

# Keeping a close eye on monitoring stations with R&S®ARGUS SIS

Are all unattended monitoring stations working properly? – This is a source of constant concern for anyone responsible for monitoring networks. The new status information system (SIS) module for the R&S®ARGUS spectrum monitoring software now handles this task – providing detailed, up-to-date status information at a glance.

## Remote monitoring and control – the key to cost reduction

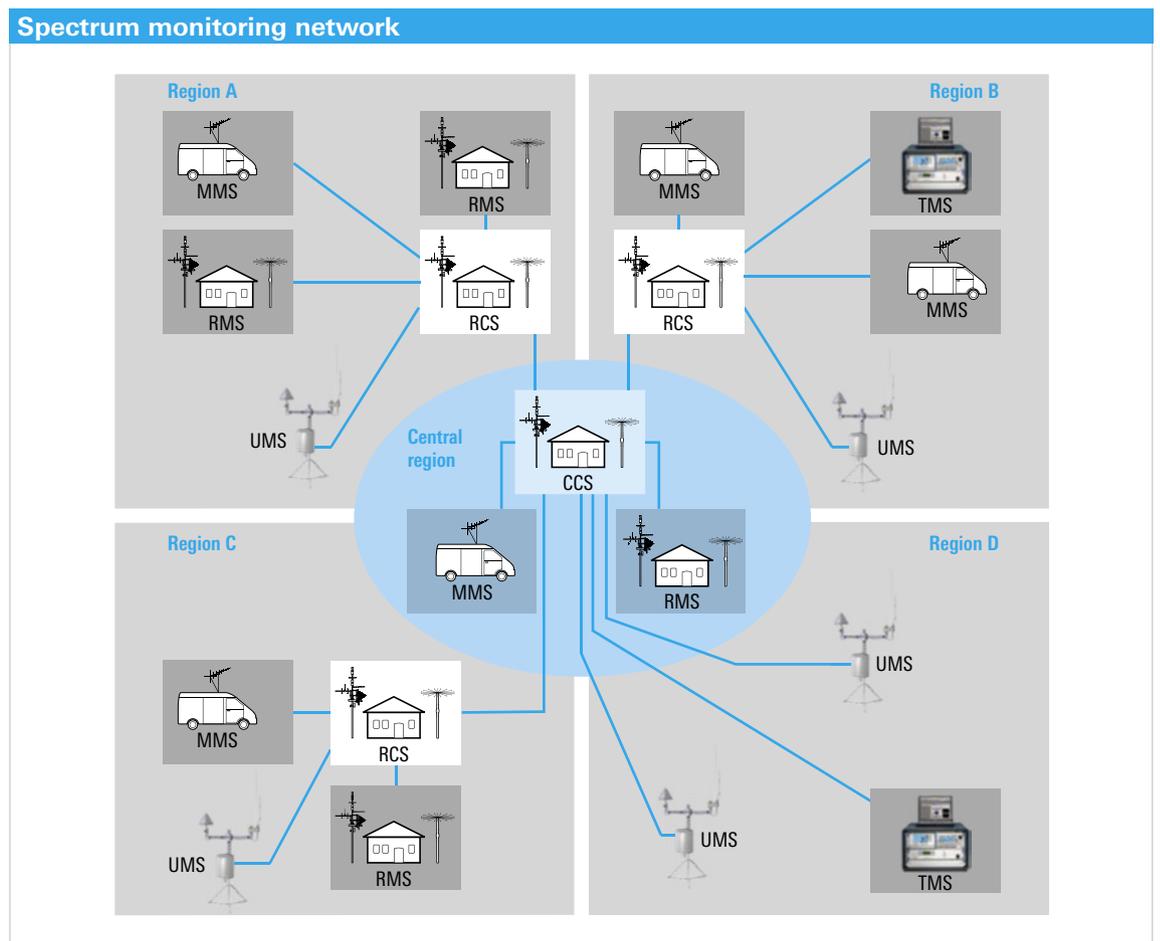
To do their jobs, national regulatory authorities have to operate a spectrum monitoring network that keeps them up to date about what is going on in the radio spectrum. Such networks usually include a national central control station (CCS), regional control stations (RCS), fixed remote monitoring stations (RMS), mobile monitoring stations (MMS), transportable monitoring stations (TMS) and universal monitoring stations (UMS) (FIG 1). Setting up and operating a national monitoring

network requires large investments. Cost reduction is therefore a major consideration.

The CCS and the RCSs are usually attended by staff working in shifts. They keep track of the situation in the radio spectrum round the clock, monitor automatic measurements, and handle any interference reports. TMSs or MMSs, by contrast, are as a rule set up temporarily when and where required for the purpose of solving interference problems at critical spots. Automatic, fixed RMSs and UMSs are used for long-term monitoring.

