

# **Information Delivery for Remote Monitoring Systems**

*An Analysis of Communication Platforms*



# Information Delivery: Choosing the Right Communication Platform

For decades, 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.

For many years, the preferred method of communicating with an RTU was landline technology. However, widespread adoption of M2M wireless and cloud-based technologies has enabled data transfer that gives organizations more options to consider. Today's alarm systems can even integrate with an organization's existing supervisory control and data acquisition (SCADA) systems to unlock advanced functionality, including real-time updates and in-depth visualizations.

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—with significant consequences.

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, RTUs can perform many common functions that 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 phone 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 device, such as a fax, computer or email, on demand. Combined data logging and alarm notification systems are also available. Cloud-based SCADA (CBS) systems go one step further to deliver real-time data in a familiar format.

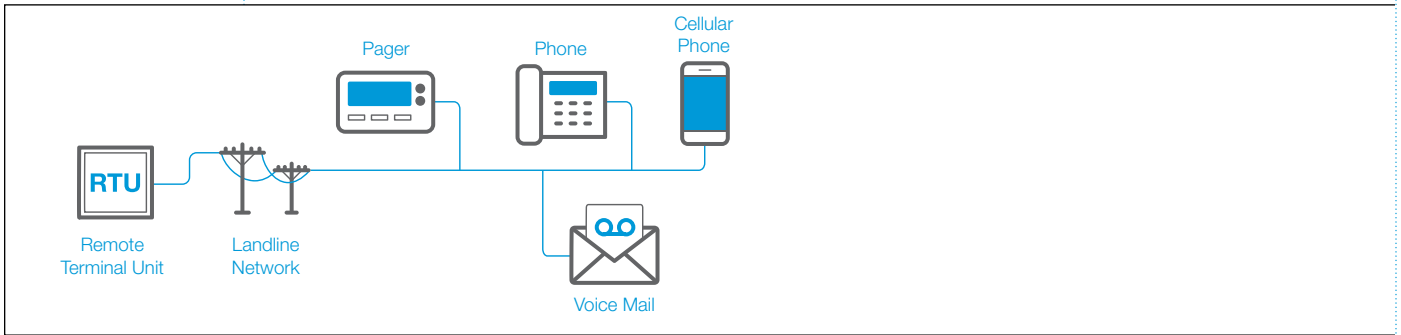
**Control functionality** may already be part of an RTU, or may be added by either integrating the unit with a SCADA system or by connecting it to a PLC device. This expands the capability of the RTU and allows personnel to perform programming and control functions—such as the ability to increase or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

### *Disclaimer:*

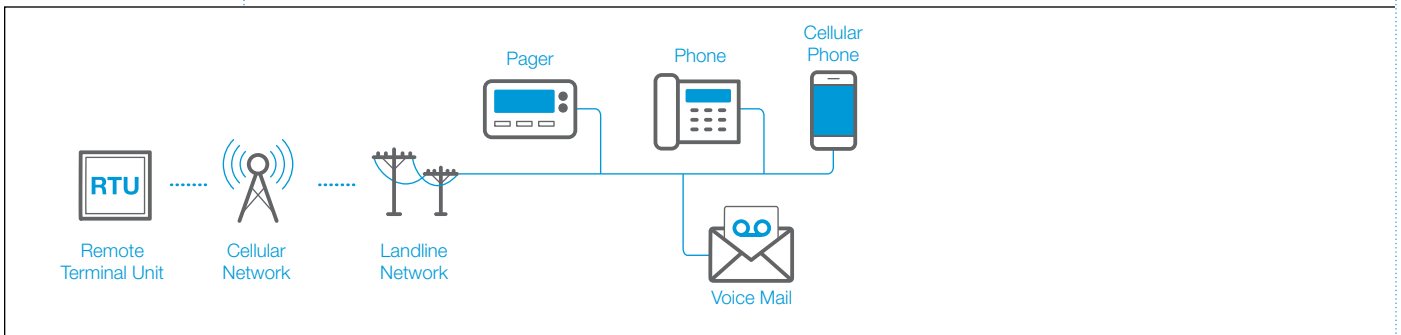
All remote monitoring systems in this document depend on one of three communication platforms: landline, cellular wireless or M2M wireless.

# How Information Travels

The information delivery process involves the transfer of information from the unattended equipment to predetermined destination(s)—using one of the following methods.

