AreaRAE Remote Monitoring System

The World’s First Wirelessly Integrated Environmental, Safety, and Security Monitoring Solution

AreaRAE Remote Monitoring System


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RAE Systems

Wireless, Open Architecture, Integrated, Gas Detection and Security Systems

Contents:

The Trend Towards Integrated Safety and Security Systems ........................................ 1
Overview of RAE Systems .................................................................................................. 2
RAE Systems’ Open Architecture Wirelessly Integrated Systems ................................. 2
United States government programs using RAE Systems products............................... 3
ProRAE Remote Host Controller Software................................................................. 5
ProRAE Remote Real-Time Information......................................................................... 7
RAE Integrated Systems Building Blocks...................................................................... 8
ProRAE Remote Integrated System Applications......................................................... 11

The Trend Towards Integrated Safety and Security Systems

Every day an increasingly wide variety of safety and security products – including atmospheric monitors – are becoming available with wireless RF (radio frequency) modems which allow real-time transfer of information from the remotely-located device, to a base station located anywhere from immediately adjacent, to many miles away from the location of the detectors.

The location where the information is displayed and interpreted might be in a mobile HAZMAT response truck, a hand-held Personal Digital Assistant (PDA), the personal computer in the safety or security office of an industrial facility, or literally anywhere else on earth where the real-time information is needed to make critical decisions.

The availability of real-time data from remotely located measurement and security devices has the potential for totally redefining the type, timeliness and quality of the information used to make many types of on-the-spot decisions.

The types of devices which are capable of being included in an integrated security system of this type are essentially unlimited. As long as the device has some kind of electrical output or signal, the information it provides can be added into an integrated system. An integrated safety and security system might include explosive gas detection, motion detectors, radiation monitors, closed circuit television or thermal imaging, all linked by means of wireless, real-time data transmission. The information is literally available anywhere in the world. It simply depends on the types of information which are needed to make the right decision.
RAE Systems’ products include portable as well as permanently installed instruments and devices which allow real-time, wireless transmission of monitoring data, position, and other information to local control and command centers, or via cellular telephone or Internet connection, to designated oversight agencies or command centers located literally anywhere in the world.

Overview of RAE Systems

RAE Systems manufactures a wide array of technologically advanced single and multiple sensor atmospheric monitors, photoionization detectors, gas detection tubes, and sampling pumps. Based in the heart of California’s “Silicon Valley”, RAE Systems is a progressive, high-tech company with manufacturing and distribution networks spanning the entire globe.

RAE Systems’ proprietary, patent protected technology has made it the World’s Leading Manufacturer of portable photoionization detector equipped instruments. RAE’s monitors are used in civilian and government atmospheric monitoring programs in over 50 countries. RAE’s products are used in all major United States manufacturing industries, as well by numerous city, state and federal agencies and departments. RAE Systems is also the leading supplier of gas detectors used for jet fuel vapor monitoring programs. Commercial aviation customers with sizable numbers of RAE Systems’ instruments include American Airlines, United Airlines and US Airways. RAE Systems’ customers include many of the World’s Leading corporations, such as General Motors, Honda, Exxon, IBM, Mobil, Dow, Texaco, DuPont, Chevron, Hewlett-Packard, British Petroleum, Amoco, Motorola, Boeing and Intel.

RAE Systems’ commitment to quality can be seen in every aspect of the Company’s business. RAE Systems has been ISO 9001 Certified since 1998. The Company’s Quality Systems constantly reinforce a customer focused culture of continuous improvement.

RAE Systems’ Open Architecture Wirelessly Integrated Systems

In 2001 RAE Systems introduced the AreaRAE Family of wirelessly integrated gas detection systems.

