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## **Possibilities of Application Building Management Systems in Smart Metering**

***Abstract.** The paper reports the possibilities of using building management systems as component of the smart metering system. They allow create monitoring, visualization and archiving systems. Additional advantage is possibility of using non-paper billing sytem for consumed energy.*

**Keywords:** building management system, smart metering, media consumption.

### **Introduction**

One of the greatest challenges of modern civilization is to provide sufficient energy. Available technology allows you to achieve this goal in different ways. The most important of them will be addressed in this paper are:

- energy-efficient solutions in buildings,
- development of consumer awareness of energy.

Building Management Systems combine these capabilities. Energy efficiency is the action to its economical and optimum wear. Implementation of these measures should take the sophistication in audience habits of saving energy and the introduction of new technologies.

### **Building Management Systems**

Contemporary market offers many different systems of intelligent houses. The most well-known of them are:

- KNX/EIB (European Installation BUS),
- LCN (Local Control Network) and
- LonWorks (Local Operating Network).

These are the systems with the main topology. Is used as a bus or a twisted pair, such as the KNX and LonWorks, or, as in the case of the LCN, an additional wire in the wire installation. The most versatile because of its openness is the KNX. It is co-created by many European manufacturers of electrical industry.

Lon Works Systems and LCN are the largest commercially available proprietary systems, except that in the LCN can use a plurality of keys dedicated to the KNX.

For less demanding users, the market offers a wide range of small systems business. The most popular are Xcomfort, Z-Wave (with its Polish variant FIBARO), Teletask etc.

Some of these systems, such as Xcomfort or Z-Wave is made in wireless technology, which greatly facilitates their implementation to existing installations [1].

### **Smart metering**

Smart metering is comprehensive, integrated information system covering smart meters of electricity consumers, telecommunications infrastructure, a central database

and management system. Smart meters are a part of the smart electricity grid and should not be considered in isolation from it.

Smart meters enable two-way communication in real-time systems with electronic energy meters. Moreover, they can automate the entire process of accounting for energy consumers from obtaining measurement data through processing and aggregation, to issue invoices.

This system is beneficial for society, suppliers of energy, economy and environment. In areas where introduced electronic energy meters, manages to increase the efficiency of its use by approximately 10%. Smart metering is part of the idea of Smart Grid, and therefore introduce the use of these counters would result in the ability to respond to changes in energy demand of the region and enable more efficient use of renewable energy sources.

Savings in Smart Metering system comes with smart and functional. They have the option to disconnect and connect the power transmission, depending on the level of consumption. They can work with the home local area network (HAN - Home Area Network), which, thanks to wireless connectivity will soon enable more efficient and convenient management of devices in your own home

Infrastructure IT of the system, in collaboration with the smart meter, allows continuous transmission of power consumption and allows us to predict the possible costs of electricity. Each of us by logging on to the Internet, you may check the status of their counters. Studies prove that such expenses increased awareness among the public and the ability to check your current balance results in greater self-control and generate further savings in energy spending. This is extremely important in the current situation, when electricity prices continue to rise.

In times that require us to care about the environment, the search for renewable energy sources and maximize the efficient use of the system, the Smart Metering is a concept that should be implemented as soon as possible in our cities

#### **Application building management systems in smart metering**

Concept of smart metering connects to the remote measurement of electricity consumption. Many currently available on the market of electricity meters has interfaces that enables cooperation with building automation systems. For example, counters plus DELTA series produced by ABB have the ability to communicate KNX, LonWorks and M-Bus.

Building automation systems make it possible to use any smart metering media users. The wide range offered by the manufacturers of these systems, electricity meters means that they are the ideal choice for remote measurement. A considerable advantage of this solution, especially in newly built premises, is of course the possibility to increase the comfort of their users. The openness of these systems also allows for the expansion of their functionality on the measurement of other media, such as gas, water or heat energy.

