

Example of a single dwelling

Expiration of the measuring procedure in practice

Mark the measuring points

A building was marked before, with the defaults in the report (Assessment of the EMI radiated by PLC installations inside buildings), with measuring points and one point of reference. For the indoor range one selected the numbers of 1 - 19 and for the outdoor range the numbers of 20 - 30. The feed-in point was marked by the number 0.

All data of the measuring points with the coordinates starting from feed-in and point of reference are described in the appendix of measuring points.

Install the measuring system

The PLC adapter system, that means, the feed-in point was installed central in the building or the flat. Via first laptop, PLC adapter system and second laptop, the data was generated over a WLAN unit with a data transmission rate by 6MBit/s. Thus it was guaranteed that the maximum power was modulated on the power line. In some cases it was not possible to reach the full data transmission rate with the WLAN unit (Absorption for 2.4GHz). In this case a third laptop was used as generator with the desired data traffic. The Control of the connection was managed by the measuring crew with PMR446-radios (manual operation). All parameters, like PLC carrier frequency, detector choice, filter range, span, and the function max. Hold and the attenuation of the selected antenna, the cables and the low-pass filter were adjusted by the software with each measuring point. Further points, like the markings of the building, of the measuring point, place of the measuring points of the feeding and point of reference, the choice of the measuring adapter (antenna, Clamp-on RF current probe) were noted likewise.

Measurement

First a measurement with the clamp-on RF current probe (ESH2-Z1) with the feed-in point was made.

After that the field strength, on one of the 10 in the report mentioned carrier frequencies, was measured with the appropriate antenna and the spectrum analyzer. For the time being one measured 1m and 3m of the feed-in point with and without PLC signal. Afterwards all in the indoor and within the outdoor range marked points measured on the same way. With an acceptable result the storage could take place immediately, or which had measurement with too many disturbers in the measuring range is repeated. Those measurements, which could not be assigned to a clear PLC signal for, were later declared as valid or invalid.



This house stands on a slope in the middle of a detached house settlement. It is a brick house, whose power lines were installed perfectly under the plaster. It stands as an example for all the other buildings (see appendix "Test houses"), which were measured in the same way. We tried the PLC adapter system to put central in the building or the flat. Thus an optimal distribution of the RF current was given in the existing net.

Figure 01: Single dwelling built on a slope in the middle of a detached house settlement

Example of a single dwelling

The following diagram shows the distribution of all outdoor measuring points. They were 3m, 10m, and 20m of the building away. The feed-in point was arranged central in the building. The positions of the measuring points are to be recognized best in the 3D-view in the figure 04.

