

# RFS Broadcast Solutions

Your unrivaled partner at the broadcast frontier



**RADIO FREQUENCY SYSTEMS**  
The Clear Choice®



# Capture the booming broadcast market with RFS' future-proof solution

## Broadcast in the digital era

The global broadcast industry is one of the most dynamic environments on the planet. Widespread migration to digital broadcasting and emerging mobile platforms present an enormous commercial opportunity—but also demand a unique breed of solutions.

Broadcasters, wireless communications companies, transmission site owners, broadcast consultants and transmitter equipment vendors (OEMs) require a variety of RF solutions that can simultaneously optimize and minimize capital and operating expenditures (CAPEX and OPEX), utilize existing site assets, ensure availability of existing services, provide future capacity and flexibility, and support the convergence of broadcast and mobile industries.

**Radio Frequency Systems® (RFS)** offers broadcast solutions based on 40 years of design and development experience. Its leadership in the sector is underpinned by clear differentiators:

- ➡ The most comprehensive range of end-to-end broadcast systems on the market, with solutions for FM radio, VHF and UHF TV, and the emerging L-band.
- ➡ A holistic design approach that ensures that every system is optimized for the best possible performance, reliability and minimum total cost of ownership.
- ➡ A demonstrated commitment to R&D, which is at the source of many breakthroughs in digital antenna and RF combiner technology.

**RFS is indisputably the world leader in tailored broadband antenna systems—your unrivaled partner at the broadcast frontier.**



## Total performance and guaranteed value over the total lifecycle

RFS is committed to developing cutting-edge, premium performance broadcast solutions that are highly cost effective. The target is a total performance package that spans the total lifetime of any system.

### ➔ Premium electrical performance

Featuring meticulous end-to-end system design and optimization, each RFS broadcast system is finely tuned to deliver premium performance over many years.

### ➔ Mechanical and environmental robustness

Rugged construction and corrosion-resistance measures ensure RFS systems work reliably even in the harshest environments and at the most demanding operating levels.

### ➔ Shared infrastructure

RFS broadband systems are specially engineered to support multiple services—up to 16 in some cases, permitting both CAPEX and OPEX to be amortized across the cost of all services, and yielding significant savings.

### ➔ Flexible and future-proof

Flexible RFS systems are conceived to continuously accommodate new services, thus making networks future-proof and guaranteeing their value over the total lifecycle.

### Brilliantly broadband. Inherently cost-efficient.

In today's dynamic digital environment, there is a distinct shift towards shared broadcast infrastructure—optimizing both capital and operational expenditures. RFS specializes in the design and manufacture of tailored broadband systems to fulfill this growing need. These systems are not only uniquely cost-efficient for today's services, but are future-proofed for tomorrow's needs.

# The widest range of fixed television and radio solutions

Since no two networks are identical, RFS is primed to provide the widest possible range of options. Its market-leading range of end-to-end broadcast solutions encompasses all RF equipment from the output of the transmitter to the antenna. This provides the optimum blend of hybrid solutions, channel combining, system upgrades/replacements and power handling.



## Comprehensive range of antenna systems

RFS offers the most comprehensive range of premium performance antenna solutions for both television and radio. These include:

### ➤ Broadband panel arrays

With all polarization options available, RFS broadband panel arrays support Bands I, II (87.5-108MHz), III (174-240MHz), IV and V (470-860MHz). Each array can be tailored for specific coverage and power-handling capability. RFS broadband antennas feature RFS' patent-pending Variable Polarization Technology (VPT). VPT enables user-defined polarization ratios from horizontal to elliptical for full circular polarization.

### ➤ Top-mount antennas

RFS offers a range of lightweight and low-profile antennas (including slot, dipole, collinear and superturnstile) that support single or multi-channel television services.

### ➤ Side-mount antennas

Providing a range of polarization and power options, RFS' side-mount antennas are a flexible alternative for television and radio applications.

Whichever broadcast band is in use for fixed television or radio broadcast, RFS is fully conversant with all global broadcasting standards and emerging digital technologies, including:

**Television (analog and digital)** — DVB-T, ATSC, ISDB-T, DMB-T/H, PAL, NTSC, etc.

**Radio (analog and digital)** — FM, DAB, DAB+, HD Radio

## The original and leading manufacturer of coaxial transmission lines

RFS' world-leading HELIFLEX® air-dielectric coaxial transmission line is fast and easy to install, with maximum site toughness and flexibility as well as a complete range of connectors. Available in a wide range of sizes (3/8-inch to 9-inch diameter), HELIFLEX® supports all analog and digital television, radio, and mobile television/media applications. HELIFLEX®'s electrical performance is unsurpassed, delivering consistently low VSWR across the entire broadcast band, and low attenuation performance; moreover, it is one of the few flexible feeder cables that can support the high-power requirements of multiple broadcast services.



