



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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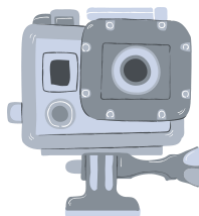


DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT 3

CASE STUDY ON MICRO GRIDS

19EEE308 – SMART GRIDS
III year / VI Semester



19EEE308 / SG / S.Bharath / AP -EEE

Case Study: MG Project at Illinois Institute of Technology

The \$14 million project has equipped IIT's MG with a high-reliability distribution system for enhancing reliability, new sustainable energy sources (roof-top solar panels, wind generation units, flow batteries and charging stations for electric vehicles), and smart building automation technology (building controllers, Zigbee sensors, controllable loads) for energy efficiency and demand response.



[12] Micro-grid Project at IIT. <http://iitmicrogrid.net/microgrid.aspx>

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Case Study: MG Project at Illinois Institute of Technology

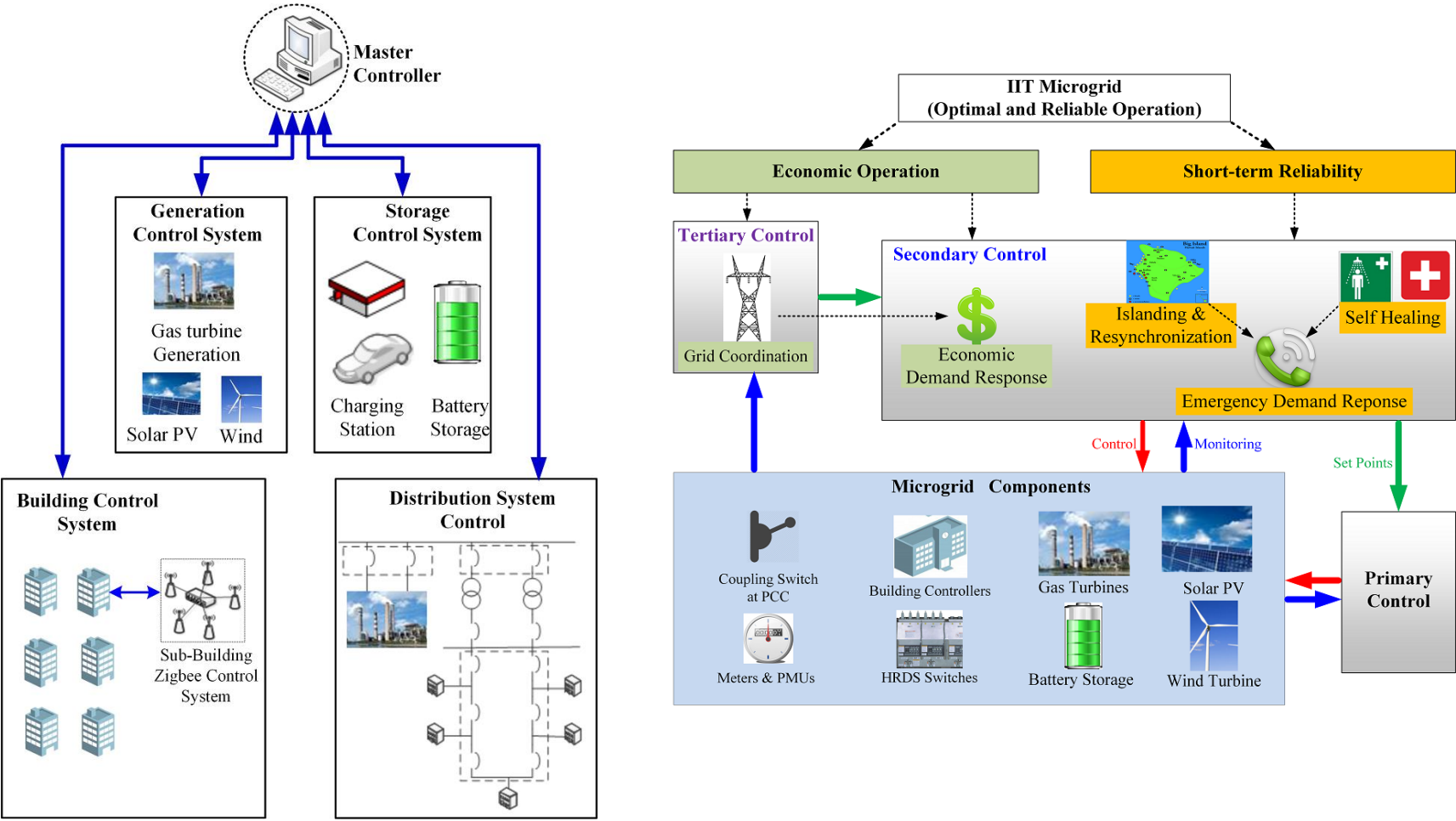


Fig. 27 General configuration of MG project at Illinois Institute of Technology [12]

