

ACORN IoT-SmartNode-Gateway Datasheet

Modular & Expandable IIoT Gateway Node

DAYTECH

Key Features

The ACORN IoT-SmartNode-Gateway is the backbone of your Industrial IoT system, providing a highly modular, flexible and scalable hardware and software platform, for an all-in-one remote control and monitoring solution.

- Easy to use and flexible, easy to wire design;
- Build your own dashboards and apps with “Drag and Drop” tools;
- Expandable system, with a power and comms bus, powering up to 8A per rail, for 4 modules and many external sensors and controls;
- ARM Cortex M4 MCU - "The Muscle" - Coordinates Mesh Networks, RS232/485 and the IO with low level RTOS (Real Time Operating System) control.
- Embedded SBC 1GHz, Single-core CPU, 512MB RAM Computer - "The Brain" - Handles IoT Gateway functions, GUI graphics and user interface with higher order control, AI/ML and 'drag & drop' flow programming with DAYTECH's Node-Red.
- DAYTECH's ControlMesh Wireless Mesh Network Protocol and API's for ease of setup and control
- Embedded Computer, "The BRAIN" handles gateway functionality, WiFi, 3G/4G cellular and TCP/IP services, user defined control and automation, huge memory with 8GB-128GB of datalogging, MQTT/COAP/HTTP, remote access and OTA firmware updates, GUI and dashboards.
- Intelligently handles 6 onboard IO, expandable up to 36 local IO and 30 remote IO nodes, with Mesh Networks, Zigbee wireless and CAN, MODBUS, RS232 and RS485 Communications.
- Sleep modes handled via the industrial grade MCU with hardened RTOS (Real Time Operating System);
- Designed for high reliability industrial control applications
- IP65 housing for outdoor use, or alternatively DIN rail mounted;
- 12VDC OR 24VDC regulated output from the node for supplying power to external industrial controls OR sensors.
- Solar/battery, DC or mains powered, with Intelligent charging.
- Acts as a Wireless Mesh Network Zigbee Co-Ordinator and concentrator, with LOS range of up to 5km to remote SmartNodes and multihopping up to 7 times.
- Multiple options in capacities, housings and models, including the SmartPower PRO Gateway. Specifications for other models are based on this document, however individual specifications may vary per variant, please enquire for more detailed information on models.



Applications

- Remote Real-Time IIoT enabled Control and Automation, Remote Monitoring and Control
- Remote Machine, Process and Equipment Monitoring and control,
- Remote PLC, RTU, SCADA, control system and communication equipment integration
- Remote pressure, temperature, flow and other sensor measurement and control
- Remote analytical and environmental measurement and control
- Remote Flow Control of Valves, Pumps and Pipelines
- Can be factory programmed for many applications
- Can be user programmed via the flow programming tool
- Process and Mining Industries, Water and Wastewater treatment, Irrigation and Agriculture

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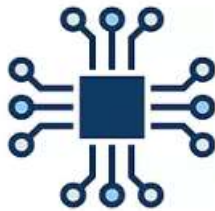


Description

The DAYTECH IoT-SmartNode-Gateway Series modular and expandable Industrial IoT gateways are designed for reliable, sophisticated and robust, all-in-one remote monitoring and automation performance. The gateway can be installed as a stand-alone monitoring and control unit, it can be integrated with existing control systems such as PLC/SCADA and also forms the backbone of your IoT wireless mesh networks in the field.

The IoT-SmartNode-Gateways have many advanced features; however we have designed the software platform to be simple to setup and operate, using function block flow programming. With its intuitive app building user interface, your remote Industrial IoT application will be reliably up and running in no time.

IoT-SmartNode-Gateway – Core Components



"THE MUSCLE" - HARDENED REAL TIME OPERATING SYSTEM (RTOS) MCU

The **ACORN IoT SmartNode** range of wireless sensor network, edge computing and gateway nodes, forms a highly inter-operable and modular platform, powered by an advanced ARM Cortex M4 IoT-Core MCU, with hardened RTOS for industrial control, with plugin modules for LoRa, LoRaWAN, Zigbee 2.4GHz, Zigbee 900MHz, 3G/4G, WiFi, Bluetooth and soon onto the market - NBloT. The ACORN comes with 6 industrial IO onboard (2 x DI, 2 x DO, AI with 0-5V / 0-10V / 4-20mA, high speed pulse input) and has expansion modules, covering almost any type of IO, allowing up to 36 IO in one unit and 1000s of distributed wireless IO nodes, meaning you can replace an RTU or DCS/PLC systems with state of the art IoT hardware.