## Versatile combiner systems

RFS is a pioneer, Emmy Award-winning leader in RF combining and filtering technologies, with solutions for the widest range of applications in all popular television and radio broadcast bands. Combining systems encompass a range of balanced, star-point (branched), commutating line and manifold combiners, depending on frequency spacing and required performance.

### ⊕ Coaxial filter technology

RFS coaxial filters, the primary component of its VHF and UHF combiners, are available with two, three, four, five, six or seven poles, depending on the level of filtering required. Additionally, six, eight, ten or twelve-pole cross-coupled filters are also available. Now featuring PeakPower+™ technology.

### ⊕ Directional waveguide technology

For high-power UHF combining applications, RFS' unique directional waveguide combiner offers superior performance in a compact footprint.

## Real-time, addressable RF switching and monitoring systems

RFS provides tailored RF switch-frames for broadcast switching applications. A key element is the unique RFS Rapid Release U-Link system, a modular, scalable system that allows switching to be completed in seconds.

An optional feature is a digital RF monitoring system that provides an active mimic display of the U-Link configuration, and allows digital monitoring of output coaxial equipment parameters (such as power and VSWR).

## Premium ancillary hardware

RFS offers a complete range of premium ancillary components, including rigid coaxial transmission lines, mounting hardware, pressurization equipment and accessories.



## Emmy Award-winning technology

An Emmy Award, the U.S. television industry's highest honor, was bestowed on RFS for its pioneering work on 'adjacent channel combiners'. This technology makes it unnecessary to deploy new antenna systems and towers in order to run digital and analog systems concurrently during TV's digital switchover, saving the industry millions of dollars.

# A world of mobile TV

Mobile TV is the focus of an industry-wide convergence between mobile carriers, broadcasters, infrastructure owners and content providers. RFS' advanced Mobile TV solution set is readily harnessed to boost infrastructure owners' and broadcasters' activities in this exciting field. And with its wide portfolio of supporting technologies, RFS can deliver solutions compatible with the full range of mobile TV broadcast technology choices.

## Solutions for all broadcast mobile TV spectrums

RFS' fast-evolving range of solutions for mobile media and TV applications include:

### 📶 VHF solutions (170 to 240MHz)

RFS' VHF antenna systems, including combining technology, switch frames, panel arrays and transmission lines, are ideal to support mobile media platforms (such as DMB) in Band III. All polarization options are available, including a four-dipole array that allows separate vertically polarized and horizontally polarized services to be broadcast via the same aperture.

### 📶 UHF solutions (460 to 860MHz)

RFS offers an extensive range of medium to high-power UHF antenna and filter/combiner systems to support broadcast network-based mobile TV in the UHF band. These can accommodate simultaneous transmission of fixed and mobile TV services.

### 📶 UHF lightweight antennas

In support of cellular network overlays, RFS offers a suite of vertically, horizontally and circularly polarized, low-profile and lightweight UHF antennas that are ideal for deployment at existing base station sites.

### 📶 L-band solutions (1452 to 1675MHz)

RFS' mobile TV solutions for L-Band include a series of broadband vertically polarized panel antennas and collinear antennas ideal for deploying at mobile base stations. Circularly polarized antennas and high-order filters are also in the product road map.

## Beyond broadcast: understanding mobile TV from all angles

Another key differentiator for RFS is that it is not just a broadcast technology company. RFS is a global leader in wireless communications infrastructure—including base station antennas, site optimization products, coaxial transmission lines, wireless indoor solutions, and microwave antenna systems. This means RFS understands mobile TV from all angles and is your ideal partner for convergence.

### 📶 3G networks

RFS delivers wireless infrastructure solutions for 3G networks in all corners of the globe; these are likely to prove an integral facet of mobile TV networks, providing the backchannel for interactivity.

### 📶 In-building coverage

Widely regarded as the 'make or break' of mobile TV networks, in-building and in-tunnel coverage will largely be achieved through distributed RF systems. RFS' ClearFill® suite of wireless indoor solutions is the ideal solution.

### 📶 Wireless backhaul

RFS' wireless transmission network solutions provide the system capacity, performance, reliability, longevity and rapid deployment demanded by the communications sector.



## Solutions for all broadcast mobile TV choices

RFS offers a complete range of HF communication antennas, including tactical antennas, broadband monopoles, horizontal, vertical and rotatable log periodics, biconical dipoles, standard and tandem deltas and HF shortwave broadcast antennas. It also offers ionospheric sounding systems, HF surface wave radar systems and antenna switching matrices, as well as system design, integration and commissioning:

### Multiple technology platforms

Digital Video Broadcast to Handheld (DVB-H and DVB-S/H), FLO TV™ Digital Multimedia Broadcasting (DMB), Integrated Services Digital Broadcasting–Terrestrial (ISDB-T).

### Four frequency bands

UHF (460 to 860MHz), VHF (170 to 240MHz) and L-Band (1452 to 1675MHz).

