

RFS Site Optimization Products

Maximizing the effective use of wireless services
in an ever-evolving wireless world



RADIO FREQUENCY SYSTEMS
The Clear Choice®



RFS Site Optimization Products

A clear vision in a rapidly evolving world

Wireless technologies are evolving at an unprecedented rate, with transitions between generations – 2G to 2.5G, 2.5G to 3G – ever shorter. Thus, initial trials and commercial deployments of 3.5G and 4G platforms – such as WiMAX, HSPA and LTE – are already underway, even before the dust of past deployments has settled. This rapid pace has created extraordinary demand for advanced RF conditioning solutions tailored for specific carriers and OEMs.

RFS has a clear vision of its customers' individual site optimization needs. The company offers cutting-edge combining solutions (diplexers and triplexers), tower mounted amplifiers, remote electrical tilt technology and co-location filtering solutions. It invests seriously in R&D and works closely with customers to provide products that secure existing sites' operations while fulfilling the requirements of new communications standards.

With unrivaled knowledge of wireless infrastructure, RFS provides leadership in meeting the challenges of rapidly evolving technologies. These strengths give rise to clear differentiators.

➔ Comprehensive base product range

RFS' proven portfolio covers the full range of the most common bands, applications and emerging technologies, including LTE (2.6GHz and 700MHz), Cellular 850, GSM 900 and 1800, PCS 1900, AWS and UMTS 2100.

➔ Premium performance RF equipment

An expert design strategy at the core of the RFS manufacturing process ensures that every component is optimized for the best possible performance, compatibility and cost-effective longevity.

➔ Lightweight, cost-reducing solutions

Innovative use of materials and software-based tools reduces tower load and maximizes existing infrastructure investments.

➔ Long-standing expertise

RFS' in-depth knowledge and experience – demonstrated by its leading role in developing the Antenna Interface Standards Group (AISG) protocol – enables it to understand and meet the unique needs of each customer.

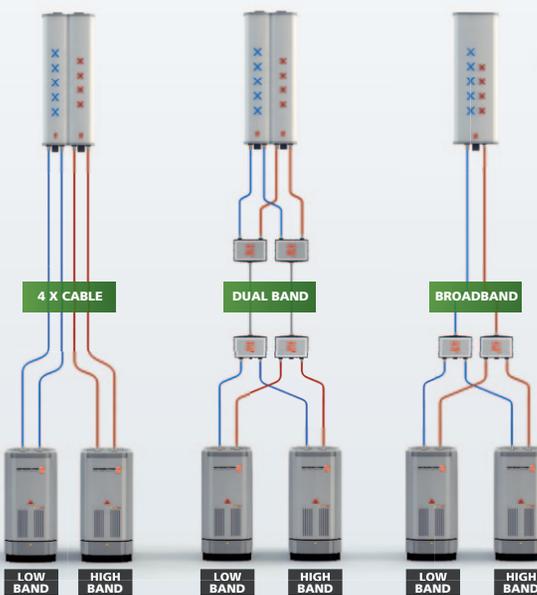
ShareLite Combining Solutions

Multiplying deployment options; dividing the costs

Combining solutions (diplexers and triplexers) allow several systems to use the same feeder cable between the base station and the antenna, resulting in a lighter tower load and a corresponding cost savings in the streamlined arrangement.

RFS' new ShareLite Combining Solutions efficiently support LTE migration on the cell tower, and are also backwards compatible with 2G and 3G frequencies. The solutions' unprecedented compact design allows cell tower installation on a swap-out basis, boosting service capabilities while avoiding added weight to the site.

In addition, ShareLite's very low insertion loss limits the impact on total system loss, ensuring high quality wireless cellular services for years to come.



