Characterizing the Performance Limits of the PLC G3 (used by Linky)

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(note : le stage peut se dérouler en français ou en anglais).

Keywords – Smart Grid, Network Communication, PLC, Stochastic Systems, Mean Field Approximation, Linky.

1 Context

Enedis is currently deploying 35 millions of smart meters (called *Linky*). Nowadays, the only role of these meters is to measure the electric consumption of houses and to send these values (once a day) to a concentrator that aggregate these values. It is envisioned in a near future that these meters could be used to more advanced tasks such as control of the charge of electric vehicles, of public lightning, or the deployment of demand-response.

In order to send their values, the Linkys communicate through the electrical network by using a protocol called PLC G3. The obtained communication channel has very limited capacities (or the order of 1 kB per second). If this communication channel suffices to the current usage (*i.e.*, aggregating one value per meter per day), it is for now an open question to decide if this protocol will be sufficient to cope with tasks that require more communication.

2 Objective of the intern

The main objective on the internship will be to contribute to the understanding of the limits of the PLC G3 protocol. To do so, the intern will construct and study a stochastic model of the MAC layer of the CPL G3 implemented in the Linky. We will use techniques such as mean field [1] or refined mean field models [4] in order to perform an analysis similar to what was done for 802.11 protocol in [2, 3]. The intern will also implement a stochastic simulator (of the original model and of the approximation), in order to compare the obtained values with real traces that have already been collected.

3 Contact

For more information, please contact `nicolas.gast@inria.fr`

4 Location

The intern will be hosted in the POLARIS team. The POLARIS team is a joint team between Inria and LIG (Grenoble Computer Science Laboratory) and is located on Grenoble University main campus (`https://batiment.imag.fr/`).

References

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[2] Giuseppe Bianchi. "Performance analysis of the IEEE 802.11 distributed coordination function". In: *IEEE Journal on selected areas in communications* 18.3 (2000), pp. 535–547.

[3] Fabio Cecchi et al. "CSMA networks in a many-sources regime: A mean-field approach". In: *Computer Communications, IEEE INFOCOM 2016-The 35th Annual IEEE International Conference on*. IEEE. 2016, pp. 1–9.

[4] Nicolas Gast and Benny Van Houdt. "A Refined Mean Field Approximation". In: *Proc. ACM Meas. Anal. Comput. Syst* 1 (2017).