FIG 1 Typical configuration of a nationwide spectrum monitoring network.

- CCS:** central control station
- RCS:** regional control station
- RMS:** remote monitoring station
- MMS:** mobile monitoring station
- TMS:** transportable monitoring station
- UMS:** universal monitoring station.



The fixed monitoring stations in particular are the ones that quickly deliver information about the radio spectrum if required. Plus, they can take the bearings of interferers and fix their positions. Such stations are frequently installed at high altitudes – on mountains and at locations that are difficult to access – to cover as large an area as possible. To scale down labor costs, fixed monitoring stations are remotely controlled from a central station.

**Remote signaling and control systems for fixed, unattended monitoring stations**

Fixed, unattended stations are usually remote-controlled via a broadband wide area network (WAN), which enables fast data exchange. If the remote link with these stations goes down due to a power failure or other malfunctions, communication with these stations is lost, and they can no longer be operated. In such a case, a service team is needed on site to put the station back into operation.

This effort can be avoided by deploying a fully autonomous remote signaling and control system based on R&S®SA129 station monitoring units (FIG 3). For this purpose, one

R&S®SA129 is installed in the remote station to be monitored and another in the CCS or an RCS. The R&S®SA129 in the CCS / RCS can control and manage up to four remote stations. The basic configuration is shown in FIG 2.

The R&S®SA129 station monitoring unit in the remote station is connected to sensors that monitor the station’s operating status and can respond to events or status conditions such as the following:

- Fire / smoke
- Open doors or windows
- Power supply o.k. / failed
- Status of air-conditioning system
- Status of generator
- Fuel level in generator tank
- Status of obstruction and hazard lighting for aircraft

If any changes are signaled by a sensor, the R&S®SA129 automatically transmits the information to its peer unit in the control station. The R&S®SA129 in the control station displays a message to indicate the status change. Status changes in remote stations can additionally be signaled by an optical and /or acoustic alarm in the control station. The staff at the control station can now access the remote station via

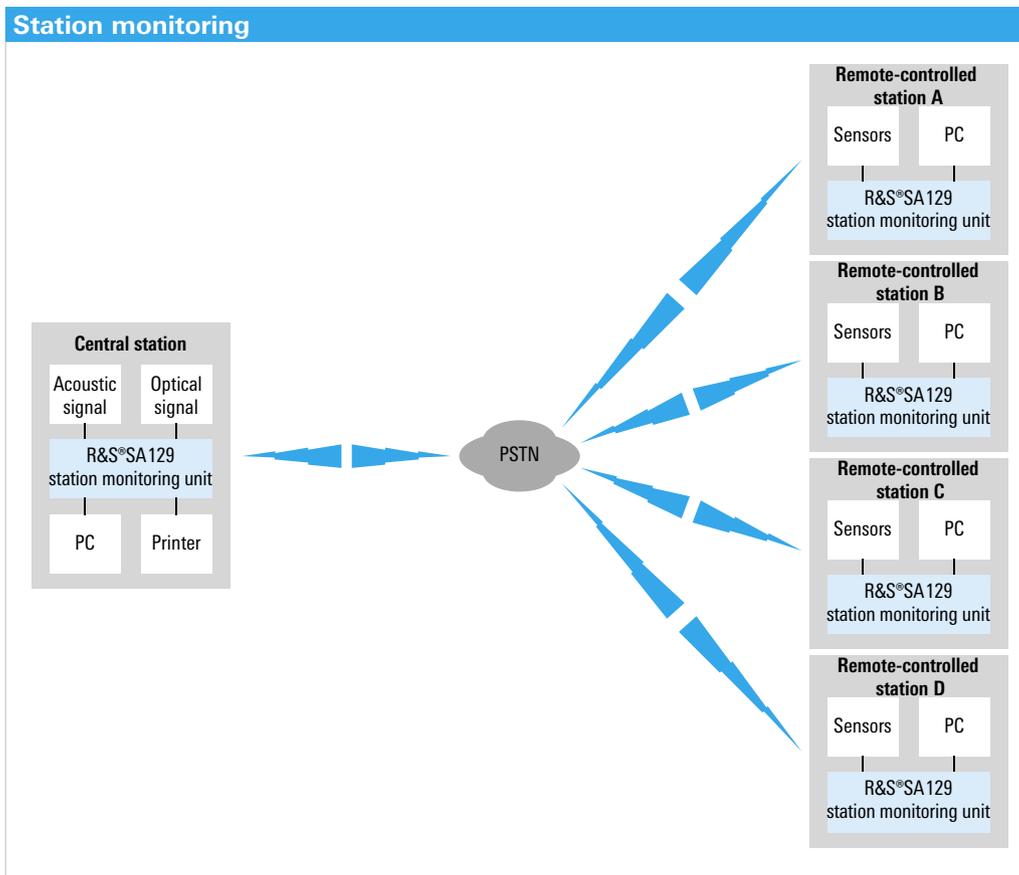


FIG 2 Station monitoring concept using R&S®SA129 station monitoring units.