Supports LTE migration on the cell tower

Key features and benefits of ShareLite Combining Solutions

- | | |
|---|--|
| Wideband design accommodates several frequency band options | ➔ Ready for use with next-generation technologies and multiple applications |
| Very low insertion | ➔ Best-in-class, with minimum system impact |
| Very high peak power handling | ➔ Supports simultaneous multiple carriers |
| Smallest high-performance diplexers in the world | ➔ For easy installation and reduced tower load |
| Cutting-edge design and construction | ➔ Resilient over extreme temperature and weather conditions and compliant with IEC environmental standards |



UltraAmp™ Tower Mounted Amplifiers

Beyond coverage improvement

UltraAmp™ Tower Mounted Amplifiers (TMAs) are used in wireless networks to improve coverage by boosting base station sensitivity. Higher BTS sensitivity leads to better voice quality and fewer dropped calls. In the case of 3G, moreover, using a TMA can also improve bit rate coverage for data transmissions, thus enhancing both coverage and capacity.

TMAs can also be used to achieve cell enlargement. This enables operators to serve more subscribers from the same BTS site, ultimately generating additional network revenue.

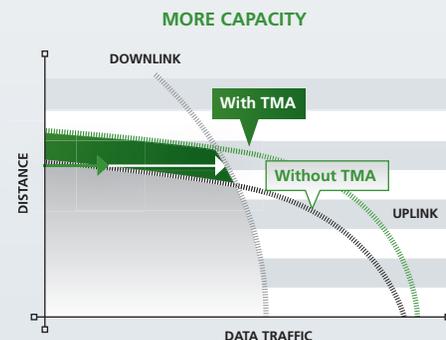
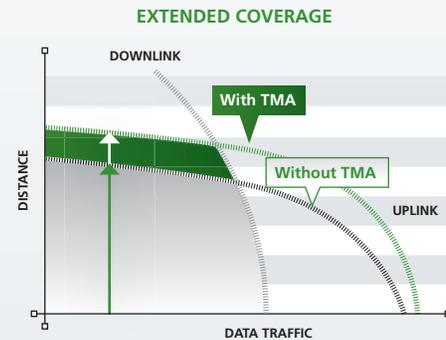
RFS is one of the leading global suppliers of TMAs, and supports the largest carriers and OEMs. Its renowned TMA portfolio covers all major bands and applications:

- ➔ Band-specific twin and wideband TMA models from RFS cover SMR (Specialized Mobile Radio), cellular 850, GSM 900 and 1800, PCS 1900, AWS, UMTS 2100 and LTE 2.6

- ➔ Current Window Alarm (CWA) base-station interface or AISG 2.0 / 3GPP-compliant for use with Remote Tilt antenna systems

- ➔ Innovative product roadmap including new technologies such as polymer filters, triple-mode ceramic filter resonators and new filter tuning concepts

Power distribution units and bias-tees are also available as part of RFS' total package solution.



Key features and benefits of RFS' UltraAmp™ Tower Mounted Amplifiers

Extremely lightweight	➔	Reduces tower load and eases installation
Low noise figure	➔	Overcomes feeder losses and enhances site coverage
Low insertion loss of Tx filter	➔	Provides increased downlink coverage
Filtering	➔	Improves Tx-Rx isolation by reducing noise and interference
Common power supply	➔	Reduces inventory and logistics
Dual-duplex configuration	➔	Enables use of a single feeder for both downlink and uplink