AreaRAE detectors are rugged, weatherproof, one-to-five sensor multi-gas atmospheric monitors that can run over 24-hours at a time via a built-in, rechargeable lithium-ion battery pack.
The AreaRAE is the *World’s First* wireless equipped multi-sensor atmospheric monitor to include a photo-ionization detector for the direct measurement of volatile organic compounds (VOCs), as well as sensors for the measurement of combustible gas, oxygen, and a choice of substance-specific sensors for the direct measurement toxic hazards such as carbon monoxide or hydrogen sulfide.

AreaRAE detectors include a built-in RF modem which allows the instrument to transmit monitoring data and other information on a real-time basis to a ProRAE Remote Host Controller located up to two miles away from the detector. The standard AreaRAE Host Controller can be used to simultaneously control up to 16 remotely located detectors. However, AreaRAE systems are easily scalable to 128 or more remotely located instruments.

AreaRAE systems may also be configured as wide area networks. RAE Application Specific Private Exchange Network (ASPEN®) systems include an embedded server which allows storage, as well as real-time transmission of monitoring information via the Internet to literally any location on earth.

AreaRAE integrated controller systems do not require software installation, or system configuration. Simply turn the integrated controller and monitors on to put the system into operation. The software is already preloaded.

Alternatively, a personal computer can also be used as the base station for an AreaRAE system. AreaRAE options also include the ability to track and display readings from remotely located detectors on a GPS map.

**Military, WMD and Other United States Government Programs Currently Using RAE Systems Products**

RAE Systems has numerous portable and wirelessly connected instrument systems currently in service with the United States Navy, Coast Guard, Marine Corps, Army, Air Force, Canadian Department of Defense, Environmental Protection Agency, Occupational Safety and Health Administration, and the Department of Justice (including the FBI, Treasury Department, Secret Service, and Drug Enforcement Agency). RAE Systems instruments are used in a wide variety of programs for the detection of vapors associated with explosives, nerve agents, chemical warfare agents (CWAs), toxic industrial chemicals (TICs), and as part of the personal protective equipment issued to bomb-disposal, hostage-rescue, clandestine crime lab, hazardous material (HAZMAT), and other high-risk response teams throughout the country. To date, RAE Systems has over 3,000 instruments fielded with these various United States government departments, agencies and programs.

RAE Systems’ portable and permanently installed atmospheric monitors are the *World’s Only* instruments available to offer a choice of both substance-specific toxic industrial chemical sensors, as well as true, broad-range, toxic gas detection by means of a built-in photoionization detector – all in the same, compact, multi-sensor instrument package.

RAE Systems’ sensors provide accurate, dependable, direct readings for the detection of chlorine (Cl₂), hydrogen cyanide, (HCN), carbon monoxide (CO), carbon dioxide (CO₂), hydrogen sulfide (H₂S), sulfur dioxide (SO₂), phosphine (PH₃) and other commonly encountered TICs.
RAE instruments may also be equipped with RAE Systems’ unique, miniaturized, photoionization detector for the broad range detection of a wide variety of volatile organic compounds (or VOCs) in concentrations down to plus or minus 1.0 part-per-billion concentrations.

RAE Systems’ patented photoionization detector technology allows dependable, linear, readings for many toxic gases and vapors that are effectively undetectable by any other means. Photoionization detection is particularly suited to the detection of the highly toxic, long-chain, low vapor-pressure VOCs associated with many explosives, TICs, nerve agents and other CWAs.

RAE portable instruments are housed in rugged, weatherproof, housings designed to stand up to the toughest environmental conditions. The instruments are highly resistant to radio frequency and other electromagnetic interference, showing no effect when exposed to a 5 watt transmitter held at 12 inches (or 30 cm) from the detector.
RAEGuard permanently installed “Fixed” instruments are housed in explosion proof enclosures suitable for permanent installation in areas which require a Hazardous Location Classification.

