Innovative Wireless Infrastructure Solutions

Microkit 9th Edition

RFS is a worldwide leading provider of innovative wireless and broadcast infrastructure products and solutions.
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RFS: The Clear Choice®
RFS is a worldwide leading provider of innovative wireless and broadcast infrastructure products and solutions

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

As an ISO 9001 & 14001 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.

RFS is committed to fulfilling the most demanding worldwide environmental protection directives and to integrating green initiatives in all aspects of its business.
**Key Customers**

The following companies are examples of our key customers:

<table>
<thead>
<tr>
<th>Alcatel-Lucent</th>
<th>KPN</th>
<th>Softbank Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td>America Móvil</td>
<td>Megafon</td>
<td>Sprint</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>Motorola</td>
<td>T-Mobile</td>
</tr>
<tr>
<td>Aviat Networks</td>
<td>MTS</td>
<td>Telefónica Móviles</td>
</tr>
<tr>
<td>Broadcast Australia</td>
<td>NEC</td>
<td>TeliaSonera</td>
</tr>
<tr>
<td>China Mobile</td>
<td>Nokia Siemens Networks</td>
<td>Telstra</td>
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<tr>
<td>China Unicom</td>
<td>Orange</td>
<td>TIM</td>
</tr>
<tr>
<td>CMC</td>
<td>Orascom</td>
<td>Taiwan Mobile</td>
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<tr>
<td>Ceragon</td>
<td>Reliance</td>
<td>Toshiba</td>
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<td>E-Plus</td>
<td>SingTel</td>
<td>TV Globo</td>
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<tr>
<td>Datang</td>
<td>Oi</td>
<td>Verizon Wireless</td>
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<td>Ericsson</td>
<td>Ooredoo</td>
<td>Vivo</td>
</tr>
<tr>
<td>Huawei</td>
<td>Optus</td>
<td>Zain</td>
</tr>
<tr>
<td>Intracom</td>
<td>SIAE</td>
<td></td>
</tr>
</tbody>
</table>

*RFS - Global presence with global customers who are major players*
### RFS Global Solutions

**Wireless ■ Microwave ■ Indoor ■ Broadcast**

**RFS provides scalable, flexible, future proof and lightweight end-to-end solutions that are optimized across the entire RF chain.**

<table>
<thead>
<tr>
<th><strong>Worldwide Presence</strong></th>
<th><strong>Innovative Solutions</strong></th>
<th><strong>Evolutive Solutions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 manufacturing centers of excellence (Germany, France, USA, Brazil, China and Australia)</td>
<td>At the forefront of RF technology</td>
<td>Scalable and flexible</td>
</tr>
<tr>
<td>A manufacturing partner in Kolkata, India</td>
<td>Proven quality and reliability</td>
<td>Future-proof</td>
</tr>
<tr>
<td>Represented on 6 continents and 20 countries</td>
<td>Renowned technical leader for more than half a century</td>
<td>Reliable</td>
</tr>
<tr>
<td>35 technical support and sales offices</td>
<td></td>
<td>Optimized end-to-end</td>
</tr>
</tbody>
</table>

**True value throughout the complete life cycle, guaranteeing maximum return on investment**
RFS Application Domains

Cables • Antennas • Tower Systems • Active and passive RF conditioning modules

- Cellular sites
- Microwave links
- Indoor coverage
- TV & Radio
Unique suite of leading RF solutions ready to support next-generation voice and data-rich wireless services
Microwave Links

Ultra-high performance, rugged antennas manufactured in every region of the globe for faster deployments
Indoor Coverage

Best-in-class coverage systems for mission-critical and commercial radio services

Support for multi-carrier, multi-service applications in road and rail tunnels

Unique patented radiating cable for multi-technology applications
Offering superior RF solutions for broadcasters worldwide, from analog radio and TV to DAB, mobile TV and digital TV switchover.
## Major Production Facilities and Sales Offices

