



AMI BY IDOMUS

White Paper

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1 SMART METERING – WHY?

Smart metering plays an important role in energy efficiency and energy consumption management.

Automated data collection from smart meters of water, gas, heat, and electricity offers several advantages that are crucial for efficient resource management and monitoring. Here are some of them:

1. **Accuracy and reliability:** Smart meters are equipped with modern technologies that provide more precise measurement of resource consumption. This helps reduce errors associated with human factor or the obsolescence of traditional meters. Accurate data on water, gas, heat, and electricity consumption helps reduce unnecessary expenses and ensures accurate consumption accounting.
2. **Convenience and automation:** Automated data collection eliminates the need for manual meter readings. This saves time and resources, as well as reduces the quantity of routine tasks for the personnel. Data from smart meters are automatically transmitted to the central server, being processed and analyzed without the need for human interaction.
3. **Real-time and remote monitoring:** Automated data collection gives real-time information on resource consumption. This allows for prompt tracking of changes in consumption and detection of anomalies or leaks. Remote monitoring also enables prompt response to any technical issues and reduces losses.
4. **Energy consumption management:** Data obtained from smart meters provides valuable information about resource consumption. It can be used for energy consumption analysis and identifying areas where expenses can be reduced. Automated data collection ensures a more efficient energy consumption management by taking measures to reduce losses and optimize expenses.
5. **Data integration and analysis:** Data from smart meters can be integrated into data management and analysis systems, providing a comprehensive view of resource consumption. Integrating data with other systems, such as energy management or building management systems, ensures efficient coordination and optimization of all interconnected components.
6. **Network Optimization and Resource Planning:** The data collected from smart meters can be used for infrastructure optimization and resource planning. They provide insights into peak loads, maximum consumption periods, and other factors that can be useful for developing efficient management and resource distribution strategies.

7. **Diversified Tariffication:** Implementing more flexible and innovative tariff plans. Providers can offer differentiated tariffs based on time of day, peak loads, or other factors. This motivates the consumers to use resources more efficiently and gives space to income optimization.
8. **Loss Management and Reduction:** Automated data acquisition helps to identify leaks and system malfunctions. Early detection of technical problems enables prompt actions to solve them and minimize losses. This contributes to more efficient consumption of resources and reduction of environmental impact.
9. **Eco Efficiency:** smart metering promotes the effective use of resources and reduces negative environmental impact. Optimizing resource consumption and implementing energy-efficient practices helps to decrease greenhouse gas emissions and enhance ecological sustainability.

All these advantages help water, heat, gas, and electricity providers to increase the efficiency and reliability of their operations, improve customer service, and optimize resource consumption. Here is a more detailed explanation of the benefits for each type of service:

- **For water providers:** The AMI system ensures accurate measurement of water consumption, detection of leaks and anomalies, and monitoring of water quality. This allows water network operators to efficiently manage resources, prevent losses, and ensure high-quality water supply.
- **For heating companies:** The AMI system ensures precise measurement of heat consumption, implementation of differentiated tariffs, and provision of detailed information to consumers. This helps manage loads, forecast consumption, and optimize the use of heating resources.
- **For gas providers:** The AMI system allows precise measurement of gas consumption, monitoring of gas usage, and detection of leaks. This helps gas network operators efficiently manage resources, prevent losses, and ensure safety.
- **For electricity providers:** The AMI system enables accurate measurement of electricity consumption, provision of detailed consumption information, and implementation of dynamic tariffs. This aids in load management, smoothing peak loads, and enhancing energy efficiency.

Altogether, automated data acquisition from smart water, gas, heat, and electricity meters provides accurate and reliable information, facilitating resource management and monitoring, expanding tariffing capabilities, enhancing customer service, optimizing expenditures, and enabling prompt actions to reduce losses and improve ecological efficiency. This represents a significant step towards the development of smart cities and efficient energy supply systems.

2 WHAT IS AMI

The AMI (Advanced Metering Infrastructure) system is an integrated network infrastructure that includes smart meters for electricity, gas, water, and other utilities, as well as network communications and a central control system. It enables automated acquisition, transmission, and processing of data on utilities consumption.

The AMI system allows real-time monitoring, control and optimization of resource consumption, flexible tariff plans and services, as well as more reliable and efficient accounting and management of energy resources.



