

Wireless Indoor Solutions

Introduction to WINS

Why RF coverage in confined areas?

In the early days of mobile communication there was only outdoor coverage. The outmost 'confined area' at that scenario was the private car where an external antenna was linked to the mobile inside.

Times have changed dramatically. Only a couple of years later the mobile communication became the driving force of the entire communication industry. This breathtaking development has not slowed down. With 3G, UMTS and W-CDMA mobile access to the Internet world will become reality in the very near future.

These highly sophisticated services cannot be restricted to only open air. Instead, coverage of confined areas becomes a key issue for the mobility of the modern society and with independency in communication wherever people go. Most 3G traffic, for example, is expected in confined areas.

Operator's benefit

Mobile users want to be independent. No matter where they actually are they expect to be reachable around the world. People have the tendency to choose those service providers that offer the best coverage. That means operators attract more subscribers for their services if the offered grade of coverage satisfy the expectations of the user.

Emergency communication

Confined areas are often susceptible to damaging incidents. Past accidents clearly show that a proper working (wireless) communication system is required for rescue forces to save lives. In many places like tunnels and public buildings it is a must to install an independently working communication system for rescue workers, fire brigade and police.

Trunk radio

Due to the high complexity of our traffic systems it is a necessity to provide wireless services to keep communication contact between train personnel and the operation headquarters. Those services have the same importance as the emergency radio.

RFS has the full range of products for all kind of system needs

Whatever kind of services is needed, RFS has the complete solution using state-of-the-art and reliable techniques. RFS will help you choose the most cost effective solution for the coverage whether it is a passive or an active network, antennas, or leaky cable.

Confined areas

There is a growing number of inside areas where wireless RF coverage for mobile communication is not sufficient. Those areas often need to be covered with multiple service providers and are usually linked to the mobile networks either via an antenna with adjacent booster amplifier or using a carrier's base station (BTS).

What does WINS stand for?

WINS stands for Wireless Indoor Solutions offering to customers RF communication systems for confined areas. It enables people to use their mobile radios and cellular phones in areas not normally covered with RF signals.

WINS provides solutions

Throughout the world RFS provides complete broadband wireless solutions for most kinds of confined areas such as those found in metros, tunnels, buildings, and other covered structures.

As an experienced leader in this marketplace RFS has the expertise combined with innovative products. These products include passive (cable, antennas, filters, combiners, etc.), and optical (fiber optic converters, etc.) that are internally designed and manufactured.

Solutions for...

WINS provides coverage for:

- Analog security and emergency services, in the frequency range of 75 to 150 MHz
 - Police
 - Fire brigade
 - Rescue service
- Paging in the range of 150 MHz
- Analog cellular networks, in the frequency range of 400 to 900 MHz
 - NMT
 - AMPS
- Digital cellular networks, in the frequency range of 380 to 2,650 MHz
 - TETRA 380 (Europe, emergency)
 - TETRA 450 (Europe, trunking)
 - TETRA 800 (Asia)
 - CDMA/TDMA 800
 - SMR (US)
 - GSM-R (European railway)
 - PMRS (Asia)
 - GSM 900
 - GSM DCS 1800
 - PCN/PCS 1900
 - UMTS 2100
 - W-CDMA 2100
 - Others
- Wireless data transmission at 2.4 GHz, 3.5 GHz, 5.2 GHz and 5.8 GHz
 - WLAN
 - WiFi
 - WiMax
 - 802.1 Ethernet
 - Bluetooth
- Broadcast services in the frequency range of FM, VHF, and UHF DAB and DVB

Wireless Indoor Solutions

Applications

The RF applications for confined areas are numerous. In structural areas where people are cut off cellular networks because they are in tunnels or behind building walls there is a need for additional broadband wireless coverage RFS has a proven track record of providing wireless systems in the following confined areas:

- **Tunnels**
 - Metros, train tunnels
 - Street tunnels
 - Service tunnels
- **Buildings**
 - High rise buildings
 - Corporate buildings
 - Campus areas
 - Arenas
 - Airports
 - Train stations
 - Shopping centers
- **Vehicles**
 - In-train
 - Aircraft
 - Offshore oil platforms
 - Vessels (commercial and military)
- **Mines**

Application driven solutions

For more than 30 years RFS has been a major leader in the WINS business worldwide. Our extensive experience in RF distribution enables RFS to offer the newest and most reliable technology in the market. RFS has the ability to offer customized solutions as well as 'standardized' approaches for easy system designs and cost effective installations.