<table>
<thead>
<tr>
<th>Meriden</th>
<th>Shanghai</th>
<th>São Paulo</th>
<th>Melbourne</th>
<th>Hannover</th>
<th>Trignac</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>China</td>
<td>Brazil</td>
<td>Australia</td>
<td>Germany</td>
<td>France</td>
</tr>
</tbody>
</table>

### Technical support & sales offices in 20 countries

<table>
<thead>
<tr>
<th>North America</th>
<th>Latin America</th>
<th>Europe</th>
<th>Middle East, India &amp; Africa</th>
<th>Asia &amp; Pacific</th>
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</thead>
<tbody>
<tr>
<td>Meriden</td>
<td>Buenos Aires</td>
<td>Copenhagen</td>
<td>Dubai</td>
<td>Bangkok</td>
</tr>
<tr>
<td>San Jose</td>
<td>Mexico City</td>
<td>Haddenham</td>
<td>Johannesburg</td>
<td>Beijing</td>
</tr>
<tr>
<td>Wallingford</td>
<td>São Paulo</td>
<td>Hannover</td>
<td>Kolkata</td>
<td>Guangzhou</td>
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<tr>
<td></td>
<td>Santiago</td>
<td>Madrid</td>
<td>New Delhi</td>
<td>Hong Kong</td>
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<td></td>
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<td>Moscow</td>
<td>Mumbai</td>
<td>Melbourne</td>
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<td></td>
<td></td>
<td>Paris (HQ)</td>
<td></td>
<td>Shanghai</td>
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<tr>
<td></td>
<td></td>
<td>Trignac / Lannion</td>
<td></td>
<td>Singapore</td>
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<td></td>
<td>Vimercate</td>
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<td>Taipei</td>
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<td>Tokyo</td>
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</tbody>
</table>
Production Facilities by Product Line

- **Meriden**
  - Transmission lines
  - Radiating cables
  - Broadcast cables
  - RF conditioning
  - Microwave Antennas
  - HYBRIFLEX™

- **Trignac**
  - Microwave antennas

- **Hannover**
  - Transmission lines
  - Radiating cables
  - Broadcast cables
  - HYBRIFLEX™

- **Kolkata**
  - (manufacturing partner)
  - Microwave Antennas

- **São Paulo**
  - Transmission lines
  - Radiating cables
  - Broadcast cables
  - Microwave Antennas
  - HYBRIFLEX™

- **Shanghai**
  - Base station antennas
  - Transmission lines
  - Radiating cables
  - HYBRIFLEX™

- **Melbourne**
  - Broadcast systems
  - HYBRIFLEX™
General Missions

General missions

- Leader in new technologies
- Innovative product concepts: WindMaster™, HYBRIFLEX™, RF X-TREME™
- Dedicated to lightweight designs
- End-to-end solutions covering the entire RF chain
- Global presence and manufacturing excellence
- Fast delivery time and superior service
- Environmental protection and energy efficiency

Radio Frequency Systems carries off coveted Emmy Award

Proven longevity thanks to premium performance and unrivaled quality.
Standard components
- Technology for feeds and dipoles
- Technology for cables
- Plastics & polymers for radomes and mechanical parts
- Plastics & dielectrics for cables
- Metals & bi-metals

Components
- Antennas (microwave, broadcast, base station)
- Filters and combiners
- Cables

Sub systems
- indoor & outdoor
- Repeaters (off-air, in-line)
- Master and remote units (AISG)
- Integrated antennas

Solutions
- Active and multi-band antennas
- Operations & maintenance
- Indoor and outdoor
- Site optimization
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<thead>
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<tr>
<td><strong>Base Station Antennas and Site Optimization</strong></td>
<td><strong>Infrastructure Solutions for RRU Deployments</strong></td>
</tr>
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</table>

- Base Station Antennas and Site Optimization
- Infrastructure Solutions for RRU Deployments
- Transmission Lines
- Wireless Indoor Solutions
- Microwave Antennas
- Broadcast Systems
Position today and Future Directions

