

RADIO FREQUENCY SYSTEMS

The background is a complex collage of blue-toned images. On the left, a tall white tower stands against a light blue sky. In the center, a woman in a black jacket smiles while holding a mobile phone. To her right, a man in a suit is seen from behind, talking on a mobile phone. In the foreground, a woman in a dark suit is focused on a laptop. A large, glowing blue globe with a network of white lines is positioned in the upper right. A smaller globe showing the European continent is in the lower left. A horizontal scale with numbers 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, and 0.9 is visible in the middle. The overall aesthetic is high-tech and professional.

RFS

The Clear **Choice**

The Clear Choice™

Across the globe, wireless communications operators rely on Radio Frequency Systems as their global supplier of cutting edge technology in telecommunications, broadcast and defense communications. RFS designs, manufactures and supplies high quality antenna systems for wireless infrastructure, point-to-point microwave, radio and television broadcasting, HF and distributed communication systems. Products used in these applications include coaxial cables and elliptical waveguides, connectors, antennas, filters, combiners and other RF conditioning equipment, repeaters, pressurization systems and installation accessories.



RFS serves operators, OEMs, distributors and system integrators in the cellular, land-mobile, microwave, broadcast and HF market sectors. As an ISO compliant organization with manufacturing facilities that span the globe, RFS offers advanced engineering capabilities, superior field support, and innovative product design. Our customers have access to our professional training programs and powerful eBusiness tools that improve their efficiency.

These value added services, plus the convenience of a single source, make **RFS the clear choice**..... time after time.





QUALITY

Quality Management is an integral part of day-to-day business at RFS. The philosophy of anticipating customer expectations and meeting them by continuous improvement is our prime objective when designing, manufacturing, supplying and installing our products in the world market. The whole business is driven by best practice at every level within the RFS corporate structure. Our future success and growth depends on quality in everything we do.

The customer partnerships that we form are long term commitments built on uncompromising integrity. That commitment to always seek improvement in every aspect of our business is the quality standard to which we have aspired. Radio Frequency Systems takes considerable pride in having achieved ISO 9001 and ISO 14001 certification for our Quality Management Systems worldwide. These international quality standards encompass all aspects of our business from design through manufacture. We have made a commitment to our customers to listen, to respond, and to excel at designing products and systems built to provide lasting value.

RFS respects the environment and promises to develop and improve operations and technologies, taking into consideration the efficient use of energy and raw materials, giving preference to renewable resources, and minimizing waste and adverse environmental impact. As an organization, RFS is striving to achieve the European Union's directives , RoHS, WEEE and EuP.

SERVICE

Customers all over the world count on RFS products and expert services for the wireless transmission of data, voice and video. Our manufacturing locations in Australia, Brazil, China, Denmark, France, Germany, and the USA, along with a worldwide network of sales, technical support and marketing professionals, focus on responsiveness that always reflects our concern for our customers' success.

A highly trained and experienced sales force implements Radio Frequency Systems' unique, personalized selling philosophy - our commitment to form close partnerships with our customers before, during and after the sale. Dedicated customer service, expert technical advice and support, and a total product package - our promise to you, every time we do business.

TECHNICAL SUPPORT

Radio Frequency Systems maintains applications engineering departments worldwide. In addition, RFS offers total turnkey services to both broadcast and in-building wireless customers.

Comprehensive training and training materials are available to RFS customers. Training can be conducted at RFS facilities or on the customer's premises. Each training session is tailored to the customer's specific interest, requirements and skill level.



[E-Catalog – PDF Datasheets](#)

[Browseable Print Catalog](#)

[μ-wave Link Calculator](#)

[RFS RPE-Viewer](#)

[X-tilt](#)

[LeTranslator](#)

[CELplot](#)

[CELcalc](#)

[ROIcalc](#)

[NFcalc](#)



In Building & Tunnel

Indoor Coverage

SINGLE NETWORK

Multiple Services for Wireless Coverage

Around the world RFS provides complete wireless RF solutions for in-building and tunnel communications systems. With over 30 years in industry, RFS is an experienced leader in the design and manufacture of components for confined coverage and in the design, installation and commissioning of confined RF coverage systems.

Depending on the application, RFS is able to offer solutions ranging from a purely passive one to a sophisticated network of optical repeaters based on remote supervision. It can also provide the installation of a distribution system using radiating cables or point antennas.

A sole RF WINS (Wireless Indoor Solutions) indoor distribution network can offer uniform coverage for multiple wireless communication services, public security, cellular networks, and wireless data transmission.

