network. Because this seldom coincides with the location of the controlling PC with Source, we have developed a couple of solutions for this.

The stick is plugged into a Stretch Lite (SL) or Stretch Lite Pro (SL Pro) which is connected by a UTP cable to the physical network and communicates with the controlling PC via the existing LAN communication.

The difference between SL and SL Pro is the communication.

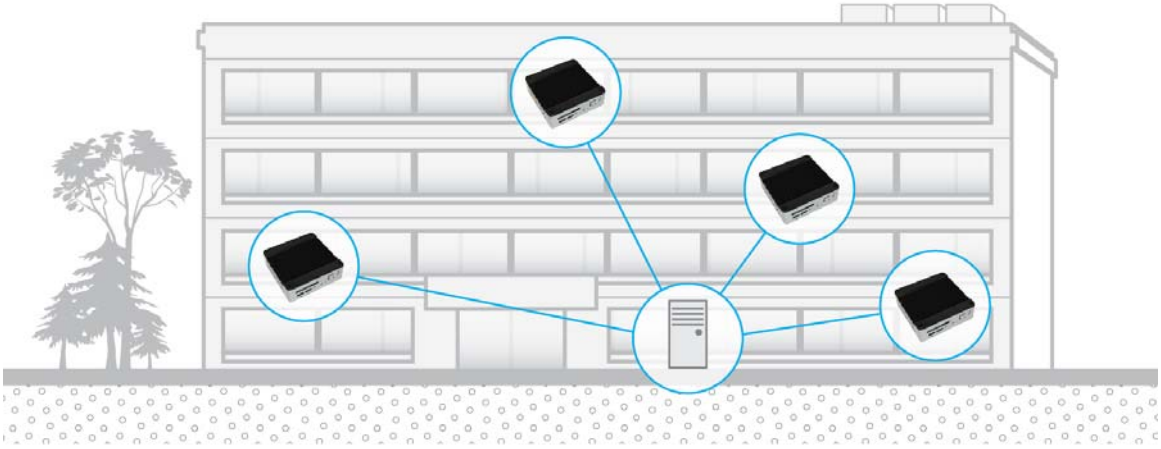

Figure 2: Only Stretch Lite (Pro) needs to be added to the LAN.

Stretch Lite (discontinued)

The SL uses a remote USB protocol. Therefore, the PC with Source 'thinks' that the Stick is plugged into the PC itself. The disadvantage is that this requires continuous communication and therefore bandwidth between the SL and the PC. This amounts to approx. 120 kByte/s. Also, the SL advertises itself through broadcasts. This is convenient for configuration and control, but broadcasts are not always allowed in a business LAN environment and do not function if the communication between the SL and controlling PC runs via a gateway or router. Furthermore, drivers need to be installed on the controlling PC. Therefore, a Stretch LIte Pro has been developed for business environments.

Stretch Lite Pro

The SL Pro communicates with Source via a SSH tunnel (SSL2). There is only data traffic if there is communication with the Plugwise network. The maximum bandwidth is 20 kByte/s, but on average it is less than 0.5 kByte/s. The configuration of the SL Pro is handled with the help of a USB memory stick that contains a secure configuration file. After configuration, the memory stick may be removed. The Stretch Lite Pro is configured in consultation with system management, who may independently change the network settings at a later stage. Because standard techniques and protocols are used, routers and gateways do not need to be a hindrance and also the installation of drivers on the controlling PC is not necessary.

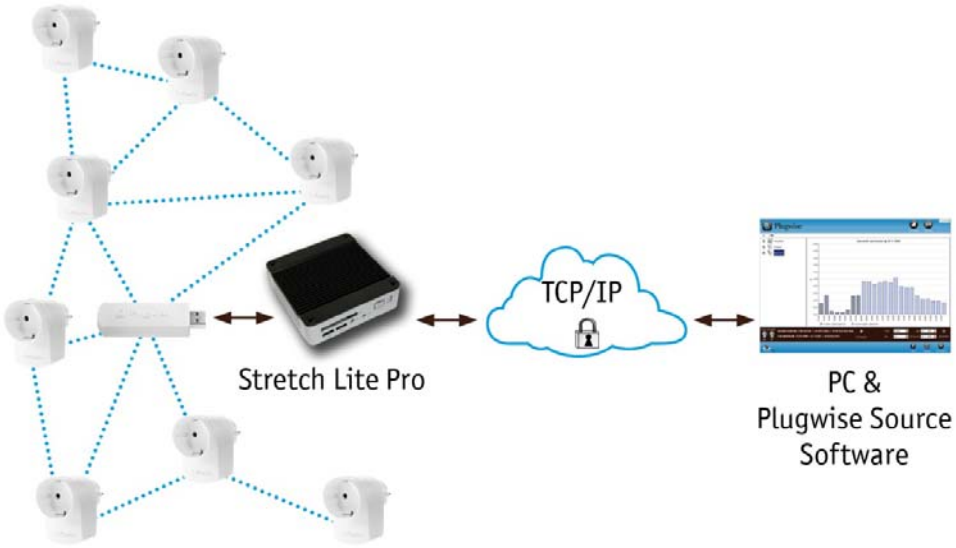

Figure 3: The communication between de Plugwise application and the Plugwise network is done through the Stretch Lite Pro.

LAN and virtual LAN

Many organizations and companies hold a policy which prohibits 'foreign' equipment to be connected to the LAN for manageability and possible security risks. Should this be the case in your company, it is possible to fully separate the network traffic between SL (Pro) and Source on the one side and your company network on the other, by means of a Virtual Local Area Network. This VLAN needs to be set up locally by your system management.
Next, the controlling PC and SL (Pro) are configured to communicate over the VLAN. If the controlling PC is included, the possibility has to be taken into account that the users and/or management will want access to the integrated Source web server through the normal LAN. This web server gateway is standard 8080 and adjustable.

Source web server

Source has an integrated web server that enables you to access the consumption data via a web interface and to switch Circles. It is not possible to upload or change files in the file system of the PC. If the web server functionality is not necessary, it can be deactivated via the Source settings menu.

Internet

The controlling PC needs to have internet access to be able to contact the Plugwise license server in order to activate the license code.
To continuously improve our services and to provide you with a full analysis of your electricity consumption, and to advise you regarding consumption reduction, your consumption data are (if contracted) sent to our portal where they are further analyzed for you.
All communication between Source and our servers is done through a secure connection (https, gate 443).

The Internet is also required for monitoring the system remotely with the help of a LogMeIn and for providing support if necessary. In consultation with your IT department, additional support software may be chosen.

Installation, maintenance and support

The full system will be installed by Plugwise. For average size to large offices, this can be done in approx. 4 hours.
Plugwise provides maintenance and support for the full system, including the software. Beside a one-off installation works such as possible configuration of the VLAN, the Plugwise system does not constitute an unnecessary workload for your IT department.

Questions and/or remarks

We hope to have provided you with a clear idea of the various aspects involving the installation of our system in your company. We have extensive experience in implementing our systems in small and large companies, and offer solutions for the many challenges this involves.
For further questions, please do not hesitate to contact one of our representatives.