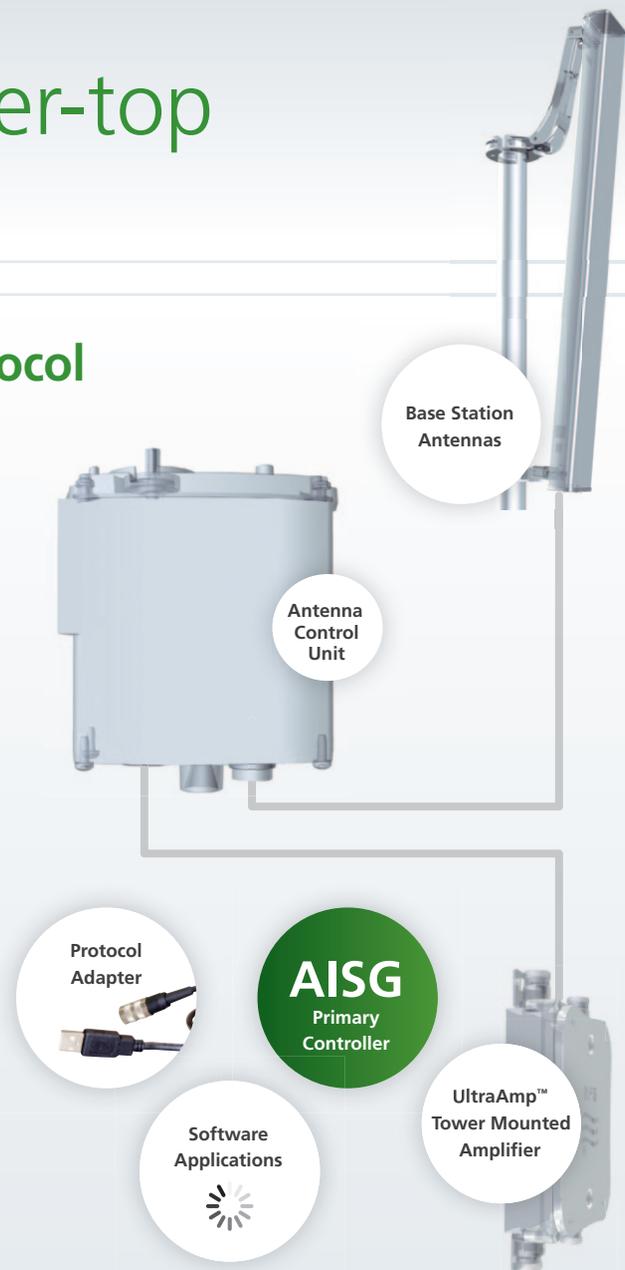
Talking to the tower-top

Compliance with the AISG protocol

The Antenna Interface Standards Group (AISG) protocol was designed by RFS and other industry leaders to enable the introduction of antenna line products that feature remote control and monitoring capabilities, while ensuring basic interoperability between these products and the control infrastructure.

Accurate control and monitoring of tower-top components frees the end user from the inherent restrictions associated with proprietary control and monitoring systems. It also enables the user to implement cost controls for both greenfield deployments and mature network retrofits.

The latest version of the protocol is AISG version 2.0. RFS offers a unique, end-to-end AISG v2.0-compliant solution set; the company has effectively aligned all key antenna-line elements with this important standard.



Key features of **RFS' fully AISG-compliant solution set**

AISG compliance	Product	Features
✓	RET (Remote Electrical Tilt) system	⇒ Permits control of a few to dozens of types of antennas on a single site
✓	'Optimizer Universal' Antenna Control Unit (ACU)	⇒ First software-configurable ACU on the market; allows communications across a range of open and proprietary protocols
✓	UltraAmp™ Tower Mounted Amplifiers	⇒ Packaged to minimize installation time and cost, with an integrated diplexer to reduce tower load
✓	Bias-Tee	⇒ Comes in compact outdoor units, for wideband usage
✓	Primary Controller	⇒ Features alarm reporting for each output port and an Ethernet interface
✓	Protocol Adapter	⇒ Features a USB connector and an integrated power supply
✓	Network Element Manager software	⇒ Easy to navigate, and includes redesigned, user-friendly graphical interface

Co-location filters

Flexible interference protection

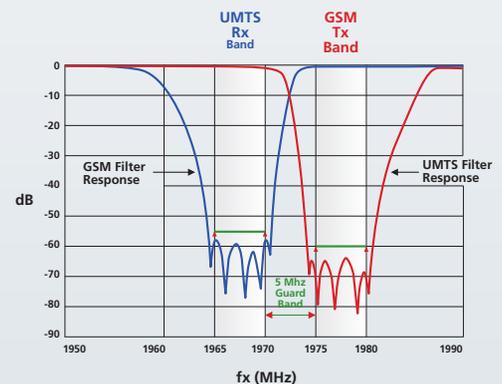
Co-location filters are used to prevent the interference that often exists when RF base stations are co-located. Interference degrades system performance and can increase the number of dropped calls in the network.