3 AMI ARCHITECTURE

The architecture of the AMI system may vary depending on specific implementation tasks, but it typically comprises the following components:

1. **Smart Meters:** Smart meters are the primary data collection devices for resource consumption (e.g., electricity, gas, water). They are equipped with sensors and possibility to connect to the network infrastructure.
2. **Data Concentrators:** Data concentrators or data collectors act as intermediate devices between smart meters and the central control system. They acquire, aggregate, and transmit data from smart meters. Data concentrators are mainly used for collecting data from electric meters.
3. **Communications:** The network infrastructure facilitates communication between smart meters, data concentrators, and the central control system. It may comprise various communication technologies, such as fixed power lines and low-voltage networks (e.g., Ethernet, PLC), or wireless networks (e.g., LoRa, Wireless M-Bus, Zigbee, Wi-Fi, GSM/GPRS/LTE).

4. **Head End System:** The Head End System (HES) serves as the central node of the AMI system. It receives data from smart meters via gateways and data concentrators, processes and analyzes the data, ensures data storage and management, and provides interface for system monitoring and control.
5. **Customer Management System:** The Customer Management System (CMS) is responsible for managing customer information, including contracts, payments, and other aspects of customer service.
6. **Analytics and Reporting System:** The Analytics and Reporting System enables data analysis of resource consumption, trend identification, report generation, and provision of analytical insights for decision-making and energy efficiency optimization.
7. **User Interface:** The User Interface (UI) grants access to consumption information, bills, tariffs, and other data for end consumers. It can be a mobile application, web portal, or other tool for interacting with the AMI system.

Overall, the AMI architecture encompasses data collection, transmission, processing, and analysis of resource consumption data, as well as management and control of energy resources to ensure efficiency, reliability, and optimal energy utilization.

4 AMI BY IDOMUS

For successful and efficient implementation of AMI, iDomus has developed a comprehensive hardware and software solution, including:

- WUM (Wireless Universal Multi-mesh) communication platform with a line of gateways, data concentrators, and specialized modules.



- SiMBA (System for intelligent Metering Billing and Analytics) software for the central control system.

This solution is specifically designed for energy and utility providers and has several evident benefits:

- The ability to adapt its hardware and software to the specific needs and requirements of a particular water, gas, heat, or electricity provider.
- A wide range of WUM IIoT controllers that provide extensive integration capabilities.
- Support for main protocols and standards and use of hybrid wired/wireless technologies, ensuring high integration potential and flexibility.
- No need to replace existing smart meters that have already been installed.
- No dependence on specific manufacturers of new smart meters.
- The Multi-mesh technology expands coverage, saves on gateways and monthly GSM subscriptions.
- Centralized control of the entire system from a single interface, use of plug & play elements for configuring the main components, quickly deployed and easy to use.
- Centralized time synchro of all system components ensures data accuracy and correctness.
- Keeping data archives for each individual meter at the primary level for a period of 30-45 days.
- Compression and encryption of all data for maximum security and optimization of the data transmission process.

An integrated solution combining a HES and a communication platform developed and manufactured by the same provider offers significant advantages in building the AMI system. Compatibility, improved performance, reliable support, easy to control, simple in maintenance – all these features contribute to the creation of a complex and efficient infrastructure for smart metering and energy management. This results in operational efficiency, risk reduction, and ensures a more reliable and user-friendly AMI system for service providers.

5 WUM CONTROLLERS

The WUM communication platform is a product line of IIoT controllers (gateways, data concentrators, pulse reading modules) that use various radio technologies and standards for communication needs.

WUM IIoT controllers use:

- Standard RS-485 wired connection for data reading from energy meters.
- Wired dry contact connection for pulse reading from water, gas, and heat meters through specialized output.
- Wireless technologies such as LoRaWAN and LoRa Mesh, Wireless Mbus, Wi-Fi Mesh, Zigbee Mesh for data transmission between meters within one network segment.
- Wireless GSM/LTE/GPRS technologies for data transmission to the central control system (HES) for further data processing, storage, and analysis.
- Power over Ethernet (PoE) for supplying power and sending data to gateways through a standard twisted pair (if needed).
- International communication protocols: DLMS/COSEM, IEC 62056-21, Modbus, M-Bus, MQTT, etc.





