

Filtering the new “smart” electrical meters

by Torbjörn Lindblom
(translated from Swedish)

A filter is available to prevent power line communication (PLC) signals in the Kilohertz range from entering the household wiring. Some types of PLC systems use low frequency signals, which are too close to the power frequency to filter out.

Keywords: Power line carrier, power line communication, filter, PLC, PLT, E.ON, dirty electricity, smart meter, EMC

The Swedish electrical utility company E.ON changed the Lindblom family’s old electrical meter to a new remotely monitored Smart Meter in September 2008. A filter was installed at the same time, to remove the “dirty power” generated by the new meter.

The family has not noticed any health effects during the four months the new meter has been installed.

The installed filter is of type FN256-25A (this number is likely only useful in Sweden). The new smart meter communicates by sending signals along the electrical wire to a receiver that is mounted by the transformer, about 150 meters (450 feet) from the house. The filter is designed to prevent the two communication signals from entering the house. They are at frequencies 75 Kilohertz (75,000 cycles per second) and 86 Kilohertz. The filter actually covers a wider area of frequencies, so it should remove other frequencies of “dirty electricity” as well.

The filter is mounted in a separate box next to the electrical meter, which in our case is mounted on the outside of the house. E.ON provided the filter for free; it would otherwise have cost around 15,000 Swedish Krona (US \$2100, 1500 Euros).

Test of the filter

The electrical meter is read around every midnight. The measured value is sent via the receiver to the electrical company. Besides receiving and transmitting the daily electrical usage, the receiver also periodically checks the connection to the smart meter. This happens every few minutes.

Preliminary measurements indicated that the filter didn’t dampen the signals as well as expected, so the electrical company came out in October 2008 to check it.

2 *Filtering the new “smart” meters*

The test signals were generated using the ECHELON U20 instrument, while the receiver by the transformer was turned off. The measurements were done with a cordless oscilloscope, at the point where the filter is mounted on the electrical line.

There is a rather low level of “dirty electricity” around 2 kHz, which comes from the outside, as shown on figure 1. This measurement is taken without any 75-86 kHz signal on the line; one notices the very low level of other noise around those frequencies.

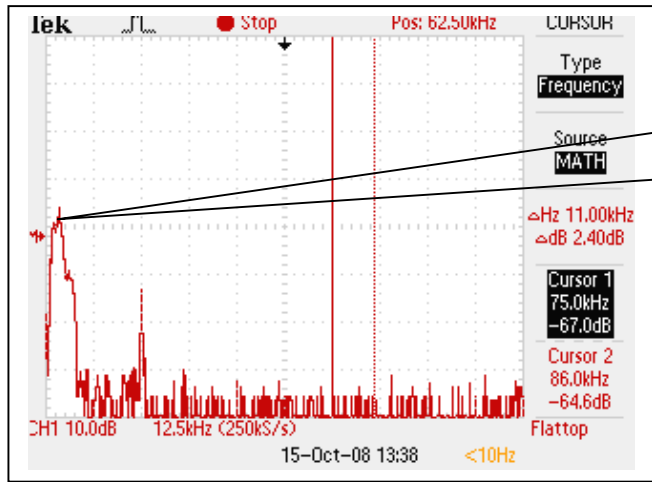
The measurements show that the strength of the 75-86 kHz signal just before the filter is about -21 dB (see fig. 2). The same signal has the strength of -45 dB right after the filter (see fig. 3). The signal is thus dampened by about 25 dB (about 99%), which was expected.

The filter dampens the 2 kHz noise much less.

Very cooperative

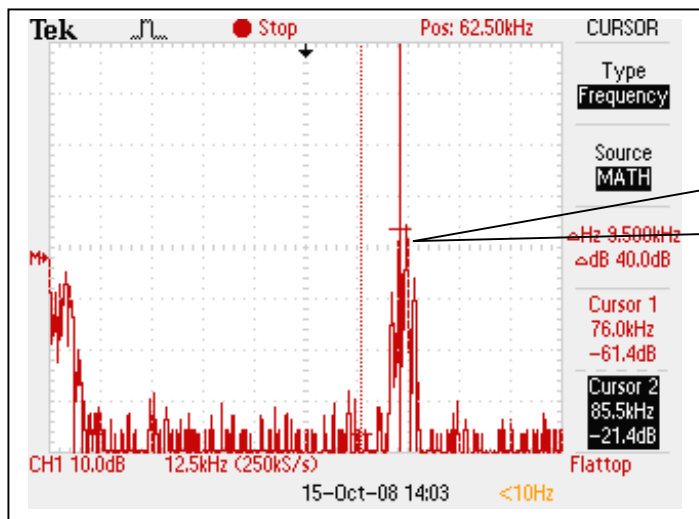
Measurements inside the house showed that the signals were dampened further, down to -60 dB. With a stetzer filter installed, it was no longer possible to detect any signal from the new electrical meter. The utility company has been very cooperative in ensuring we can have a good electrical environment.

