

# Microwave Radio

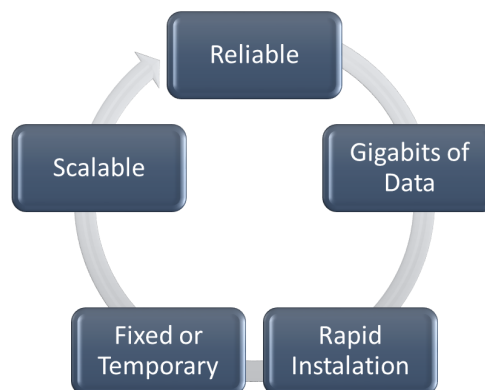
## CableFree LHR

## Long Haul Microwave Radio



### About Microwave

Using the latest RF technology, our microwave links operate in all the popular bands from 4-11GHz, distances over 100km and net throughput up to 3Gbps full duplex. Our advanced Full-Outdoor Microwave Radio provides a platform with IP/Gigabit Ethernet interfaces, with Power-Over-Ethernet technology to ensure simplicity of installation in zero-footprint deployment scenarios. Flexibility, performance and low cost of ownership are ensured.



### CableFree Long-Haul Microwave Radios 4-11GHz

#### System Features

- Compact, All-Indoor configuration
- Ultra high power transmission up to 34.5dBm (128QAM) and 33.5dBm (256QAM)
- Spectrally Efficient, Software-Defined Radio
- Powerful Forward Error Correction (FEC)
- Capacity up to 2.5Gbps Full Duplex (8+0)
- Native IP/Gigabit Ethernet Copper & SFP Interfaces
- Rugged & proven telecom-grade design
- 1+0, 2+0, 4+0, N+N, N+1 flexible architectures
- Supports 256QAM and future 512, 1024QAM

- ACM (Adaptive Coding and Modulation) features
- Choice of Compact and Extended versions
- Supports Adjacent Channel modes including ACCP, ACAP and CCDP with LHR Extended version

#### Applications

- Telecom Service Providers & ISPs
- 4G Backhaul for Cellular Network operators
- Metro Ring Wireless networks
- CCTV backhaul for multiple cameras
- Corporate backbone links
- Resilience for Fibre links

## **Enhanced Performance, Flexibility & Features**

Our microwave radios are high performance, modern generation wireless networking platforms supporting IP/Ethernet and STM-1 interfaces, operating from 4 to 11GHz frequency bands and capacities up to 2.5Gbps (using 8+0) or even higher aggregation. CableFree units have pioneered the use of Software-Defined Radio, which enables in-service upgrades, remote configuration, and low equipment costs. The LHR platform supports Radio Link Aggregation (RLA) for N+0, N+1 or N+N aggregation applications including a full range of modes. Resilient N+N protected links are supported with full signal path resilience in HSB and SD modes.

## **System Architecture**

The Long Haul Radio system consists of one or more Indoor Units (IDU), Radio Frequency Units (RFUs) and Branching Unit (BU) which contains microwave filters and circulators. These items are normally co-located in an indoor 19" rack or in an outdoor weatherproof shelter for rooftop deployment sites. The Long Haul Radio system is normally connected to a single antenna for 1+0 to N+0 applications, or spatially separated antennas for N+N Space Diversity systems for long links especially when transmitting over water.

## **Ideal for Repeater Sites**

Repeater site configurations are easy to establish where separate East and West links can be established in a single RFU chassis, and IDU with dual modems. For larger repeater sites, N+0, N+1 or N+N East and West can be combined. Advantages for repeater sites include reduced rack space and lower power consumption compared to traditional options.

## **Support for Dense Deployment Options**

Cross-polar and Adjacent Channel Operation options include ACCP, ACAP and CCDP. The extended version of the product supports these modes due to the sophisticated filtering implemented in the Branching Unit (BU) supplied as a complete package with the radio.

## **ECO operating modes**

The CableFree LHR platform supports ECO mode to reduce power consumption especially on sites where power may be limited or costly, and to reduce carbon emissions to meet corporate or government targets. Power savings are achieved by reducing transmit power in non-fade conditions, ATPC back-off, standby transceiver back-off and powering down fans when below temperature thresholds

## **Flexible Deployment**

CableFree LHR is a flexible, scalable and upgradable platform, enabling "pay as you grow" deployments for operators where network loading is predicted to grow strongly or future needs unknown. Various "upgrade kits" are available to add extra channels or levels of resilience to existing link deployments, often without need for network downtime or traffic disruption.

