

Information Delivery for Remote Monitoring Systems

An Analysis of Communication Platforms



Information Delivery: Choosing the Right Communication Platform

For years, municipalities, utilities, manufacturing organizations and others have used remote terminal unit (RTU) technology to facilitate the alarm notification, monitoring, data logging and maintenance functions of unattended equipment.

Currently, the most preferred method of communicating with RTU technology is landline technology. However, with the advent of cellular wireless and machine-to-machine (M2M) wireless technologies, there are now more options to consider. To ensure the appropriate platform is chosen, the decision maker must establish and carefully evaluate

a clearly defined set of business objectives, application requirements and communication delivery criteria. Neglecting to do so may lead to critical equipment failures going unreported.

The purpose of this paper is to present information that will assist in the process of choosing the proper communication platform. It includes a background of the remote monitoring systems market, an overview of each communication platform, a comparative analysis chart and key questions to ask yourself when making a decision.

The Basics Regarding Remote Monitoring Systems

Depending upon unit specifications, common functions that may be performed by RTUs include continuous monitoring, alarm notification, data logging and control.

Continuous monitoring is the most common use of RTU technology. This function provides personnel with the ability to contact, interrogate and interact with unattended equipment at all times without having to visit the site. Types of information that are continuously monitored include performance levels, output parameters, predictive and preventative maintenance schedules, and other environmental conditions.

When combined with **alarm notification** technology, RTUs can detect and report pre-programmed alarm conditions such as system or equipment failures, out-of-range performance levels, maintenance alerts or security breaches. When an alarm condition occurs, the system automatically contacts predetermined destinations to notify personnel of the location and nature of the alarm. Most systems will continue contacting destinations until an authorized individual acknowledges the alarm condition (usually via telephone or other remote device).

Data logging systems allow for remote data collection from a variety of process points. These systems sample designated input values at scheduled intervals and then send that data to a predetermined destination in formatted reports. Depending upon the model, units can be polled at any time and will report the data to a remote location, such as a telephone, fax or email, on demand. Combined data logging and alarm notification systems are also available.

Control functionality may already be part of an RTU, or may be added by either integrating the unit with a SCADA system or by connecting it to a PLC device. This expands the capability of the RTU and allows personnel to perform programming and control functions — such as the ability to increase or decrease flow rates, the manipulation of output relays and the ability to change performance parameters — from a remote location.

Disclaimer:

All remote monitoring systems in this document depend on one of the three communication platforms: landline, cellular wireless or M2M wireless.

Comparative Analysis Chart

This comparison chart is a quick reference guide to assist you in choosing your “best fit” option. The chart provides detailed information regarding variables such as supported functions, capabilities, risks and costs, and how they relate to each communication platform.

Note: The information in this chart is specific to the features and capabilities of the RACO product line. Features and capabilities may vary per other RTU manufacturers. RTU manufacturers can provide you with further information regarding delivery service providers in your region. Again, services vary among providers.

