AT SEA, IN THE AIR AND ON LAND

SATEL SOLUTIONS

SATEL®

WIRELESS WORLD – LOCAL SOLUTION

SATEL®

Contents

SATEL HAS SOLUTIONS

SATEL radio modems are used everywhere where data needs to be transmitted wirelessly. The reliable radio modems are used in various remote monitoring and control tasks and safety applications. The possibilities are endless, all the way from the hot desert to icy polar conditions. The high-quality radio modems are reliable, even in the most difficult environments. Radio modem networks are vital where cabling is impossible or would be too expensive, for example at remote measuring sites, in mobile equipment or in location data applications.

Radio modems communicate wirelessly with each other point-to-point or on a multipoint basis – the routing options are diverse. A local data transfer network can be built without telecom operators or other intermediaries. A real-time radio modem network can operate without a licence on licence-free UHF or VHF frequencies or on frequencies requiring a licence. Systems are easily expanded: we can offer compatibility of our devices for years after the first purchase.

Wireless world – local solutions

SATEL Oy, established in 1986, is a Finnish electronics and telecommunications company that specialises in the design, manufacturing and international marketing of radio modems for data communication and alarm transfer. We are one of the leading suppliers in the world, operating worldwide through our wide distribution network. As well as constantly enhancing its product line, SATEL adheres to a strict philosophy of quality, based on long-term planning, flawless products and high flexibility. All products are designed and manufactured in Finland.

SATEL serves its customers locally. The Network Design Centre (NDC) will help to design a reliable wireless data transfer network corresponding to needs and will make, if necessary, the link budget calculations.

Proven cost savings for public transportation

RADIO MODEMS FOR TRAFFIC CONTROL

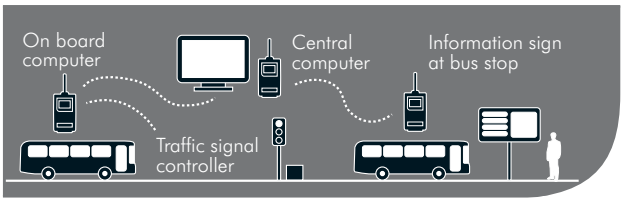
Traffic situations constantly change. SATEL has addressed this by producing radio modem solutions that enable traffic control, interactive traffic signs and vehicle tracking and positioning.

Up-to-date information is essential on the road. Without it drivers desperately look for free parking slots, and freezing passengers at bus stops count down the minutes until the next bus arrives. On freeways, real-time weather updates, warnings and traffic control signs are needed to match the changing situations. Real-time data and interactive remote-controlled signs and data-boards make everyone's life easier and traffic safer on the roads.

Mass transit information and location data

Radio modems and two-way data transfer can be used to monitor vehicles and relay location data. For instance, the schedules on bus/tram stops are always up-to-date as they receive real-time data relating to the vehicles precise location thus improving the quality of the public service. On-board information helps first-time passengers on the route to reach their destination stop. The passenger information relies on the Automatic Vehicle Location (AVL) system using GPS-satellite navigation and the odometer of the bus. SATELLINE radio modems can also be used to ease congested traffic flow more efficiently by prioritising automatic traffic lights to let buses, police or ambulances have the right of way.

- **Simultaneously monitor a fleet of many vehicles**
  - **Public transport**
  - **Emergency vehicles**
- **Relay passenger information**
- **Ease congested traffic flow by prioritising automatic traffic lights**
- **Cost saving by better fleet utilization**



Road information for smoother traffic flow

SATEL radio modems enable real-time and centralised control of information boards, traffic signs and speed limits. With wireless data transfer networks drivers can be kept up-to-date on free parking spaces in parking lots thus enhancing the fluidity of the city traffic and reducing downtown traffic congestion. Traffic signs and speed limits can also be adjusted according to weather, even in remote areas. The settings can be either broadcast to all units or updated individually, whatever the situation requires. All this can be done using a privately run, reliable network without costly cables, additional charges, line rentals or 3rd party companies (i.e. operators).

- **Control your controls: information boards, traffic signs and speed limits**
- **Deliver parking information**

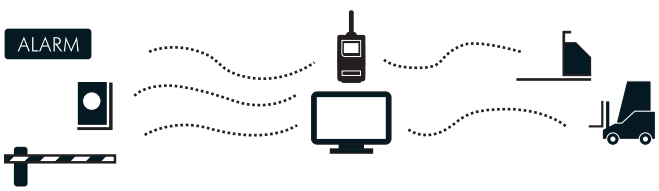
Wireless radio for fleet management

On vehicles, radio modem networks make real-time data transfer and various remote control applications a simple, cost-effective reality. SATEL wireless data transfer networks are used extensively in vehicle-based applications within industrial complexes, for example in the remote control of unmanned vehicles (AGV) or simply to transfer data. In warehouses, real-time inventory data reduces needless traffic and unmanned vehicles can be controlled centrally. Radio modems also offer an easy way to transmit location and telemetry data and to monitor machinery.

