One chip vs. waste of electricity!

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One chip vs. waste of electricity, savings on current without even having to bother to think about it. ETH seeks to significantly reduce energy consumption with the use of a chip.

The lamps, the fridge, the television, the PC printer and many other electrical appliances are currently controlled in a pretty rudimentary fashion. Apart from the "on/off" switch positions there is usually, for the most part, just a standby control and that often consumes more current than it saves. With a targeted distribution of the current to those users which particularly need it at that moment in time it would be possible to dramatically increase energy efficiency. It is anticipated that in the near future there will be a standard for electrical intelligence to assist in saving current and, in fact, in such a way that the consumer doesn't even have to give a thought to it.
The concept derives from Ludger Hovestadt and he is a professor at ETH, albeit not in the field of information technology or electro-technology but in the Department of Architecture. Intelligent domestic engineering – which has been worked on worldwide for decades now – is about to rapidly become reality in the form of a system called digitalSTROM. An alliance has already been established between science and industry and Hovestadt has high hopes that the first products will be on the market in 2009.

Intelligent switching
The central element is a so-called high-voltage chip. This component, which is currently only available from a few manufacturers, does not work, as in a computer, with weak current and low voltage but directly with the 230-volt mains power supply. Nonetheless the switching has space enough on a surface of 6x4 millimetres which means that no design alterations are needed for this to fit comfortably into practically every electrical appliance or into any and every socket. Hovestadt is convinced that the mass production methods anticipated will soon make the chip so cheap that the final product will not cost any more than the components which are currently in use today.

Every chip carries an identification number which is structured in a manner analogue to the code of the RFID technology. Hence it is, for example, possible to define which appliances form a group and, when leaving the house, all lights which one doesn't want left on during one's absence could be switched off with one flick of a switch in one fell swoop. By contrast the lamps in the entire house can also be individually switched in such a way that they simulate the presence of someone – a task for which, hitherto, special time switches were necessary. Individual lighting scenarios can be pre-programmed for instance – such as for an evening in front of the TV or for working in the kitchen.

With the assistance of the chip it is possible to ascertain how much current the appliance in question is using. This is not interesting for statistical reasons only but could be used by electricity suppliers for the compilation of tariffs in such as way as, for example, that the current for the tumble dryer might become particularly expensive just at the time when the mains network is heavily loaded at lunchtime. Or it might even be possible to have a priority control whereby all appliances which do not depend on current would be switched off at times when the mains are overloaded. The chest freezer does not necessarily have to be running full pelt at a time when current is in short supply. Using these kinds of methods it would be possible to make power consumption much more well-balanced, the mains networks and, in the final analysis, also the power stations, would need to be much less aligned to the fulfilment of short-term peak requirements.

Thanks to its high-voltage characteristics the chip can mesh directly with the mains. It can in fact also, as a so-called current modulator, exert influence upon the current characteristics and, for instance, alter the voltage so that it would no longer be necessary to have a transformer for

appliances using low-voltage current since 24-volt current would be coming out of the 230 volt socket.

Flabbergasted experts

The data exchange with other chips in the building or with the central switchboard which has to be installed in the control box, and where the mains commands of the electricity works are also processed, takes place via the 230 volt cable. And that is precisely where the procedure of digitalSTROM distinguishes itself from the approaches of other intelligent domestic engineering which use separate cables or radio. The University of Lucerne is, for instance, involved in the development of energy management with radio technology and works together with ZigBee-Allianz which is uniform for all large electrical concerns in the world. The novelty from Zürich differs from the Powerline technology, which similarly works with the 230 volt cable, by virtue of the more high-performance data structure. Is it really possible for the ETH System to assert itself in the face of the domestic engineering bus system hitherto so vigorously propagated by the industry? After all, well-known companies have for a long time now been trying to launch intelligent domestic engineering networks on the market but have hitherto only succeeded in being able to cable major facilities such as hospitals, hotels or universities.

Ludger Hovestadt is optimistic. The fact that the novelty is being launched by a neutral entity and not by an individual company improves the chances of its attracting collaboration from a variety of branches. And the technical details, which have not been published, would purely and simply have flabbergasted initiated experts. It is also an additional advantage that the new chip does nothing to interfere with existing technologies and could be introduced step-by-step without incurring any problems. The effect, as a complete phenomenon, could however only be achieved if the procedure were to become generally implemented as an international standard.

One only has to reflect upon the fact that in Switzerland alone around 300 million electric appliances are connected to the mains and, by virtue of their stand-by operation, alone account for 10 per cent of electricity consumption, to realise that any initiative in the direction of efficiency improvement is well worthwhile! Quite apart from this, the new technology offers electricity suppliers distinct administrative advantages: At very little expense it would be possible to automate remote reading of meters and the tariff system can be refined with new incentive and/or charging models.