As networks have evolved from 1G to 2G, and 3G to 3.5G and 4G overlays, and as environmental considerations have gained ground, the filtering challenge associated with indispensable, modern co-location scenarios has become particularly complex. Indeed, each scenario is unique.

RFS is ideally positioned to respond to today's highly sophisticated, tailor-made co-location filtering requirements. It has a wide inventory of RF conditioning products covering all bands, and offers dedicated engineering support on a product-by-product basis.

A proven supplier, RFS ships more than 5,000 filtering products per week across the globe. All its filtering solutions are subject to literally hundreds of rigorous design verification tests, including those for shock, vibration, temperature extremes, salt, fog and other environmental hazards.

RFS' skilled engineering team is ready to engage customers in technical discussions at the earliest stage in the project to help define an optimal solution.



Key features and benefits of RFS co-location filters

- All major air interface technologies supported → Maintains appropriate isolation for co-located base stations
- 8-week turnaround for specification-compliant units → Tailored solutions are quickly available
- High integration levels → Compact and lightweight solution set
- All designs undergo a rigorous design verification test regime → Reliable, long-life performance, even under extreme conditions
- Designed for outdoor applications → Easy integration with existing systems or new deployments

Why RFS?

A worldwide leader in wireless and broadcast infrastructure



Radio Frequency Systems (RFS) is a global designer and manufacturer of cable, antenna and tower systems, along with active and passive RF conditioning modules, providing total-package solutions for wireless and broadcast infrastructure.

RFS serves OEMs, distributors, systems integrators, operators and installers in the broadcast, wireless communications, land-mobile and microwave market sectors.

As an ISO-compliant organization with manufacturing and customer-service facilities that span the globe, RFS offers cutting-edge engineering capabilities, superior field support and innovative product design.

Serious about services

Customers know they can count on RFS for comprehensive logistical capabilities, flawless execution and outstanding technical skills and support. The company's dedicated shipment coordinators, hotline staff and on-site engineers go well beyond mere technology, striving to offer tailored solutions to meet even the most complex site-engineering and delivery challenges.

RFS' value-added services match the exact needs of business partners large and small.

Ever-present quality guarantee

From design to manufacture, ISO 9001 and ISO 14001 certification standards encompass all aspects of RFS' business worldwide. Every product RFS ships has stood up to the most stringent technical, environmental and quality control tests, continuously meeting and surpassing the expectations of a long list of wireless carriers, transportation and utility operators, and broadcasters.

RFS backs every product bearing its name with a quality guarantee that is unrivaled in the market.

A tradition of innovation

For over a century, RFS has been at the forefront of the wireless communication industry through its unwavering commitment to design and develop the world's most advanced technology in the field. Dedicated R&D teams, along with a privileged partnership with Bell Labs, are at the source of breakthroughs that are ensuring the mobility of an increasingly wireless world.

RFS is at the frontier of wireless technology innovation, sustaining the boldest ventures to enhance the way people communicate and live.

A truly global company

With on-the-ground personnel in more than 20 countries and on every continent, RFS always delivers on its commitments, providing a comprehensive range of premium products, systems and services. Its clients benefit from all the advantages of a global supplier, while relying on dedicated support from RFS' local engineering, manufacturing and shipping teams.

RFS' products, systems and personnel can be found in every corner of the planet. As a global group, RFS is committed to upholding the most stringent environmental, health and safety standards, and seeks to integrate green initiatives in every aspect of its business.

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