LoRaWAN (Long Range Wide Area Network) serves as the primary data transport within the WUM platform. The key advantages of Smart Metering solutions offered by manufacturers of such unified line of LoRaWAN gateways, data concentrators, and pulse reading modules include:

1. **Integration and compatibility:** manufacturers providing a unified LoRaWAN product line ensure a high degree of integration and compatibility among their devices. This means easy integration and interaction with various Smart Metering system components, such as smart meters and central control systems.
2. **Flexibility and scalability:** Solutions offered by manufacturers of unified LoRaWAN product lines provide flexibility and scalability in deploying Smart Metering systems. They can support a large number of devices, operate at different distances and in various environments, and can be easily scaled up to growing system needs.
3. **Reliable connectivity and extended coverage:** LoRaWAN technology offers long-range transmission capabilities and penetrates obstacles like walls and buildings. This ensures reliable connectivity between Smart Metering devices and data concentrators, even in remote and poorly covered areas.
4. **Energy efficiency:** LoRaWAN devices operate with low power consumption, thus extending the battery life. This is particularly important for Smart Metering systems where long battery life is a key factor.
5. **Easy installation and configuration:** Solutions offered by manufacturers of unified LoRaWAN product lines provide easy installation and configuration. They can be easily integrated into existing infrastructure and quickly deployed, simplifying the implementation process of the Smart Metering system.

6 HES SIMBA

HES SiMBA is a centralized control and monitoring system for smart energy and utilities metering devices. It is responsible for collecting, processing, and managing data collected from smart meters. HES acquires data from meters and monitoring energy consumption for efficient energy management, as well as processes data for analysis and decision-making.

HES SiMBA from iDomus is a universal HES software platform.

Universal HES (Universal Head End System) is an enhanced version of the standard HES, offering additional benefits and functionality. Here are a number of key advantages of Universal HES compared to the standard HES:

1. **Universal solution:** Universal HES provides support and compatibility with various types of smart meters and communication protocols. It can work with a wide range of devices, making it a more flexible and scalable solution.
2. **Integration:** Universal HES allows for the integration of data from different systems and sources, that include not only electricity meters but also gas, water, and other utilities. This provides a more comprehensive view of resource consumption and enhances management efficiency.
3. **Advanced data analysis:** Advanced data analysis: Universal HES offers advanced data analysis algorithms, enabling deeper and more accurate energy and resources consumption analysis. This serves for identifying trends, anomalies, and optimizing use of resources.



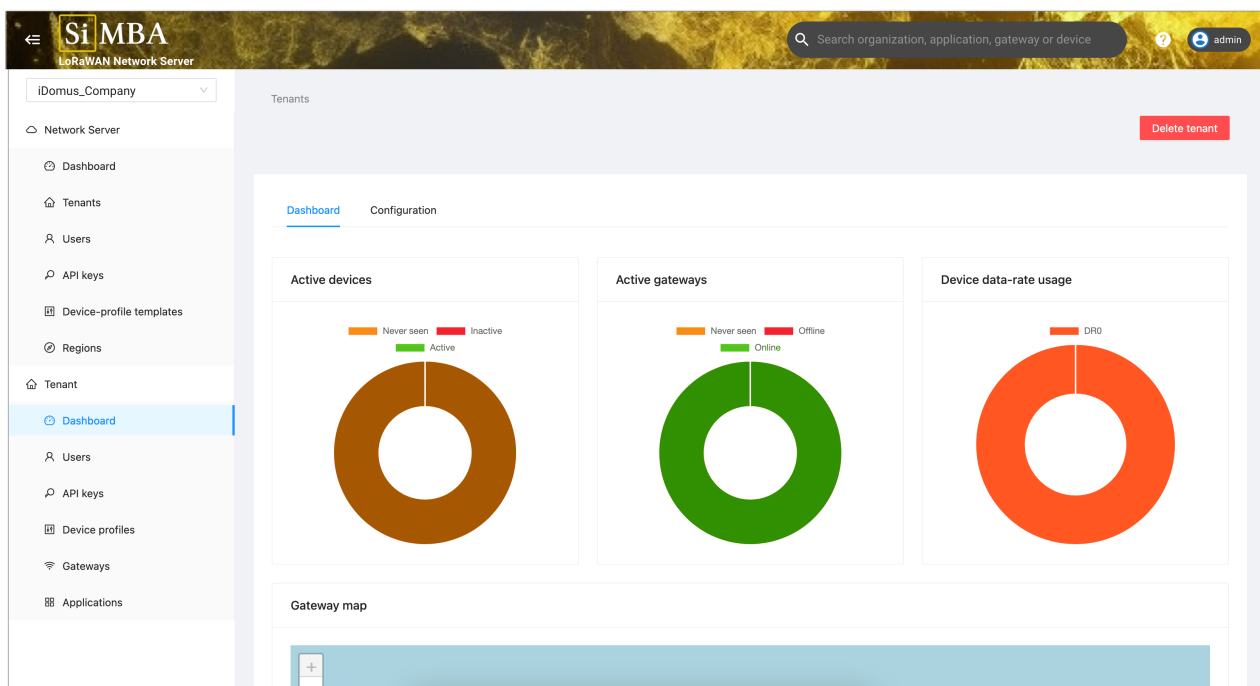
HES SiMBA by iDomus is a universal software HES platform