Position today
- Massive introduction of Digital Dividend II and TDD compatible antennas
- Wide suite of legacy and LTE antennas
- Integration of embedded RET
- WindMaster™: Multi-band antennas with industry's lowest tower loading, to be used where site upgrade is tough
- RF X-TREME™ Ultra Broad Band: Ideal choice for MiMO applications
- 2 highly efficient and flexible production sites

Future directions
- Advanced research on smart and multi beam antennas
- Continuous development in radiating technology and energy efficiency
- Increased coverage for multi-band antennas
- Improved coverage for global LTE antennas
- Reduced footprint in terms of size and tower loading
- Anticipation of new frequency bands (600 MHz for USA – 3.5 GHz worldwide)
- Improve the integration of the antenna system in its environment:
  - Visual aspect
  - Technical aspect

RFS BSA portfolio covers frequencies up to 2.7 GHz, including LTE combinations.
Base Station Antennas

Production Sites

- Meriden, United States
- Shanghai, China
Position today and Future Directions

Position today
- Founded in 2010 to support customers in their technology migration to Remote Radio Units (RRUs) with best-in-the-market infrastructure solutions
- Under the brand HYBRIFLEX™, RFS offers a complete portfolio of hybrid cables to meet requirements from MNOs and all major RRU manufacturers
- HYBRIFLEX™ cables are engineered to make RRU deployments easier, faster and more reliable
- HYBRIFLEX™ cables are ready for LTE
- The product families DC-FIT™ and F/O-FIT™ allow easy and cost-effective swapping from a conventional BTS to a distributed BTS with RRU
- Improved installation due to space-efficient designs

Future directions
- Continuous extension of HYBRIFLEX™ cable family to meet customer needs in a single RAN application with multiple services and RRUs per sector
- Customized infrastructure solutions for large RRU rollouts
- Innovative logistics concepts to enable fast, on-demand delivery to RRU deployment projects
HYBRIFLEX™ to The Antenna

Production Sites

- Meriden, United States
- Hannover, Germany
- Shanghai, China
- São Paulo, Brazil
- Melbourne, Australia
Position today and Future Directions

**Position today**

- Technology leader and inventor with many product first, including the corrugated coaxial cable
- Most complete corrugated copper and aluminum cable portfolio — CELLFLEX®
- 100% common accessories for CELLFLEX® copper and CELLFLEX® Lite aluminum cables
- Two tailored accessory families satisfying all application needs:
  - OMNI FIT™ premium for PIM-critical applications
  - OMNI FIT™ standard for typical requirements and optimized rollout costs
- LTE-ready product portfolio
- Full recyclability for CELLFLEX® copper and aluminum cables
- Reduced TCO due to PIM-aware connector and jumper technology
- Improved installation due to space-efficient designs

**Future directions**

- Continuous extension of HYBRIFLEX™ cable family to meet customer needs in a single RAN application with multiple services and RRUs per sector
- Customized infrastructure solutions for large RRU rollouts
- Innovative logistics concepts to enable fast, on-demand delivery to RRU deployment projects
Transmission Lines

Production Sites

- Meriden, United States
- São Paulo, Brazil
- Hannover, Germany
- Shanghai, China
Position today and Future Directions

Position today

- RFS is a premium supplier of microwave antennas for OEMs
- All common frequency bands and sizes are available
- No compromises on performance with the most stringent qualification procedures including wind-tunnel tests
- Low-profile design CompactLine® EASY antennas to reduce transportation costs, wind load and antenna weight
- The best 3 ft/1 m antenna on the market: SC3
- Manufacturing in all regions for shorter lead times and better service

Future directions

- A unique 2-port OMT upgradable to 4 ports (pay-as-you-grow plan)
- E-Band antennas for ultra-high capacity links
- Small form antennas for low visual impact and evolution to small cells and HetNets

The most complete microwave antenna portfolio, manufactured in all regions to support rapid deployments and help operators meet ever-increasing traffic requirements
Radio Link Networks

Production Sites

- Meriden, United States
- Trignac, France
- São Paulo, Brazil
- Shanghai, China
Position today and Future Directions

