



Renewable Energy Research Laboratory

# Dynamic Control Communication System for Hybrid Power Systems

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# Overview

- Background information
- System description
  - Hardware
  - Software
- Experiments



# Introduction

- Imagine:
  - Buying off the shelf components, installing the components, plug them in to power grid and communications network, and they work
  - Replacing a component with something similar, not exactly the same, and the the system still works
  - Component failure is handled gracefully
- A smarter, if not easier, hybrid power system
- Buzzword: Plug and Play



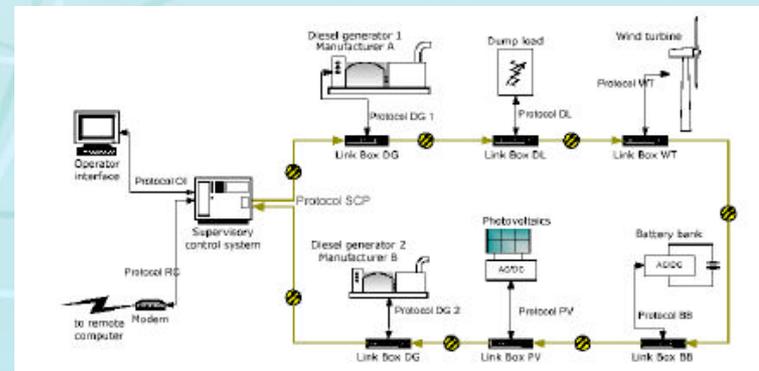
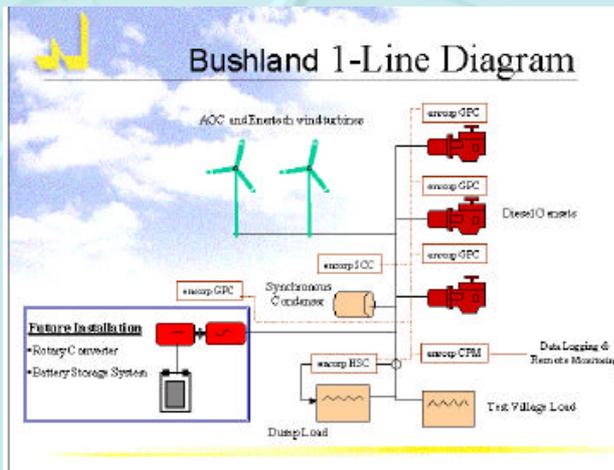
# System capability

- Allow the supervisory controller knowledge of what is available on the hybrid power system grid
- Update information as needed
- Objectives:
  - Flexibility
  - Modularity



