

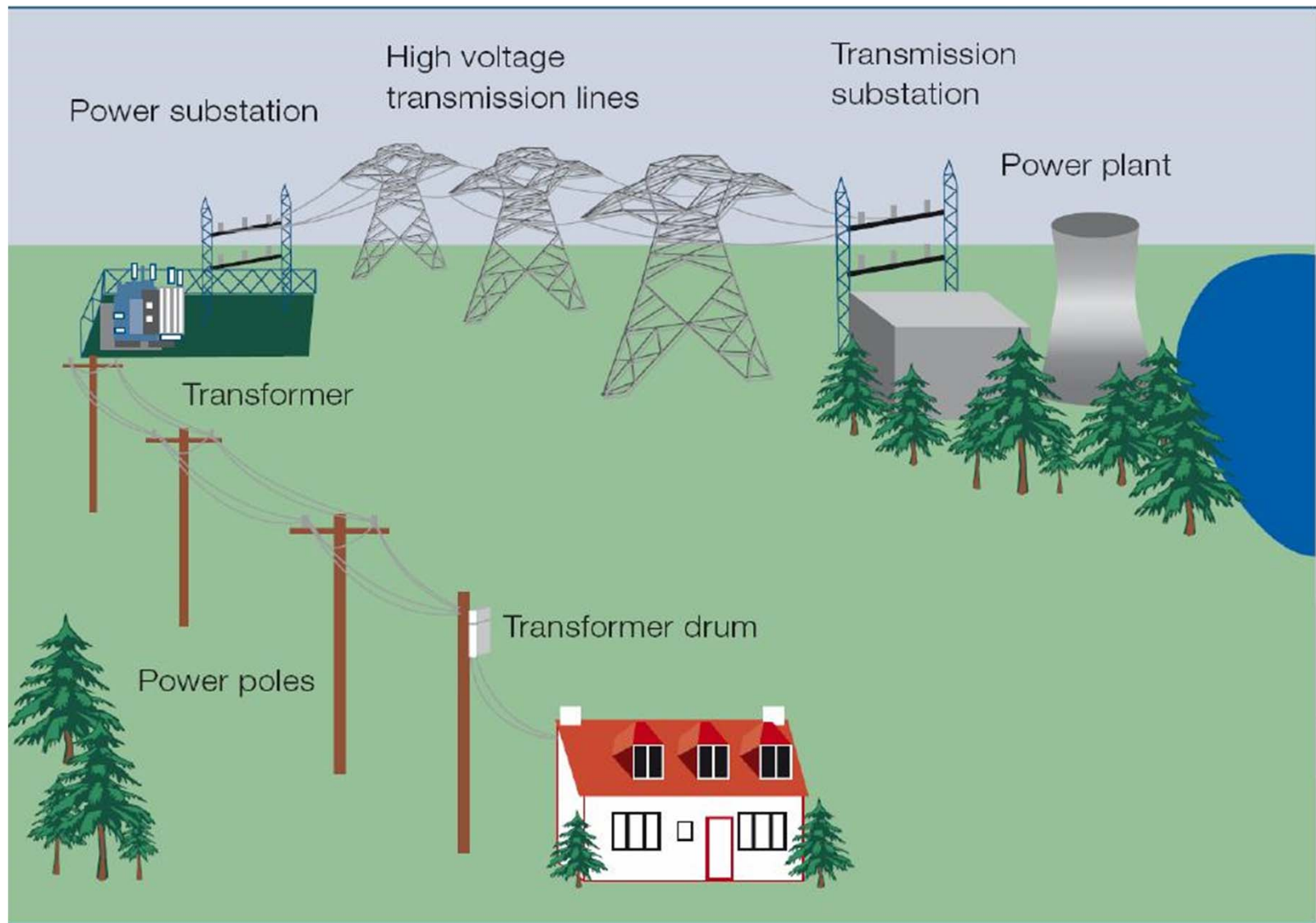


SmartGridLab+ :
**integrated software emulator and
hardware testbed for smart grid**

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Power Grid: centralized power supply

