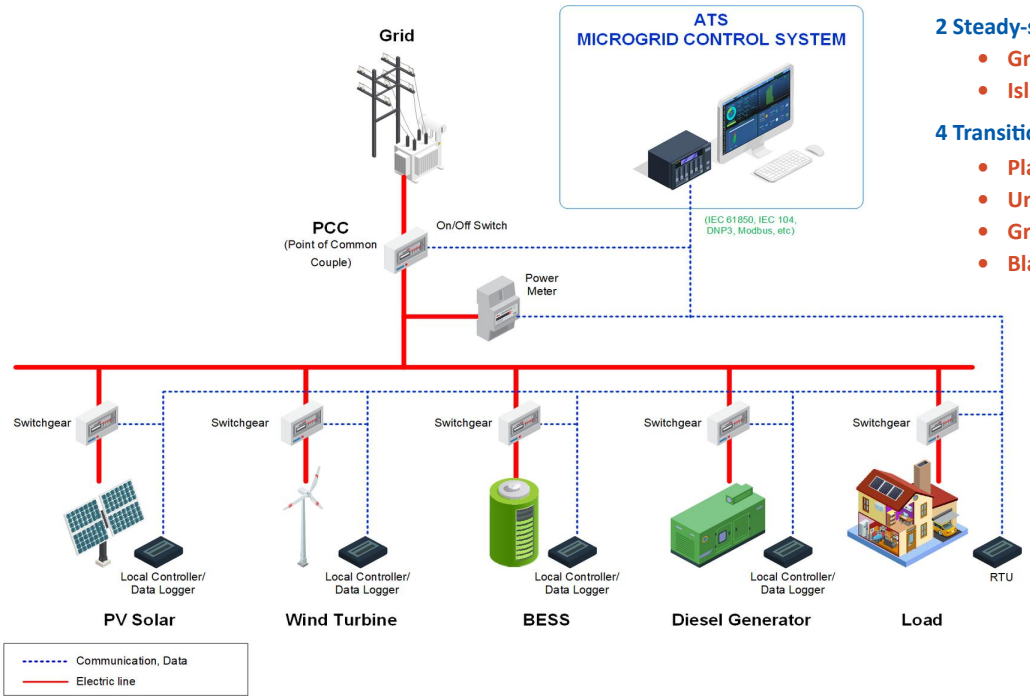
@MicroGrid™ is an ATS designed and provided control system solution for microgrids designed in any configurations and composed of any types of DERs. The solution completely complies with international standards and can be developed and customized to fulfill the technical needs of specific microgrid projects.



System Architecture of @MicroGrid™

2 Steady-state Modes:

- Grid-connected (On-grid)
- Islanded (Off-grid)

4 Transitioning Modes:

- Planned Islanding
- Unplanned Islanding
- Grid Reconnection
- Black-start

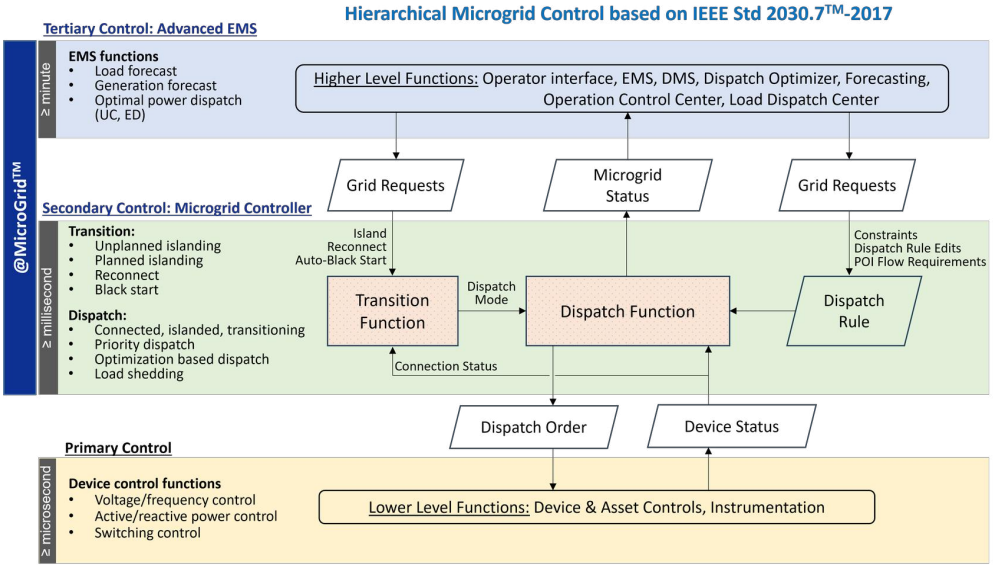
2 Core Modules:

