CableFree
Wireless Excellence

CableFree Sapphire
Compact, High Performance 2x2 AC MIMO Radios
Overview

About Wireless Excellence

Founded in 1996 and with headquarters in Oxford UK, Wireless Excellence Limited is a leading designer and supplier of outdoor and indoor Broadband Wireless communication products.

With a complete range of solutions including Radio, Microwave, Millimeter-Wave, Free Space Optics, WiFi and 4G/LTE solutions, customers in over 70 countries have chosen Wireless Excellence as the "one stop shop" solution of choice for dependable wireless networking.

About CableFree MIMO Radios

CableFree MIMO radios are:

Cost Effective
High Power
High Performance
Compact
Versatile
Feature Rich
Long Range
Dependable

Sapphire radios are part of the complete CableFree OFDM MIMO Radio range

Overview

Building on the impressive pedigree of previous generations of CableFree radios, the CableFree Sapphire range take the same concept to the future with new redesigned sleek and elegant form-factors along with integrated CableFree MIMO AC Technology. These low cost, high performance radios are ideal for both Point-to-Point and Point-to-Multipoint applications, are feature rich and extremely versatile, and are ideal in a wide range of applications

Specific Features and Benefits

Configuration Flexibility: CableFree Sapphire radios offer flexible configuration options including for Point-to-Point (P2P) as well as Point-to-Multipoint (P2MP) network architectures.

Spectrum Options: The CableFree Wireless Broadband system provides wireless communication in a wide variety of spectrum choices—including 900 MHz, 2.4, 3.3, 3.5, 4.9, 5.1, 5.2, 5.4, 5.7 and 5.9 GHz—and helps ensure exceptional performance no matter which spectrum is best for your network.

Fast Installation: Simple but elegant design makes the CableFree system easier to install than most other networks. The solution features all-outdoor units that eliminate the need for indoor huts or cabinets, and built-in installation and deployment assistance helps simplify every step of the deployment.

Lower Costs: The system makes broadband access to multiple locations extremely cost-effective. There are no major investments in equipment or software. The platform's exceptionally low acquisition, installation, operation and maintenance costs result in substantially lower cost of ownership.

Advanced IP Networking: Powerful inbuilt software routing features enable sophisticated IP networks to be built without need for external routers or network appliances, reducing network complexity and cost of ownership.

Enhanced Wireless Features: CableFree radios feature Software-Defined Radio (SDR) which offers the user huge flexibility in configuration options. In addition, sophisticated CableFree wireless technology features ensure high throughput even when small VOIP packets are used and that airside packet collisions do not occur.

Interference Resistance: The solution's unique and powerful modulation scheme significantly improves the quality of data delivery and effectively mitigates interference from other systems of virtually every shape and spectrum. The system avoids interference dynamically selecting clear channels where no other radio is operation. Narrow channel support down to 5MHz with wide tuning range ensures maximal ability to select clear frequencies and make optimally efficient use of spectrum available.

Extended Coverage: CableFree Wireless Broadband wireless signals are highly effective in line of sight (LOS) service in environments ranging from small communities to suburban areas to rural locations. CableFree equipment is based on OFDM technology and provides near-line of sight (nLOS) coverage into urban and other environments that present significant obstruction challenges.

Data Rates: CableFree OFDM radios offer fast upload and download speeds. CableFree radios offer up to 650 Mbps net data rate (867Mbps peak) per radio interface. Of course, speeds on any network are affected by several factors so actual upload/download speeds may vary, but the potential to offer an incredible broadband experience is inherent in the system.

Operating Ranges: The platform offers superior broadband access for networks of various sizes and coverage areas. Because operating ranges are highly dependent on power levels, many of the system's components support adjustable power to meet specific network and regulatory requirements.

Scalability: CableFree OFDM radios advanced scalability allows you to quickly accommodate changing needs, wider geographical areas, larger populations and higher traffic volumes. In addition, its high tolerance for interference and directional antennas ensure that adding additional transmitters increases capacity without degradation of performance.