The Total Package

Decades of experience in designing and manufacturing high performance RF equipment have made RFS very successful in the global marketplace. Besides the supply of the full Bill of materials, RFS has extensive experience in international markets in providing the complete range of services from basic system design to full turnkey solutions. Complex broadband wireless solutions have been designed, installed and commissioned in P.R. China, Europe, Hong Kong, Singapore and the Americas.



RADIAFLEX® Radiating Coaxial Cable

Directional Couplers

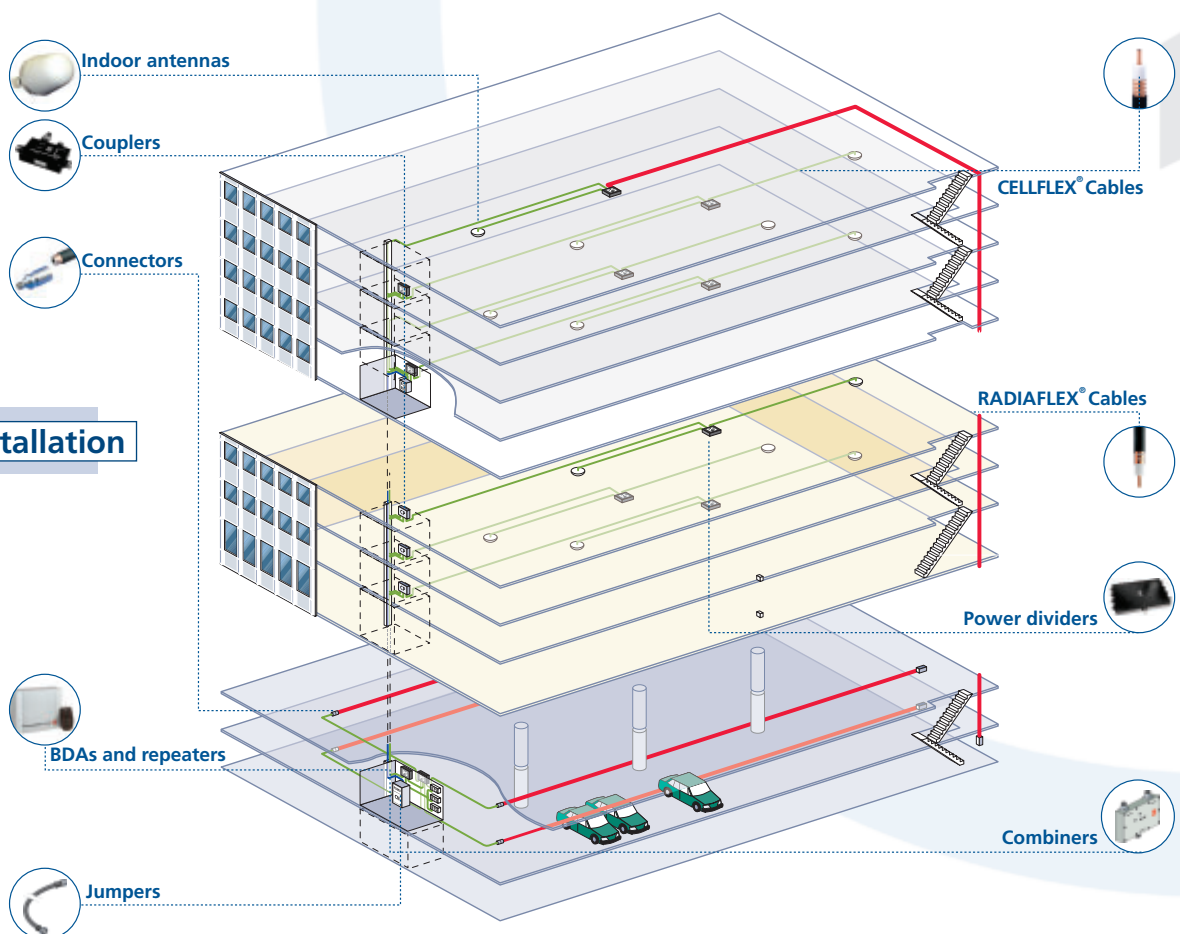
Power Dividers

Combining System Products

DC Block

Indoor Antennas

Bi-Directional Amplifiers



Typical Building Installation

Solutions



A FULL RANGE OF WINS ARCHITECTURES

WINS stands for Wireless Indoor Solutions, RFS's solution for wireless communications in confined areas.