- **Vehicle tracking and diagnostics**

FROM SINGLE WAREHOUSE TO AN EXPANSIVE HARBOUR

Precise location information and real-time data transfer are vital in logistics. With SATELLINE radio modems it is easy to set up various location data applications, for example in cargo containers in large depots or moving maintenance vehicles at the airport. Anywhere where accurate, real-time location data is needed.



Efficient warehouses, precise deliveries

With SATELLINE radio modems it is possible to create a reliable data transfer system for warehouses that gives precise location data, helps in stock management and increases reliability.

The data flow in a radio modem network is bi-directional and can therefore be used to control applications as well as to monitor them. For example, the system can be used to track a straddle carrier, which can then be ordered to fetch a specific container at a given time. In warehouses, radio modems are used to control unmanned vehicles and relay location data. The radio modem network can also transmit inventory information between the warehouse control centre and collectors and can be used for real-time stock control.

- **Accurate location information**
- **Monitoring stock levels in real-time**
- **Remote control**
- **Diagnostics**

= **Cost reduction for logistics**

Access control

SATELLINE radio modems are used to control automatic gates and booms. With radio modems and location data, access control applications can be automated, preventing access by unauthorized vehicles or persons in restricted areas, leaving movements of authorized personnel unhindered. The network is configured so that vehicles and gates are connected to each other and communicate to a central control office.

- **Automated access control**
- **Remote control of automatic gates and booms**

Traffic control in harbours

Reliable traffic control systems are also required in harbours and shipping lanes. In busy harbours, traffic is constant, so the signs and signals in the channel must function reliably and breakdowns must be addressed instantly. SATELLINE radio modems can be used to control buoys, channel lights and beacons and, utilizing the bi-directional data flow, can send both status information and diagnostics from the buoys to the control centre.

- **Control of shipping lane signs**
- **Fast reaction to breakdowns**

= **Improving flow and safety of harbour traffic**

IMPROVEMENTS IN SECURITY

SATEL radio modems, equipped with an auxiliary power source, are used worldwide in different alarm and control applications by both official authorities and private citizens.

An independent wireless system is fast, reliable and economical. Since a SATEL radio modem network can be flexibly expanded, the applications can vary between singular targets to city-wide systems. In addition, the modems can be used to relay a wide range of information, making the levels of the monitoring almost limitless.

Wireless surveillance system and alarm transfer networks

Private citizens and the business sector want to protect and monitor their property: homes and company premises. SATEL radio modems are compact, easy to install and networks are expandable. Radio modems are reliable and robust, as data transfer is not dependent on cables.

Since a SATEL radio modem network can be flexibly expanded, the applications can vary between singular targets to city-wide systems. A two-way data network makes it easier to control an alarm system, as the different control levels and alarm settings can be carried out remotely.

- **Monitor property and premises: the security-related applications typically include areas like anti-burglary, fire prevention and environment protection monitoring**
- **Monitor remote locations such as marinas and warehouses**

Keeping track of things

SATEL radio modems applications include water-level monitoring, malfunction reporting or weather monitoring: in short, anything that requires reliable, real-time wireless communication. SATEL radio modems are used in reservoirs to monitor water levels and at airports to monitor ice levels on aircraft. In agriculture the applications are used for monitoring conditions inside grain silos and driers or to measure soil moisture. I/O data transfer is also possible.

- **Follow-up and control the operation of equipment in dispersed industrial systems, such as road lighting systems, waterworks and transformer stations**
- **Set up wireless alarm and security systems functioning within industrial premises or administrative complexes**
- **At airports, to transmit information on weather changes to air traffic control**

Access control in remote areas

SATEL radio modems are suitable for access control applications. Traffic control or automatic gates can be equipped with radio modems so that only authorized vehicles have access. With SATEL radio modems a full-scale alarm and monitoring system for remote locations can be installed without difficulty, disruption and expensive cabling.

- **Monitor access control, especially remote or widespread areas**

Wireless link for warning lights

The SATELLINE radio modem and I-LINK 100 I/O converter provide a working solution to a wide range of remote control problems related to, for example, switching on and off pumps, valves or warning lights. The technique is also used to enhance flight safety in order to reduce the number of close-shave situations and to minimise the risk of accidents.

- **To set up and control remotely warning lights surrounding airports**
- **Remote control of dam warnings**

When accuracy counts

EVERYTHING CAN BE MEASURED: DGPS AND ENVIRONMENT

In an age when having up-to-date, reliable information is vital, SATELLINE modems provide an easily installed solution. Used world-wide in a variety of remote measurement, control and monitoring applications, many companies have come to depend on SATEL products.

