Building Energy Management Open-Source Software Development (BEMOSS)

FOA822 Project Meeting (DE-EE0006352)

Prof. Saifur Rahman

Virginia Tech - Advanced Research Institute

Virginia Tech

Project Objectives

◆ **We propose** to develop a web-based BEMOSS software platform for effectively managing electrical energy demands in small and medium-sized buildings.

◆ **Our foci:**

❑ **Applications** – Open architecture and scalability for accelerated deployment

❑ **Usability** – Interoperability and plug & play feature for flexible integration with different equipment and device controllers

❑ **Advanced monitoring** – Web-service interface allowing access from virtually everywhere

❑ **Cost-effectiveness** – Low deployment cost and advanced algorithms for energy saving improvement and demand response

Objective - Phase 1

◆ **Phase 1 –** BEMOSS software and software interface for plug & play hardware device integration in a simulated environment
  - ❑ Task 1: BEMOSS open source software development in consultation with Industry
  - ❑ Task 2: BEMOSS user interface and software tools design
  - ❑ Task 3: Plug & play device integration

◆ **Phase 1 – Milestones**
  - ❑ Successful operation of HVAC, lighting and plug load controllers in a simulated environment
  - ❑ Successful integration of all three hardware controller interfaces with BEMOSS system
  - ❑ Software apps that display sufficient maturity to allow testing the functionality of BEMOSS system
  - ❑ Plug & play capable hardware controller interface devices

Overall Concept – Year 1

◆ Select commercially available hardware devices, including HVAC, lighting and plug load controllers

◆ Design & develop BEMOSS operating system environment based on LINUX (or iOS, or Windows)

◆ Develop open source software to interact with the controllers of selected commercial products so that they function as plug-and-play devices in the BEMOSS operating system environment

◆ Design BEMOSS user interface

◆ Demonstrate the preliminary BEMOSS operating system in a simulated environment

Architecture of BEMOSS Master Controller

Applications

Monitoring, Control, Demand Response, System Administration, User Interface

Framework

Apache Web Server, MySQL Database Server, Python Server, Tomcat Java servlet container
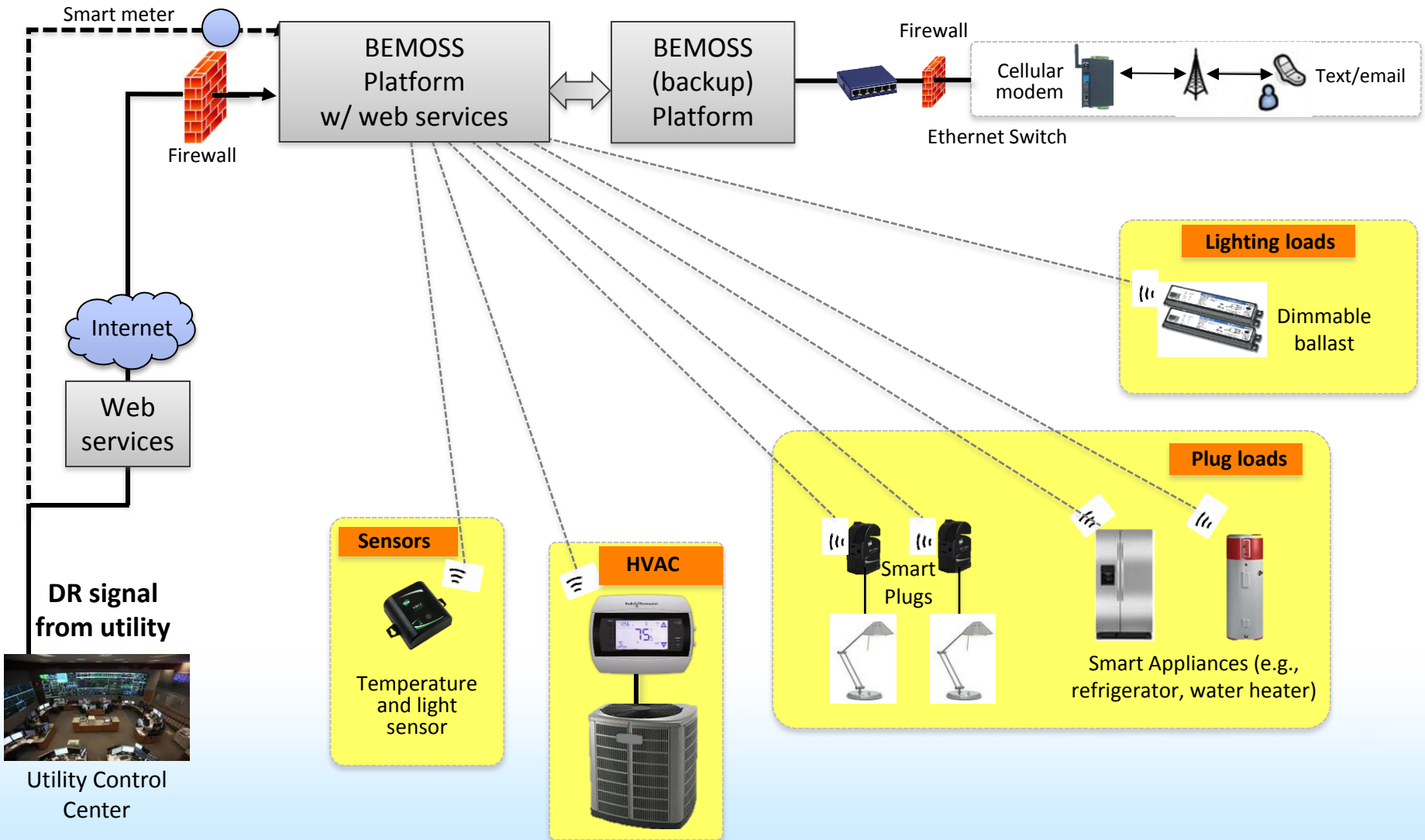
Operating System – LINUX-UBUNTU