FIG 3 The R&S®SA129 station monitoring unit contains a built-in power supply and is thus accessible via the public telephone network also in case of a power failure.

the public telephone network and take the required action to restore the proper operating status of the station. This process is completed in a matter of minutes and may involve the following:

- Restoring broadband communications
- Resetting the controller
- Manually starting up a generator
- Automatically shutting down the station in case of fire / smoke
- Activating the fire extinguishing system
- Switching on indoor and outdoor lighting as well as webcams

The R&S®SA129 station monitoring unit contains a built-in power supply, which ensures that the unit is operative also in case of a power failure. Despite its wide range of functions, the R&S®SA129 comes in a compact box of 19" and two height units.

### Integration of R&S®SA129 station monitoring units into R&S®ARGUS monitoring systems

The new status information system (SIS) module for the R&S®ARGUS spectrum monitoring software provides – within a map display – a fast, straightforward and reliable overview of the status of all fixed monitoring stations (FMS) operating in a country. FIG 4 shows a simplified monitoring network in Germany with one CCS near Munich (two green status marks), one unattended monitoring station (FMS1, yellow and green status marks) close to the Frankfurt airport and another unattended monitoring station (FMS2) approx. 70 km southeast of Hamburg (red and white status marks). Double-

FIG 4 Map showing a simplified example of a monitoring network.



clicking a status mark, e.g. that of station FMS1, opens a window with detailed status information (FIG 5).

The displayed information reveals that a user named "Demo" with telephone number 0049-89/4129-12194 is operating the CCS. The communications system, the AC power supply, all measuring instruments, the GPS receiver and the R&S®DDF195 direction finder are working properly. The R&S®ESMD wideband monitoring receiver is in the virtual mode. Moreover, the status display indicates that no measurement is currently being performed at the station.

FIG 6 shows the status of station FSM2. The AC power supply has failed, the door to the monitoring station is open, and the standby generator is not operational because the fuel tank is empty. However, since the communications system is functional, the display indicates that the station is now running on the uninterruptible power supply. It further indicates that no user is logged onto the station and no user is connected to the station. The R&S®DDF05E direction finder is in the virtual mode, and no measurement is currently being performed at the station. All this data retrieved by remote control yields the same scenario that a service team would discover on site. In addition, capabilities for remote control are provided (FIG 7).

FIG 5 Details regarding the status of station FMS1.