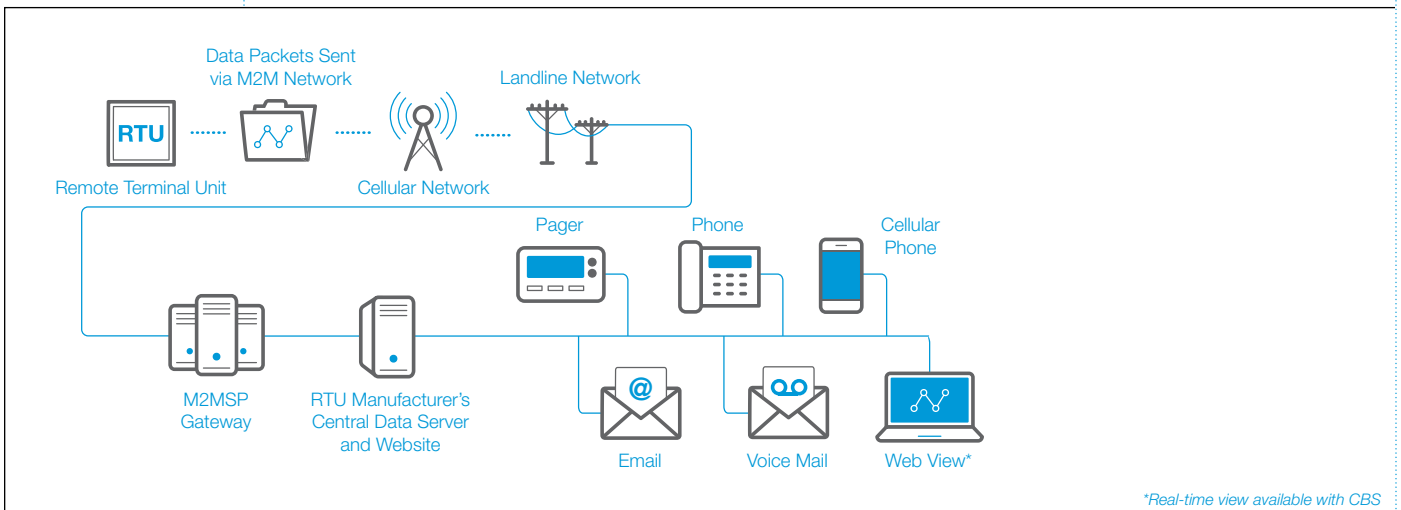


*The RTU obtains information from the unattended equipment and sends it via the landline network to multiple predetermined destinations, one at a time.*



*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 through*

*a CFWT, which then sends the information to the landline network, where it is delivered to predetermined destinations, one at a time.*



\*Real-time view available with CBS

*The RTU gathers information that is sent in encrypted "data packets" from the transceiver via the wireless 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 (CDS). The data is then visible on the manufacturer's portal, for user access. Notification alarms are then forwarded to multiple predetermined destinations simultaneously. With CBS, users can view real-time data online.*

# Make the Right Choice for Your Needs

The 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.