Wireless connectivity provides a major cost of ownership advantage when compared with old-fashioned “hard wired” systems. A well known rule-of-thumb is that two-thirds of the total cost for a system, when you include running cable, conduit, and other costs associated with stringing together system components, comes from the installation. Because RAE Systems’ wirelessly integrated system elements are able to communicate with each other by means of RF modems, the cost of installation is a fraction of that for traditional, “hard wired” systems. In many cases the total cost of acquisition of a wirelessly integrated RAE System is substantially less than one-third of the cost for a similar hard-wired system. The larger the area or distance between system components, the greater the savings. And of course, for really large systems, hard wired connection may not be a feasible option at any price.

RAE instruments are used by the FBI, Treasury Department, Secret Service, Coast Guard, DEA, Navy, USMC, Army, and various national guard programs as first line surveying instruments, personal protective gas detectors for confined space entry, jet fuel vapor detection, general explosive gas detection, as well as for CWA and TIC response. RAE instruments are deployed in WMD, bomb-disposal, hostage rescue, clandestine drug lab investigation, and general HAZMAT response and security programs throughout the country.

Most importantly, RAE instruments are inexpensive, and extremely easy to use. The personnel who routinely use RAE instruments are not always experts in the use of complex analytical equipment. With RAE Systems’ designs, they don’t have to be.
ProRAE Remote Host Controller Software

RAE Systems’ ProRAE Remote Host Controller software provides a simple-to-use Windows® PC interface that integrates the outputs of remote sensors and other system elements, into an easy-to-understand, user-friendly visual environment. ProRAE Remote software provides:

- **Real-time continuous display of monitoring data and alarm status.**
- **With GPS option, ProRAE Remote software can identify and display the current real-time location as well as monitoring information of individual remotely located system elements.**
- **ProRAE Remote communication is two-way. ProRAE Remote software can send text, or even send voice messages directly from the host controller to remotely located system elements.**
- **ProRAE Remote software allows transmission of monitoring, alarm, and other system status information directly to cell phones, pagers, personal digital assistants (PDAs), and other types of portable and stationary receivers. RAE Systems’ ASPEN® embedded server systems allow transmission of ProRAE Remote system information to literally any location on Earth via real-time Internet connection.**

ProRAE Remote Real-Time Information

ProRAE Remote information screens are designed to look and feel similar to traditional hard-wired panel displays. The screens provide a simple, “Point and Click” environment where the information you need is intuitively easy-to-access.

Consider a simple, integrated system consisting of three wirelessly equipped AreaRAE portable detectors, and using a portable laptop PC with ProRAE Remote software as the system controller.

The system has been deployed to establish an “instant perimeter” around a hazardous chemical spill. The system controller is located in a safe area well outside the “Hot Zone”. The AreaRAE detectors are located at the edge of the Hot Zone. Each AreaRAE in this example is equipped with five sensors (combustible gas, oxygen, volatile organic compounds, carbon monoxide and hydrogen sulfide).

The AreaRAE detectors have their own built in digital displays for readings, a loud audible alarm, and a built-in, extremely bright cluster LED alarm light.

The Panel View screen on the laptop shows the real-time status for all of the AreaRAE detectors in the system. This information is updated on a second-by-second basis. As long as the chemical vapors in the air where the AreaRAE detectors are located remains below the alarm concentration threshold, the panel will continue to show a green indicator icon for all three units.
The moment that the concentration of any contaminant, measured by any sensor, installed in any of the three AreaRAE detectors exceeds the alarm threshold, several things happen:

- The AreaRAE located in the area where the alarm concentration has been exceeded immediately goes into alarm. The built-in alarm light and audible alarms are activated, and the numerical readings of the affected sensors change to reflect the new values.

- The AreaRAE system is also notified that an alarm concentration has been exceeded. The status icon for the affected AreaRAE immediately changes from green to a flashing red, octagonal, alarm indicator, and a general system alarm icon is also activated.

- In addition, if the laptop is equipped with speakers, a synthesized voice message will announce the AreaRAE detector which has experienced the alarm, and the type of hazard which has been registered.