FACT: From an RF communications perspective, there is no 'standard' tunnel or building. All are unique; all demand purpose-built solutions and attention to design detail. Development of the RFS capability was born out of this fact; capability that draws together a world-class team of designers and engineers, coupled with RFS advanced RF technologies. RFS adopts a unique 'top-down' approach to your tunnel and in-building communication needs rather than 'one size fits all.' Your tunnel or building is one of a kind; so are its RF communication needs. RFS custom solutions offer the best fit to these and future needs. Depending on the application there are different system approaches; from a purely passive network solution to a highly sophisticated active network with fibre-optic backbone and remote surveillance.

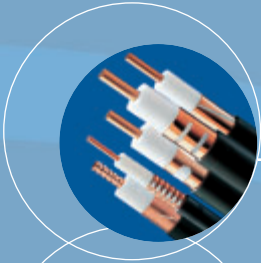
RFS TECHNOLOGY ADVANTAGE

Today's most advanced RF solutions for tunnels and in-building applications are based on a mix of technologies – distributed antenna systems, radiating cable systems, fibre-optics extension systems and point of interface technology.



DISTRIBUTED ANTENNA SYSTEMS (DAS) TECHNOLOGY

RFS provides the complete bill of material for distributed antenna systems. Commonly these systems require the distribution of 800 – 2200 MHz cellular services however some applications call for additional bands as low as 70 MHz or as high as 2500 MHz including WLAN (WiFi) services. RFS also provides the components that allow the successful implementation of these systems.



RADIATING CABLE SYSTEMS

The RFS world-renowned RADIAFLEX® range of radiating cable offers almost limitless capacity for more demanding applications. Providing a bandwidth of 70 MHz to 2.5 GHz the RFS radiating cable solution is ideal for multi-carrier / multi-service applications typically found in road and rail tunnels. RADIAFLEX® cable is available in a range of variants, covering many different applications.



POINT OF INTERFACE EQUIPMENT

Modern RF communication systems incorporate an increasingly complex "mix" of services. This is particularly so in tunnels, where services may include FM Radio, UHF emergency services and paging along with CDMA800, GSM900, GSM1800, PCS1900 and WCDMA2100. In addition there may be a number of operators in some of these bands. In such complex multi-user applications, advanced filter and combiner technology is crucial to total system performance. RFS boasts a leading in-house design and development facility for such cutting edge point of interface technology.



TUNNEL COVERAGE EXTENSION SYSTEMS

In longer tunnels Wireless Indoor Solutions may require the installation of repeaters. One method of achieving this is to use a fibre-optic backbone system. RFS provides a range of optical backbone systems to suit all major tunnel systems. Another option for long tunnels is the RFS bi-directional amplifier (BDA) series for use in regenerating RF signals, both uplink and downlink.



IN-BUILDING COVERAGE EXTENSIONS SYSTEMS

For high rise buildings, campus environments, shopping centers, airports and other large buildings RFS provides a range of bi-directional amplifiers and fibre-optic backbone systems to extend the coverage to provide quality communications right throughout the indoor environment.



Wireless Communication

Antenna and Feeder Systems

Voice and data wireless traffic growth has:

- *Increased the demand for new sites to meet specific capacity and coverage requirements and*
- *Developed the need for site upgrade using environmental friendly solutions*

As for Base Station Antennas and Coaxial Lines, RFS offers:

- *Antennas for radio base stations and antennas for microwave links, for all pattern types and most common frequency bands and applications*
- *System cabling*
- *Radio equipment interconnections*
- *Interlink cables or internal and external applications with excellent features*
- *Customized solutions in kits*

Such solutions are adaptable to radio access systems such as cellular networks, land and sea mobile communications and all kinds of wireless systems, in addition to rural telephony, microwave communications and radio broadcasting.