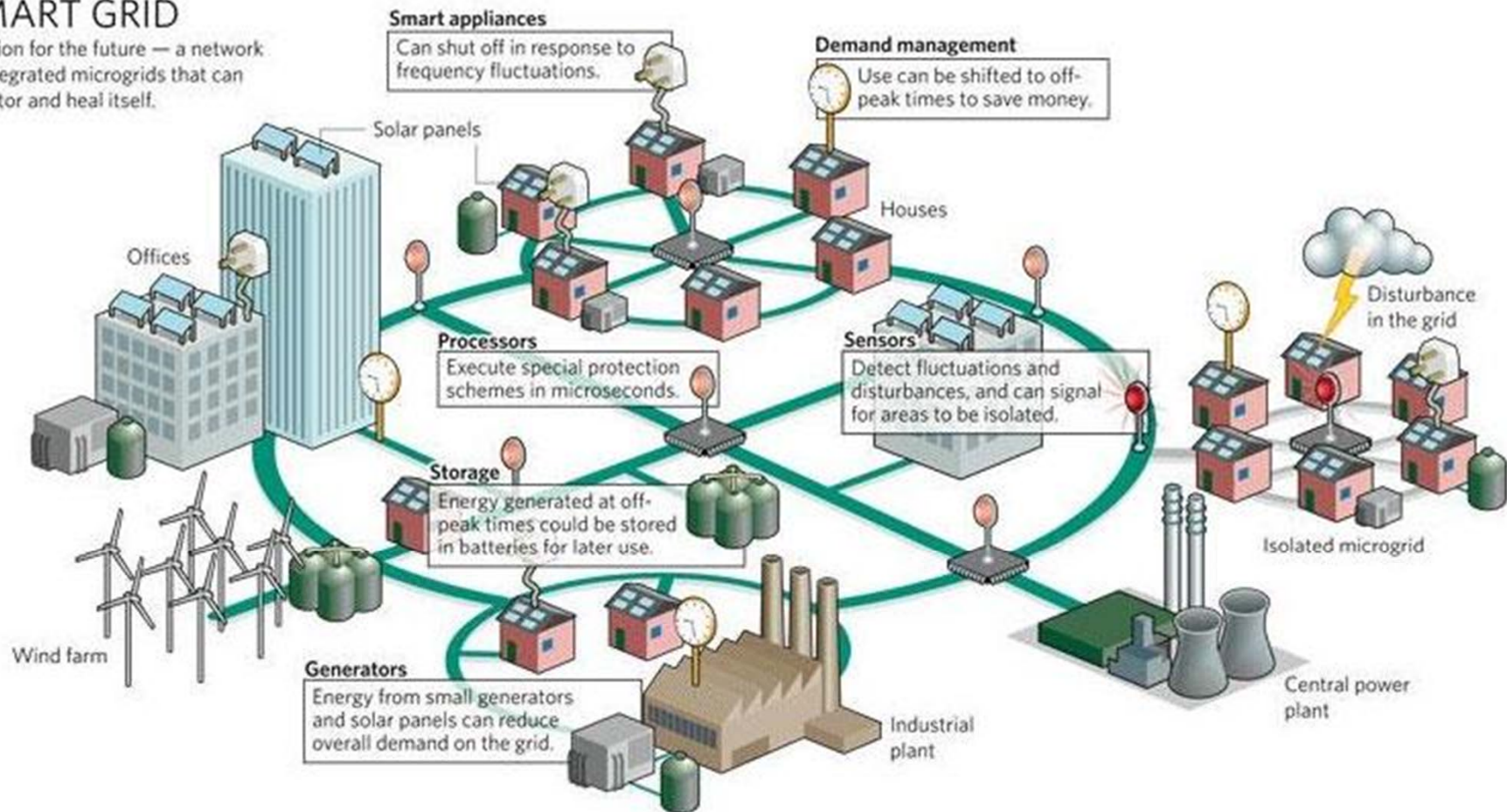




Smart Grid: power grid + information network