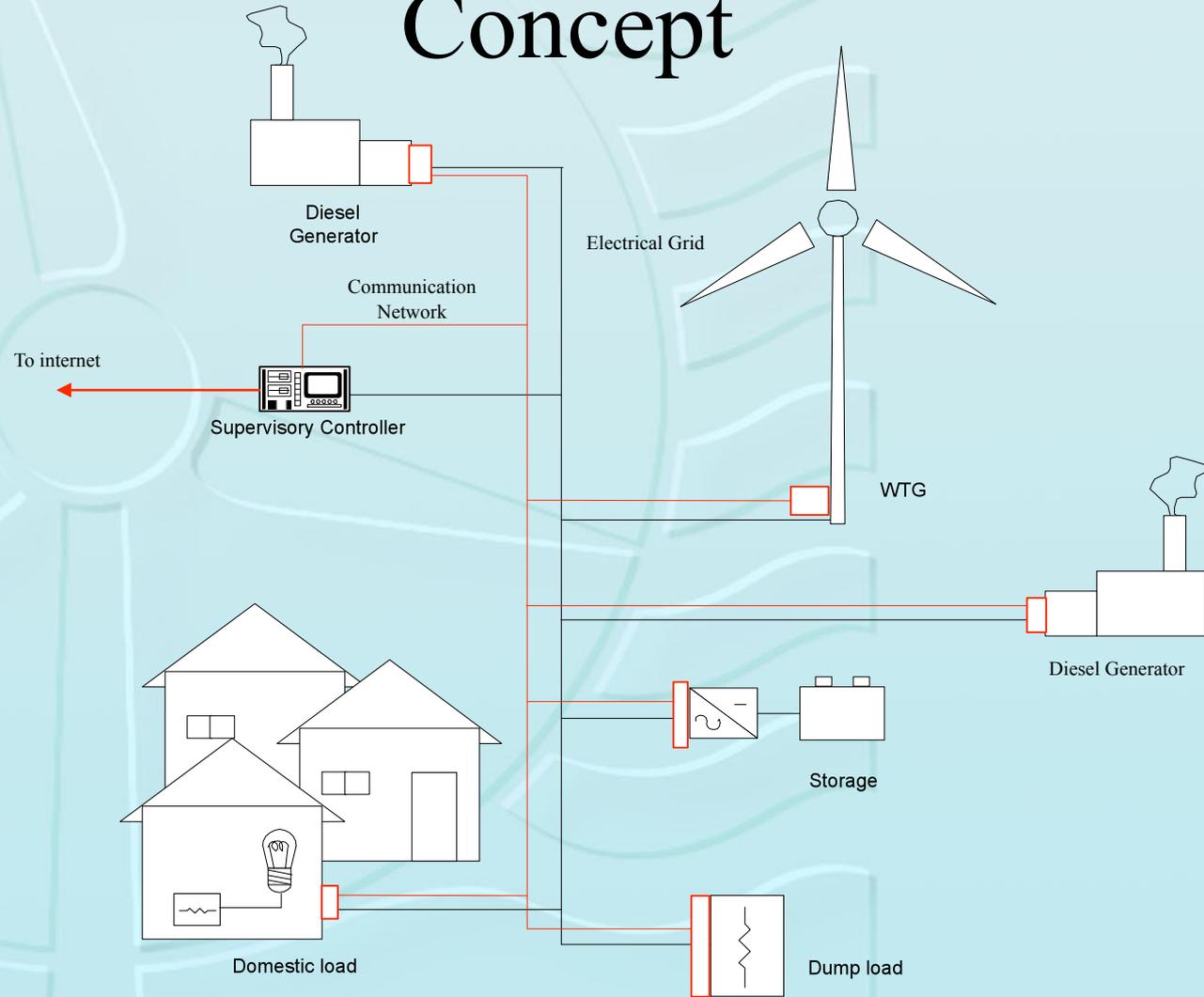
# Previous work

- Linton and Dohmen (2000)
- Pereira (2000)