4. **Hybrid communication model:** Universal HES supports various communication technologies, including wired and wireless protocols, thus using the optimal communication method depending on the requirements and specific infrastructure characteristics.
5. **Enhanced security:** Universal HES provides additional security and data protection methods, including encryption and advanced authentication. This is crucial for ensuring data confidentiality and integrity of the AMI system.

In conclusion, Universal HES offers universality, integration with various devices, advanced data analysis, hybrid communication model, and enhanced security. These additional capabilities make Universal HES a more powerful and flexible solution for managing smart meters and resources.

In addition to its basic functions of system management and collecting data on consumption and network parameters, HES SiMBA integrates additional modules - Billing and Analytics, which are designed to assist energy and resource providers in their interaction with consumers, including:

- Generating electronic invoices and their automated online delivery.
- Online payment of invoices through connecting to various payment systems.
- Organizing a personal web portal with secure access for consumers.
- Using specialized mobile applications for simplified access to personal data.
- Data visualization and working with data archives to monitor energy consumption and forecasting.



Furthermore, the implementation of HES SiMBA software through cloud technologies aims to give small utility providers and utilities management companies with:

- Quick deployment of the entire system.
- Significant cost savings on server equipment, including the cost of specialized software licenses.
- Reduction of operational expenses, including provision of electricity and 24/7 internet access, salary cost of highly skilled IT specialists for system support, etc.

HES SiMBA can be integrated with other software platforms through API interfaces or by importing/exporting data in diverse widely used formats such as JSON, XLS/XLSX, TXT, CSV, XML.

7 SOLUTION FOR PUBLIC UTILITIES COMPANIES

The AMI solution by iDomus is an optimal choice for utilities providing companies, condominiums, and housing cooperatives due to the following characteristics:

- The acquisition of data from water, electricity, heat, gas, and other utility meters into a unified central system.
- An extensive range of WUM devices, including gateways, data concentrators, pulse reading modules, with support for various communication interfaces and data transmission methods, able to solve diverse tasks of any complexity and



For utilities management companies, the main advantages of Advanced Metering Infrastructure (AMI) systems with integrated Billing, include:

1. **Automated metering and billing:** Integrating the AMI system with Billing enables the automation of meter readings and invoice issuing processes. This simplifies and speeds up invoice generation, reduces the likelihood of errors, and improves accuracy in calculations.
2. **Various tariff plans and services:** By integrating the AMI system with Billing, the utilities providing companies will have the flexibility in setting the tariff plans and services for customers. This includes differentiating tariffs based on time of the day, season, distribution of expenses among residents, and other options. Customers will pay only for the services they actually consume.

3. **Improved resource management and reduction of unjustified expenses:** AMI systems gives the utilities providing companies the opportunity to efficiently manage resource consumption in residential complexes. Based on real-time consumption data, utilities companies can identify anomalies, control energy losses, and take measures to optimize consumption.
4. **Better customer service:** Using comfy online platforms or mobile applications, the customers have access to detailed and up-to-date information about their consumption, account status, and tariff details. This allows the customer to rationally manage their resources, reduce expenses, and promptly respond to any anomalies, thereby increasing customer satisfaction and improving the quality of service.
5. **Streamlined management processes:** The integrated AMI and Billing solution simplifies the management processes for utilities providing companies. The automation of meter reading and invoice generation helps working with large number of customers, reduces manual labor, and improves operational efficiency.
6. **Price and tariff plans optimization:** Based on integrated AMI and Billing system, the utilities providing companies can flexibly adjust tariff plans based on customers' actual consumption. This contributes to optimizing tariff structure, promoting rational resource usage, and improving financial results.
7. **Simplification of debt management processes:** Integrating AMI and Billing systems automates debt management processes. The system can automatically send notifications about bills unpaid and offer various payment methods. This helps reduce delays in payments and improves debt collection efficiency.
8. **Economic efficiency:** The integrated AMI and Billing system allows utilities providing companies to optimize their operational expenses. The automated process of meter reading and data management reduces the need for manual work, resulting in reduced labor costs and increased business efficiency.
9. **Reduction of losses and uncertainties:** AMI systems integrated with Billing enable the detection and prevention of energy resource losses. Data analysis helps identify leaks, unauthorized consumption, and other anomalies, reducing risks and improving resource management efficiency.