Hardware – PC or embedded system

Communication Gateway

WiFi
ZigBee
Ethernet

Preliminary BEMOSS Architecture

BEMOSS Goals

BEMOSS Key Features:
- Scalability
- Robustness
- Plug and play
- Open protocol
- Interoperability
- Cost-effectiveness
- Local and remote monitoring

Open communication protocols, e.g.,
- BACNet
- MODBus
- OpenADR

Communication technologies, e.g.,
- WiFi
- ZigBee
- Ethernet

Loads, e.g.,
- Lighting loads
- Plug loads
- HVAC

- **Various sensors**, e.g., ambient light/ temperature, occupancy, photocells
- **Multiple-zone control**
- **Alarm management**
- **Weekday/weekend schedules**

Communications with external sources via web services, e.g.,
- Utilities
- DR aggregators

Public Domain Information Exchange

- The BEMOSS web address www.bemoss.org has been acquired.

- In addition to http://sourceforge.net, this web portal will be used as a full-scale repository to host information about the BEMOSS project, source codes, user interface tools, project progress and information about demonstration sites.

Building Energy Management Open Source Solution (BEMOSS)

Home   Contact Us

Virginia Tech at 1021 Prince Street, Alexandria, VA

Building Energy Management Open Source Software (BEMOSS)

The objective of this project is to develop a web-based Building Energy Management Open Source Software (BEMOSS) platform for optimizing electricity usage in small and medium-sized buildings and help implement demand response (DR). BEMOSS aims at:

- **Application**: Open architecture of BEMOSS will encourage hardware manufacturers to accelerate their development of energy management tools

- **Usability**: The proposed BEMOSS software will have application gateway features to provide interoperability between various standards, and enable the plug & play feature.

- **Advanced Monitoring**: BEMOSS will provide real time monitoring of the building energy consumption and device' status through a web interface.

- **Cost-effectiveness**: BEMOSS will provide advanced algorithms for energy efficiency improvement and demand response (DR).

BEMOSS Partners

Contact Us for More Information

9

Thank You

Prof. Saifur Rahman

Virginia Tech, USA
Email: srahman@vt.edu