# Concept



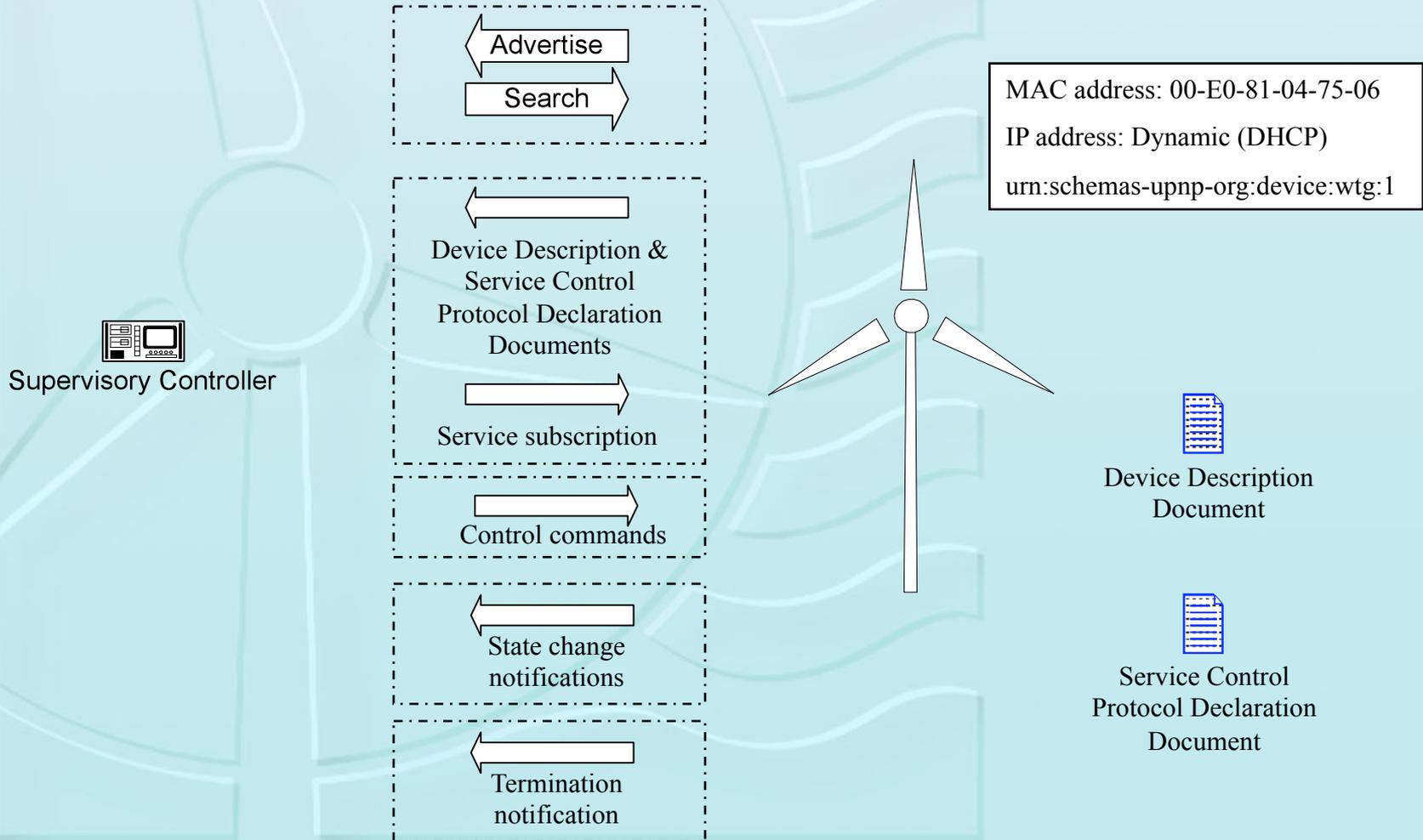


# Software

- Universal Plug and Play (UPnP) specification
- Ethernet (IEEE 802.3)
  - Dynamic Host Control Protocol (DHCP)
  - Hyper Text Transport Protocol (HTTP)
  - Simple Service Discovery Protocol (SSDP)
  - Simple Object Access Protocol (SOAP)
  - General Event Notification Architecture (GENA)
  - UPnP Application Program Interface (API)
- Linux Operating System
- Linux SDK for UPnP devices