- Microgrid Controller (MGC)
- Advanced EMS (A-EMS)

Control Functions:

- Active Power Control
- Reactive Power Control
- Frequency Control
- Voltage Control
- Fault Ride-Through Control
- Load Shedding Control
- BESS SoC Managment
- Spinning Reserve Management
- Generator Minimum Load Protection
- Optimization-based & Rule-based Control

Hierarchical Microgrid Control based on IEEE Std 2030.7™-2017



Hierarchical Microgrid Control Structure

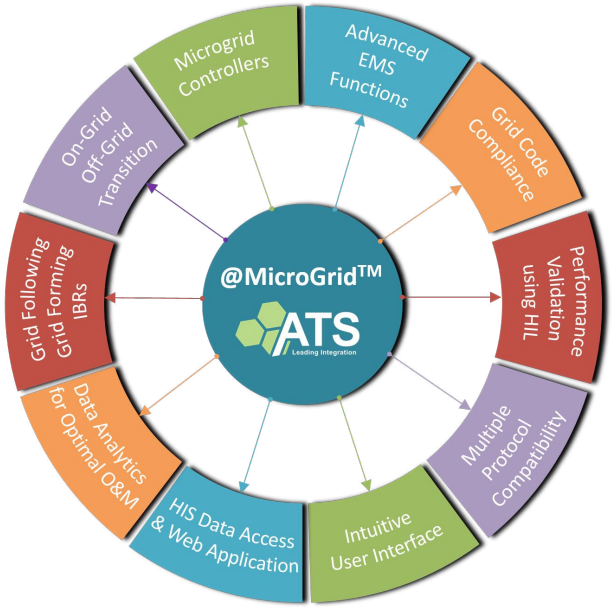
- **Microgrid Controller (MGC):** The core component in charge of overall microgrid control and coordination. According to IEEE Std. 2030.7-2017, two core control functions, namely Transition Function and Dispatch Function, are performed by MGC. There are four transition modes including **Planned Islanding, Unplanned Islanding, Reconnection to the grid, and Black Start**. The Dispatch Function carries out the operations for **Grid-connected, Islanded, and Transition Modes.**

- **Advanced Energy Management System (A-EMS):** Advanced applications that communicate with the microgrid controller to monitor and **optimize the operation of the entire microgrid**. It makes optimal dispatch of energy resources by using **machine learning and deep learning-based forecasting models, and optimization algorithms** to balance supply and demand at lowest costs while satisfying all operational constraints.

@MicroGrid™ - A Complete Solution for Monitoring, Control, and Optimization of Microgrids

KEY FEATURES:

- **Unique platform:** The software system is developed on a unified software platform from ATS manufacturer.
- **Adherence to standards:** The hardware and software shall adhere to either de-jure or de-facto standards broadly used in the industry, especially ANSI/IEEE, ISO and IEC.
- **Worldwide grid code compliance:** The Microgrid Control System has been designed to comply with the most recent global grid codes and standards, and can be developed to meet any local grid codes.
- **Supports multiple communication protocols:** IEC 61850, IEC 60870-5-104, IEEE C37.118, DNP3, Modbus, OPC UA/DA, SNTP, SNMP, etc.
- **Vendor Independance:** The Microgrid Control System supports a wide range of devices from major manufactures. Compatible with many different microgrid's electrical device manufacturers such as Huawei, Sungrow, Kehua, etc.
- **Redundancy:** There will be no single-point failure that can cause the system to be inoperable.
- **Scalability:** With the same basic architecture, the Microgrid Control System is scalable and can support microgrid projects of many different sizes, supporting the connection of a variety of electrical devices.



All-In-One @MicroGrid™



Microgrid Controller (MGC) HMI



Seamless Planned Islanding Controlled by MGC



Complete Off-Grid Operation Controlled by MGC



Intensive Monitoring of Equipment

ATS Leading of Integration

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