	Landline	Cellular Wireless
1. Service Availability	<ul style="list-style-type: none"> Available in virtually all rural and urban areas May be unavailable in mountainous urban areas 	<ul style="list-style-type: none"> Available in approximately 98% of North America Additional antenna strength may be required for fringe areas
2. “Links in the Chain” of the Communication Delivery Path	<ul style="list-style-type: none"> Phone service at remote site—outage can cause delivery to fail 	<ul style="list-style-type: none"> Cellular service at remote site—outage can cause delivery to fail
3. Installation/Relocation	<ul style="list-style-type: none"> Instant connection anywhere landline phone is available 	<ul style="list-style-type: none"> Individual cellular account required per device A new cellular account may be required to avoid roaming fees if an RTU is relocated
4. Functions Supported	<ul style="list-style-type: none"> Alarm autodialing/notification Data logging PLC annunciation Process control 	<ul style="list-style-type: none"> Alarm autodialing/notification Data logging PLC annunciation Process control
5. Alarm Notification	<ul style="list-style-type: none"> Unlimited number of alarm calls allowed per day Calls predetermined phone numbers until alarm is acknowledged Can contact various destination types, such as cell phone, fax, pager, email, etc. 	<ul style="list-style-type: none"> Unlimited, but excessive alarm calls may add to costs Calls predetermined phone numbers until alarm is acknowledged Can contact various destination types, such as cell phone, fax, pager, email, etc.
6. Data Logging	<ul style="list-style-type: none"> Has the ability to log data from up to 256 channels Can log up to 5MB of data Sends unlimited amounts of data Sends transmissions as often as needed 	<ul style="list-style-type: none"> Has the ability to log data from up to 256 channels Can log up to 5MB of data Sends unlimited amounts of data Sends transmissions as often as needed
7. Report by Exception	<ul style="list-style-type: none"> System able to send an unlimited number of alarm calls 	<ul style="list-style-type: none"> System able to send an unlimited number of alarm calls
8. Inquiry on Demand	<ul style="list-style-type: none"> Unrestricted calling to any remote location from any phone at any time for RTU status 	<ul style="list-style-type: none"> Unrestricted calling to any remote location from any phone at any time for RTU status
9. Remote Supervisory Control	<ul style="list-style-type: none"> Unlimited RSC operations 	<ul style="list-style-type: none"> Unlimited RSC operations
10. System Watchdog	<ul style="list-style-type: none"> System watchdog feature available on most autodialers 	<ul style="list-style-type: none"> System watchdog feature available on most autodialers
11. Degradation Risks of Communication Delivery Technology	<ul style="list-style-type: none"> Time-proven communication delivery technology RTU equipment is independent of landline service provider 	<ul style="list-style-type: none"> Less reliable than landline, but still time-proven communication delivery technology RTU equipment is independent of cellular service provider
12. Costs (beyond RTU/autodialer equipment)	<ul style="list-style-type: none"> Monthly line charges No installation cost unless there is no existing phone service Existing phone service rate plan is controlled by the FCC 	<ul style="list-style-type: none"> Airtime charges, usually flat rate (varies among carriers) Monthly rate plan is controlled by the FCC

Machine-to-Machine (M2M) Wireless

- Available in approximately 98% of North America
 - Additional antenna strength may be required for fringe areas
-
- The M2M method has numerous links at which outages can occur and cause delivery to fail:
 - M2M services at remote site
 - M2M subcarrier service
 - Internet and user's own ISP, user network and/or computer
 - Vendor's website
-
- Individual account from equipment reseller required per device
 - Switching manufacturer's service is not possible
 - Most RTUs cannot be relocated without reprogramming the system identifier (SID)
-
- Alarm autodialing/notification
 - Limited amounts of daily data logging
 - Limited process control
-
- Limited number of alarm calls allowed per day
 - Alarms are routed through manufacturer's website, then forwarded to other destination types, such as cell phone, pager, email, etc.
 - Users can also access alarm data directly from manufacturer's website
-
- Can only log data from a limited number of channels
 - Capacity can be extremely limited
 - Extremely limited data sent is restricted to the capacity of individual channels
 - Limited number of transmissions allowed per day
 - Large amounts of accumulated data can be centrally stored and made available on demand for viewing and analysis
-
- Dependent upon Internet backbone functionality and service
-
- Dependent upon Internet backbone functionality and service
 - Some restrictions regarding frequent polling of an RTU or performing control operations
-
- RSC limited to occasional and infrequent use
-
- Offers a system watchdog feature
-
- This method is supported by technology and companies that have not faced the test of time
 - Equipment could become useless if manufacturer of M2M product or service provider goes out of business
-
- Monthly Internet service provider (ISP) charges
 - Monthly service charge per unit
 - Surcharges for excessive usage
 - Monthly rate plan is not controlled by the FCC

Making the Decision

Refer to the comparison chart to analyze each option according to the application requirement.