Depending on the application there are different system approaches from a purely passive network solutions to a highly sophisticated active networks with fiber optic backbone and remote surveillance. RFS can provide solutions from simple antenna to broadband leaky feeder cable distribution or a combination of both.

Underground Systems

WINS started with providing essential services for police, fire brigade, and train control in major tunnels. Tunnels being absolutely RF dead once past the first bend from the portal provided a unique challenge for the RF engineer to provide wireless services. RFS, the first to develop modern corrugated cable, solved this problem with the development of radiating cable. Since a cable could be strung the entire length of a



tunnel the distributed antenna characteristics of the radiating cable provides a continuous wireless system.

With the use of radiating cable and bi-directional amplifiers to compensate for the insertion and coupling losses of the cable over long distances, wireless communication from the train cab and hand-held radios was possible to the outside world. For the first time in history wireless communications coverage was possible and extremely reliable in an underground environment.

In-building Structures

Large building structures often have poor RF characteristics. As an example, hospitals that are often made of RF absorbing concrete and steel inhibit wireless devices like pagers, mobiles and wireless test equipment. Doctors and nurses who must communicate with their patients and staff are unable to use their portable phones and pagers once inside the hospital. RFS's Wireless Indoor Solutions product line provides the solution to make communication possible in the environment. Wireless test equipment, pagers, mobiles can operate on the same backbone system comprised of RADIAFLEX® radiating cables and communication electronics.

Other large building structures like airports, shopping centers, and high rises often have the same poor RF characteristics. Again WINS can be used to simultaneously provide multiple services to many different wireless portable users. It is not good enough to have your wireless devices operate only in an outside environment or next to the nearest available window. Today's wireless users are demanding that their portable wireless devices work in all environments and through the entire building.

Applications

Transportation

Vehicles carrying many people are mostly built of metal, which naturally shields RF penetration in both directions. Therefore, mobile communication is usually poor, especially in those trains in which windows of a vehicle are covered with a thin metal coat for better air conditioning purposes. Sea going ships also do not allow satisfying mobile communication due to the massive presence of steel.

The installation of distributed antennas in vehicles is often not suitable or recommended due to their placement and often being an obstruction. A simple radiating cable solution is often the answer. It is wideband, can be placed out of site, and is not obtrusive. The installation of radiating cables requires high mechanic properties of those like high flexible body and small bending radii in order to place it into narrow, pre-given spaces. RFS designed a special radiating cable, the RSF12-50, which fulfills those requirements.

Mines

Wireless communications underground has become more and more important. Besides the analogue technique already operating in most mines there is the need to install highly sophisticated wireless communication systems to remotely control machineries. Also the need for new TETRA systems for emergency services is required. Here, future proof applications require a broadband solution that can be supplied by RFS.

From cable deliverer to solution provider

RFS has long expertise in the RF coverage of confined areas, starting with the first radiating cable in the seventies for communication in tunnels. At that time no one could imagine the success story of the mobile consumer communication. Radiating cable was installed to enable analog trunk communication between the train driver and the related operation centers at a low RF frequencies in the range of 75 MHz to 150 MHz. Today the requirements and expectations in a RF communication network have changed greatly. Coverage must be provided for a number of different services at different frequencies. Broadband technique is now requested transmitting mainly digital signals up to 2.4 GHz including WLAN services and more.

RFS offers complete RF system solutions for nearly every kind of confined area. These systems vary from specific solutions for large tunnel projects to a cost-effective modular system for In-building; from passive system approach to active driven systems with an optical fiber backbone structure. Last but not least RFS rounds up their spectrum offering complete remote surveillance systems for active equipment like amplifiers and electro-optical converters.

All services – one stop shopping

The development of high performance RF equipment and components combined with quality products has made RFS very successful in the global marketplace.

Besides the development and production of system equipment, RFS has extensive experience in the international markets in providing the complete range of services from basic system design to full turnkey solutions. Complex broadband wireless turnkey solutions have been designed, installed, and commissioned in Hong Kong, Singapore, China, Europe, and the Americas.

RFS provides the following services:

- Consulting
- Site survey
- System design
- Project management
- Installation
(also subcontracting to local companies)
- Supervision
- Commissioning
- Acceptance tests
- Training
- Maintenance
- Turnkey