- If the laptop is equipped with speakers, an audible alarm at the system controller will also be activated, and a synthesized voice message will be generated identifying the detector, and the type of affected sensor, for example: “Unit 4 VOC alarm”

- In addition, a pop-up status window will automatically show a detailed and constantly updated report of all individual sensor readings for the affected AreaRAE instrument.

Once the alarm state has cleared, the status indicators will go back to green, and the system will go back to normal operation. The detailed pop-up status window for a particular AreaRAE detector can be viewed at any time simply by clicking on the appropriate “Unit Button”. An alarm status box at the bottom of the window pop-up window identifies any current alarm conditions.

Additional Alarm Notification Options
In addition to visual and voice prompted alarms at the main host controller, ProRAE Remote can send alarm notification out via e-mail, pager or even a phone call to your cell phone. When hooked up to a phone line, the host computer can call any phone and provide a simulated voice message of the alarm condition. This allows the AreaRAE system to be set up and left running without the requirement for an operator at the host controller at all times. This feature is particularly useful in long term security applications.

**ProRAE Remote Lets You View System Information Just the Way You Want**

- **ProRAE Remote: Image View**

  Image view allows users to place the remote unit on an imported map (bmp, jpg, gif). This is perfect for indoor applications when GPS will not work. Status windows can be shown on this view just like panel view.

- **ProRAE Remote: Log View**

  Log view can show the history of each remote unit on the AreaRAE system as either text or graphic data.
RAE Integrated System Building Blocks

**ProRAE Remote: GPS View**

A GPS (Global Positioning Satellite) Receiver can be optionally added to the AreaRAE to automatically add real-time position information to the system. The GPS option allows users to view AreaRAE detector information displayed directly on a GPS map. Coordinates are automatically logged and displayed on the bottom of the Status window.

**RAELink Modem**

- Self contained RAELink RF modem connects to a PC through an RS-232 port.
- License free operation! Uses ISM (Instrument Scientific Medical) 902-928 MHz spread spectrum transmission frequency band (US, Mexico, Canada).
- Two-mile transmission radius.
- Runs off line power, or up to 18 hours with internal lithium-ion rechargeable battery.

**Complete Turn-Key ProRAE Remote Systems**

- Comes complete with Notebook PC pre-loaded with ProRAE Remote Software.
- Totally configured, just turn it on & go.
- Controls up to 16-remote units.
- Includes RAELink Modem with antenna, cable and RS-232 cable.
- Includes magnetic mount antenna and 12 feet (4 m) of cable.

**Basic Host Package**

- Uses customer’s own PC to operate system.
- ProRAE Remote Software loaded from CD and system configured by customer.
- Controls up to 16 remote units.
- Includes RAELink Modem with antenna, cable and RS-232 cable.
AreaCOM Integrated Portable Primary Host Controller

• The AreaCOM is a rugged and simple all-in-one integrated portable controller for the AreaRAE system replacing the PC-based controller and RAELink modem.
• The AreaCOM is UL Classified as Safe for Use in Class I Division II Hazardous Locations.
• The AreaCOM can monitor and control up to 8 remote units.
• 30-hour continuous operation with built-in rechargeable lithium-ion battery.
• Hazardous Location Classification allows attendant in Hazardous Area to monitor multiple confined spaces.

RAELink Com Kits for MiniRAE 2000 and ppbRAE Instruments

• ProRAE Remote software allows direct integration of other RAE instruments into the integrated system.

ProRAE Remote Repeaters

• When other antenna options have been tried and failed, repeaters allow the signal to be boosted along the way, so that a strong signal is available for the host computer.
• Allows signal transmission over a much wider radius.

AreaPORT Interface Module

• Allows any measurement or security device with a 4-20 mA output to be integrated into a ProRAE Remote integrated system.
• Allows up to four additional non-instrument devices per AreaPORT to be connected to ProRAE Remote integrated system.
**ProRAE Remote Monitors**

- Allows a second PC to passively monitor but not control the AreaRAE System.
- Monitor PC shows same user interface as ProRAE Remote.

