Distributed Solar Power Station Management Solution

Transforming Renewable Energy Operations with IoT

SRP-ESP315

- Centralized operation with unmanned remote sites
- Scalable architecture which works in plants of any size
- Analyzing and optimizing power station efficiency

ADVANTECH

Enabling an Intelligent Planet

Introduction

Due to the technological progress of the solar power industry, more and more solar power plants are planning to be built and put into operation around the world. Now, power plant owners and grid companies have concerns about how to ensure the accuracy and long-term storage of the data acquired from the photovoltaic generators, how to get an overview of the real-time operation, and how to meet health and safety requirements of government agencies. A unified monitoring management system can integrate inverters and equipment from different manufacturers, categories and types, so that the monitoring and control system can be unified. The three fundamental requirements of an ideal monitoring and management system are as follows.

System Adoptability

Due to the scale or specialty of the project, some of the vendors may only be capable of providing software or hardware. This may bring trouble when system conflicts occur between the hardware and software. Trouble may also happen after integration has finished. What owners and operators need, is to have one vendor to provide a total yet reliable solution for the operation, including data acquisition, transmission, publishing and even a cloud solution. Also, different user level access for system integrators, investors and owners, who need different access regarding power station operation.
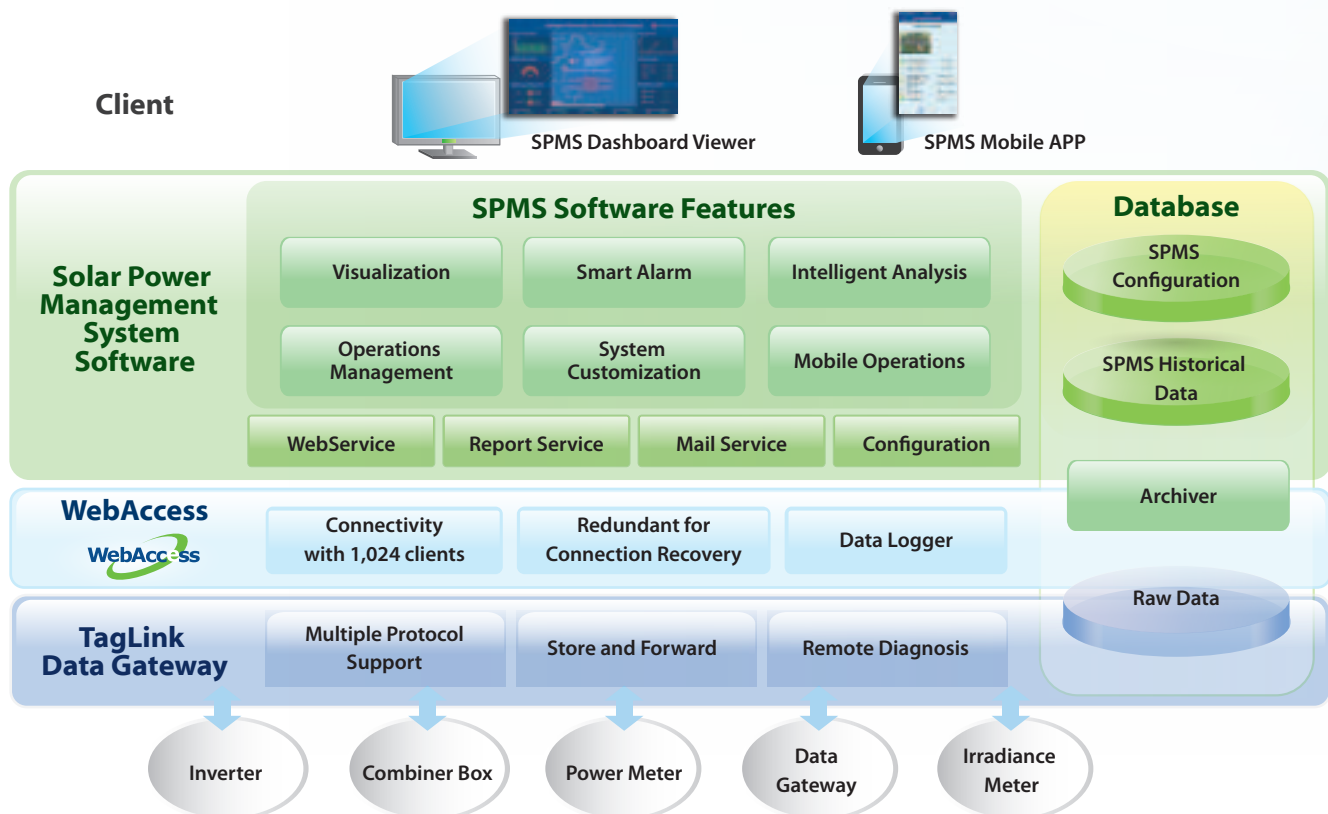
Flexible and Modularized Solution