[12] Micro-grid Project at IIT. <http://iitmicrogrid.net/microgrid.aspx>

Case Study: IIT-Bronzeville Networked MGs

The Bronzeville community MG [13] is adjacent to an existing MG on the campus of the Illinois Institute of Technology, which owns, manages, and operates its electric distribution system.

Phase I

- ~ 362 customers
- 2.5 MW of load
- Battery storage and solar PV
- Mobile generation used for testing purposes

Phase II

- ~ 748 customers in total
- 5.2 incremental MW of load
- Sufficient DER to meet the load
- Connected with the IIT MG to form a MG cluster

[13] M. Shahidehpour, Z. Li, S. Bahramirad, Z. Li and W. Tian, "Networked Microgrids: Exploring the Possibilities of the IIT-Bronzeville Grid," in *IEEE Power and Energy Magazine*, vol. 15, no. 4, pp. 63-71, July-Aug. 2017.

Case Study: IIT-Bronzeville Networked MGs

To explore the possibility and benefits of networking MGs, two adjacent MGs, IIT campus MG (ICM) and Bronzeville community MG (BCM) are physically tied together.

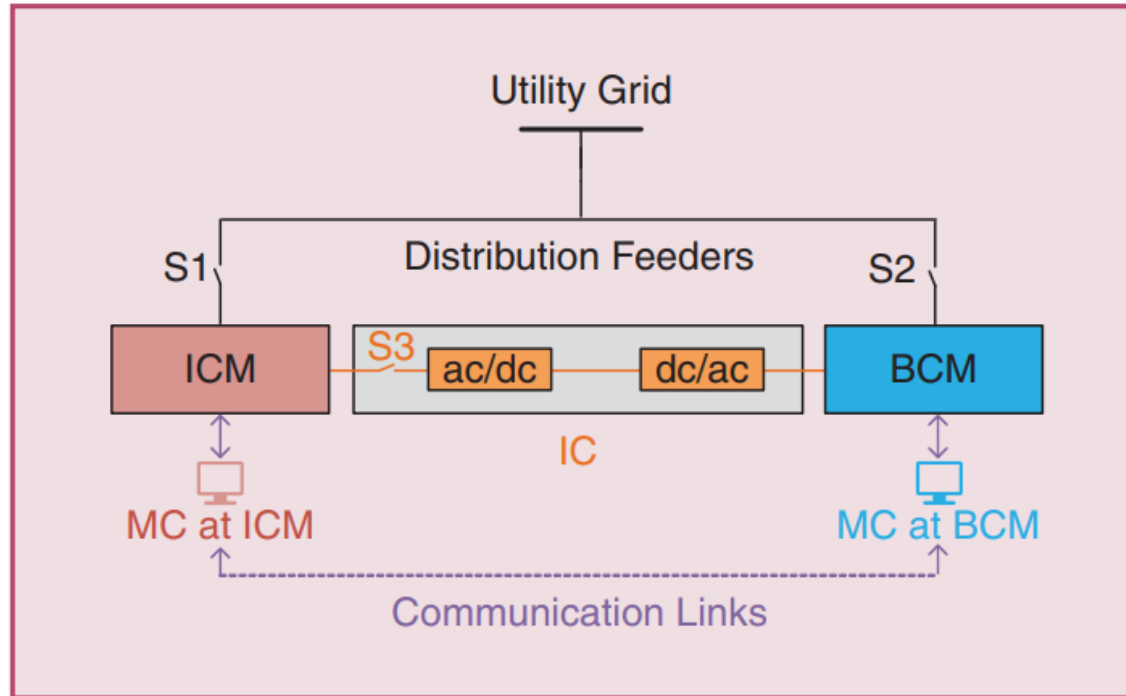


Fig. 28 A conceptual integration of the IIT-Bronzeville networked MGs [13]

[13] M. Shahidehpour, Z. Li, S. Bahramirad, Z. Li and W. Tian, "Networked Microgrids: Exploring the Possibilities of the IIT-Bronzeville Grid," in *IEEE Power and Energy Magazine*, vol. 15, no. 4, pp. 63-71, July-Aug. 2017.

