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COIMBATORE-35

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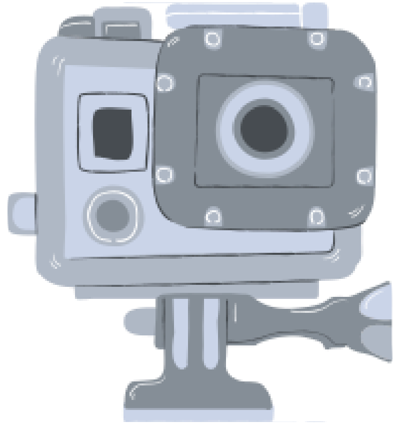
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 19EEE308 SMART GRID

III YEAR VI SEMESTER

Topic : WAMS(Wide Area Measurement System.)



WAMS

Introduction to WAMS

- Definition: WAMS is an advanced monitoring system for power grids using Phasor Measurement Units (PMUs).
- Purpose: Real-time data collection and analysis to improve grid reliability.
- Importance: Ensures power system stability, enhances control, and prevents blackouts

WAMS

Components of WAMS

- PMUs (Phasor Measurement Units): Measure voltage and current phasors in real time.
- PDCs (Phasor Data Concentrators): Collect and synchronize PMU data.
- Communication Networks: Transfer real-time data for analysis.
- Control Centers: Process data and make grid operation decisions.

WAMS

Working Principle of WAMS

- PMUs collect electrical measurements across the grid.
- Data is timestamped using GPS signals for precise synchronization.
- PDCs aggregate and analyze data, detecting grid instabilities.
- Operators receive alerts to take preventive actions.

WAMS

Applications of WAMS

- Power Grid Stability Monitoring: Detects faults and disturbances.
- State Estimation: Improves accuracy of power system modeling.
- Renewable Energy Integration: Helps balance fluctuations from solar/wind energy.
- Blackout Prevention: Identifies weak grid areas for preventive action.

WAMS

Benefits of WAMS

- Improved Reliability: Detects faults before failure occurs.
- Real-time Monitoring: Enhances situational awareness.
- Faster Response: Reduces blackout risks.
- Efficient Power Distribution: Optimizes energy flow across networks.

Challenges of WAMS

- High Implementation Cost: Requires advanced infrastructure.
- Data Security Risks: Susceptible to cyberattacks.
- Data Overload: Large volumes of data require efficient processing.
- Communication Latency: Delays in data transmission can impact decisions.

WAMS

WAMS vs Traditional Monitoring

Feature	WAMS	Traditional Monitoring
Data Collection	Real-time	Periodic
Accuracy	High	Moderate
Fault Detection	Instantaneous	Delayed
Grid Stability	Proactive	Reactive

WAMS

Future Trends in WAMS

- AI & Machine Learning: Advanced analytics for grid optimization.
- Edge Computing: Reduces data transmission latency.
- 5G Networks: Enhances communication speed and reliability.
- Increased PMU Deployment: Expands monitoring coverage.