Weather stations

There are numerous applications in our everyday life where knowing the weather conditions would improve the quality or safety of life, productivity or the competitive edge. However, monitoring requirements vary greatly. And often these monitoring stations are located in remote, difficult places where normal connections are impossible to set up. SATEL radio modems have low power consumption and can transfer data over long distances, making them an excellent choice for data transfer and controlling independent measuring stations. The UHF radio communication has proved to be a most economical and reliable way of transmitting valuable meteorological data.

- **Real-time weather information**
- **A data transfer network can be built in remote locations, where there is no telecommunication services or cellular coverage**

Wireless remote control of equipment

Changing the settings of an application is more comfortably done from an office than on-site. This is why bi-directional SATEL radio modem networks are well suited for the remote control of equipment, in addition to just monitoring. For example, several ski resorts use applications that measure the amount of snow as well as weather conditions, such as wind speed and temperature on the slopes. If the snow cover is melting or weather conditions otherwise changing, the application will switch on the snow blowers. Another common application is street lighting. By using a centralized control system, the lighting can be switched on or off automatically or simply adjusted to suit the conditions.

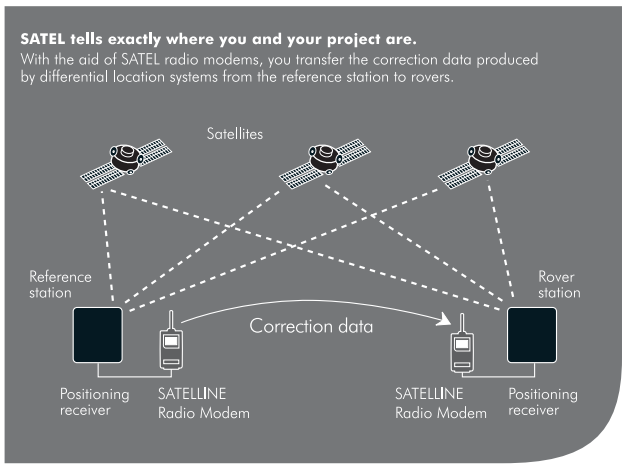
SATEL products are renowned for their reliability in demanding conditions as demonstrated by a number of international armies that use radio modems to control moving targets in live fire exercises. In anti-aircraft exercises, the radio modems relay strike information from the target, based on air pressure changes.

- **Monitoring and remote control of equipment**

Wireless land surveying radios

In real-time DGPS and RTK, data is transmitted from the base GPS receiver situated in a known position to the rover GPS receiver. The rover GPS receiver takes the base data into account in order to calculate its own position to the accuracy of a centimetre. SATELLINE Radio modems provide wireless communication between the GPS base station and the GPS rover station. The reference base station sends position correction data to the rover once a second.

- **High accuracy, fast and reliable positioning**



UNINTERRUPTED SERVICE FOR ENERGY DISTRIBUTION

Within the energy industry SATELLINE radio modems are frequently used in monitoring and diagnostics applications as well as distribution networks, for example in SCADA systems. Independent radio modems with an auxiliary power supply can ensure communication under any circumstances, even if energy and data networks fail.

SATELLINE radio modems come into a league of their own in a large number of control and monitoring applications. Using radio modems, energy output can be automated reliably, as independently triggered control functions can be included in the monitoring. Essential information is always available in problematic situations, and radio modems, equipped with auxiliary power sources, are independent from problems that may arise from cables or power lines. Radio modem networks can also be extended by adding new substations, and so make provision for future growth.

Distribution network monitoring and controlling

Particularly in energy transmission that is sensitive to problematic situations, possible breaks in distribution must be kept as short as possible. This requires a reliable monitoring and control network. With SATEL radio modems it is easy to set up a network that monitors the condition of the electricity grid and link stations. If problems arise, malfunctioning stations can be pinpointed quickly and in some instances restored remotely.

- **Remote control and monitoring of power substations**
- **Transfer data and monitoring the status of distribution networks and substations**
- **Automated Meter Reading (AMR)**

Gas and oil distribution

In this field, SATEL radio modems are primarily used for monitoring gas compression and pressure reduction stations. To easily generate radio coverage over a vast geographical area, each radio modem can serve as a data link for local RTUs and at the same time route/relay messages to other radio modems. SATEL radio modems can easily be used to control devices such as boiler controllers (gas temperature settings after pressure reduction) or injection gas odorisers (THT concentration proportioning and odoriser controller reset).

- **Monitoring of pipeline pressure changes**
- **Collecting production volumes from pumping stations**
- **Remote control of pumping stations**

Remote control of energy sources

Wind turbines are usually erected in remote locations so as to minimize noise pollution. Laying data cables can prove expensive, thus making radio modems a natural choice for monitoring and controlling these innovative energy sources. Since wind turbines require constant monitoring to ensure the best possible energy output, the communications used must be reliable and fast. With SATELLINE radio modems setting up a flexible data transfer network is easy and more importantly, reliable.