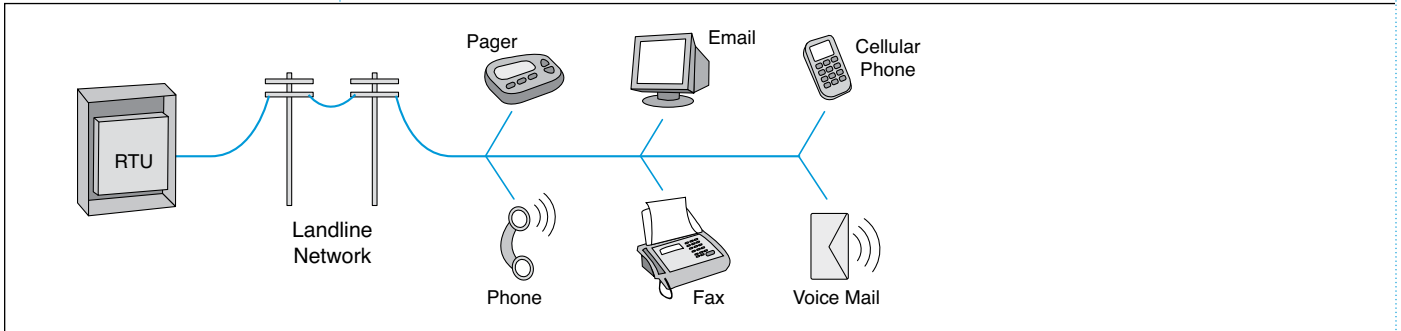
When evaluating these options, it is important to identify and prioritize the key variables that will impact your decision by asking the following questions:

- How critical is the process that you are monitoring?
Points 2, 4, 5, 7, 8, 10 and 11
- How frequently do you need to transmit data? At what volume?
Points 4, 6 and 12
- Does your application require extensive data logging?
Points 4 and 6
- What is your budget?
Point 12
- How frequently and how easily do you want to access your data?
Points 5, 7 and 8
- Where is the RTU located?
Points 1 and 3
- For how long will you require this service?
Point 11

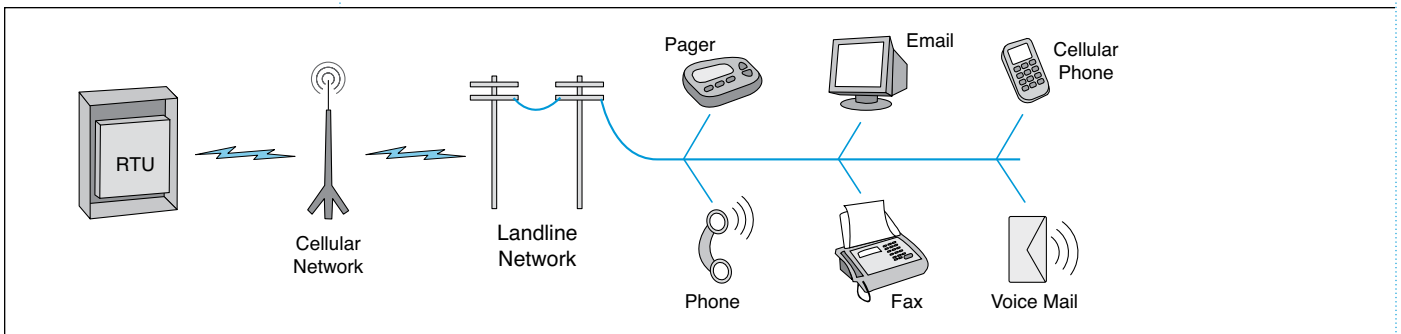
In addition to these variables, you want to carefully research the service providers and RTU manufacturers experience, service track record, specifications and capabilities.