"THE BRAIN" - POWERFUL & INTEGRATED SINGLE BOARD COMPUTER / GATEWAY

The ACORN IoT SmartNode has a plug-in slot for a single board computer, that fits within the weatherproof housing, allowing you to program sophisticated control applications, gateway to cloud and remote servers, run sophisticated AI/ML and Neural Network algorithms for control or edge processing and many more features. You can run DAYTECH's drag and drop "flow programming" tool for GUI, dashboard and automation app development! This also allows you to access, program, configure and control your applications locally via WiFi/Bluetooth with the GUI from your PC/Smartphone/Tablet, or remotely via WiFi, or 3G/4G (plug-in required) with VPN or cloud integrated solutions.



"THE COMMUNICATION SKILLS" - RS232/485, CAN BUS, MODBUS, UART, I2C, SPI

The ACORN IoT SmartNode can not only walk the walk, it can talk the talk! For fully inter-operable IIoT solutions, you need the flexibility to communicate with a myriad of devices and other platforms. We've packed the ACORN full of communications ability, not only wireless protocols such as WiFi/Bluetooth/Zigbee/LoRa, Cellular 3G/4G but also comes standard with RS232/485, CAN Bus, UART, I2C and SPI. We can factory configure GPS, SDI-12, MODBUS-RTU, MODBUS-TCP or a plethora of other protocols, set us a challenge!



"THE POWER" - MAINS 230VAC, 12VDC, 24VDC, EXPANDABLE BATTERIES, SOLAR

The ACORN IoT SmartNode can be powered from 230VAC with a plugpack, or directly to DC with a wide range 12-28VDC input range. It has an onboard solar battery charging IC for sophisticated and safe solar power charging or up to 2 x Lithium Ion 3Ah battery packs per node, for seriously long life remote operation. The node features 12VDC outputs and 24VDC optional output to power, control and monitor sensors and actuators, wireless and from battery/solar power. Intelligent sleep modes allow you to expand battery life and shut down individual modular units of the node and externally powered sensors/actuators as required.

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Environmental and Installation Consideration – Rugged Industrial Design

- Designed for high reliability industrial control applications:
- Power supply and all IO has ESD to 15KV, overvoltage, undervoltage, reverse polarity, and overcurrent protection; plus designed for EMC compliance;
- Protection on all IO and wiring interfaces to prevent user damage.
- Designed to allow for noisy EMI (industrial environments);
- Robust and allow for industrial levels of vibration and high levels of environmental moisture;
- Designed for easy wiring into the spring connections, with positioning for easy installation.
- Rugged and robust for industrial and outdoor conditions
- Installation outdoors with no enclosure required and integral antenna, or DIN rail mounted inside an enclosure, with external antenna via coaxial extension cable with the SMA connector.
- High temperature range (-10 to 50degC), limitation is also based on the load on the CPU, which can vary per application.
- Over current and overvoltage protection.
- Intelligent signal processing.
- RCM and CE Certification on SBC



IO Features

The ACORN IIoT-SmartNode system is flexible and expandable. Connect up to 4 modules together, with up to 36 local IO. The locally plugged in expansion units are conveniently connected via ribbon cable, forming one device with a common power and communications bus. The same IIoT-SmartNode unit can communicate locally or remotely over the wireless mesh network. Wirelessly connect up to 30 remote mesh networked IO SmartNodes to the one gateway or PLC/SCADA system with poll rates depending upon the number of remote nodes.