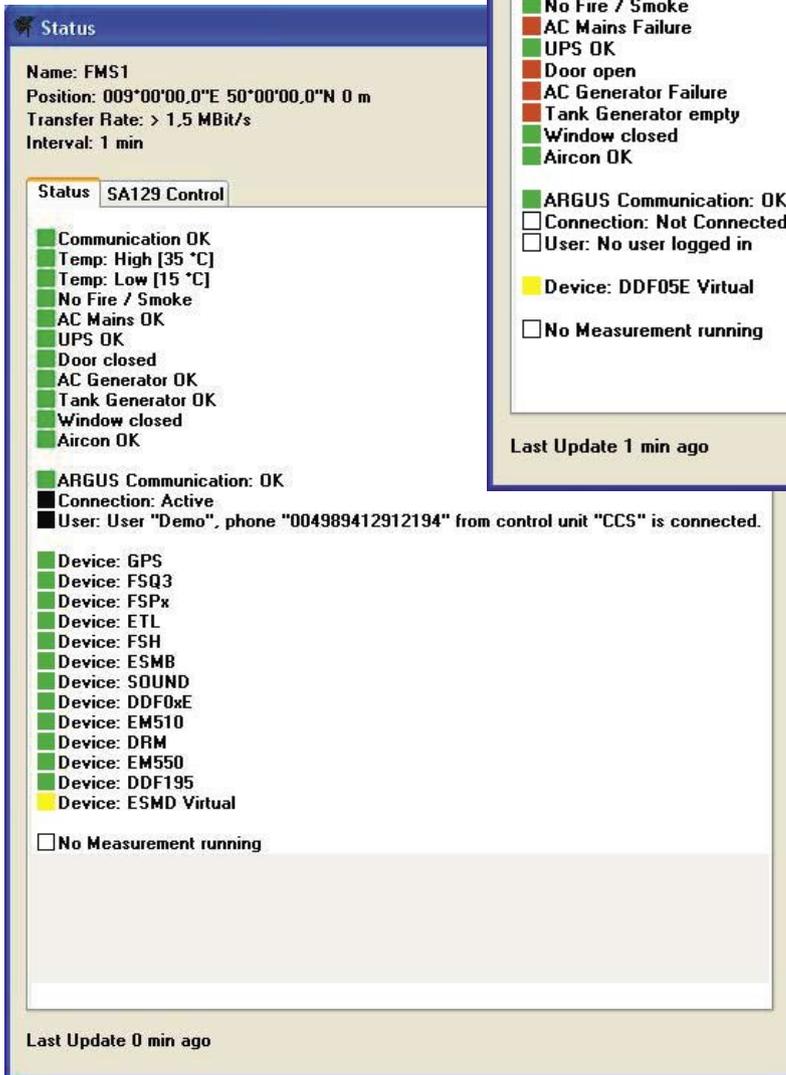


FIG 6 Details regarding the status of station FMS2.

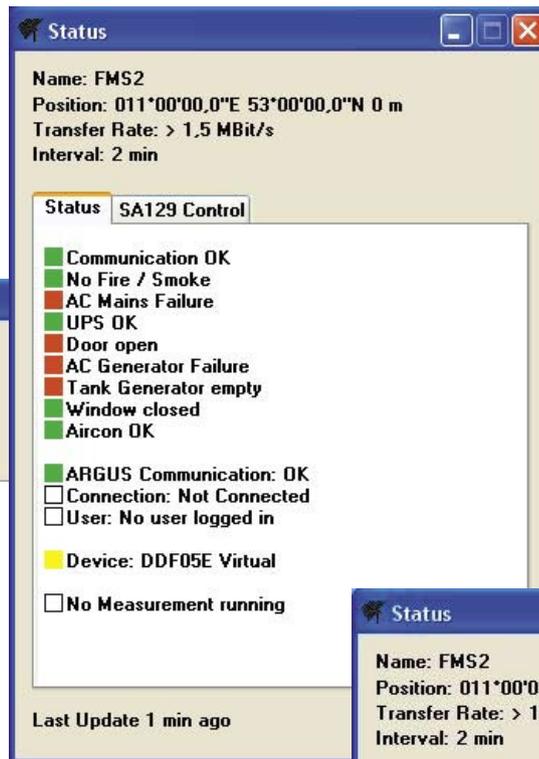
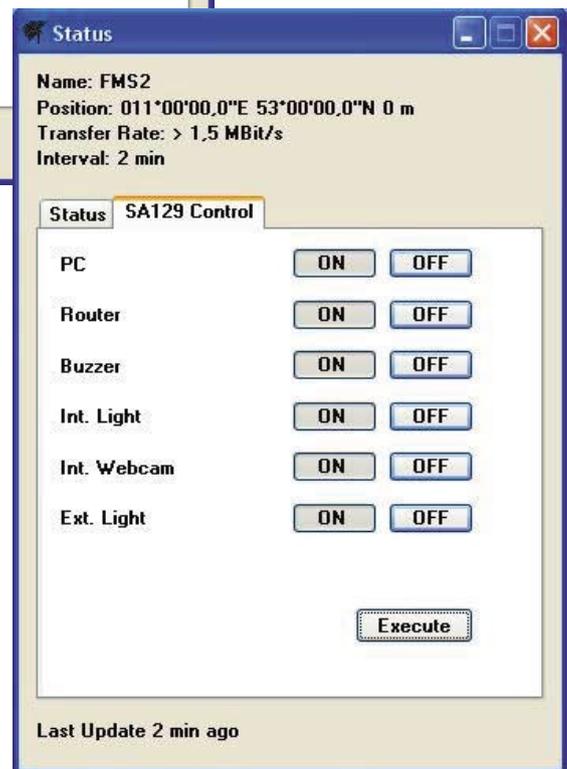


FIG 7 Remote control functions for station FMS2.



## Availability, equipment supplied, system configuration

The new SIS module is available starting with version 5.3.0 of the R&S®ARGUS software. The module includes general maps of all countries. The user can integrate customized maps in BMP or JPG format, and reference them geographically by means of the known coordinates of reference points. If the map is superimposed on a Google map, a highly detailed map as shown in FIG 8 is obtained, for example. This provides administrators of monitoring networks with virtually unlimited map display capabilities.

## Further innovations are in the pipeline ...

Future issues of News from Rohde&Schwarz will present further innovations in the R&S®ARGUS software:

- Pulse measurement mode (PMM) for measuring pulsed signals
- Macro recorder for simplifying manual operating sequences

Michael Braun

FIG 8 Detailed map superimposed on a Google map.