- **Monitoring of wind power plants**
  - Amount of produced energy
  - Wind speed, humidity, temperature
- **Wind mill maintenance**

Remote monitoring of electricity consumption

Measuring information is also needed locally. One of the more common applications is the automated remote reading of electric meters (AMR), which enables the monitoring of electricity consumption in real-time. In the near future, several countries are going to adopt new policies regarding electricity distribution. The most notable change will be that customers are going to be charged for precise electricity consumption instead of an approximate amount. This calls for reliable and flexible data transfer networks without operator expenses, a perfect application for SATELLINE radio modems.

- **Monitoring electricity consumption in real time**

Where people and goods move

CUT THE WIRES

With a radio modem network, machines and workstations can be made independent from cabling. This enables flexible workspaces and easy layout changes. SATELLINE radio modems can be used to set up flexible wireless data transfer networks, monitoring and remote control applications.

SATELLINE radio modems are designed for industrial use and licence-free frequencies are available in most countries, cutting costs even further. They also offer excellent coverage in industrial areas. To complement the modem range, SATEL also supplies converters and software to ensure that network configuration, running applications, and adding or removing substations are simple and straightforward. SATELLINE radio modems are used in conjunction with various systems, such as SCADA, and are compatible with most commonly used protocols in industrial automation, such as Modbus and Profibus.

Wireless radio for fleet management

On vehicles, radio modem networks make real-time data transfer and various remote control applications a simple, cost-effective reality. SATEL wireless data transfer networks are used extensively in vehicle-based applications within industrial complexes, for example in the remote control of unmanned vehicles (AGV) or simply to transfer data. In warehouses, real-time inventory data reduces needless traffic and unmanned vehicles can be controlled centrally. Radio modems also offer an easy way to transmit location and telemetry data and to monitor machinery.

- **Vehicle tracking and diagnostics**

Always in real-time

SATEL industrial applications include passage control and alarm systems. The flexibility of the radio modem network makes surveillance easier as new substations can be added easily to form large networks. In alarm systems, SATELLINE radio modems are ideal for protecting remote warehouses or installations – both from intruders and malfunctions. DGPS positioning is a widely used technique in container yards, in harbours areas as well as in inland transportation terminals.

- **Container handling and terminal management**

Clean environment

ENSURE YOUR WATER DISTRIBUTION

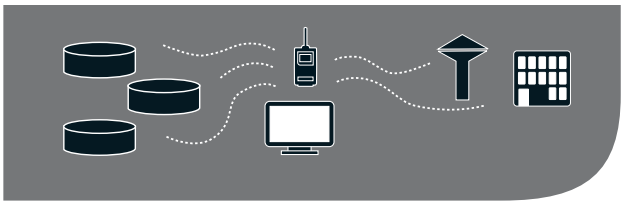
Radio modems are used widely for the remote control and monitoring of waterworks and sewage processing plants. Since these installations are often in remote places or cover a large area, the data network needs to be flexible, easy to extend and above all reliable.

Radio modems enable flexible monitoring networks precisely where they are needed. As substations can be added or removed from the network freely, it is easy to keep costs down thus leaving resources to be focused on other problem areas.

Go with the flow

In water distribution plants, interruptions must be kept to a minimum, and problems addressed instantly. This puts additional pressure on the reliability and integrity on the monitoring and control network. With SATELLINE radio modems, real-time monitoring networks can be configured and expanded according to demand. The network may cover, for example, pumping stations, water reservoirs and distribution substations. SATELLINE modems are also used to monitor water usage, flow or other set parameters. As well as monitoring water distribution, SATELLINE radio modems are used to control pumping stations.

- **Monitoring the flow and pressure of the water system**
- **Temperature-dependent irrigation for farming**
- **Control overflow gate**
- **Monitoring leaks in water distribution system**
- **Remote control of pumping stations**
- **Remote measuring of water levels**
- **Monitor and control of pumping stations**



Sewages under control

A sewerage system needs to be constantly monitored and controlled. This is crucial, especially when monitoring ageing sewerage networks, where old pipes are often the cause of leakages. The problem with sewerage and drainage networks is that sites often cover a large area. This makes monitoring the network using traditional means difficult. Radio modems however are a flexible, economical and reliable solution for building comprehensive data transfer networks. SATEL radio modems can be quickly and easily installed to provide instant access to vital information without the hassle of laying cables.

- **Monitor sewage pumping stations, water treatment plants or selected parts of a sewerage network**

SATEL RADIO MODEMS ARE AN EXCELLENT CHOICE WHENEVER RELIABLE WIRELESS DATA COMMUNICATION IS NEEDED.

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