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India SMART UTILITY Week 2024

Supporting Ministries



Session : PRESENTATION OF SELECT TECHNICAL PAPERS

Smart Buildings and Electric Vehicles Acting as
Microgrids in Context of India

Presented By

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- Proposal
 - To move towards electric vehicles.
 - Committed to Paris Agreement
 - Be a developed country by 2047.
- What: Need a system that can manage electricity supply locally and augment it too
- How: IoT, Smart Buildings, Microgrids can help in better management of electricity supply
- Where: Residential and Commercial (smart) buildings that can carry roof top solar modules and batteries

- Scenario:
 - Electricity Demand is expected to increase due to housing, industries, electric vehicles
 - Cannot keep on building new power plants to meet the demand
 - Fossil Fuels are limited supply and already add to pollution
 - Sustainable Development
- Contrast Scenario
 - European Commission study found that buildings are responsible for 40% of energy and 36% of Greenhouse gas emissions
 - Studies exist that show that personal vehicles are idle for most of the day in parking lots or at residences
 - A parking lot may have many personal electric vehicles that may be fully charged.

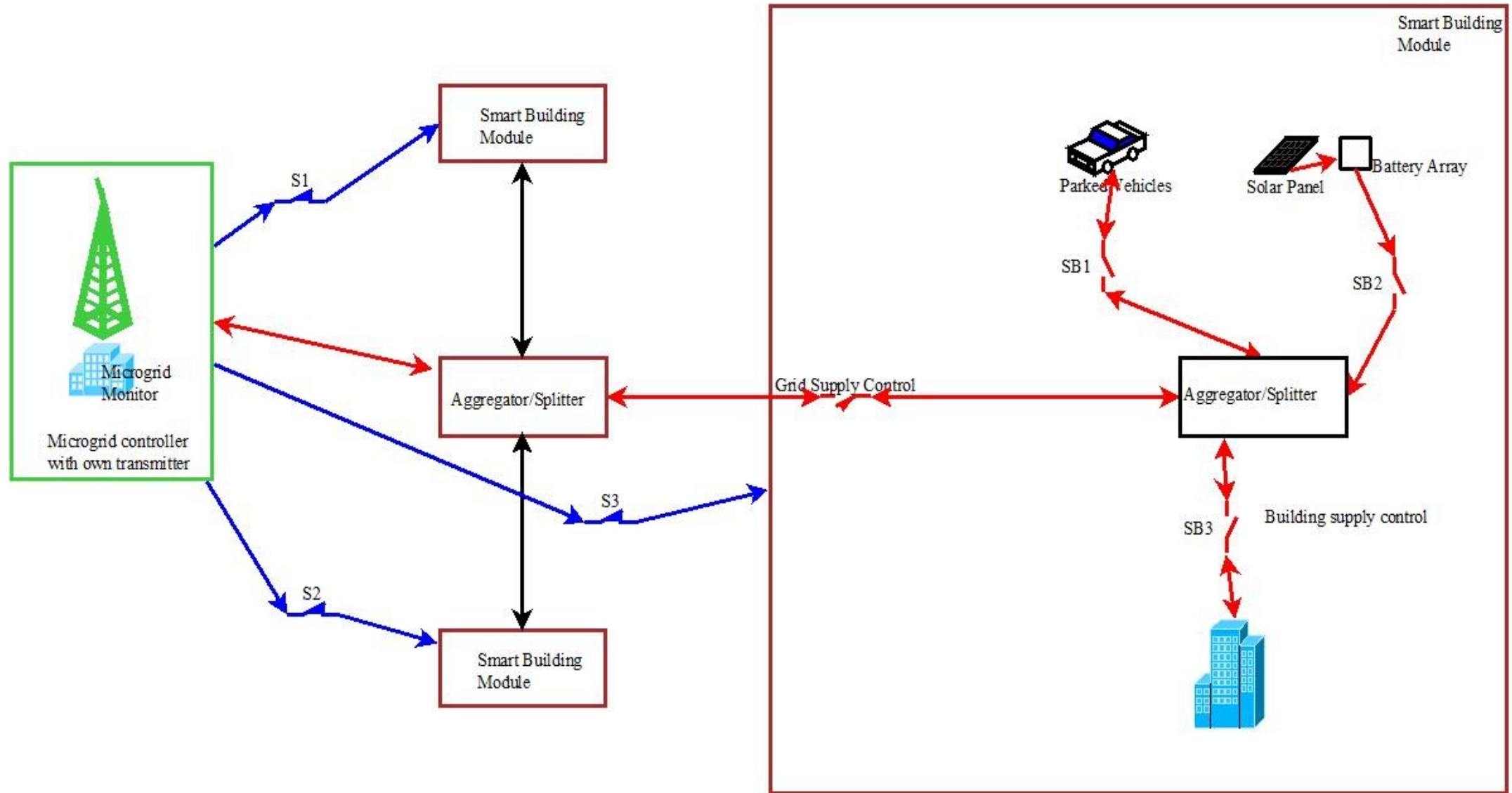
- Research already on going
 - “Grid-interfaced Solar Photovoltaic Smart Building with Bidirectional Power Flow Between Grid and Electric Vehicle with Improved Power Quality, Electric Power Components and Systems”
<https://www.tandfonline.com/doi/full/10.1080/15325008.2015.1120818> :
Base for this paper
 - 192 kWp Solar Roof Top project at IIT Kanpur:
<https://gensol.in/casestudy/192-kwp-solar-roof-top-project-at-iit-kanpur>
 - PM Surya Ghar Muft Bijli Yojana- <https://pmsuryaghar.gov.in/> already announced,
- Why not use this research to reduce dependence on grid and give back to grid