Case Study: IIT-Bronzeville Networked MGs

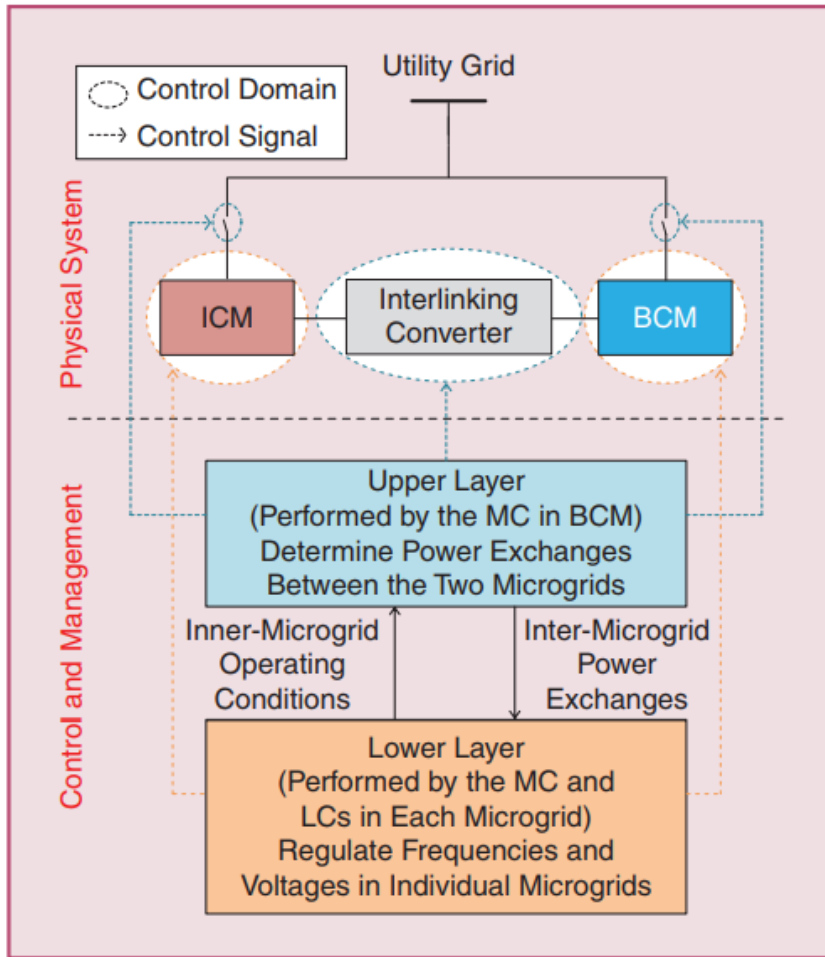


Fig.29 shows the composition of the proposed coordinated control mechanism, which is divided into two coordinated layers for facilitating the operation of the networked MGs.

- Upper layer: the MC in the BCM determines the optimal exchange of power with the utility grid and between the two MGs.
- Lower layer: the MC in each MG manages operation independently for satisfying the designated power exchanges. Each MC will communicate with its LCs in response to any changes in real-time operating conditions to regulate MG frequency and voltages.

Fig. 29 Two-layer energy management for networked MGs [13]

[13] M. Shahidehpour, Z. Li, S. Bahramirad, Z. Li and W. Tian, "Networked Microgrids: Exploring the Possibilities of the IIT-Bronzeville Grid," in *IEEE Power and Energy Magazine*, vol. 15, no. 4, pp. 63-71, July-Aug. 2017.

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- [13] M. Shahidehpour, Z. Li, S. Bahramirad, Z. Li and W. Tian, "Networked Microgrids: Exploring the Possibilities of the IIT-Bronzeville Grid," in *IEEE Power and Energy Magazine*, vol. 15, no. 4, pp. 63-71, July-Aug. 2017.

Thank you!