CELLFLEX® Foam-Dielectric Coaxial Cable

HELIFLEX® Air-Dielectric Coaxial Cable

CELLFLEX® Jumpers

RAPID FIT™ Connectors

Hangers

Wall/Roof Feed-Throughs

Grounding Kits

Hoisting Grips

Ceiling Adapters

Strapping Kits

Round Member Adapters

Cable & Connector Attachment Kits

Surge Protectors

Omnidirectional Antennas

Directional Panel Antennas

Optimizer® Panel Antennas

Optimizer Remote Tilt Units

Penetrator Antennas

Antenna Mounting Hardware

Antenna Accessories

Cavities

Combiners

Boosters

Duplexers

Filters/Preselectors

Receiver Multicouplers

Tower Mount Amplifiers and Boosters

Dual Band Duplexers & Triplexers

Microwave Solid Parabolic Antennas

RFS SlimLine® Solid Parabolic Antennas

RFS CompactLine® Solid Parabolic Antennas

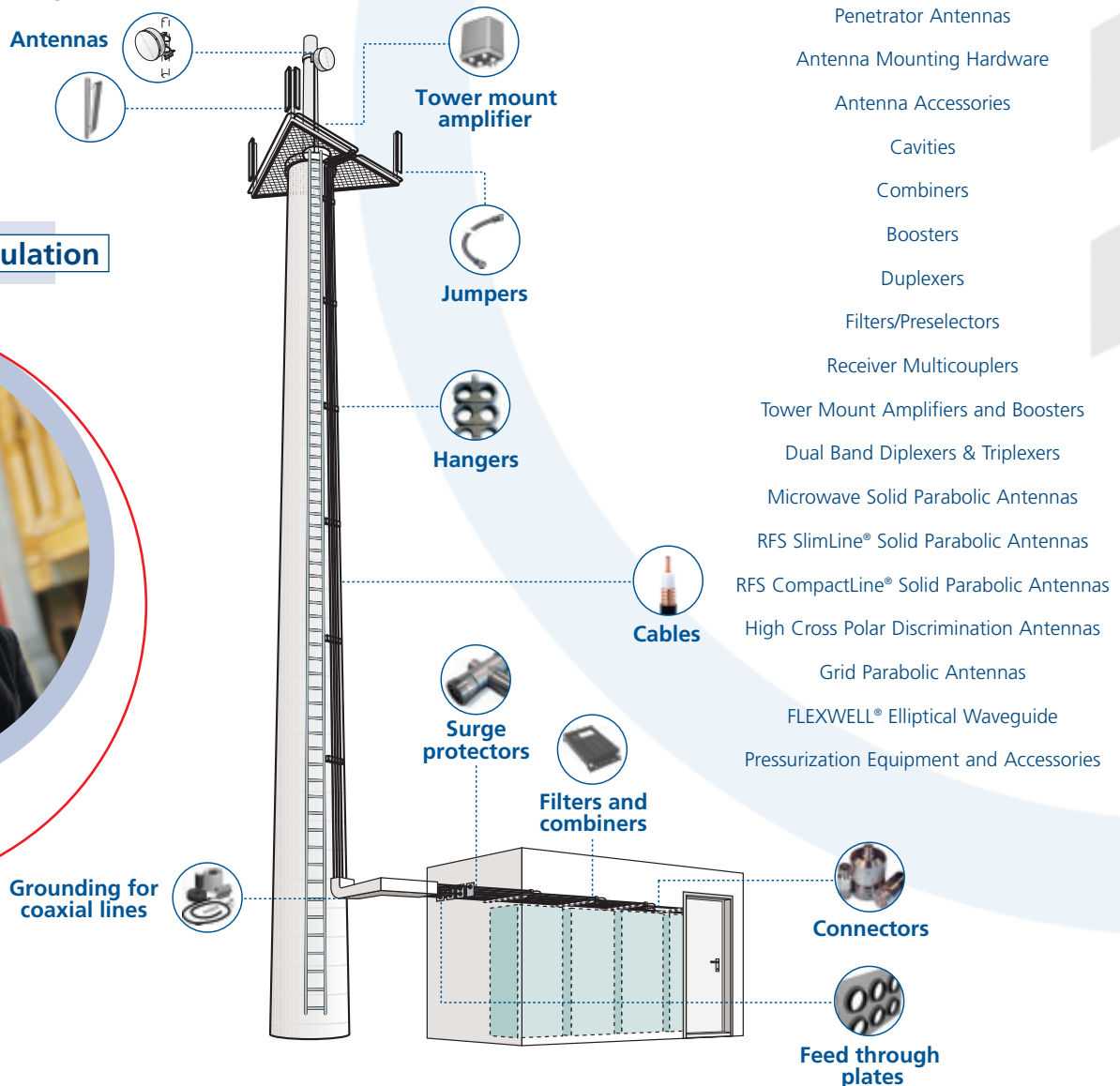
High Cross Polar Discrimination Antennas

Grid Parabolic Antennas

FLEXWELL® Elliptical Waveguide

Pressurization Equipment and Accessories

Application Simulation





& Site Optimization Products

TRANSMISSION LINES



RFS manufactures a comprehensive range of transmission line products used world-wide for antenna feeders, cabling of antenna arrays, radio equipment interconnections, jumper assemblies and indoor applications.