	Landline	Cellular Wireless	Machine-to-Machine (M2M) Wireless
<b>1. Service Availability</b>	<ul style="list-style-type: none"> <li>Available in virtually all rural and urban areas</li> <li>May be unavailable in mountainous urban areas</li> <li>Competition with VOIP for voice</li> </ul>	<ul style="list-style-type: none"> <li>Available in approximately 98% of North America</li> <li>Additional antenna strength may be required for fringe areas</li> </ul>	<ul style="list-style-type: none"> <li>Available in approximately 98% of North America</li> <li>Additional antenna strength may be required for fringe areas</li> </ul>
<b>2. “Links in the Chain” of the Communication Delivery Path</b>	<ul style="list-style-type: none"> <li>Phone service at remote site—outage can cause delivery to fail</li> <li>VOIP is vulnerable to power failures and hacking</li> </ul>	<ul style="list-style-type: none"> <li>Cellular service at remote site—outage can cause delivery to fail</li> <li>Weather event</li> </ul>	<ul style="list-style-type: none"> <li>The M2M method has numerous links at which outages can occur and cause delivery to fail: <ul style="list-style-type: none"> <li>M2M services at remote site</li> <li>M2M subcarrier service</li> <li>Internet and user’s own ISP, user network and/or computer</li> <li>Vendor’s website</li> <li>Weather event</li> </ul> </li> </ul>
<b>3. Installation/Relocation</b>	<ul style="list-style-type: none"> <li>Instant connection anywhere landline phone is available</li> </ul>	<ul style="list-style-type: none"> <li>Individual cellular account required per device</li> <li>A new cellular account may be required to avoid roaming fees if an RTU is relocated</li> <li>Switching carriers may be possible</li> </ul>	<ul style="list-style-type: none"> <li>Individual account from equipment reseller required per device</li> <li>Switching manufacturer’s service is not possible</li> <li>Most RTUs cannot be relocated without reprogramming the system identifier (SID)</li> </ul>
<b>4. Functions Supported</b>	<ul style="list-style-type: none"> <li>Alarm autodialing/voice notification</li> <li>Single conversation</li> <li>Data logging</li> <li>PLC annunciation</li> <li>Limited process control</li> </ul>	<ul style="list-style-type: none"> <li>Alarm autodialing/voice notification</li> <li>Single conversation</li> <li>Data logging</li> <li>PLC annunciation</li> <li>Limited process control</li> </ul>	<ul style="list-style-type: none"> <li>Alarm notification by voice, SMS, email, browser</li> <li>Multiple simultaneous conversations</li> <li>Unlimited amounts of data logging</li> <li>HMI visualization</li> <li>Report generation</li> <li>Data historian</li> <li>OPC connectivity</li> <li>Limited process control</li> </ul>
<b>5. Alarm Notification</b>	<ul style="list-style-type: none"> <li>Unlimited number of alarm calls allowed per day</li> <li>Calls predetermined phone numbers until alarm is acknowledged</li> <li>Can contact various destination types, such as cellphone, fax, pager, email, etc.</li> <li>Single conversation</li> </ul>	<ul style="list-style-type: none"> <li>Unlimited, but excessive alarm calls may add to costs</li> <li>Calls predetermined phone numbers until alarm is acknowledged</li> <li>Can contact various destination types, such as cellphone, fax, pager, email, etc.</li> <li>Single conversation</li> </ul>	<ul style="list-style-type: none"> <li>Limited number of alarm calls allowed per day</li> <li>Alarms are routed through manufacturer’s website, then forwarded to other destination types, such as cellphone, landline, pager, email, etc.</li> <li>Users can also access alarm data directly from manufacturer’s website</li> <li>Multiple conversations of alarm notifications occurring simultaneously</li> </ul>
<b>6. Data Logging</b>	<ul style="list-style-type: none"> <li>Has the ability to log data from up to 256 channels</li> <li>Can log up to 5MB of data</li> <li>Sends unlimited amounts of data</li> <li>Sends transmissions as often as needed</li> </ul>	<ul style="list-style-type: none"> <li>Has the ability to log data from up to 256 channels</li> <li>Can log up to 5MB of data</li> <li>Sends unlimited amounts of data</li> <li>Sends transmissions as often as needed</li> </ul>	<ul style="list-style-type: none"> <li>Can only log data from a limited number of channels</li> <li>Onboard storage capacity can be extremely limited</li> <li>Data can be sent continuously to the website</li> <li>Large amounts of accumulated data can be centrally stored and made available on demand for viewing and analysis</li> </ul>
<b>7. Report by Exception</b>	<ul style="list-style-type: none"> <li>System able to send an unlimited number of alarm calls</li> </ul>	<ul style="list-style-type: none"> <li>System able to send an unlimited number of alarm calls</li> </ul>	<ul style="list-style-type: none"> <li>Able to send multiple notifications simultaneously by SMS, email, pager and voice alarm calls</li> </ul>
<b>8. Inquiry on Demand</b>	<ul style="list-style-type: none"> <li>Unrestricted calling to any remote location from any phone at any time for RTU status</li> </ul>	<ul style="list-style-type: none"> <li>Unrestricted calling to any remote location from any phone at any time for RTU status</li> </ul>	<ul style="list-style-type: none"> <li>Able to send multiple notifications simultaneously by SMS, email, pager and voice alarm calls</li> <li>Browser-based polling of an RTU or performing control operations</li> <li>Real time-data connection with auto refresh reduces need to make inquiries</li> </ul>
<b>9. Remote Supervisory Control</b>	<ul style="list-style-type: none"> <li>Unlimited RSC operations</li> </ul>	<ul style="list-style-type: none"> <li>Unlimited RSC operations</li> </ul>	<ul style="list-style-type: none"> <li>Unlimited RSC operations</li> </ul>
<b>10. System Watchdog</b>	<ul style="list-style-type: none"> <li>System watchdog feature available on most autodialers, 24-hour cycle/1 per day</li> </ul>	<ul style="list-style-type: none"> <li>System watchdog feature available on most autodialers, 24-hour cycle/1 per day</li> </ul>	<ul style="list-style-type: none"> <li>Offers a system watchdog feature, 1-hour cycle/24 per day</li> </ul>
<b>11. Degradation Risks of Communication Delivery Technology</b>	<ul style="list-style-type: none"> <li>Time-proven communication delivery technology</li> <li>RTU equipment is independent of landline service provider</li> <li>Traditional POTS being replaced by VOIP</li> </ul>	<ul style="list-style-type: none"> <li>Less reliable than landline, but still time-proven communication delivery technology</li> <li>RTU equipment is independent of cellular service provider</li> <li>Evolution of carrier network backbone is rapidly changing and obsoleting installed base</li> </ul>	<ul style="list-style-type: none"> <li>Equipment could become useless if manufacturer of M2M product or service provider goes out of business</li> <li>Evolution of carrier network backbone is rapidly changing and obsoleting installed base</li> </ul>
<b>12. Costs (beyond RTU/autodialer equipment)</b>	<ul style="list-style-type: none"> <li>Monthly line charges</li> <li>No installation cost unless there is no existing phone service</li> <li>Existing phone service rate plan is controlled by the FCC</li> </ul>	<ul style="list-style-type: none"> <li>Airtime charges, usually flat rate (varies among carriers)</li> <li>Monthly rate plan is controlled by the FCC</li> </ul>	<ul style="list-style-type: none"> <li>Monthly internet service provider (ISP) charges</li> <li>Monthly service charge per unit</li> <li>Monthly rate plan is not controlled by the FCC</li> </ul>

