

Author: Travis Brown, Sales Engineer, Westell Technologies, Inc.

# Unlocking the Potential of RTUs in Advanced Site Management White Paper

September 2023

## Introduction

In the realm of intelligent site management, Remote Terminal Units (RTUs), also called Remote Telemetry Units, play a crucial role. This white paper presents an overview of the RTU – what it is, and how it provides the intelligence to efficiently monitor, control, and manage various site systems.

We will shed light on how the RTU's functionality, key features, and benefits make it central to modern site management practices.



## Understanding RTUs

Remote Terminal Units are advanced electronic devices designed to remotely monitor and control a wide range of equipment and processes. The Internet of Things (IoT) and RTUs are interconnected technologies that complement each other to enhance automation, data collection, and remote monitoring capabilities in various industries. RTUs work with IoT to create a comprehensive and intelligent system through the integration of sensors, communication protocols, and cloud-based platforms. RTUs serve as a vital communication interface between field devices and a centralized control system. Customizable alarming thresholds flexibly adapt to specific industry requirements. RTUs are commonly employed in industries such as telecommunications, utilities, transportation, and manufacturing.

The RTU's primary function is to collect data from field devices and sensors, process that data, and transmit it to the central control system for analysis and decision-making. RTUs are equipped with multiple input and output ports to interface with various devices including sensors, meters, valves, relays, and device controllers. They can monitor parameters such as temperature, pressure, flow rate, voltage, and more, providing real-time data. Figure 1-1 provides an example of a basic RTU setup with multiple pieces of equipment connected and monitored by the RTU.