ON Board the ACORN IoT-COMBO Gateway:

- 2 x DI (5-35VDC – opto-isolated and protected), takes 12VDC and 24VDC inputs;
- 2 x DO (5VDC / 12VDC / 24VDC configurable), 24VDC only when factory configured (easy to do, speak to the team at DAYTECH for more info);
- 1 x AI (4-20mA/0-5V/0-10V configurable), connected to high resolution and high speed ADC (12 Bit);
- 1 x High Speed PWN counting inputs (Pulse Input);

IO PINOUT:

5-36V DC input	5-36V DC input	12V DC Out	12V DC Out	4-20 mA / 0-10V / 0-5V	PWM Input
DI 1	DI 2	DO 1	DO 1	AI 1	PWM In



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IoT-SmartNode – Wireless Communication Options



IoT-SmartNode – Wireless Application Example

DAYTECH SMART SENSOR TECHNOLOGY + ACORN IoT

Go wireless and control your process and equipment directly from DAYTECH smart sensors.



Wireless smart temperature and pressure – complete with digital display setup for switching at setpoints for remote wireless control.



Wireless flow switch – complete with sensitivity control for switching flow at setpoints for remote wireless control.



Wireless level sensor – point to point for control and switching pumps, motors or valves wirelessly for tanks, dams or bore level control.

You're only limited by your imagination – the possibilities are endless!

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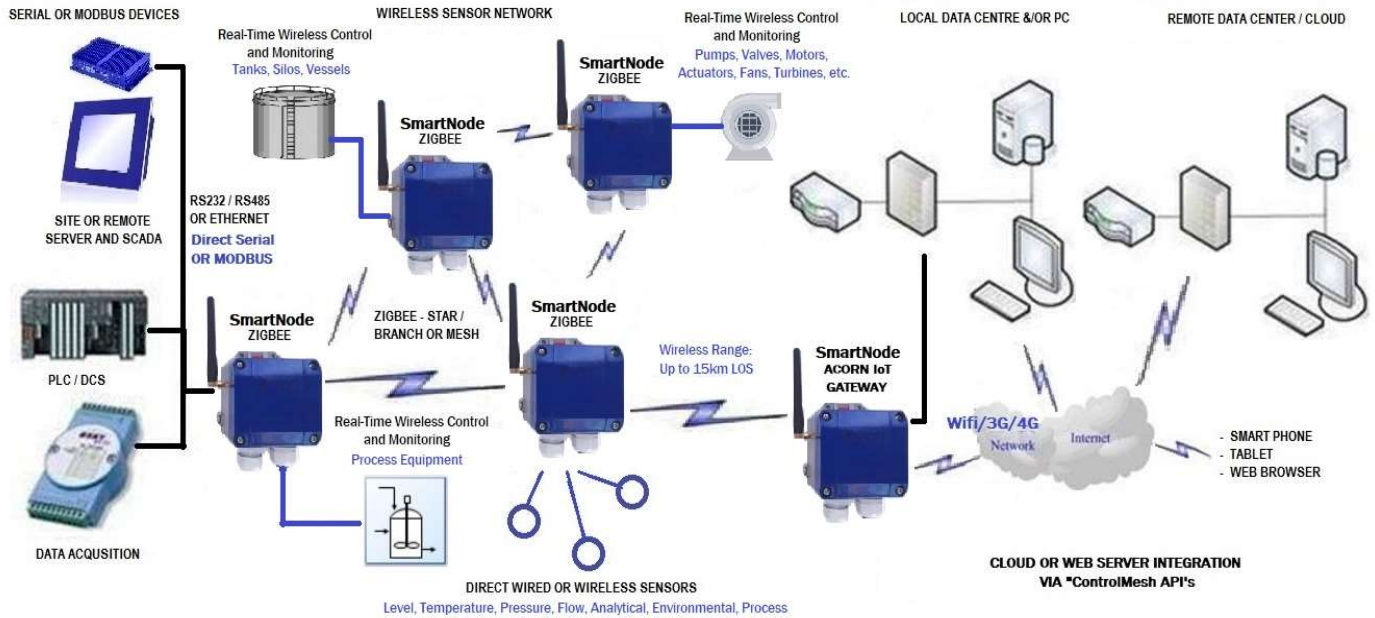
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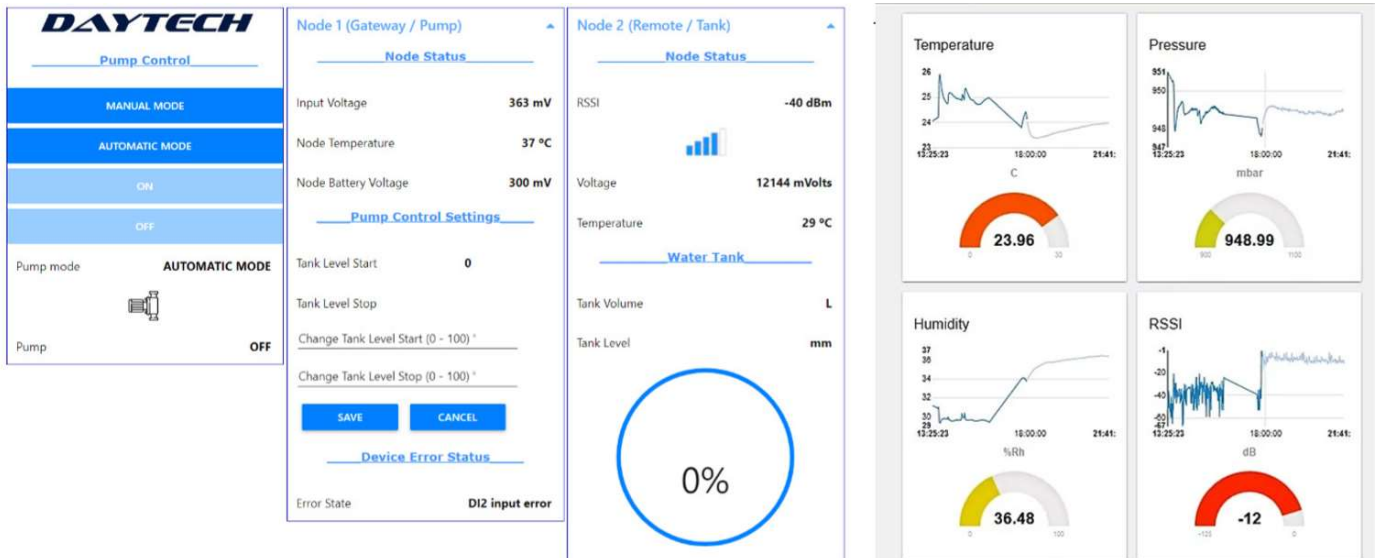
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IoT-SmartNode – Wireless Network Topology – In Field Example