A flexible and modularized system is desired not only because it can shorten the construction and integration period, it can also satisfy the type and scale of distributed solar power stations. A well-designed system can also meet the needs for future expansion.
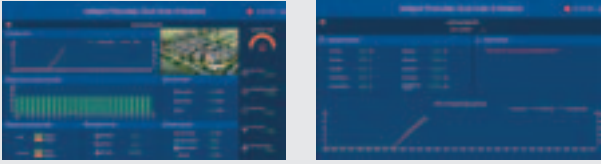
Technical Support and Service

When more and more power stations are deployed under one project owner, the project owner wants a reliable and professional service to ensure the smooth operation, as well as a quick response for constructing new power station sites. Furthermore, advanced technical training is also needed to keep staff and engineers up to speed to help optimize the operation.

Software Architecture and Key Design Features

Client

SPMS Dashboard Viewer   SPMS Mobile APP

SPMS Software Features

Solar Power Management System Software			
Visualization	Smart Alarm	Intelligent Analysis
Operations Management	System Customization	Mobile Operations
WebService	Report Service	Mail Service	Configuration

Database
- SPMS Configuration
- SPMS Historical Data
- Archiver
- Raw Data

WebAccess

Connectivity with 1,024 clients	Redundant for Connection Recovery	Data Logger

TagLink Data Gateway

Multiple Protocol Support	Store and Forward	Remote Diagnosis

Inverter   Combiner Box   Power Meter   Data Gateway   Irradiance Meter

Key Features

Hierarchical Visualization

- Hierarchical visualization of Group / Power Station KPI
- Real-time monitoring of string / inverter / meter andother equipment operating parameters
- Integrated display with web map service

Operations Management

- Supports Web GIS
- Auto report delivery service
- Manually record for knowledge base
- Auto record device history
- Access rights setting by user level

Smart Alarm

- Customized settings of alarm threshold
- One-key alarm dismiss functionality
- Versatile sound / visual effects of alarm settings
- Alarms with SMS, email or APP

Intelligent Power Generation Analysis
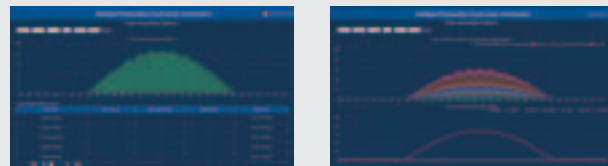
- Multi-dimensional analysis of power generation data
- Multi-granularity report statistics by "day", "month" and "year"
- Data can be exported in .xls format

System Customization
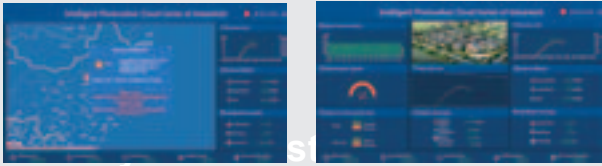
- Customization of monitor screen and data report
- Customization of power station equipment information
- Easy integration with third party software and secondary development

Mobile APP

- Supports Android and iOS
- Overview of group / station level power generation overall KPIs
- Fingerprint login available (iPhone only)
- Real-time display of plant / equipment level operation status
- Quick abnormal event query

Key Advantages/ Features

### System stability guaranteed by seamless integration

A total remote monitoring and control solution which covers data acquisition, transmission and analytics.