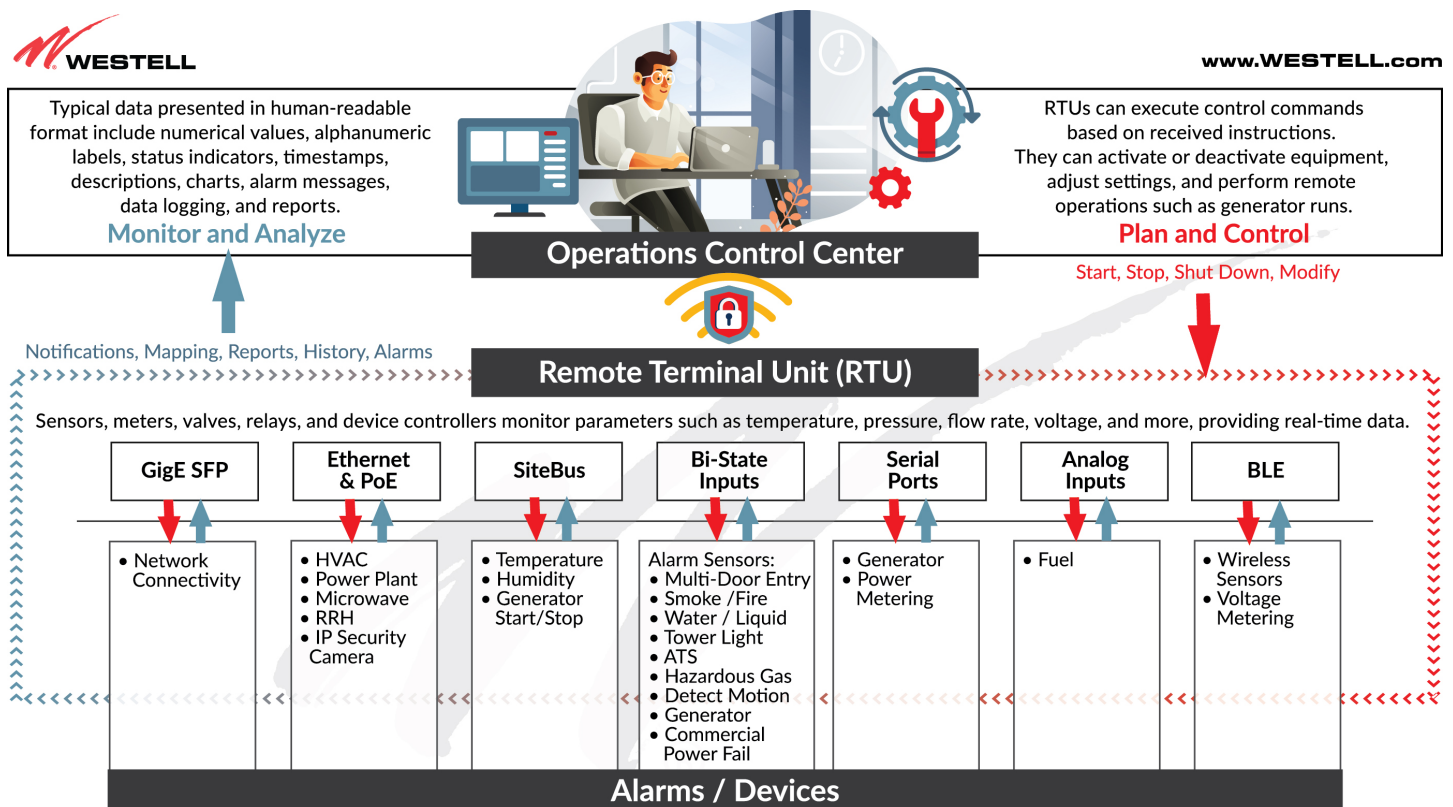


Figure 1-1: Basic connections to an RTU



## Key Features of RTUs:

### 1. Communication

#### Protocols:

RTUs support a wide range of communication protocols, enabling seamless integration with different field devices. Common protocols include Modbus, Serial, Ethernet/IP, and SNMP.

### 2. Data Acquisition:

RTUs are designed to collect and process data from sensors and devices in the field and present this data in a human-readable format for easy understanding by operators and engineers. The human-readable format is essential for efficient decision-making and company process monitoring. Typical data presented in human-readable format include numerical values, alphanumeric labels, status indicators, timestamps, descriptions, charts, alarm messages, data logging, and reports. RTUs present data in a way that is easily understandable, actionable, and tailored to operators' and engineers' specific needs. The human-readable format ensures that important information can be quickly interpreted, enabling effective decision-making and helping ensure smooth operation.

### 3. Alarm

#### Management:

RTUs monitor predefined thresholds and trigger alarms in case of deviations or critical events. These alarms are sent to the central control system or operators, allowing prompt action and issue resolution.

### 4. Control and Automation:

In addition to data monitoring, RTUs can execute control commands based on received instructions. They can activate or deactivate equipment, adjust settings, and perform remote operations such as generator runs.

### 5. Scalability and Expandability:

RTUs are designed to accommodate the growing needs of an intelligent site. They can support a large number of input/output points, and many RTU models are expandable through additional modules or network connectivity.

### 6. Multitude of I/O Ports:

RTU ports include Ethernet, Serial (Async), Discrete, Analog, SiteBus, and Voltage Metering. (See Figure 1-2)

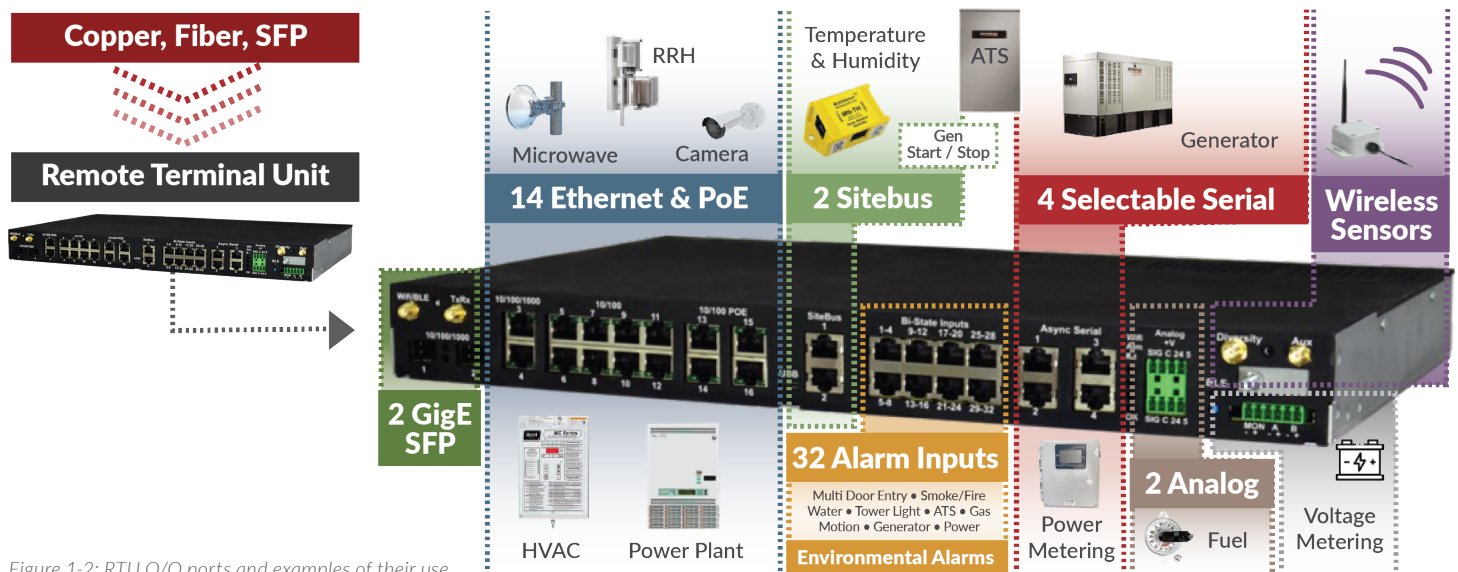


Figure 1-2: RTU I/O ports and examples of their use



## Benefits of RTUs in Intelligent Site Management

### 1. Enhanced Data Collection:

RTUs play a pivotal role in enhancing operational efficiency by enabling real-time data collection. These units can be equipped with sensors that continuously gather critical information from various points within a system or process. The data collected includes parameters such as temperature, pressure, voltage levels, and more. This wealth of real-time data allows operators and engineers to have an in-depth understanding of the system's performance, enabling them to make informed decisions promptly.