IoT-SmartNode-Gateway – Graphical User Interface & Process Dashboards – Examples



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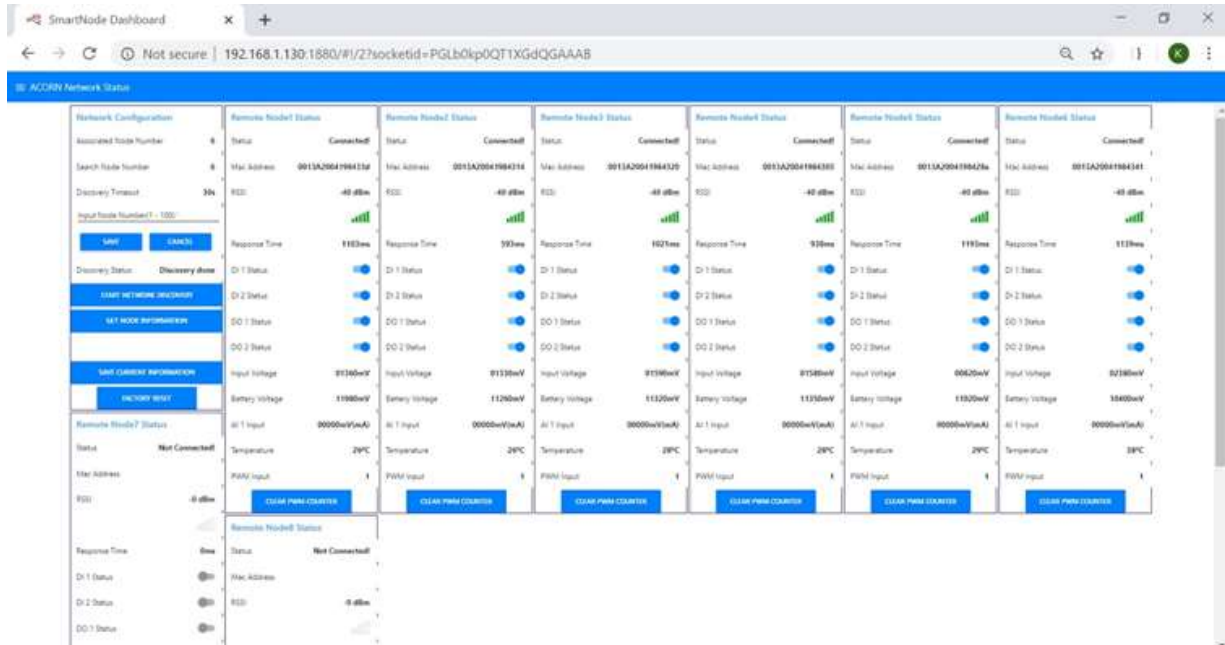
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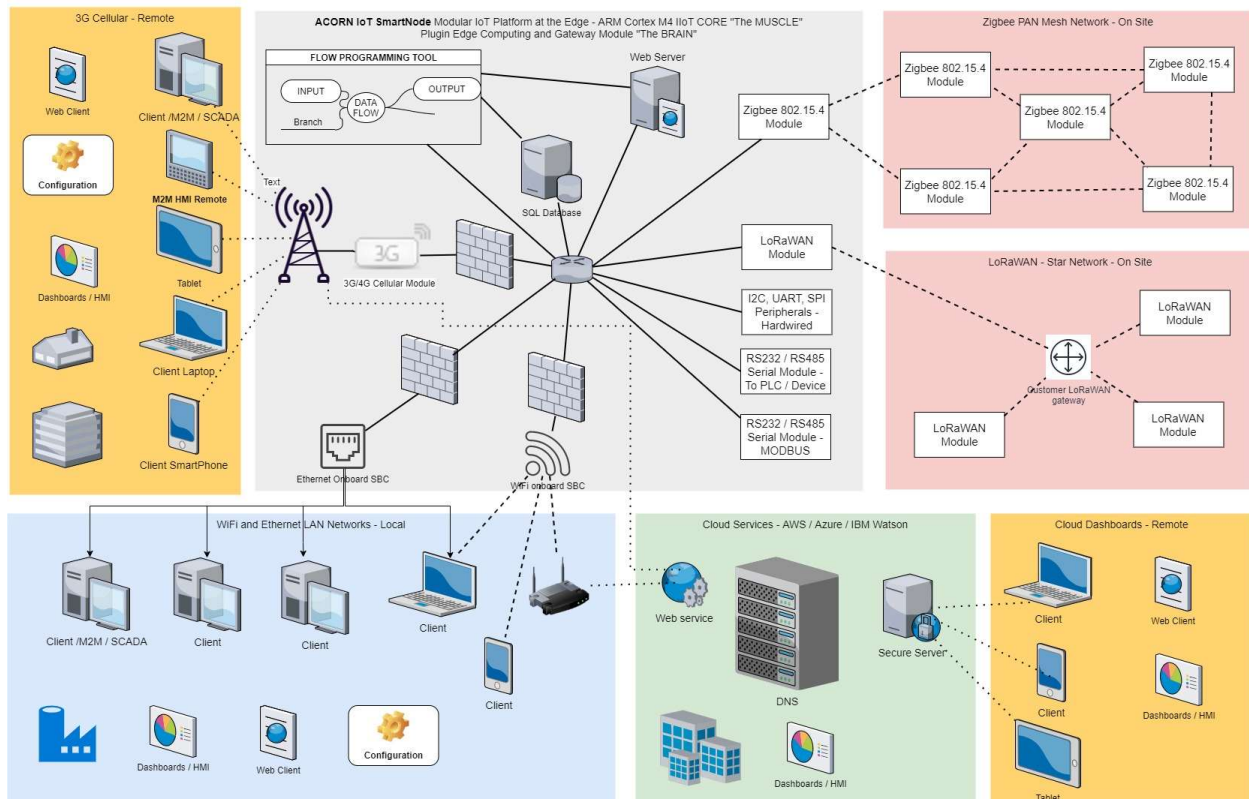