Products include: HELIFLEX® air-dielectric feeder cables, combining excellent electrical characteristics with robust mechanical performance; and CELLFLEX® foam-dielectric cables, providing a reliable backbone for cellular radio systems – from GSM and CDMA, to UMTS.

Other additional high quality products can deliver value in applications such as Industrial Automation, Closed-Circuit TV/Security, Satellite, Load Cell, Fire Detection/Safety, Audio, and Automotive. These include high performance 50 ohm and 75 ohm flexible coaxial products as well as twisted and shielded cables.

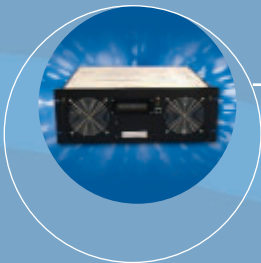
BASE STATION ANTENNA SYSTEMS



RFS provides state-of-the-art base station antenna solutions – covering different footprints, patterns, gains and tilt types – to suit all mobile standards in all frequency bands. Whether it be for a green field player or an existing operator, RFS has the widest range of 2G (GSM/TDMA/CDMA) and 3G (UMTS/cdma2000) antenna solutions for network deployment.

For high density and urban areas, antenna configurations are available for both space diversity and polarization diversity applications. RFS has a complete range of antenna down tilt options for network optimization: from adjustable mechanical site adjustment to fixed or variable electrical tilt with local or remote control solutions.

INTEGRATED PRODUCTS



A leader in the supply of RF conditioning products to OEMs and wireless carriers, RFS offers a comprehensive portfolio of advanced RF technologies at a world-class level of expertise.

Complementing its antenna range, RFS offers complete end-to-end base station RF solutions. Innovative products are combined with superior customer service to provide solutions for network coverage, capacity and infrastructure-sharing.

The product range comprises: combiners, that incorporate manual tune and autotune technologies, filters, receiver multicouplers, diplexers, duplexers, low-noise amplifiers, including tower-mounted amplifiers for 3G applications and boosters.

MICROWAVE ANTENNA SYSTEMS



The range of RFS microwave antennas is the most comprehensive in the industry, available in all common frequency bands up to 60 GHz. The range includes: heavy-duty grid antennas; WLL, LMDS and MMDS broadband wireless antennas; high cross polar discrimination antennas; and the cost-effective, RFS CompactLine® and RFS SlimLine® antennas, suitable for the needs of mobile operators.

In support of the microwave antenna systems, RFS FLEXWELL® corrugated elliptical waveguides ensure the highest quality transmission line for microwave communications and reliable pressurization equipment rounds out the offering.



Radio and **Television**

Broadcast

Offering a total solution for Broadcasters

RFS manufactures a complete range of broadcast antennas, feeder systems and combining equipment for VHF/UHF TV or FM and DRB services. At RFS, we consider ourselves a strategic partner, one where our products are supported with design, project management, installation and commissioning services.

Decades of experience. A global presence.

RFS has been active in the design and development of broadcast solutions for over 35 years, with customers in every corner of the world. This experience has led to the development of a wide range of innovative technologies and patents.

