


UNIT-IV

Management and Control Hierarchy of Storage Systems

Introduction

- ▶ Storage systems require local area networks
- ▶ Management ensures safety and security
- ▶ Control systems interact with global networks



Management & Control Hierarchy

Management and Control Hierarchy

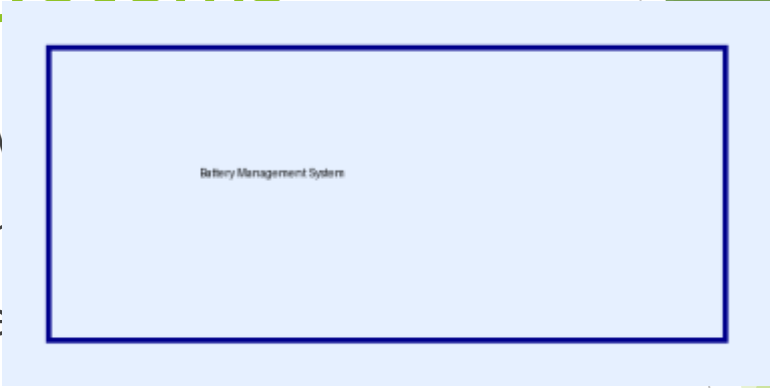
- ▶ Storage systems connect through
- ▶ Converters manage current and
- ▶ Controllers define active and re



Management & Control Hierarchy

Internal Configuration of Battery Storage Systems

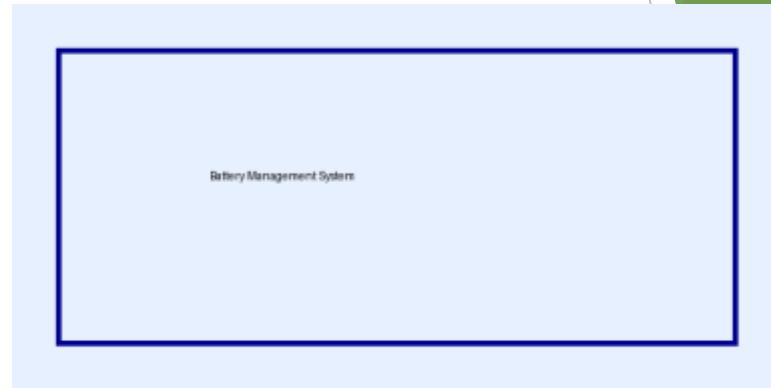
- ▶ Battery Management System (BMS)
- ▶ Controls charging and discharging
- ▶ Improves safety and battery life



Battery Management System

Functions of BMS

- ▶ Cell monitoring
- ▶ Temperature protection
- ▶ Charge balancing
- ▶ Fault detection



External Connection of EES Systems

- ▶ Set-points can be local or remote
- ▶ Applications determine control
- ▶ Used for load leveling and wind



Applications of External EES Control

- ▶ Energy time shifting
- ▶ Wind power smoothing
- ▶ Dynamic grid management



Virtual Power Plant (VPP)

- ▶ Aggregates EES and distributed
- ▶ Acts like one large power plant.
- ▶ Controlled using smart grid tech



Virtual Power Plant

Advantages of VPP

- ▶ Improves grid flexibility
- ▶ Supports renewable integration
- ▶ Efficient centralized control



Battery SCADA

- ▶ Centralized control of dispersed
- ▶ Integrates different battery systems
- ▶ Supports utility applications.



Battery SCADA

Functions of Battery SCADA

- ▶ Load frequency control
- ▶ Load leveling
- ▶ Power flow management
- ▶ Battery coordination



Future of Storage Control Systems

- ▶ Smart grids need advanced control
- ▶ Battery aggregation will increase
- ▶ SCADA and VPP will play major roles



Battery SCADA

Conclusion

- ▶ Management systems are essential
- ▶ BMS and SCADA improve performance
- ▶ VPP supports future smart grid



Management & Control Hierarchy

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Thank You

Questions & Discussion