For example, the figure 1 presents this type system based on LonWorks technology. MMC module allows you to connect all possible counters. If you want to use to measure the temperature in all or most of the rooms, use the module STP- 02 / E, which allows you to connect up to 6 miniature temperature sensors, for example DS1820 ( Dallas ) on the network 1 – wire.

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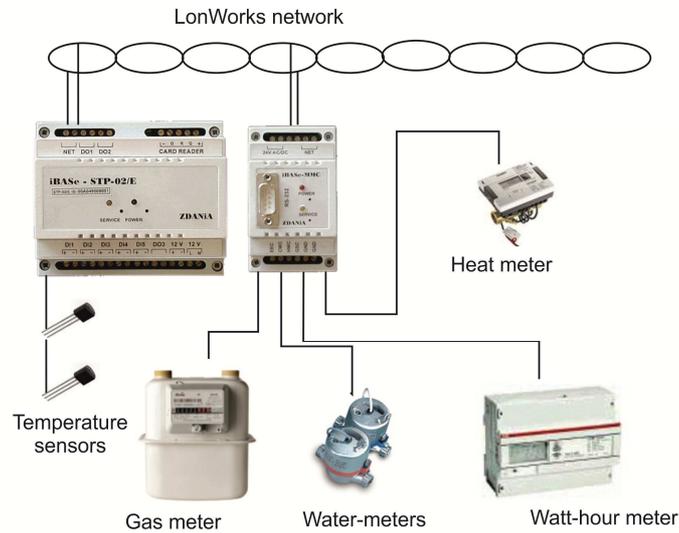


Fig. 1. Proposition of media consumption measurements system in flat.

The measurement data of the apartments you have transferred to your computer archiving them. In order to do all the premises to connect the LonWorks network. It can be assumed, for the clarity of the system that each building is a separate logical group . Communication can take place using a twisted pair TP and TP/FT-10 channel . This type of connection will allow installation of up to 128 devices Lon Works in one branch . In the case of a larger number of devices can be used repeaters .

The router allows you to connect a branch of the main system bus. The bus is connected to a host computer equipped with a card allowing you to connect to a LonWorks

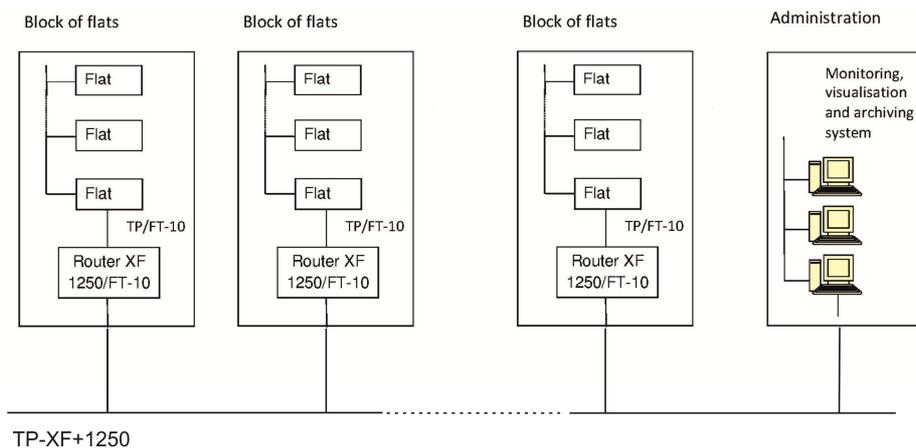


Fig. 2. Wiring diagram of buildings using the network TP/XF-1250.

Using Web server measurement data are transmitted and read directly on the Internet. This solution allows for unlimited access to the counters by the users premises and the system operator or administration. It also allows measurements to distribute media to the relevant suppliers without the need for additional staff in the process. Through proper configuration and login process , you can control access to data. In this way you can protect yourself against unauthorized access to information and to create an appropriate level of security. Figure 3 shows an example of possibility to implement the proposed solution.