Position today

- Comprehensive in-building and in-tunnel solutions suite
- An expert blend of active and passive ClearFill® solutions to suit any building size or tunnel length
- Provide coverage for commercial & mission-critical services for 2G, 3G, 4G/LTE, DAB, DVB, GSM-Rail & TETRA
- Support single and multiple operators, single and multiple wireless services
- End-to-end indoor solutions offer including consultancy and product-attached services such as solution design and on-site acceptance for lowest-cost solutions
- Broadest RF bandwidth (380 MHz to 3.5+ GHz) passive indoor DAS
- CELLFLEX® and CELLFLEX® Lite lowest-loss feeder cables
- RADIAFLEX® best-in-class radiating cables up to 6 GHz

Future directions

- Strengthen global leadership in radiating cable technology through continuous portfolio evolution and introduction of innovative, future proof (full frequency spectrum) products aligned with changing market needs
- Distributed antenna concepts for 6 GHz — for example, radiating waveguides enabling real-time signaling and track-to-train applications with the highest data throughput demands
Production Sites

- Meriden, United States
- Hannover, Germany
- São Paulo, Brazil
- Shanghai, China
Position today and Future Directions

**Position today**
- Suite of antennas, combiners, filters, transmission lines, and switch frames
- From analog radio & TV to DAB, mobile TV and DTV
- Unrivalled digital switchover (DSO) project expertise
- FM, UHF/VHF panel array and slot antennas
- HELIFLEX® air-dielectric transmission lines from 3/8" to 9"
- Numerous broadband HF antenna designs

**Future directions**
- New post-DSO broadcast applications
- Best-in-class digital mask filters
- Variable polarization antenna technology
- Low-wind load panel array solutions
RFS’s adjacent channel combiners’ win an Emmy Award for TV broadcasting.

The World Technology Competence Centre for Broadcast is located in Melbourne, Australia.
Position today and Future Directions

RFS is committed to being the leading supplier of high performance site optimization equipment across all standards and frequencies.

Position today

- Broad portfolio of products for LTE network upgrades and overlays around the world
- Product suite includes cross-band and in-band combiners, co-location filters, diplexers, duplexers and tower mounted amplifiers
- Solutions for all telecommunication technologies – LTE700 through LTE2600 and everything in between
- Highly efficient and flexible production of RF assemblies
- Rapid development of co-location filter and combiner solutions
- ShareLite™ leading-edge diplexers and triplexers ideal for fast and cost-effective LTE overlays
- UltraAmp™ lightweight tower mounted amplifiers optimize site coverage and throughput

Future directions

- New solutions for TDD and FDD LTE Bands from 600MHz to 3.5GHz
- Unique filtering solutions for smaller size and high performance
- New advanced material options for lighter weight products with lower insertion loss
- Tailored filtering solutions for special applications
RF Site Optimization Products

Production Sites

Meriden
United States
Position today and Future Directions

**Position today**
- Ferrite isolators and circulators from 80 MHz to 40 GHz
- SMT, Drop-in, Coaxial and Waveguide isolators
- 4-port coaxial isolators and circulators for public safety applications
- Excellent electrical performance and quality
- Ferrites for:
  - Microwave radio and Microwave sub-systems
  - Sat-Com applications
  - Mobile cellular telecommunications (GSM, W-CDMA, LTE, Small cells, Broadband wireless)
  - Public safety

**Future directions**
- Product development for LTE and Small cells base stations and broadband wireless applications
- Low-IMD and high power devices for wireless data applications
- Leveraging technical leadership in ferrites to capture more of the high-volume OEM market

RFS Ferrocom excels at customizing high-quality ferrite devices to precise customer specifications – including unique electrical requirements or enhanced performance specifications.
Ferrocom

Production Sites

- Shanghai, China
- San José, United States
We work closely with our customers, anticipating their evolving technology needs and offering powerful and cost-efficient products and solutions.

We provide dedicated customer service, expert technical advice and support, and a total product package.

We offer advanced engineering capabilities, superior field support, and dedicated technical assistance and training.

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