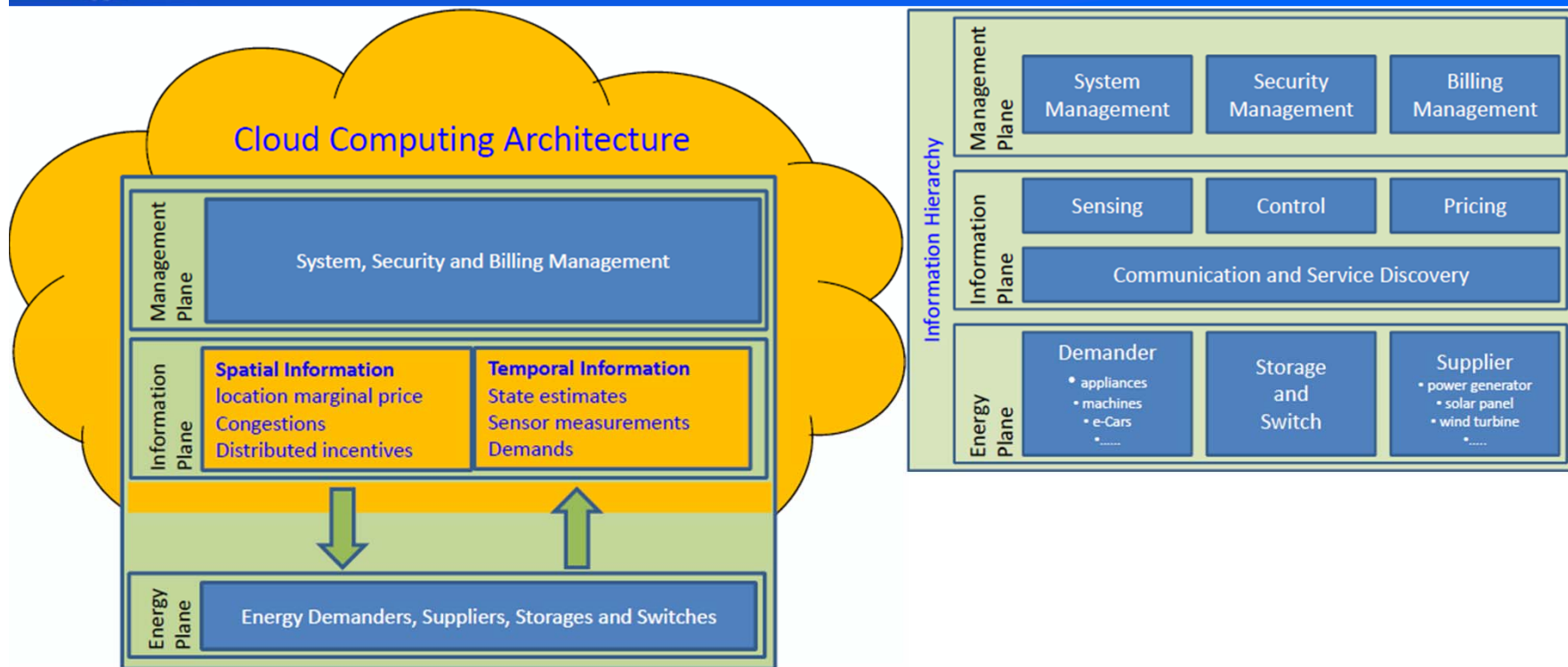
SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.