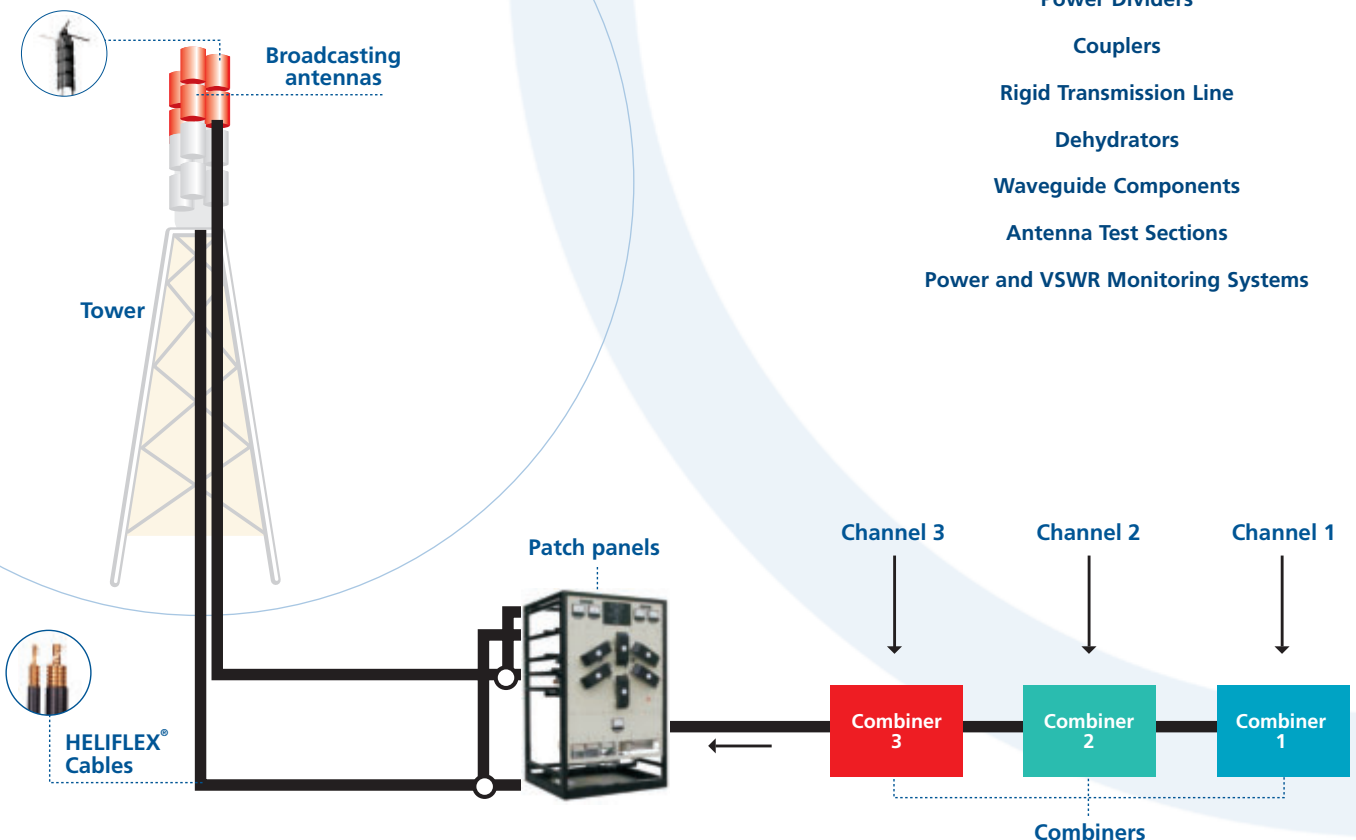
The added value that comes from working with a company like RFS does not only come from our products, it comes from our sales and support people in offices in 24 countries around the world. With decades of in-field broadcast experience and specialist in-house broadcast technology know-how right down to component design level, our product knowledge is unrivaled!

The Total Package

From the manufacture of products to the commissioning of the system.

- *Site survey*
- *Coverage design*
- *System design*
- *Manufacture*
- *Project Management*
- *Installation*
- *Commissioning*

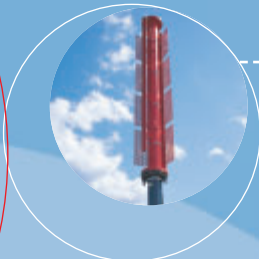
Television Application Simulation





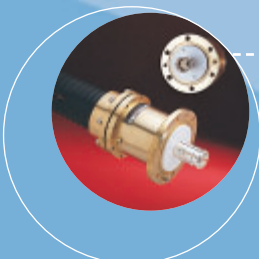
Products

BROADCAST ANTENNA SYSTEMS



RFS boasts the most comprehensive selection of panel array and slot antenna configurations for both UHF and VHF services, in a complete range of power capabilities. Designed to accommodate multi-channel operation and using precision-engineered distribution patterns for optimal coverage, RFS antenna systems provide the ideal broadcast solution. Rugged construction and corrosion resistance ensures RFS antennas are the optimal choice for even the harshest environments.

FEEDER SYSTEMS



RFS manufactures and supplies the world's leading feeder systems, including the HELIFLEX® transmission line coaxial cable range. Available in sizes ranging from 3/8" to 9" diameter, the HELIFLEX® feeder system is the ideal choice for all applications. It is one of the few flexible feeder cable ranges providing a high-power cable to suit DTV's practical maximum – 6 1/8" diameter. Manufactured from pure electrolytic copper and corrugated for strength, HELIFLEX® cable can be bent into complex configurations and requires no special expansion systems.

COMBINER SYSTEMS



RFS is a pioneer in many combiner technologies. From industry leading space saving low power combiners to world-firsts in high power adjacent channel combining systems, RFS has the global expertise to be your partner in combining services.

RF SWITCHING SYSTEMS



RFS' Rapid Release U-Link system provides the ideal modular system for manual broadcast switching applications. The U-Link's fast, simple lever action allows switching to be completed in only seconds. Available in all sizes to 7 3/16" diameter, the RFS Rapid Release U-Link system is fully modular and scalable, allowing it to be fully integrated into combiner systems and other broadcast equipment.