**AreaALARM**

- The AreaALARM is a remote wireless *alarm only* unit that allows an operator in a Class 1 Division II Hazardous Area (like Confined Space Entry attendants) to passively see the status of up to 7-deployed AreaRAE detectors.
- The AreaALARM allows Attendants or other workers in the Hazardous Area to monitor but not control settings for multiple confined spaces. The AreaRAE Primary Host is located in Supervisor’s office or another Safe Area.
- The AreaALARM includes audible and visual alarms which are activated when any one of the AreaRAE units is alarming.
ProRAE Remote Integrated System Applications

Example of ProRAE Remote Host Controller and RF equipped portable AreaRAE monitors used to establish a monitoring perimeter during a hazardous material response. The Primary Host is a portable laptop PC located in the fire engine. A ProRAE Remote Monitor is used to display real-time data at the municipal Fire Department Headquarters. An ASPEN (Application Specific Private Exchange Network) with embedded server is used to transmit real-time integrated system information via the Internet to the Fire Marshal’s Office in the State Capital.
Multiple Location Confined Space Monitoring System

Example of ProRAE Remote Host Controller and RF equipped portable AreaRAE monitors used during a confined space entry procedure. The integrated system allows the standby Attendant to verify that the atmosphere remains within safe entry limits for entrants, or in the event of an emergency, to alert entrants of the need to evacuate the space, or to coordinate rescue activities.

Each confined space entrant has an RF equipped AreaRAE gas detector to monitor the atmosphere within the confined space. The Attendant is able to continuously monitor the atmosphere in both spaces simultaneously through use of an AreaALARM Remote Passive Wireless Alarm. The AreaALARM allows an operator in a Hazardous Area (like CSE attendants) to passively see the status of up to 7-deployed AreaRAE units at a time.

The AreaALARM allows the Attendant located in the Hazardous Area to simultaneously monitor both confined spaces. The AreaALARM will activate audible and visual alarms when any one of the AreaRAE units is alarming.

The primary integrated system host is located in the Safety Supervisor’s office in a safe area. An alarm condition from either monitor would immediately trigger evacuation of both of the confined spaces, and the real-time notification of the Safety Office that an emergency had occurred.

Activating the response team within seconds after an accident has occurred is crucial to the ability of the team to successfully respond to an incident. Having the atmospheric monitoring data, and alarm-state information displayed in real-time in the rescue service provider’s office, is clearly a step towards improving the ability of the rescue provider to rapidly respond in an emergency.
Integrated Hazardous Waste Site Remediation System

Example of integrated hazardous remediation site system. The system includes four RF equipped AreaRAE detectors located within the hazardous area “Hot Zone”. All instruments within this zone must be Classified for use in a Class 1 Division II Hazardous Location. The system also includes four RF equipped portable ppbRAE photoionization detectors capable of broad-range VOC detection down to plus or minus one part-per-billion concentrations.

The ppbRAE detectors are being used to verify “fenceline” VOC concentrations at the perimeter of the remediation site. The Primary Host is a portable laptop PC located in a safe area.
Example of integrated hazardous remediation site system that includes several different types of measurement devices and transducers. The system includes 20-microwave transmitter / receiver motion detectors, two real-time radiation monitors, two real-time dust monitors, and two AreaRAE RF equipped gas detectors. The motion detectors, radiation monitors and dust monitors are integrated into the ProRAE Remote system by means of six AreaPORT RF interface modules. Each AreaPORT is capable of accepting the input from four motion detectors or monitors by means of a 4-20mA standard interface.

The primary host controller is a desk-top PC located in the site safety office. A ProRAE Remote Monitor redundantly displays real-time system data in the local sheriff’s office.