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THE EVOLUTION OF SMART IMS

STEP BY STEP

Today's competitive deregulated markets make it necessary to develop new and innovative products, which meet both the current and future needs of the consumers active in these markets. ADD GRUP's AMR system – Smart IMS – has evolved as customer requests have been fulfilled, and as a consequence the system continues to attract new users.

Smart IMS is constantly being developed in three interconnected directions – the meter, the communication environment and the general structure of the system. This article looks at developments involving the meter in more detail.

ADD GRUP's activities in the area of AMR began in 1997, when we attempted to integrate induction meters which were already in use. At that time our customers thought that this approach was the most favourable from the economic point of view, and was technically quite feasible. Really, what could be easier? We will modernise the meter – we will equip it with the gauge of disc revolutions, we will create a pulse output and...

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We and our customers very soon realised that this way results in deadlock. First, the induction meter has a number of basic restrictions – in particular a low accuracy class of measurement and primitive functionality, which make it unattractive for AMR. Secondly, all known attempts at modernising induction meters have resulted in unreliable data collection, or appear very complicated and expensive. For example, transmitting data as accounting pulses is characterised by low reliability, often resulting in data loss or distortion. The construction of additional information lines and application of special protection measures is necessary to overcome this. Thirdly, at the operational level of the AMR system, the use of out-of-date devices creates ongoing problems for both suppliers and electric power consumers. As a result, the use of induction meters in the first generation Smart IMS system did not go beyond the initial testing phase.

In the meantime the desire of various utilities for an effective AMR system which could be used commercially encouraged us to look at the electronic meters of external suppliers, and also to become involved in this sector of the market ourselves. In the beginning the high accuracy class and more advanced functionality inspired optimism, but...

Even though the system was improving all the time, users' demands grew even faster. What yesterday was an undoubted success (just think of remote meter reading) is today a standard func-

tion, and our customers continued to ask questions such as: “Will the probability of data losses or distortions be completely eliminated? Will we get a system capable of supporting the multi-tariff mechanism? Will we be able to limit consumption

remotely in cases of emergency? Will reliable protection against various ways of tampering be provided?”

We couldn't find any satisfactory answers to these and other consumers' questions within the framework of existing electronic meters. And in addition the well-known problems of the pulse output, and the construction of additional information lines and their protection, still remained.



Figure 1 –

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It was necessary to find a radical solution – and such a solution was eventually found. The new concept developed by ADD GRUP involved the creation of a universal device which would integrate all the present requirements of our customers, and which would also allow for future needs to be met. The concept has found reality in our family of single- and three-phase new generation smart meters, based on micro-processor technology. These are just some of the integrated technical solutions to be found in our smart meters:

- Digital methods of measurement, processing and data transmission which have allowed us to satisfy the main requirements of our consumers – the ability to provide a high accuracy of measurement and to remove the probability of data losses or distortions.
- Our revolutionary approach – the integration of our own electronic meter and a PL modem in one device – has allowed us to satisfy many of the explicit needs of our customers. In particular, the device provides the opportunity for constant and reliable data exchange with the meter. Construction of special information data highways is not needed, which obviates the need for their protection; and the volume of installation works has been minimised.
- To avoid data losses in the event of communication disruption caused by incidents such as failure of the communication equipment or a period of repair work, we incorporated non-volatile memory into the design of the meter, which allows data accumulation and storage for a ten-day period.
- The problem of multitariff mechanism support has also been solved. Now the supplier can calculate the consumed electric power using up to four tariff zones and up to eight tariff plans. In addition it is possible to change the zone borders and tariff factors by sending commands from the centre. The consumer can receive complete information at any time, including allocation of tariff zones.

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This has all been made possible by relocating the multi-tariff mechanism inside the meter. Detailed data is also available from the built-in LCD.

Suppliers of electric power also need to be able to restrict consumption in emergency situations. This is now possible with the help of smart meters. Maximum power control in combination with automatic connection/disconnection functions allow utilities to choose the appropriate method of limiting demand. It is possible, for example, to disconnect the consumer remotely if he has not paid his electricity bills (“strict” policy) or to establish time restriction on power consumption (“light” policy).

The question of tampering has also been addressed. Complex solutions have been installed



Figure 2 –

within the framework of the meter that protect the supplier from all known ways of tampering. Well thought out control schemes identify any attempts to interfere with the meter and ensure that the centre is notified immediately. The consumer is then instantly disconnected from the supply.

Some suppliers think this is not enough; they would like to stop any attempts to by-pass the meter, including interference with the power line. When we developed the Smart IMS we found the solution to this problem. It takes place at the system level and consists of rendering balance on the appropriate sector of the distribution network. This balance rendering became possible because of the introduction of the current consumption hourly values function in the meter calculation.

All these developments mean that the Smart Meter justifies its name. It also automatically verifies the clocks with the centre's clocks, periodically carries out self-diagnostics, participates in configuration of the communication environment and even co-operates with neighbouring meters.

And initial fears concerning the possible high cost of the integrated solutions were groundless. The cost of the Smart Meter is comparable with the total cost of the induction meter and accompanying communication equipment, and also works on upgrade and mounting in recalculation per metering point. Admittedly the Smart Meter is a bit more expensive than other alternatives – but all the features that are available to users make it worth it! **mi**

ABOUT THE COMPANY:
ADD GRUP is a group of private companies working together in the modern high technology markets. The head office was established in 1992 in Kishinev, Moldova; two more companies represent the group's interests in European capitals such as Kiev, Ukraine and Moscow, Russia.

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