ANCILLARY HARDWARE



RFS offers a complete range of high quality ancillary products including rigid line coaxial feeder systems, power and VSWR monitoring systems, mounting hardware, pressurization equipment and accessories.



HF and Tactical

HF Tactical & Transportable

Manpack antennas to major HF installations...

RFS is a world leader in the innovative design, manufacture and installation of HF antennas, combiners, baluns and associated sub-systems. RFS also excels in the design, development and manufacture of leading-edge tactical and transportable antenna systems.

As RFS designs are broadband, its antennas suit a wide range of applications ranging from simple low cost SSB installations to complex large scale military installations and electronic warfare countermeasure systems.

From short, medium and long-distance HF and broadband coverage to ionospheric propagation and shore-ship/ship-shore/ ground-air communications, the RFS product range includes tactical manpack, transportable and stationary antennas for all omnidirectional and directional applications and field conditions.

RFS HF and tactical antennas provide economical and innovative solutions that can be fully tailored to suit particular system requirements and applications.

Field Service

RFS provides a comprehensive antenna field service, with field staff available to support all antenna site activities – site planning and clearing, through installation to final system testing and commissioning.

Custom HF System Design Services

RFS has an in-house team of HF engineering experts. For 30 years RFS engineering has provided government and military bodies with consulting and design services.



Tactical Antennas

Broadband Monopoles

Horizontal Log Periodic Antennas

Vertical Log Periodic Antennas

Rotatable Log Periodic Antennas

Biconical Dipole Antennas

Standard and Tandem Delta Antennas

HF Short-Wave Broadcast Antennas

Antenna Switching Matrices

Surface Wave Radar



Antenna Systems



TACTICAL ANTENNAS

RFS's wide range of tactical man pack and transportable antennas are available in standard designs, or can be customized to meet specific customer requirements.



STANDARD & TANDEM DELTAS

Omni directional high angle radiators designed for ionospheric propagation over short to medium distances. Radiation results from a wave traveling upward to a resistive termination at the antenna's apex. Similar in form to the standard delta, the tandem delta does not have a terminating resistor – as a result, all input power is radiated, achieving gains of 3-4dB over the standard delta.



BROADBAND MONOPOLES

Designed for medium to long distance omni directional operation, these antennas exhibit low angle radiation patterns – an economical solution for general HF communication applications.



HORIZONTAL & VERTICAL LOG PERIODICS

Suitable for short to long distance applications, RFS's horizontal log periodic antenna performance is virtually ground independent, with take-off angle able to be tailored to suit particular requirements.

Alternatively, RFS vertical log periodic antenna series provides ground-dependant vertical beamwidths and is characterized by a low angle radiation that is essentially constant at all frequencies.



ROTATABLE LOG PERIODICS

High performance directional antennas designed to provide short, medium and long-range coverage. These units exhibit high gain characteristics coupled with excellent rotational speed and accuracy, making these multipurpose antennas the ideal solution for multi-link applications.



BICONICAL DIPOLES

This omni directional broadband series is designed for short and medium range coverage. As neither terminating resistors nor antenna tuning hardware is required, essentially all input power is radiated.

HF SHORT WAVE BROADCAST ANTENNAS

High performance omni- and directional antennas are available to suit short wave HF broadcasting applications. These antennas are capable of handling high input powers and have a wide frequency bandwidth.



The Clear Choice in

Technological

Wireless

The wireless industry has clearly moved from raw build-out to a period of optimization. The RF interface is an important battleground in this optimization arena and the exciting rise of data-driven technologies such as EDGE, 1xRTT, EV-DO and WLAN – often as overlays to existing RF infrastructure – are important drivers in this optimization upsurge.

RFS offers the most complete RF product portfolio as well as the relationships and expertise that operators need to realize their optimization goals.

One of the company's most significant developments in recent times is a complete end-to-end base station RF technology control system that is fully compliant with the open-communications standard of the Antenna Interface Standardization Group (AISG) recently adopted as a 3GPP standard. Comprising antenna remote tilt systems, tower mounted amplifiers (TMAs), bias-tees, and control-network interfaces (CNIs), the AISG compliant range provides optimal flexibility in the control of base station antenna tilt control and monitoring systems.

