Smart Water Metering

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ABSTRACT

Smart meters are a major component of eco-friendly home or building. Smart metering is required for the operation of the smart homes and buildings. The benefits of smart water metering have been recognized. A powerful approach for hour-by-hour monitoring and metering purposes in water networks is the automatic meter infrastructure (AMI). Smart metering is now an established technology which can be applied to collect, store, and distribute real-time data on water usage. This paper provides a brief introduction to the smart water metering.

Key Words: smart water metering, intelligent metering, urban water metering

INTRODUCTION:

Water is an increasingly discussed commodity as it is one of vital substances we need to live on this earth. For example, water is used in drinking, cooking, cleaning, bathing, gardening, and farming. Therefore, consuming and saving water efficiently and responsibly is becoming a major issue.

Traditional residential water meter is read manually, and the volume of water used by a customer is recorded on a monthly basis. Factors such as water scarcity, aging water infrastructure, increasingly stringent regulations, population growth, increased urbanization, rising production costs, uncertain climatic conditions, and the need for accurate billing are driving utilities to consider smart water solutions [1]. Measures that have been taken to mitigate these factors include smart water grid, water metering, water accounting and loss control, pricing, and education.

WATER METERS

A water meter is a device that measures the amount of water consumed in a home or building. Traditional water meters are read manually on a monthly basis by a person. Smart meters constitute a central element in the digitalization of water grids. Although it is the behavior of the household residents that drives water demand, smart water meters can help monitor and detect leaks. Smart water metering helps identify and reduce leakages and non-revenue water. Smart meters are battery powered and thus low-power devices. Smart water meters are one component of an automated meter infrastructure (AMI) system that water utilities may choose to deploy to monitor and record hourly water use of homes and buildings. The meters wirelessly report the data collected to a central database [2].

There are four categories of smart water meters [3]: (i) displacement meters; (ii) velocity meters; (iii) compound, (iv) electromagnetic meters.. Smart meters for electric energy are being rolled out in large quantities, while smart water meters are not yet being implemented at such a scale.

WATER METER COMPONENTS

"Smart meter" refers to accurate measurement of water flow using electronic components. The concept of smart metering embraces two elements: meters that use new technology to capture water use information and communication systems that can capture and transmit water consumption data [4]. The smart water meter consists of four parts [5]:

➢ **Central Control Unit:**
Communication infrastructures play key roles on the success of smart metering systems. The control unit uses an ICT enabled platform to design, develop, and implement better water management policies. ZigBee protocol is used for wireless communication between user and data center for data maintenance and billing operations. The water system can also be based on the Internet of things (IoT).

➢ **Pulse Water Meter:**
This provides information on the intensity and continuity of water flow.

➢ **Two-way Ball Valve:**
This is based on the request from the control system.

➢ **Backup battery:**
This provides a standby power supply in the event of a power outage.

The smart water metering emerged in the 2000s as water utilities responded to global trends of delivering more predictive and proactive services. The component of this effort is advanced metering infrastructure (AMI) technology. A typical architecture for smart water metering is shown in Figure 1 [6].
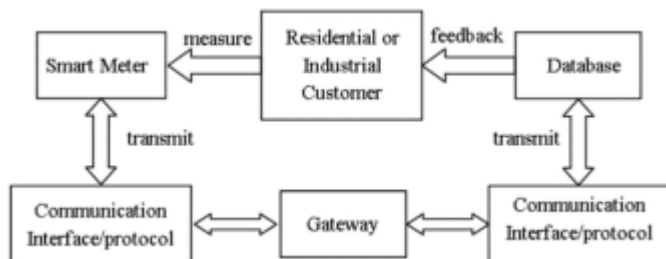
Figure1. A typical architecture for smart water metering [6]

AMI VERSUS AMR
The automatic meter reading (AMR) is a metering technology that collects consumption data from the water meters and transfers it to a central database for billing and other purposes. Water utilities are implementing advanced metering infrastructure (AMI) systems, which extends current advanced meter reading (AMR) technology by providing two-way meter communications. AMI differs from AMR in that AMI allows two-way communications with the meter and the customer. Smart water meters use AMI to allow for two-way remote communications with meters. Although AMR is inferior to AMI, it is less expensive and hence has a higher market share. Water utilities are often not sure whether to fully convert to AMI or run an AMR water grid. They will find the most "future-proofed" investment in AMI deployments.

BENEFITS AND CHALLENGES
The potential of smart water metering goes far beyond the enablement of accurate billing.

Energy experts agree that smart water meters save thousands of liters of water. Smart metering helps in identifying and dealing with different kinds of water loss or leak. Billing errors caused by the old analog water meter can be eliminated. Water theft can be avoided since there are no mechanical parts that can be tampered. Data security in provided in real time [7]. Cost reduction is the key benefit of the remote reading of water meters. For developing countries, prepaid smart water metering has the potential of reducing the time spent fetching water. It is likely to discourage the current practice of communal sharing of water in times of need [8].

Water utilities are not traditionally the fastest adopters of ICT solutions. Although the necessity for water utilities to adopt smart water metering is obvious, they are reluctant to invest in technology that will come to an abrupt end. The market is still immature, uncertain, and without regulation and standardization. Regulations are needed to cover the rights of the customers as well the utility. The lack of a common standard for these technologies hampers progress in the deployment of the smart water systems [9].

CONCLUSION
In today's digital world, where communication and connectivity are important, good is no longer good enough. The digital utility has the future. The smart meter and smart water grid are gaining momentum worldwide. The Smart Water Networks Forum (SWAN) is an organization that encourages water utilities to adopt smart water technologies. Rapidly falling prices and the numerous benefits to both customers and utilities should make the smart water systems even more compelling.

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