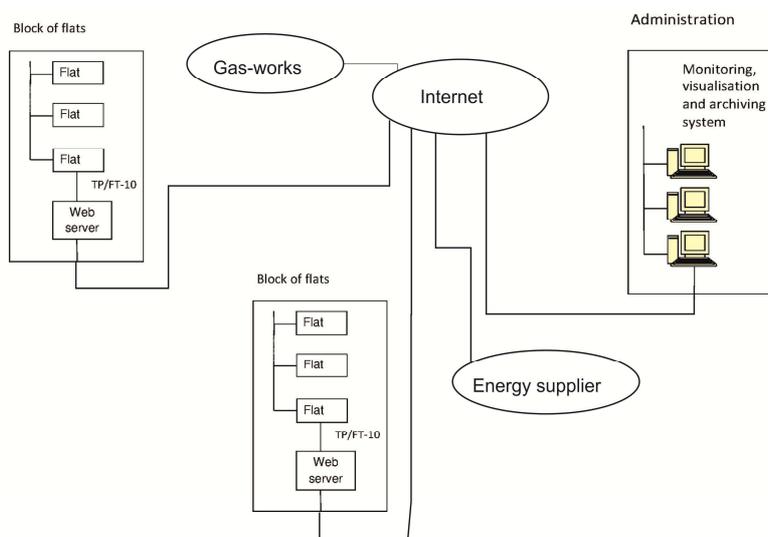


Fig. 3. Online media consumption control system.

The use of such solutions can also interoperate with local power grids using renewable energy sources , especially that To balance demand and supply of power energy economically and reliably is the main task of a power system with any scale and any type [3].

Another advantage of such systems is the ability to produce a readable presentation of measurement data, which is especially important in predicting energy consumption. Visualization systems allow for multi-level access control for users and media presentation of information. In Figure 4 shows a flow diagram of an exemplary system, information visualization.

The building manager or operator of the local power grid can, using such an application, have access to aggregated data on consumption of electricity by all consumers. Also, each individual recipient can have access to historical data from the counters. This possibility should obviously affect the evolution of consumer awareness of energy -efficiency of its use .

I should also mention the possibility of automating the process of clearing the used media. Based on the existing data in the system to create a simple invoicing system is not a major problem.

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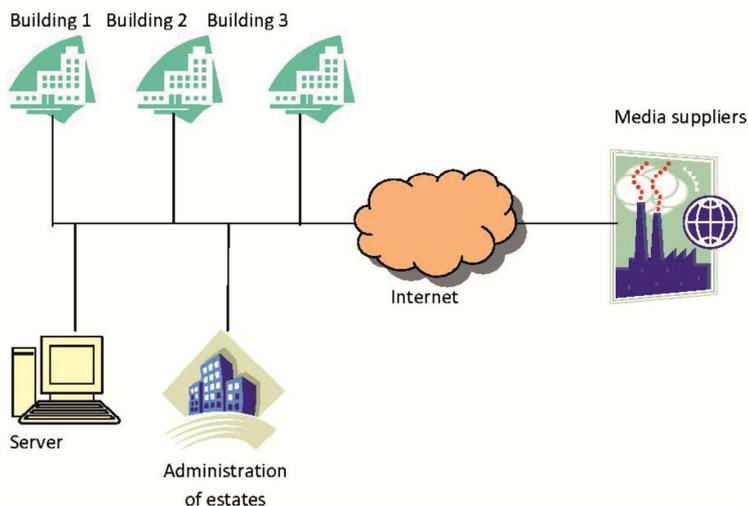


Fig. 4. The flow of information in an exemplary visualization system

### Conclusions

1. Building management systems offer many opportunities for users. One of them is to reduce the cost of using the building. The development of information technology will introduce electronic settlement systems.
2. Smart metering is likely to evolve in the direction of measuring the consumption of all media. Building management systems allow for easy consolidation of media measurement systems.
3. An increasing number of local power grids will need to implement an efficient system for billing of media consumption. The proposed solution allows both to solve this problem, as well as the rationalization of energy carriers of each user.

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