Security: The CableFree OFDM radios provide multiple layers of security, including the over-the-air DES (Data Encryption Standard) encryption standard. For the highest-grade security, the platform is also available AES (Advanced Encryption Standard) that provides 128-bit encryption or VPN tunnels to ensure secure data delivery and exceptional reliability. Other proprietary features can be enabled also. When used together these features make it virtually impossible to break into a CableFree Wireless Network.

Specifications

System Variant	SAPPHIRE-MIMO-AC2

Performance

Bandwidth	Over 650Mbps Half Duplex (867Mbps raw speed) in 2x2 MIMO mode
Power Consumption	13W; 24V fed from Power-over-Ethernet injector; 115/230Vac
Operating Temp	-40...+60 deg C

Wireless

Frequency	5GHz: 5.150-5.350 (5 MHz step) 5.725-5.825 (5 MHz step) 5.47-5.725 GHz, 4.90-6.00GHz
	DFS (Dynamic Frequency Select) feature for regions requiring DFS enabled
Radio Type	MIMO, OFDM
Modulation	5GHz: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256QAM); Dynamic (Adaptable to Conditions)
Latency	<3ms
RF Channels	Software Selectable 20, 40 & 80MHz
RF Output Power	Min. 5mW (7dBm) up to 22dBm (standard power) per chain – TPC (Transmit Power Control) under software control
Sensitivity @FER=0.08:	OFDM: 54 Mbps -76 dBm; 6 Mbps -96 dBm; MIMO: MCS0 -96dBm; MCS7 -77dBm; MCS9 -72dBm
Radio Data Rate	5GHz (Normal mode): 54, 48, 36, 24, 18, 12, 9, 6 Mbps, auto-fallback 5GHz (N 2X2 mode): 300, 270, 240, 180, 120, 90, 60, 30 Mbps, auto-fallback 5GHz (AC 2X2 mode): 867, 780, 650, 585, 520, 390, 260, 195, 130, 65 Mbps, auto-fallback
Compatibility	Proprietary modes plus back compatibility fully interoperable with IEEE 802.11a/b/g
Radio Architecture	Support ad-hoc, peer-to-peer networks and infrastructure communication to wired Ethernet networks via Access Point
Security	64/128-bit WEP data encryption; WPA; Proprietary mode

Antenna

Type	Integrated antenna models only*: Integrated Directional, Flat Panel, Dual Polarised
Gain	16dBi * Note, optional Connectorised Version with 2x SMA connectors

Router Platform

CPU	700MHz Cortex A7 CPU; 256MB DRAM; 128MB FLASH Memory
System Software	CF-OS V1; Remotely Upgradeable via TFTP
Management	Local and Remote configuration, control and administration via Telnet, SSH, HTTP, SNMP protocols
Resilience Features	Network configurations with multiple units allows two complete radio ODUs to be configured with one in 'hot standby' for high-availability applications

Mechanical

Dimensions (mm)	304x133x45mm
Connectors	External: 1x 10/100/1000 Ethernet: RJ45 ; RF SMA connectors for non-integrated versions Internal: USB Connector Optional: Second Ethernet RJ45 connector
Environmental	IP66
Weight	0.7kg

Ordering Information

Product Code	Description
SAPPHIRE-U-1-5S-16	SAPPHIRE 2x2 MIMO-AC Radio Unit, 5GHz Std Power, 650Mbps, 16dBi integrated antenna, GBE POE Interfaces
SAPPHIRE-U-1-5S-SMA	SAPPHIRE 2x2 MIMO-AC Radio Unit, 5GHz Std Power, 650Mbps, 2x RF connectors, GBE POE Interfaces
SAPPHIRE-B-1-5H-16	SAPPHIRE 2x2 MIMO-AC P2P Link Bundle, 5GHz Std Power, 650Mbps, 16dBi integrated antenna, GBE POE Interfaces
SAPPHIRE-B-1-5H-SMA	SAPPHIRE 2x2 MIMO-AC P2P Link Bundle, 5GHz Std Power, 650Mbps, 2x RF connectors, GBE POE Interfaces