Smart Grid/FiWi co-simulator

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Requirements

The co-simulator requires two computers, the first one with Ubuntu/Linux and the second one with Windows 7.

- On a Ubuntu/Linux computer:
  - Omnet++ 4.1, http://omnetpp.org/omnetpp/doc_details/2217-omnet-41-source—ide-tgz. (This specific version must be used). Note that, the Omnet part was used on Ubuntu/Linux only (Kernel version: 3.2.0-38).
- On a Windows computer:
  - To calculate power flow analysises, OpenDSS was used on a Windows 7 machine. OpenDSS: http://sourceforge.net/projects/electricdss/ .
  - In order to execute power flow calculations from the Linux machine, an http server was installed on the Window machine. For simplicity, I installed easyPHP: http://www.easyphp.org/
  - Python 2.6.

The flow of execution is as follows. Omnet++ creates both communications and power events. On demand, when power events occurs, Omnet calls a PHP script (HTTP request) in the Windows machines, then PHP calls a python interface of OpenDSS, OpenDSS calculates the power flow calculation, and finally the results are successively returned back to Python, PHP, and Omnet.

Installation notes

- About Omnet:
  - First, launch Omnet. Then, import FiWi, inetmanet, and Vlan projects. Note that the FiWi project must “references” to the inetmanet and Vlan projects. Then, compile all projects.
  - To run simulations, etc., refer to tutorials: http://www.omnetpp.org/documentation
- About the PHP script:
  - Make sure to place the PHP script in the “www” folder in the easyphp directory.
- Files to be installed on the Windows machine are included in backupOpenDSS.rar.

Notes/comments

- Note that this is an “experimental” simulator. Feel free to extend/modify it to your own work.

- The main “smart grid application” files are in /FiWi/src/common/FiWiTrafGen and /FiWi/src/PowerSystem.
- The power system is a distribution grid of 342 customer households according to standard IEEE 13-Node.
- The PON network was simplified and optimized for my own work.
- The wireless network can be used to simulate IEEE 802.11b/g/n/ac/e with frame aggregation techniques, virtual collision (11e), etc. Note that the radio layer was simplified for my own work, too, since my work is on the MAC (DCF/EDCA) layer.
- It would be more interesting/simple to run both power sys. and communications systems on a single machine, for example by modelling the power system with MATLAB on Linux.