Hierarchy of Smart Grid

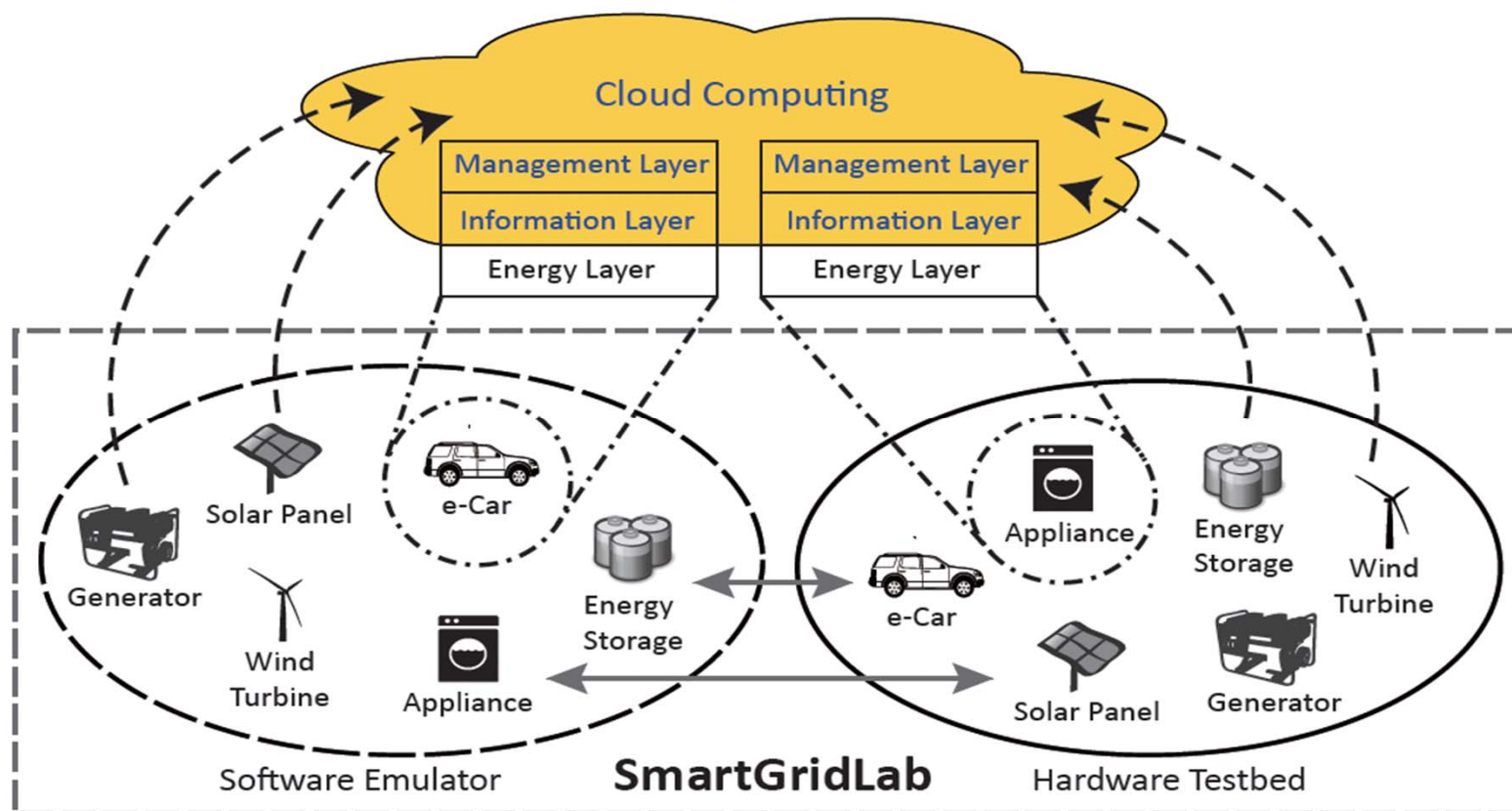


2011 NSF CPS Project (\$1.87M 2011-2015): Information and Computation Hierarchy for Smart Grids (PI: Tong (Cornell), Co-PI: Birman, Mount, Thomas (Cornell), Varaiya (UC Berkeley), Song (GSU))

The goal is to gain a foundational understanding of how information should be partitioned in time and space; how it should be collected, distributed, compressed, and aggregated.