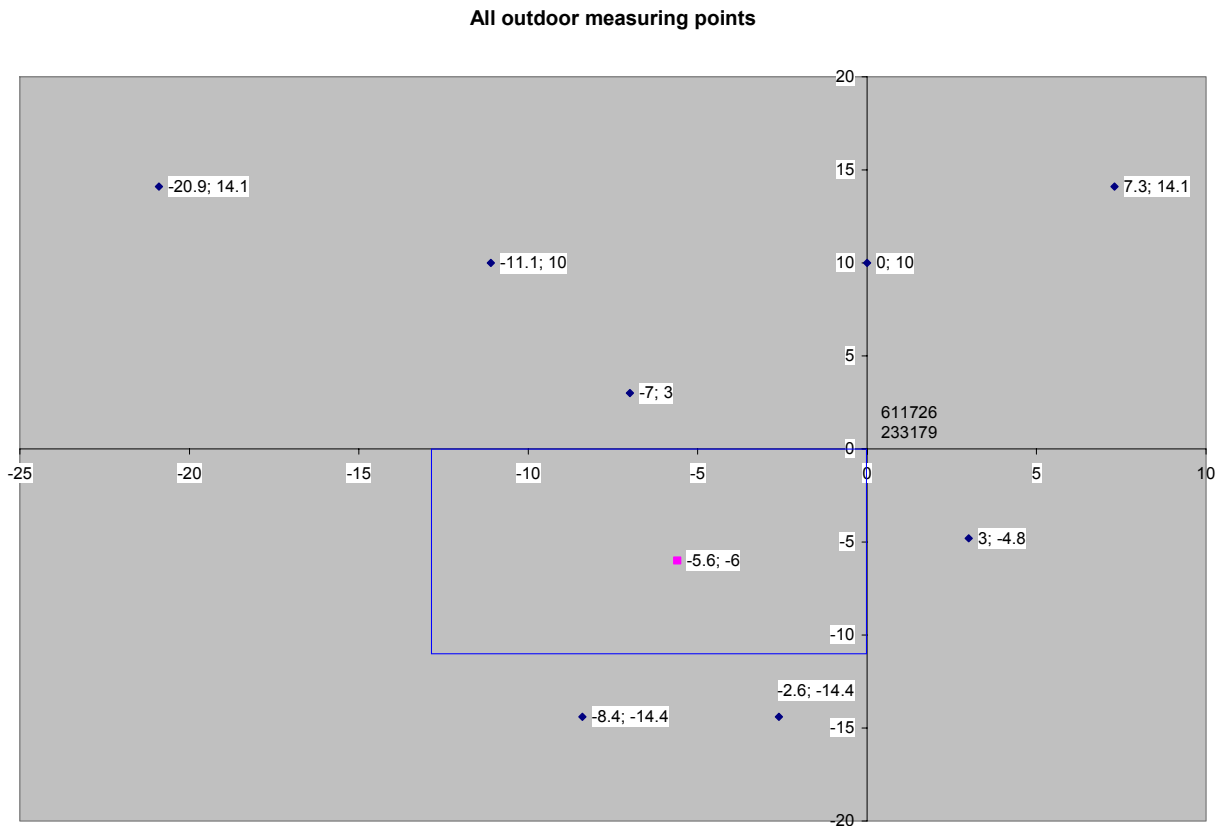


Figure 02: Distribution of all measuring points outside of the building with the feed-in point of modem.

The outdoor measuring points around this building have been distributed on three measurement planes. They should show that outside of the building the distance law applied approximately. The measurements did not take place any longer directly in the near field. Here it made sense measure meaningfully over 3 meters distance to the house with the rod antenna, which has an approximately 10dB larger sensitivity, than the loop antenna.

Example of a single dwelling

The following diagram shows all indoor measuring points. They were normally distributed on the floors spatially. The position of the measuring points is best recognized in the 3D-view of the figure 04.

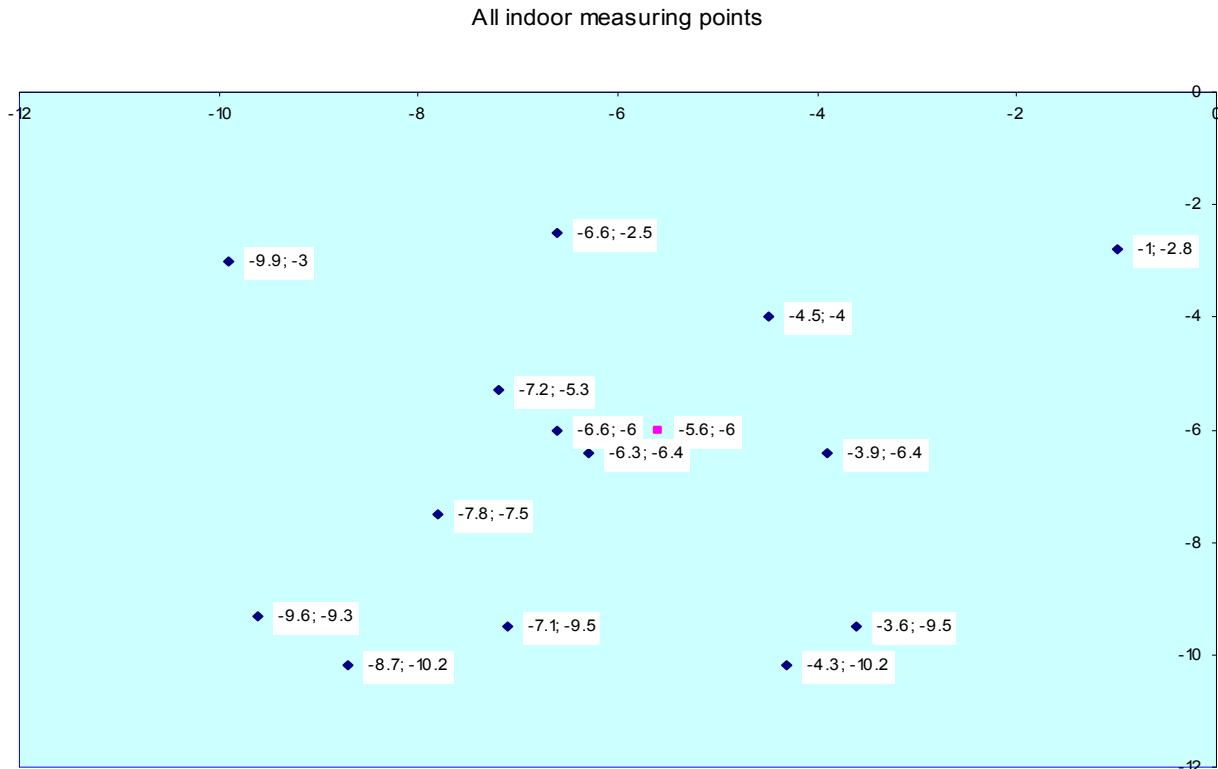


Figure 03: Distribution of all measuring points within the building with the feed-in point of modem