# System Operational Overview



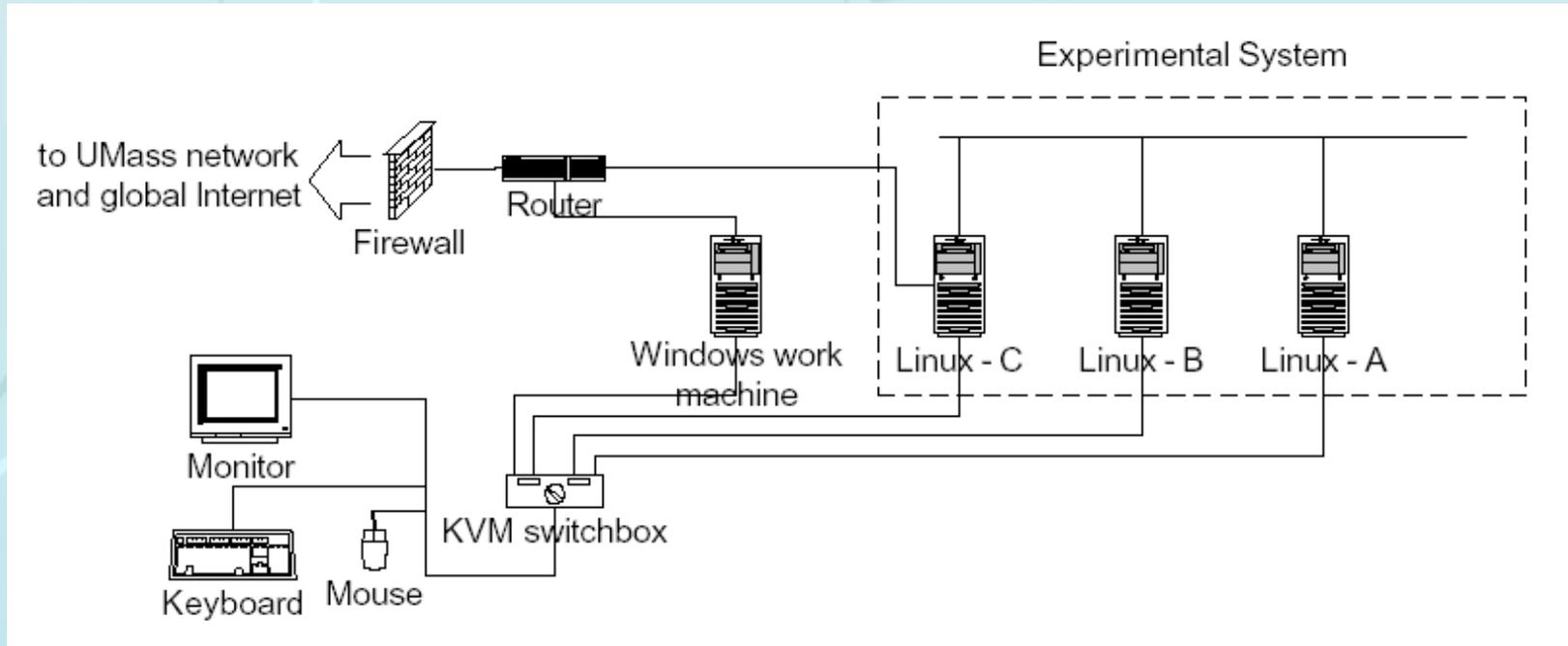


# Component Modeling

- **Supervisory Controller**
  - Dispatch algorithm
- **Diesel generator**
- **Wind turbine generator**
- **Primary load**
- **Dump load**



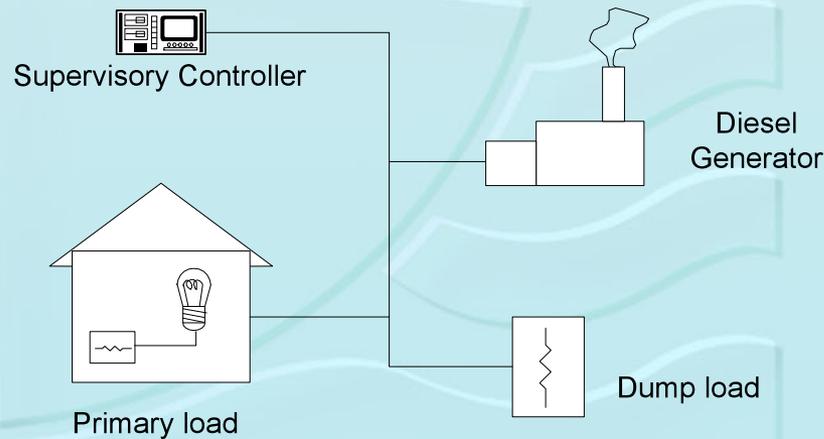
# Experimental System





# Tests

- Identification of connected components
- Sending and receiving of commands
- Dispatch source and sink