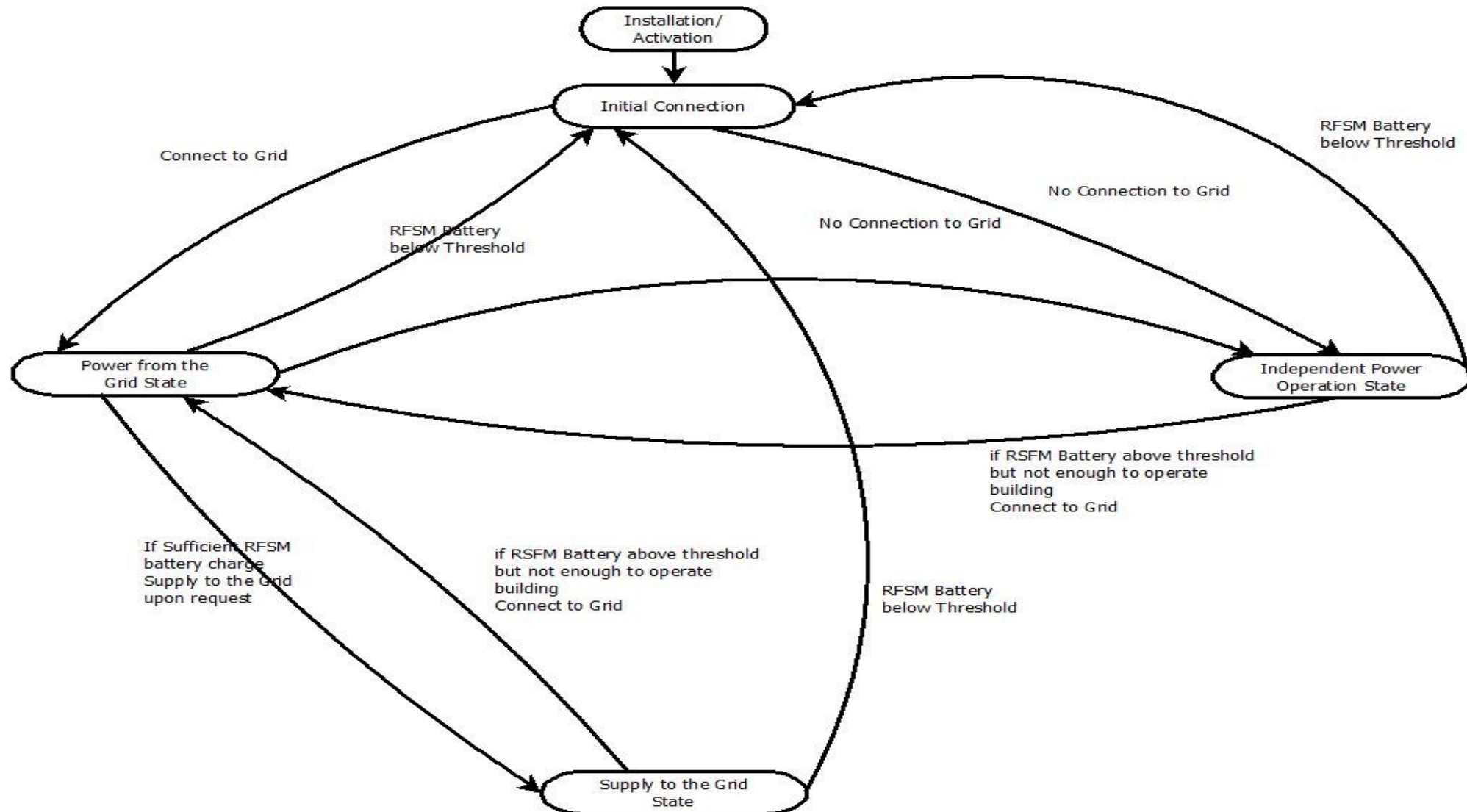
System Diagram



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USECASE: Grid to Power Cut to Grid



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- Default Case: Smart Building is getting power from Grid
- Assumption: Roof Top Batteries are Fully Charged
- The Smart Building Module (SBM) detects loss of power
- SBM switches on power from roof top batteries and moves to independent power state
 - EV charging is stopped
 - All units in the SBM are informed of the switch
 - The power is supplied from batteries until grid supply is restored or battery charge level nears threshold in which case battery supply is stopped



- Buildings are responsible for 40% of energy and 36% of GHGs
- Demand may exceed supply even if temporarily especially with EVs
 - May become difficult to construct large plants in future-> Land and other infrastructure and raw materials
- Smart building modules (SBM) can augment Electricity Supply Can reduce load on grid
- System requires inter SBM and intra SBM cooperation
- Data Privacy concern
- Periodic and prompt maintenance -> may require extra staff with hands on experience and expertise

THANK YOU

*For discussions/suggestions/queries email: **isuw@isuw.in***

visit: www.isuw.in

Links/References (If any)