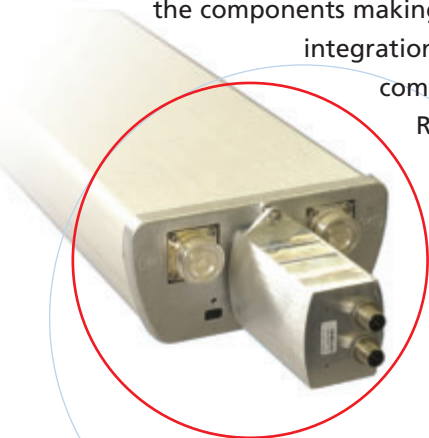
Land Mobile and Emergency Services

In today's world of high bit-rate data transmissions and broadband applications, we're witnessing an almost exponential climb in land mobile and emergency services radio system performance requirements. It is simply not enough to boast excellence in any one RF component group or technology area. The RF link is just that – a vital link from base station to antenna, transmitter to tower, or radio unit to microwave dish. As RFS designs and manufactures all the components making up this link, we can guarantee the tightest integration and premium performance at both the component and total system level. This is where RFS clearly leads – by providing total 'end-to-end' RF excellence.



- DTV
- Broadband
- EDGE
- EV-DO
- GSM
- PCS
- 1xRTT
- WLAN
- 3G

RFS completes the **AISG** link!





Innovation

Broadcast

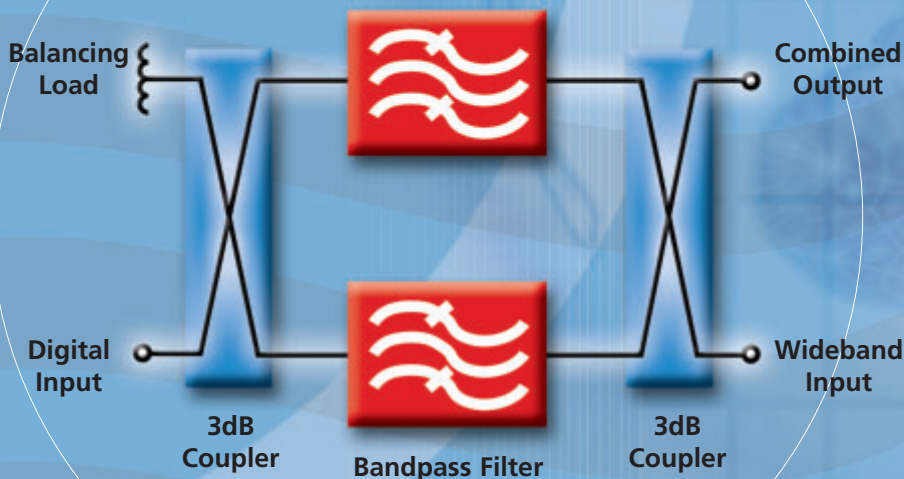
Real world DTV deployment solutions are all about efficiencies. Specifically, broadcasters aim to make the best use of existing broadcast site RF hardware – towers, antennas, buildings and so on. This ensures that the new DTV services can be overlaid on existing analog services in the timeliest and most cost-efficient manner.

The future will see much effort focused on the development of innovative low-cost devices for low power site applications. This is an area of great growth.

Addressing the technical, economic and practical limits of DTV combining is an exciting and important area of development. Solutions are evolving very quickly – Radio Frequency Systems is challenging and will continue to challenge the bounds of RF combining know-how. As always, these developments will be driven by broadcasters' demands for higher performance, more compact and reduced cost combining technology. RFS will meet these demands.



DTV takes a combined approach



Balanced combiner schematic

E-Business

Initiatives

The RFS global website offers customers a handy way to access product-specific information. A searchable database provides product datasheets that are easily downloadable while an Acrobat version of our printed catalog is available for browsing our extensive product lines.

www.rfsworld.com

For the latest word on RFS products and services, our most recent press releases as well as the RFS magazine, Stay Connected, are available on our website.

From system configuration software to antenna pattern viewers, RFS offers a variety of tools to make your job easier.

End-to-End Excellence



RADIO FREQUENCY SYSTEMS

- Athens
- Bangkok
- Beijing
- Coral Springs
- Dubai
- Glendale Heights
- Guangzhou
- Hannover
- Hillerød
- Hong Kong
- Johannesburg
- London
- Madrid
- Melbourne
- Meriden
- Mexico City
- Monza
- Moscow
- New Delhi
- Paris
- São Paulo
- Shanghai
- Singapore
- Taipei
- Tokyo
- Trignac/Lannion

The Clear Choice™

Please visit us on the internet at <http://www.rfsworld.com>

08.04.050 F 17100202-03