How Information Travels

The information delivery process involves the transfer of information from the unattended equipment to predetermined destinations — landline telephone, cellular telephone, alphanumeric or numeric pager, computer, fax, email or voice mail system — using one of the following methods:

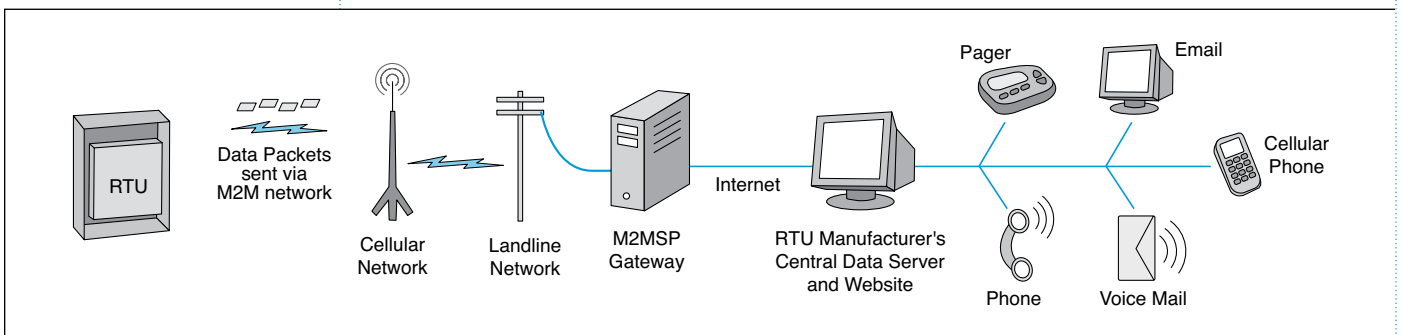


The RTU obtains information from the unattended equipment and sends it via the landline network to multiple predetermined destinations.



The RTU uses a cellular fixed wireless terminal (CFWT), rather than a landline, to send information. The RTU obtains information from the unattended

equipment and sends it to a CFWT, which then sends the information to the landline network, where it is delivered to predetermined destinations.



The RTU gathers information that is sent in "data packets" from the transceiver via the M2M portion of the cellular network, and on to the region's cellular tower. Then, the data packets are transmitted via the landline network to the M2M service provider

(M2MSP) gateway, where they are sent to the RTU manufacturer's central data server. The data is then placed on the manufacturer's website for user access. A notification alarm is forwarded to predetermined destinations.

In Summary

Each information delivery method offers specific advantages and disadvantages that make it more appropriate for some applications than others.

Landline, the most mature method, offers time-proven reliability and flexibility, and a full range of features. If the RTU is monitoring a critical process that requires frequent interrogation of information, extensive data logging and alarm notification, the landline method would be the most logical choice.

Cellular wireless systems offer virtually all of the functionality of landline technology; however, there are more opportunities for signal interference. Also, additional costs

may be incurred for extensive data logging, alarm notification and calls to the unit.

Machine-to-machine telemetry offers a convenient, cost-effective alternative to more intensive monitoring systems. If the RTU is monitoring a process that does not require the frequent interrogation of information, extensive datalogging and alarm notification, the M2M method is a valid option.

About RACO

For more than 60 years, RACO Manufacturing and Engineering Company, Inc. has provided municipalities, industry and government with a wide variety of high-quality, reliable remote communications systems for monitoring, alarm notification and data logging applications. Additionally, RACO offers systems with the ability to run SCADA, PLC annunciation and process control applications.

RACO's product line ranges from interactive, wireless data communications systems to alarm autodialing systems, which enables RACO to provide a solution for any delivery technology utilized — landline, cellular wireless and M2M wireless.

Products from RACO include:

- Verbatim®, an advanced remote monitoring and alarm notification system.
- Verbatim® Gateway, which doubles as an alarm notification system and PLC interface.






- Catalyst®, the first integrated data logging and alarm notification system.
- Chatterbox®, a time-proven remote monitoring system.
- Guard-It®, a cost-effective choice for remote monitoring and alarm notification.
- All systems can be used in landline applications and can be packaged with RACO's Cellularm® for use in cellular wireless applications. Cellularm is RACO's innovative cellular voice and data communications system.
- AlarmAgent.com®, offered for M2M wireless applications

For more information, contact RACO at 1400 62nd St., Emeryville, CA 94608; Ph: 800-722-6999; Fax: 510-658-3153; email: sales@racoman.com; or visit www.racoman.com



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