### Three network models

Mobile network overlay; high-power terrestrial broadcast overlay; hybrid satellite/terrestrial.

### Three or more polarizations

Horizontal, vertical, circular or mixed.

### Network models for mobile TV

#### Cellular overlay model



#### High-power terrestrial broadcast model



#### Hybrid satellite / terrestrial model



## On-the-ground mobile TV experience

RFS has demonstrated experience in mobile TV deployments, participating in technical trials across the UK, Europe and Australia during the technology's infancy, and, more recently, in real-world deployments of mobile media services.

# Four corners of the globe: RFS is tried, tested and true



## China mobilized for mobile TV

A complete VHF antenna solution from RFS allowed Guangdong Mobile Television Media Co. Ltd to deliver one of China's first mobile television services. The DMB network incorporates multiple sites across the Guangdong cities of Guangzhou, Foshan, Zhongshan, Dongguan, Shenzhen and Zhuhai. RFS has supplied two-channel VHF Band III combined antenna systems.



## L.A. broadcasting in the limelight

RFS provided a sophisticated digital/analog combined UHF system on Mount Wilson for a consortium of four Los Angeles broadcasters. Dual RFS broadband panel arrays provide sculpted signals that protect the Mexican border and eliminate wasted power over the ocean. These are supported by a pair of parallel RFS directional waveguide combiner chains. The high-power system has the capacity for 12 services in total.



## Taking a stake in Europe's DSO campaign

In support of several European digital television (DTV) switchover (DSO) projects, RFS has designed, installed and commissioned advanced broadcast antenna solutions for leading broadcasters and infrastructure operators. As an ongoing partner in these historic transitions, RFS has supplied key components of complete multi-channel DTV solutions that are now on-air.



## Meeting Australia's DTV challenge

Collaborating with Australia's broadcast transmission service providers, RFS provided systems to support triplecasting of analog, digital and high-definition DTV at sites in major cities and rural locations across the entire country. These comprised VHF and UHF antenna systems, including the world's first UHF directional waveguide combiner. The broadband systems ensure uniform coverage and minimized interference.



## Tailored antenna system for TV Globo, Brazil

A complete, tailored VHF antenna and UHF system was supplied to one of the world's largest broadcast groups, TV Globo, in Brazil. Specifically designed for the project, the Band I VHF antenna provides unrivalled pattern circularity and premium VSWR performance.



### **A decade of broadcast networks in Thailand**

For nearly 10 years, RFS has worked closely with the engineering teams of Thailand's various broadcasters, providing unique solutions for broadcast network expansions. Primarily, this has involved RF signal strength mapping, plus system design, manufacture and installation of UHF and VHF Band III antenna systems at a multitude of sites across the country.



### **India's nationwide FM push**

As part of India's massive multi-city common transmission infrastructure project, RFS was enlisted to design and supply fully engineered FM radio broadcast systems. Each broadband system is tailored to the Indian broadcast environment, supporting five government and commercial channels. The broadband multi-channel systems provide a solution with optimum coverage for all services.



### **Weimar gets DTV**

RFS has supplied broadcast solutions to many sites as part of Germany's DTV rollout and digital switchover. In the rural city of Weimar, RFS supplied a fully engineered three-channel (12-service) UHF antenna/combiner system that allowed a 'hard cutover' from analog to digital services. The system is future-proofed for a twofold increase in DTV services.



### **New broadcast station for Bahrain**

RFS provided design, delivery and installation supervision of UHF TV and FM radio antenna and combiner systems for a new broadcast station in Bahrain. To accommodate the high-power requirements of the UHF system, RFS supplied a six-channel waveguide combiner with full-wave cavities incorporated into the design for some services. The FM system supports ten 10kW services.



### **DTV climbs mountains in Taiwan**

In the challenging environment of mountainous Taiwan, RFS provided digital broadcast infrastructure and services to a consortium of Taiwanese broadcasters. RFS supplied solutions for 11 DTV sites, including UHF antenna systems and directional waveguide combiners to support both analog and digital broadcasts. Services included planning, dismantling of old sites, installation, testing and commissioning.

# RFS speaks broadcast

## Broadcast system services for a “Total Package Solution”

RFS’ end-to-end broadcast system solutions are not limited to equipment alone; they include a host of additional services that make or break a successful installation. RFS broadcast services include:

### ➔ Site survey

Assessing existing infrastructure and coverage requirements.

### ➔ Field strength mapping

Using sophisticated software packages.

### ➔ System design

Tailoring for specific site, performance and coverage requirements.

### ➔ Manufacturing

Leveraging state-of-the-art manufacturing facilities.

### ➔ Project management

Ensuring projects progress smoothly.

### ➔ Installation and commissioning

Taking responsibility for system optimization and deployment.



# 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.

**For more information, please contact  
the nearest RFS sales office:**

**Southern Europe, Middle East, Africa & India**

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