10. **More accurate forecasting and planning:** AMI and Billing systems provide utilities providing companies with more accurate information about resource consumption, making more accurate forecasts and operation planning, including resource procurement and distribution, enhancing efficiency and reducing costs.
11. **improvement of environmental sustainability:** The integrated AMI and Billing system contributes to increased environmental sustainability. More accurate and transparent billing interaction help customers use resources more consciously and reduce consumption. This contributes to reducing negative impact on the environment and creating more sustainable and environmentally responsible communities.

The main advantages of integrating AMI systems with Billing for utilities providing companies, condominiums, and cooperatives include accurate and automated billing, transparent and detailed invoicing, tariff optimization, simplified debt management processes, and improved customer service. This contributes to effective resources management, enhanced transparency in customer interactions, and improve financial results.

8 BUILDING AMI TOGETHER

We are a team of developers, specialized in complex IIoT solutions, that include concepts, technologies, software, and microelectronics, at the same time being a manufacturing and system integration company.

An AMI system built with a company that has all three functions - developer, manufacturer, and system integrator, offers several advantages:

1. **Centralized and Coordinated Approach:** A company that performs the roles of developer, manufacturer, and system integrator can ensure centralized project management and coordination for AMI, thus contributing to a more coordinated and efficient implementation of the system.
2. **Enhanced Compatibility and Integration:** Being both a developer and manufacturer, the company can ensure high compatibility between AMI system components and simplify the process of integration with the existing infrastructure. This allows operators to derive maximum benefits from the system with no difficulties related to incompatible or mismatched components.
3. **Prompt and Efficient Support:** A company that combines the functions of developer, manufacturer, and system integrator has a deep understanding of the AMI system and can provide prompt and efficient support to energy and resource providers. This includes technical assistance, updates, and problem resolution during system operation.
4. **Improved Security and Confidentiality:** Being in control of all aspects of the AMI system, the company can pay special attention to data security and confidentiality. It can develop and implement data protection measures and ensure compliance with relevant regulatory requirements. This helps energy and resource providers maintain a high level of protection and trust in the AMI system.
5. **Flexibility and Individual Approach:** Working with a company that integrates all abovementioned roles, gives the energy and resource providers flexibility and individualized approach during the development and implementation of the AMI system.
6. **Cost Optimization:** A company serving as a developer, manufacturer, and system integrator can optimize the implementation and operation costs of the AMI system. It has control over the production process and can efficiently manage project costs, minimizing the need for external service providers.

7. **Rapid and Flexible Scalability:** The company can ensure rapid and flexible scalability of the AMI system according to the needs of electricity, heat, gas or water distribution networks. It can easily add or expand system components and provide updates and new features.
8. **Innovation and Progressive Solutions:** With an in-house developer, network operators can access innovative and progressive solutions for the AMI systems. The company can integrate new technologies and methods into its products and offer operators advanced hi-tech solutions for efficient network management.
9. **Enhanced Partnership and Collaboration:** A company performing all the roles in the AMI system can establish a closer partnerships and collaboration with energy and resource providers. This fosters a deeper understanding of operators' needs and requirements, allowing the company to provide tailored solutions and support, based on closer cooperation.

A company that serves as a developer, manufacturer, and system integrator provides water, heat, gas, and electricity providers with a comprehensive package of services and solutions, ensuring high efficiency, individualized approach, cost optimization, and reliability of the AMI system. A company that serves as a developer, manufacturer, and system integrator provides water, heat, gas, and electricity providers with a comprehensive package of services and solutions, ensuring high efficiency, individualized approach, cost optimization, and reliability of the AMI system.