## Making the Decision

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

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

- How critical is the process that you are monitoring?  
[Points 2, 5, 7 and 10](#)
- How frequently do you need to transmit data? At what volume?  
[Points 4 and 6](#)
- Does your application require extensive data logging?  
[Points 4 and 6](#)
- What is your budget?  
[Point 11 and 12](#)
- How frequently and how easily do you want to access your data?  
[Points 6, 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 provider’s and RTU manufacturer’s experience, service track record, specifications and capabilities.

## In Summary

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

Landlines have traditionally offered time-proven reliability and flexibility. If the RTU is monitoring a critical process that requires frequent interrogation of information, extensive data logging and alarm notification, the landline method can still be a logical choice. However, as many users exchange traditional landlines for VOIP technology, new security risks emerge.

Cellular wireless systems offer virtually all of the functionality of landline technology and continue to grow more robust as the industry moves toward 5G. While cellular-based systems can face more opportunities for signal interference, antennas and boosters can help. Cellular systems also require more attention to security.

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

Cloud-based alarm (CBA) systems offer a convenient, cost-effective alternative for more intensive monitoring systems that extend functionality to more remote locations while enabling real-time notifications when something is amiss.

Meanwhile, cloud-based SCADA (CBS) systems, while retaining the alarm notification capabilities of CBA, go even further by enabling rich data visualizations on any device, no matter how distant from the RTU. The human-machine interface (HMI) can be customized to fit your existing dashboards and workflows, giving end-users a single unified view of their entire facility and ecosystem rather than just the RTU.

Integrating with an organization's existing SCADA system and other data sources via OPC connectors is also possible. This allows for your data, collected in the cloud, to be integrated into your existing dashboards and workflows.

## About RACO

Since 1948 RACO Manufacturing and Engineering Co. 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. Whether you need M2M wireless communications with OPC data connectivity, or a wired communication solution such as EtherNet/IP™ or Modbus® TCP to monitor a new installation or an existing system, RACO offers the solution that will provide peace of mind for your application.

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, cloud-based alarm and cloud-based SCADA.

### Products from RACO include:






- Verbatim®, an advanced remote monitoring and alarm notification system.
- Verbatim Gateway, which doubles as an alarm notification system and PLC gateway.
- Catalyst®, the first integrated data logging and alarm notification system for PLCs.
- Guard-It®, a cost-effective choice for remote monitoring and alarm notification.
- AlarmAgent.com® cloud-based SCADA and AlarmAgent.com cloud-based alarm notification for real-time reporting and data visualization of remote assets.
- 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 communications system.



For more information,  
contact RACO at:

1400 62nd Street  
Emeryville, CA 94608  
(800) 722-6999 – Sales  
(510) 658-3153 – Fax  
sales@racoman.com  
www.racoman.com

#### FOLLOW US

-  [www.facebook.com/RACOmman](http://www.facebook.com/RACOmman)
-  [www.racoman.com/linkedin](http://www.racoman.com/linkedin)
-  [www.twitter.com/RACOmman](http://www.twitter.com/RACOmman)
-  [www.youtube.com/user/RACOmman](http://www.youtube.com/user/RACOmman)
-  [autodialer-info.racoman.com](http://autodialer-info.racoman.com)