Precise and effective data acquisition

- Isolation protection ensure data accuracy
- Automatically resumes data transmission after network reconnection to ensure data integrity
- Supports multiple protocols and transmission networks
- Remote maintenance and upgrade

Hierarchical visualization & complete management
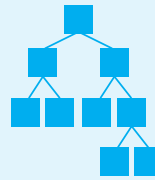
Advantech SPMS (Solar Power Management System) can be broken down into group / station / equipment / transformer / generator levels. It allows simple queries and reporting, statistical analysis and future multi-dimensional analysis or data mining.

Solution-Ready-Platform Package

ECU-4784
IEC-61850-3 Certified Power Automation Computer, 16GB RAM, 500GB SATA HDD, Windows Server 2008 R2, WebAccess 8.1Pro. Unlimited tags

ECU-1251
TI Cortex A8 Industrial Communication Gateway with 2 x LAN, 4 x COM Ports

SPMS
Solar Power Management System with one APP client

Application Scenario

How Hierarchical Visualization Works for Microgrids

From the Edge to the Cloud

Distributed Generation, Centralized Management

With more and more solar power stations being built and operated, the equipment and protocols are becoming inevitably more complex. So how to integrate multiple power stations and manage them has become a key question for owners and operators. It takes a lot of human resources to ensure equipment is properly maintained by patrolling, checking and cleaning solar panels, so an automated hierarchical visualization and reporting solution could fulfill a lot of managerial demands.
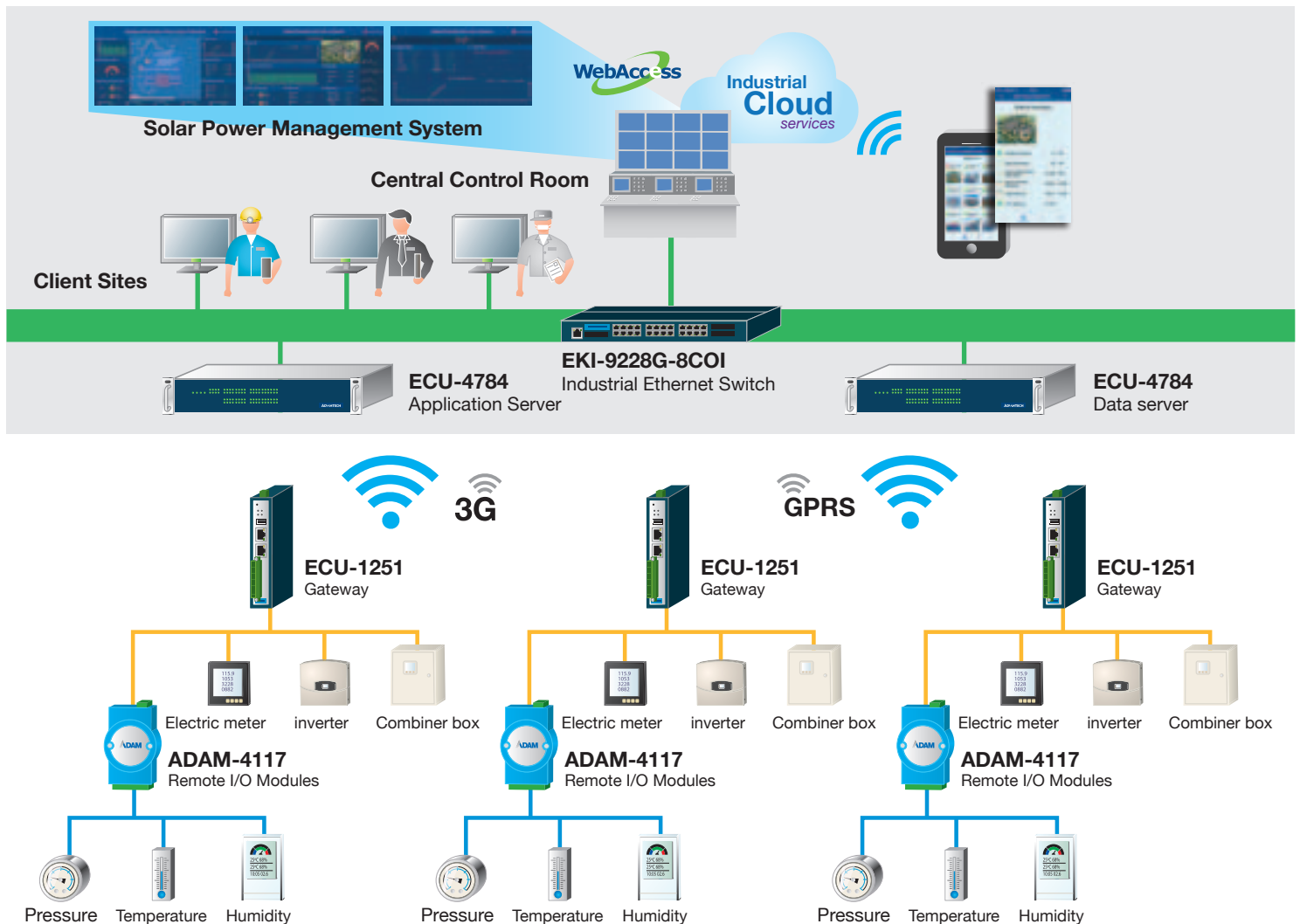
It's All in The Details