One realized **the indoor measuring points** as well as possible with the default of the measuring point distribution in the report. All measuring points within the building lay in the middle of the electrical wiring and were measured with the loop antenna. It was not guaranteed that the measured points were in the proximity of an immured electric cable.

The Background noise (without PLC signal) within and outside of the building was measured likewise. In the range of a PLC carrier of approximately 200 kHz different signals were to be seen. Information signals such as short wave transmitters, broadband signals, signals of the railway lines in the proximity or other spurious signals, which were produced for example in the building, were almost always present.

However the PLC signals about 10-20 dB were in most cases higher than the disturbing signals in the background noise. So these measurements could be stored without any doubts. All measurements, accompanied by narrow-band signals, which stood over the level of the PLC signal, were not relevant for the measurement, if they did not fall straight into the measuring range. With wide-band signals (digital signals), which the PLC signal no longer clearly explains or even made to disappear, had one after the measurement to make a decision whether in the measuring range the PLC signal is still recognizable.

Example of a single dwelling

The lattice model (3D-view) represents the number of floors as well as the position of the measuring points realistically. The dimensions of the house are only rudimentarily kept.

The larger circle in the lattice model is named the point of reference of the house. This point of reference was taken up with a government inspection department. In the figure 02 these coordinates are to be found. The yellow points show the measuring points in the indoor -, the green within the outdoor range. With the asterisk and the distance from the floor (red line) the feed-in point is characterized. The distance represents the position of the plug socket, which was either 0.3m or 1m from the floor away.

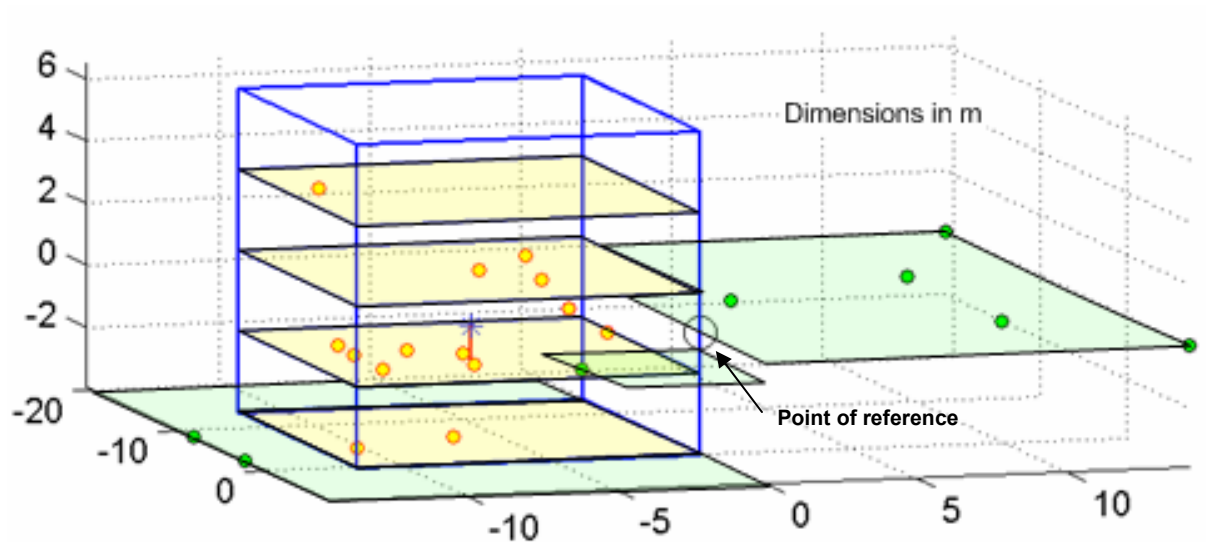


Figure 04: Lattice model with measuring point and feeding place of the single dwelling illustrated above and the point of reference (circle) at the house corner.