IoT-SmartNode-Gateway – Node Configuration, IO/Comms Status Dashboards – Examples



IoT-SmartNode-Gateway – Wireless Network Topology – Protocols Example

DAYTECH - ACORN IoT Node AND CONTROLMESH - NETWORK TOPOLOGY



Highly Inter-operable & Powerful Industrial IoT Platform - Start Your Journey Today!!

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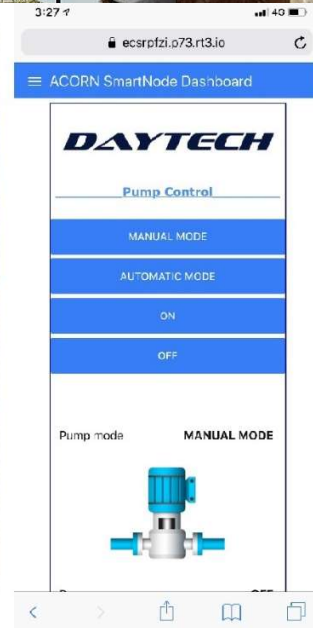
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IoT-SmartNode-Gateway – Automation Application Example – Pump Control

In this example, the IoT-SmartNode-Gateway has been used as a remote pump monitoring and automation system. Multiple remote SmartNodes are wireless connected on the mesh network to the SmartNode-Gateway. Water level in the tank, dam and the bore is monitored and the pump is controlled in manual or automatic mode, with user defined control setpoints, email notifications, data historian for collecting and saving time/date stamped data to CSV, graphics for tank level gauges, trend graphs, maintenance and configuration.



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IoT-SmartNode-Gateway – Optional Features

- **Wireless Option 1** - WiFi 802.11n for internet connection on users WiFi network comes standard with this ACORN IoT-Smart Node Gateway model, with optional 3G/4G Module (AUS Certified, Cellular Band Unlicensed) (refer module specifications) for stand-alone cellular operation. Module and Antenna SOLD SEPERATELY - select from options to add factory fitted module.
- **Wireless Option 2** – Daytech DT-MESH 802.15.4 Zigbee Module (2.4GHz AUS Certified, ISM Band Unlicensed) - up to 2km range LOS (refer module specifications). Module and Antenna SOLD SEPERATELY - select from options to add factory fitted module.
- **Wireless Option 3** - Daytech DT-MESH PRO 900HP Zigbee Module (900MHz AUS Certified, ISM Band Unlicensed) - up to 5km range LOS (refer module specifications). Module and Antenna SOLD SEPERATELY - select from options to add factory fitted module.
- Takes 10-28VDV input power from 240VAC adaptor (sold separately), or DC power supply or Solar panel (sold separately).
- IP65 weatherproof enclosure, suitable for mounting outside as standalone, or inside panels on DIN rail or with screws.
- Several options for antennae depending upon requirements. (sold separately).
- 2600mAh replaceable lithium Ion Battery pack. Can power remote SmartNodes or act as a UPS for mains/DC powered SmartNodes (sold separately). Expandable battery capacity, for supplying larger loads, modular battery pack add-on. (sold separately). *Important Note: the Li-ion batteries have max temperature rating of 50degC.*
- 230VAC / 12VDC Mains Power Pack. (sold separately).
- Rugged Industrial Housing, Weatherproof IP65 (included)
- Optional Wireless Access Point for web based programming, commissioning and dashboards for control.
- Modular and highly scalable, add up to 3 optional plug-in expansion IO modules for up to 36 local IO and 1000s of remote wireless nodes across multiple protocols!

Selection Guide

Please login to your account at www.daytech.io for a configuration tool. Please contact our sales and engineering team for application assistance.

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