### 2. Improved Safety and Security:

By monitoring critical parameters and triggering alarms, RTUs enhance site safety. They enable quick responses to potential hazards, helping prevent accidents and ensuring the security of personnel and equipment.

#### a. Network Security:

In today's networks, connecting directly to edge devices via a router is not advisable due to security risks. Edge devices often lack rigorous cyber security testing, making them vulnerable entry points for unauthorized access. However, the Westell RTU offers a secure solution for connecting to these edge devices, mitigating the risk of breaches to your network. By using the Westell RTU as an intermediary, you can ensure a safe and protected connection while maintaining the integrity and security of your network.

#### b. Early Hazard Detection:

RTUs continuously monitor critical parameters and can be programmed to send instant alerts to operators and safety personnel when parameters exceed safe limits, allowing for immediate action to mitigate potential hazards before they escalate.

#### c. Intrusion Detection and Security:

RTUs can also be integrated with security systems to enhance site security. By monitoring access points, perimeter fences, or surveillance cameras, RTUs can detect unauthorized intrusions or suspicious activities. When an intrusion is detected, the RTU can initiate security protocols, such as sounding alarms, notifying security personnel, or locking down sensitive areas, ensuring the protection of assets and personnel.

#### d. Emergency Shutdown Capability:

In scenarios where a sudden safety threat arises, RTUs can trigger emergency shutdown procedures. These procedures can shut down specific equipment or an entire process to prevent further escalation of a dangerous situation. For instance, in the event of a gas leak or equipment malfunction, the RTU can automatically initiate a shutdown sequence to safeguard personnel and assets from harm.

#### e. Environmental Monitoring:

Environmental monitoring is a versatile practice applicable to both indoor and outdoor settings. By incorporating built-in temperature sensors or integrated temperature and humidity sensors, RTUs can effectively monitor various locations, including site shelters, cabinets, HVAC systems, and the outdoor climate. This comprehensive approach ensures that a wide range of environmental conditions is continuously monitored and analyzed for optimal control and management.

#### f. Preventative Maintenance for Safety:

RTUs contribute to safety by enabling preventative maintenance practices. By continuously monitoring the condition of equipment and machinery, the RTUs can detect early signs of wear, deterioration, or malfunctions. This proactive approach to maintenance helps prevent unexpected failures that could lead to accidents and ensures that equipment operates within safe operating limits.

*(continued on page 5)*







**Benefits of RTUs in Intelligent Site Management (continued)**

**g. Compliance and Regulatory Support:**

In industries governed by rigorous safety and environmental regulations, RTUs assume a critical role in facilitating compliance. They serve as indispensable tools for data collection and monitoring, vital for demonstrating adherence to stringent safety standards and regulatory requirements. Ensuring compliance is not only crucial for safeguarding personnel and equipment, but also mitigates the risk of potential legal and financial repercussions.

A noteworthy example is evident in certain states with strict requirements for generator odometer reporting to maintain regulatory compliance. In this situation, Westell RTUs become a game-changer, streamlining the entire process by enabling remote data collection. This capability ensures seamless compliance with regulatory demands, removing the need for manual intervention and expediting reporting procedures.

By harnessing the power of Westell RTUs, industries can confidently navigate the intricate landscape of regulations, streamlining data collection and ensuring adherence with safety and environmental standards. This proactive approach not only enhances operational safety but also safeguards businesses from potential legal complexities and financial liabilities.

**3. Remote Accessibility:**

RTUs have revolutionized site management by enabling seamless remote monitoring and control, eliminating the necessity for physical presence. This exceptional feature not only optimizes operational efficiency but also yields significant cost savings. Moreover, RTUs greatly enhance accessibility, particularly for sites situated in remote or hazardous environments. In this regard, Westell's RTUs stand out with an impressively low Mean Time To Repair (M.T.T.R), facilitated by real-time alert notifications that promptly inform users of any failures or alarms. This comprehensive alarm system not only delivers crucial information but also empowers users to make informed decisions about dispatching service technicians to the site.