SmartGridLab Testbed + Emulator

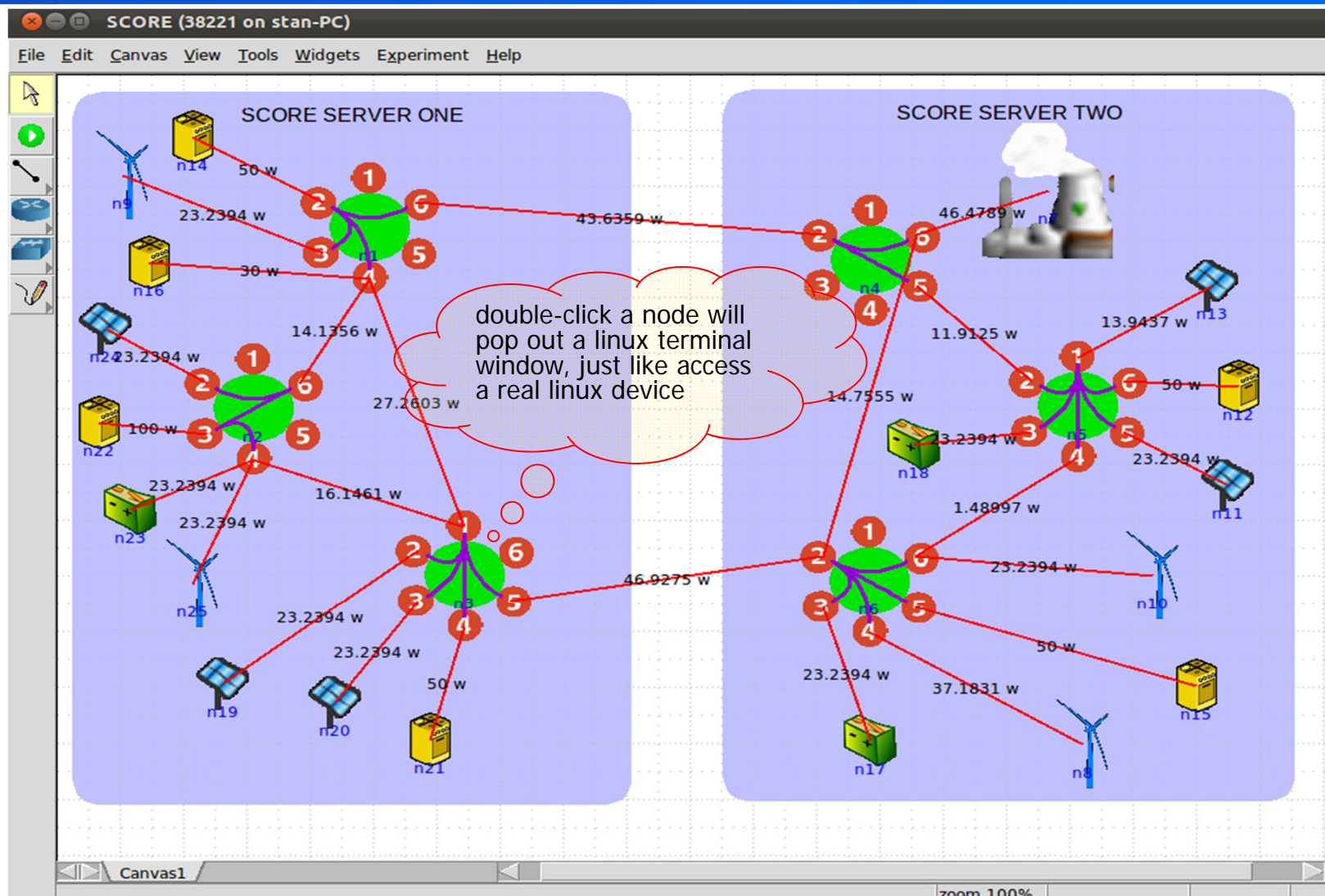


Features:

- Virtual node in emulator and real node in testbed can mutually communicate and exchange power;
- Exact same source code can run in both testbed and emulator;