No negative health effects have been observed in our family during the four months the new electrical meter has been installed. Even other people with EHS have found our home safe.



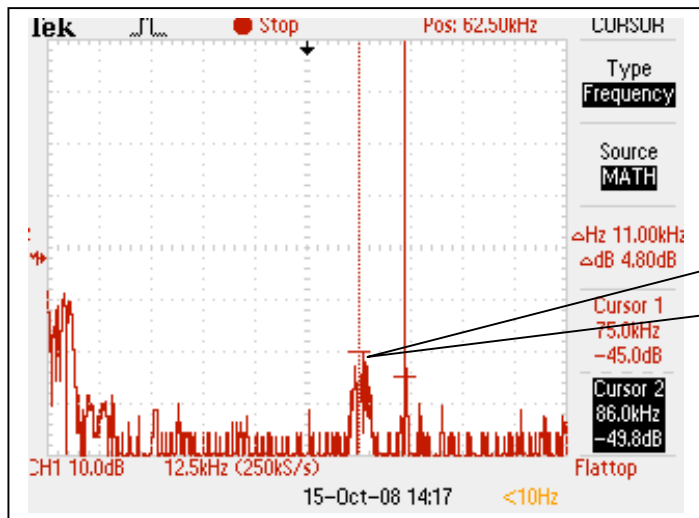
Noise signal around 2 kHz, about -20 dB. The equivalent of a voltage less than 10 mV.

Fig 1 Before filter. Phase L1 to separate ground rod



86 kHz signal generated by U20, before filter. Signal strength about -21 dB

Fig 2 86 kHz signal before filter



75 kHz signal generated by U20, after filter. Signal strength about -45 dB

Fig 3 75 kHz signal after filter

4 Filtering the new “smart” meters



The E.ON filter is the box mounted on the wall to the right of the Lindblom family’s electrical meter.

Translator’s note

The E.ON filter is unfortunately not usable in North America. The reason is that the wiring standard is different, with much fewer houses sharing a transformer. Transformers block the higher frequency signals, so in North America, the PLC meters use much lower frequencies (mostly below 1 kHz). It is virtually impossible to build a filter to remove these frequencies from a power line that still needs to carry the 60 Hz power to a house. American houses also have higher amperage feeds (due to lower voltage), which further complicates a filter.

For more information about PLC smart meters, see www.eiwellspring.org/smartmeter.html

A letter of thanks

A large “thank you” to E.ON

The E.ON utility company is replacing their old manually read electrical meters with new meters which automatically transmit information about the customer’s electrical usage. The information is transmitted via the utility lines. This means that the customer is always billed for actual electrical usage and not sometimes the estimated usage. The pulses transmitted on the utility lines pass in through every meter on the same line, which is a problem for people who are electrically sensitive.

Since my wife has been seriously electrically sensitive for many years, we were concerned about what could happen. We contacted E.ON and discussed it with their representative. He took us seriously and explained that E.ON was developing a new filter which should prevent these pulses from creating problems. We were also told that if the filter did not solve the problem, then they would continue to work on a solution. E.ON has now had a private company install the filter, and there have so far been no problems.

As far as we know, E.ON is the only electrical utility company which has been willing to put down so much effort to remove the effects of these new meters. A great big “thank you” to E.ON and all others involved for the help and respect they have shown the problems of the electrically sensitive. It feels really good to be an E.ON customer.

Ernst Nilsen

Also a thanks from FEB

Already at the first meeting between FEB and E.ON we were told that “we have to solve this one”. And E.ON really did. Even Fortum has been helpful from the start. These two electrical utilities have shown the way for the other electrical utilities [in Sweden].

The FEB electrical meter task group

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