**4. Data-Driven Insights:**

RTUs provide accurate and up-to-date data to the system, enabling detailed analysis and reporting. This data-driven approach facilitates informed decision-making, predictive maintenance, and optimized resource allocation.

## Selecting the Optimal RTUs

Contrary to commonly held assumptions, the integration of a new RTU does not invariably demand a complete overhaul of your existing alarm monitoring system. The process of selecting the ideal RTU for your remote monitoring system can appear intricate, given the plethora of options available. Striking the right balance among capacity, interface, and features necessitates thoughtful evaluation. Prior to reaching a decision, it is essential to evaluate the immediate and long-term implications an RTU will introduce to your network monitoring strategy. Your chosen RTU should not only augment network visibility immediately but also harmonize with your future upgrade road map, thus fulfilling forthcoming monitoring objectives. Westell's team of seasoned sales engineers offers decades of experience to guide your organization toward an optimal investment in RTU technology.





## Conduct a RTU Site Survey and Inventory

The first step to upgrade your alarm monitoring system is an RTU site survey. This will provide a comprehensive overview of your existing alarm monitoring setup and assist in devising a road map for the upgrade process. Before embarking on your search for a new RTU, take stock of your current network monitoring equipment. This will enable you to select an RTU that meets your present requirements and is compatible with your existing network transport.

To initiate your network-monitoring inventory, answer the following questions:

1. How many remote sites require monitoring?
2. What protocol and transport mechanisms are utilized by the existing RTUs?
3. How many alarm points need to be monitored at each remote site?
4. What is the available rack space at present?
5. What type of network transport is available – network connectivity or wireless backhaul?
6. How many devices (e.g., D.C. Plant, Generator, RRH, Tower Lighting, etc.) require monitoring at remote sites?
7. What power options are available at both the primary and remote sites?
8. Security requirements (public vs. private networking)

## Identify Features Required to Support Anticipated Growth

When selecting an RTU, it is vital to consider your long-term goals for network monitoring. Questions such as the number of alarm points your network alarm system will need to monitor in the next 10-15 years, the required alarm monitoring features, and the preferred data transport method should be addressed. After defining your current and long-term network monitoring objectives, choose an RTU that fulfills your immediate needs and possesses the capacity to expand to meet future requirements. An RTU with multi-generational hardware is recommended to ensure scalability as your needs evolve.

When planning your alarm monitoring system, always keep future needs in mind. It is always preferable to add alarm capacity in a controlled manner for the future rather than rushing a new deployment when you exceed your current alarm capacity.

Questions such as the number of alarm points your network alarm system will need to monitor in the next 10-15 years, the required alarm monitoring features, and the preferred data transport method should be addressed.



## Conclusion

In conclusion, RTUs have revolutionized the way industries monitor and control various systems within their sites. Our aim with this white paper is to convey a comprehensive understanding of RTUs and the numerous benefits they offer in modern site management practices.

RTUs serve as the communication bridge between field devices and centralized control systems, enabling seamless data collection, analysis, and decision-making. Their versatility allows them to be widely employed in industries such as telecommunications, oil and gas, utilities, transportation, and manufacturing.

The key features of RTUs, including their support for various communication protocols, data acquisition capabilities, alarm management, control and automation functions, scalability, and expandability, empower industries to optimize their operations and enhance safety.

The benefits of using RTUs in intelligent site management are substantial. They enable enhanced data collection, providing real-time insights into system performance and facilitating informed decision-making. They contribute to improved safety and security by detecting potential hazards. They facilitate remote monitoring in hazardous environments. And they trigger emergency shutdowns when necessary. RTUs also can play a crucial role in regulatory compliance, ensuring adherence to safety and environmental standards.

The remote accessibility feature of RTUs allows operators to monitor and control sites from a distance, reducing costs and enhancing accessibility, especially for remote or hazardous locations. The data-driven insights provided by RTUs enable predictive maintenance and optimized resource allocation, leading to greater operational efficiency.

Selecting the optimal RTU requires careful consideration of the network monitoring strategy and long-term upgrade plans. Conducting an RTU site survey and taking inventory of existing network monitoring equipment help in making informed decisions. It is essential to identify the features needed to support anticipated growth, ensuring that the chosen RTU can fulfill both immediate requirements and future scalability.

As technology continues to advance, RTUs will undoubtedly remain at the forefront of intelligent site management, driving efficiency, safety, and reliability across diverse industries. Their continued integration and development promise to enhance the management of complex systems and pave the way for even more sophisticated and intelligent site management solutions in the future.

**With millions of products successfully deployed worldwide, Westell is a trusted partner for transforming networks into high quality, reliable systems.**

**Let's Talk More. Contact Westell Today!**



Westell Technologies

(800) 377-8766

[info@westell.com](mailto:info@westell.com)

[www.westell.com](http://www.westell.com)