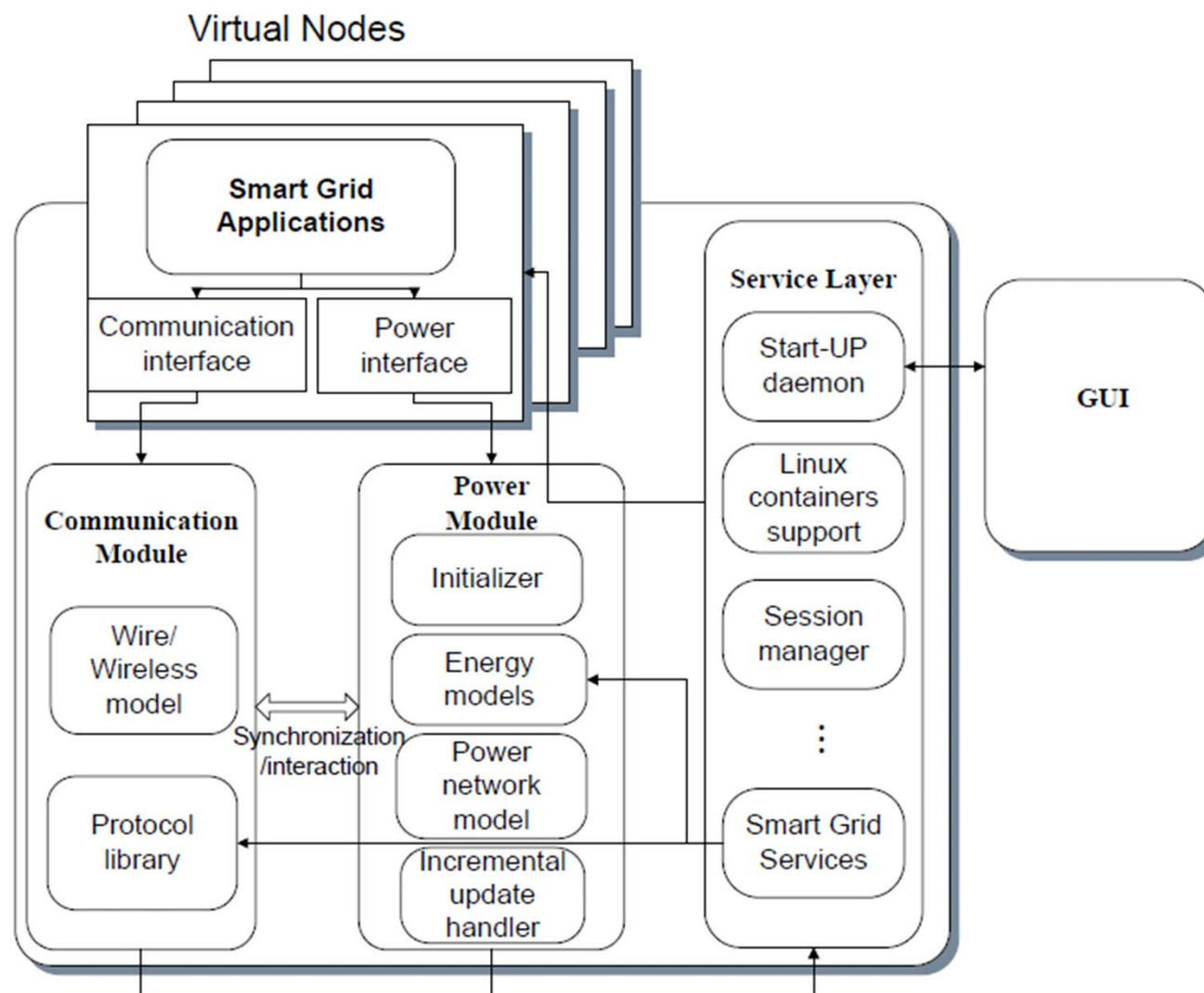
SmartGridLab Emulator Screenshot



V1.0 was released on August 2012 at <http://sensorweb.cs.gsu.edu/?q=score>



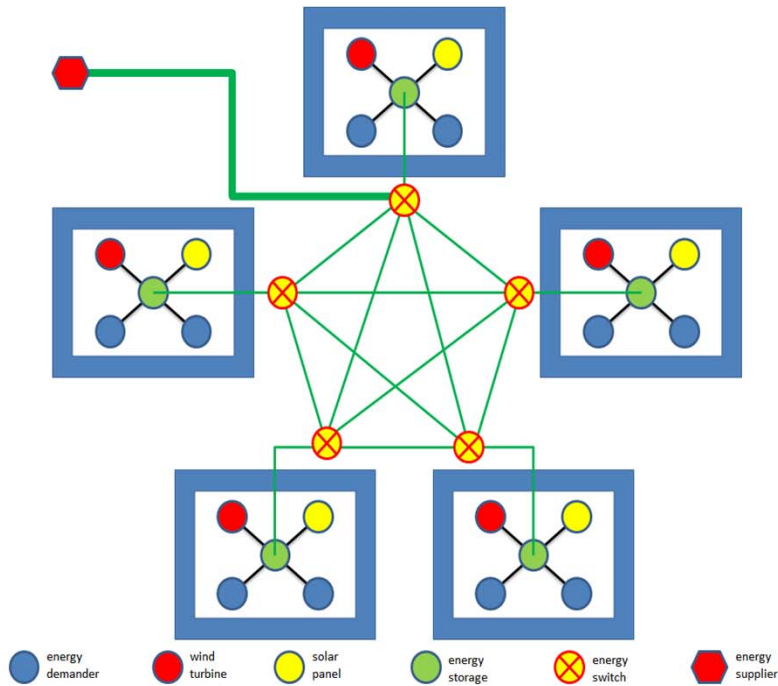
SmartGridLab Emulator Design



Song Tan, et al , [SCORE: Smartgrid Common Research Emulator](#), IEEE SmartGridComm, 2012



SmartGridLab Testbed – ongoing





Status Summary

- Our software emulator SCORE v1.0 is released and its design will appear in SmartGridComm'12.
 - Emulate both communication and power network
 - First attempt in the community
 - Design as an emulator - more than a simulator
 - Same software can be directly run in real linux-based devices
 - Later it can directly interact with smart grid testbed too
 - Support large-scale emulations in the Internet
 - Can run across multiple machines in the Internet
- Our hardware testbed has individual modules designed and needs more validation and integration.
- Next plan is to allow online inter-connection of multiple emulators and/or testbeds.