LHR has advanced N+1 Ethernet modes, N+1 STM-1 modes, and Hybrid N+1 combined Ethernet+STM-1 modes. For example, for Gigabit Ethernet, an 8+0 deployment can scale automatically down to 7+0 or 6+0 in case of any individual link outage; N+1 STM-1 modes where an STM-1 "protection radio" can be used to replace a failed transmission path, and hybrid N+1 Ethernet+STM-1 where both Ethernet resilience as well as STM-1 resilience is provided within the same platform.

## **Compact and Easy to Deploy**

The CableFree LHR is extremely compact: a 4+0 terminal can occupy just 8U of rack space, with 3U per RFU "shelf" (2 transceivers per shelf) and 1U for each of the IDUs (2 channels per IDU).

## **Link Design and Verification Services**

Operating distances vary depending on local weather conditions, specifically link frequency and rain intensity. Planning for microwave wave spectrum use must take into account the propagation characteristics of radio signals at this frequency range. There are a complete range of tools and services available to plan your microwave network to meet all design objectives. Generally, higher frequencies are used for short-range, high capacity links, and lower frequencies are used for long range links. Link lengths exceeding 100km are possible when correctly designed, specified and deployed.

## Specifications

<b>System Variant</b>	<b>CFMW-LHR-256QAM-I-X</b>
<b>System Parameters</b>	
Frequency Band	4, 6L, 6U, 7, 8, 11GHz (Factory set to within a sub-band)
Bandwidth	CEPT/ETSI: 7, 14, 28, 56MHz ANSI/FCC: 10, 20, 30, 40, 50MHz
Capacity	Up to 2.5Gbps Full duplex net throughput with carrier aggregation up to 8+0
Modulation Type	QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM. RFU ready for 512, 1024QAM
Rx Sensitivity	Depends on specific modulation used
Output Power	Up to 35.5dm (128QAM) and 34.5dBm (256QAM), 6GHz version
Forward Error Correction	Trellis-Coded Modulation concatenated with Reed-Solomon Coding
Network Management	SNMP Enabled
Remote Monitoring	Full range of SNMP, HTTP/web, CLI, serial
Advanced Radio Features	ATPC, QoS, Software Defined Radio
Radio Configurations	1+0, 1+1, 2+0, N+N, N+0, N+1 including HSB and SD configurations
<b>Data Interface</b>	
IP/Ethernet Interface	100Base-T, 1000Base-T (Standard IEEE 802.3), Optical (SFP) STM-1 with Electrical or
Sonet/SDH Interface	Optical (SFP), with wide choice of optical SFP modules
<b>Antenna</b>	
Antenna Type	Cassegrain type antenna with radome – 30cm up to 4m – please see separate datasheet
Antenna Gain/ beamwidth	Depends on specific antenna and frequency chosen – see appropriate antenna data
<b>Power / Environment</b>	
DC Power	-40 to -60 Volts DC (-48V typically)
Power Consumption	Depends on specific configuration
Operational Temperature	-5°C to 50°C
Humidity	0 to 95%, non-condensing
<b>Physical Dimensions</b>	
Dimensions (RFU only)	17" (431.8 mm) x 11" (280 mm) x 4.843" (123 mm),
Dimensions (IDU only)	19", ETSI Compliant, 1U (44mm) high
Weight	8.1 Kg for 1+0 configuration including Branching Unit 11.8 Kg for 1+1 MHSB configuration including Branching Unit

### Wide range of frequencies and bands available

CableFree Long Haul Microwave radios are available in all commonly-used frequency bands worldwide. The Long Haul Radios feature the same IDU families as our split-mount radios giving installers ease of familiarity with the platform and lower costs of spares in mixed-technology deployments. Examples include:

Frequency Band (GHz)						
Band	4	6L	6U	7	8	11
Frequency Range	4.400-5.000	5.925-6.425	6.425-7.125	7.110-7.900	7.725-8.500	10.696-11.710