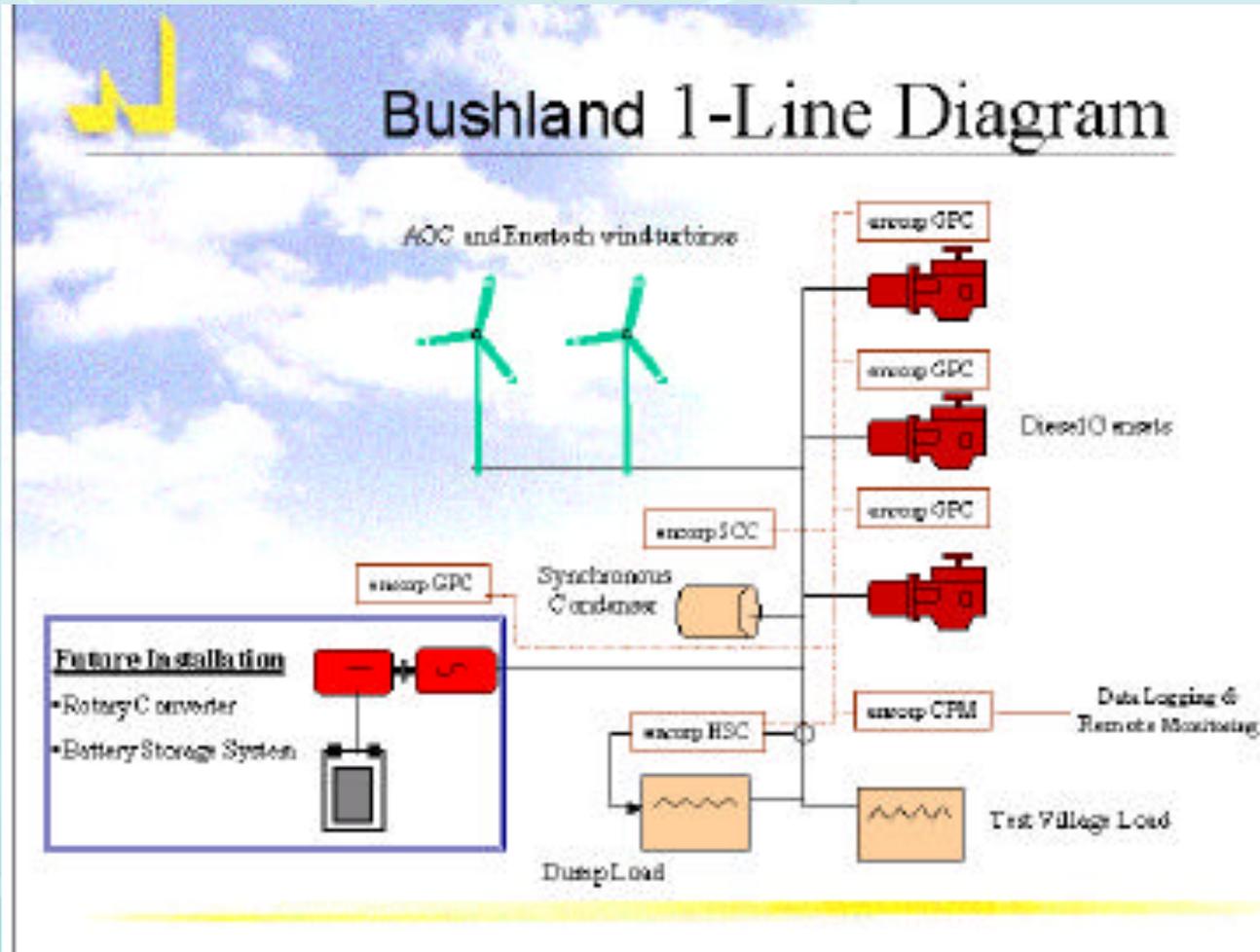


# Conclusion

- A concept that facilitates adaptable hybrid power system supervisory controller
- Automatic component identification and capability recognition
- Tests confirm viability of concept
- Further development potential



# Linton and Dohnen (2000)





# Pereira (2000)