To ensure the smooth operation of the power stations, Advantech Solar Power Management System provides multiple protocol support to monitor equipment status, data accuracy and connections. Furthermore, data auto restores after network reconnection to ensure the data accuracy. Furthermore, the GIS integrated system empowers users to monitor all sites with video for security purposes.

Future: Unmanned Station

With the well managed system, the power stations can be expected to be unmanned or decrease human power fee to lowest. Also, the vision of dispatching the generated power as smart grids can be realized.

Solar Power Management System

WebAccess

Industrial Cloud services

Central Control Room

Client Sites

ECU-4784 Application Server

EKI-9228G-8COI Industrial Ethernet Switch

ECU-4784 Data server

3G

GPRS

ECU-1251 Gateway

ECU-1251 Gateway

ECU-1251 Gateway

Electric meter · inverter · Combiner box

Electric meter · inverter · Combiner box

Electric meter · inverter · Combiner box

ADAM-4117 Remote I/O Modules

ADAM-4117 Remote I/O Modules

ADAM-4117 Remote I/O Modules

Pressure · Temperature · Humidity

Pressure · Temperature · Humidity

Pressure · Temperature · Humidity

Ordering Configuration Table

SRP-ESP315 Distributed Solar Power Station Monitoring and Management Solution

Package Offering

Application Software:	Application Server:	Gateway:	OS:
SPMS *Browser-based solar power station monitoring and management software*	ECU-4784 x 1 *IEC-61850-3 Certified Power Automation Computer, 16GB RAM, 500GB SATA HDD, with preinstalled WebAccess 8.1Pro. Unlimited tags*	ECU-1251 x 10 *TI Cortex A8 Industrial Communication Gateway with 2 x LAN, 4 x COM Ports*	Windows Server 2008 R2 *Preinstalled Microsoft® Windows 2008 R2*

Expansion offerings

Gateway

ECU-1251   ☐ Qty: _____
TI Cortex A8 Industrial Communication Gateway with 2 x LAN, 4 x COM Ports

Storage Solution for ECU-1251   ☐ Qty: _____
- ***96FMMSDI-8G-ET-AT ATP*** *8GB MICRO SD CARD I-GRD SLC(G)*

Wi-Fi Solution for ECU-1251   ☐ Qty: _____
- ***9656EWMG00E*** *Half to full-size Mini PCIe bracket pack*
- ***EWM-W150H02E*** *Half-size mini card, supports 802.11 b/g/n (Wi-Fi)*
- ***1750006043*** *SMA(M) 15cm cable*
- ***1750000318*** *11cm 2dBi antenna for testing*

Wireless AP

EKI-6332GN   ☐ Qty: _____
IEEE 802.11 b/g/n Wi-Fi AP/Client