

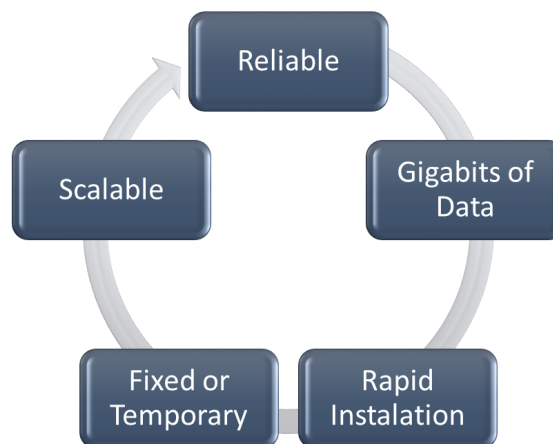
## Millimetre–Wave Radio

MMW Radio—60 & 70/80GHz  
Fast Ethernet



### About Millimetre-Wave

MMW (Millimetre Wave) links offer higher performance connections using high frequency microwave technology offering bandwidths of up to 1.5Gbps Full Duplex capacity. MMW technology is complimentary to FSO (Free Space Optics) and ideal for dense urban areas where radio spectrum is congested. Planning for MMW is based on rainfall, giving useful transmission distances of many kilometres.



### System Features

- Capacity 125Mbps Full Duplex
- Versions for unlicensed 60GHz and semi-licensed 70/80GHz bands
- Range from 1.5 up to 25km\*
- “Pencil beams” of 0.5 - 0.8degrees
- Rugged outdoor grade waterproof enclosure

### Applications

- 4G/LTE Backhaul Infrastructure
- Wireless Internet Service Providers (WISP)
- Point-to-Point Wireless networking
- Corporate backbone or Telecom service provider
- Resilience for FSO or Fibre links
- Fast Roll-out & Temporary Deployment

\*Depends on environment and antennas

## Product Features and Benefits

CableFree MMW products are highly robust and ruggedized for operation in harsh climates.

The highly integrated Full-Outdoor radio units are shipped with a choice of 30cm or 60cm antennas to meet customer network requirements.

Inside the radio unit there are connectors for user network interface and power. The default network interface is 10/100BaseT with RJ45 connector, and an SFP feature for optional SFP optical interface for Multimode or Singlemode fibre interface with LC fibre optic connectors. Various choices of SFP area available to match customer network equipment and fibre installations.

The links are supplied with mounting brackets to mount the units on poles which are typically installed on walls, towers or roof top locations to ensure clear Line of Sight (LOS) between the end points of the wireless link.

Alignment of the links is achieved using simple Digital Voltmeter connection to the radio unit as common with most microwave links and takes a skilled installer team typically 5-20 minutes.

When installed the links provide “fit and forget” connectivity between the nodes on the network and can be remotely managed and monitored using a choice of Web-based NMS and SNMP Management platforms.

## Fast Ethernet using 57-64/55-66 & 71-76/81-86 GHz Millimetre Waves

The CableFree range use a range of high performance radios using millimetre wave frequencies. Using high frequency microwave signals at 60GHz and above, large bandwidths of up to Full Duplex Fast Ethernet capacity can be provided.

Millimetre wave is a technology complimentary to FSO (Free Space Optical) communication systems. Planning for millimetre wave is based on rainfall, compared to FSO which is based on visibility, predominantly fog.

The CableFree MMW-60-FE and MMW-70-FE are full-duplex fast point-to-point links especially designed according to FCC and ETSI requirements. They provides interconnection between remote LAN segments at ultra-high speed and utilizes Fast Ethernet protocols, which is the evolving standard for switches and routers available from a variety of telecommunication equipment manufacturers.

One full-duplex Fast Ethernet link provides 125 Megabits-per-second connectivity that is the equivalent of approximately 65 T1 lines or 1,00 DSL connections. The MMW-70-FE product has 10/100Base T and optional 100 Base-SX fibre optic connections at each end of the wireless link and operates as a transparent link. The resulting connection can replace a fibre-optics cable physically connected end-to-end. The wireless millimetre wave Fast Ethernet link provides fibre equivalent performance, reliability and security but with no high deployment cost associated with outdoor fibre installations.

The Fast Ethernet point-to-point millimetre wave radio links have been designed with compact parabolic Cassegrain antennas of 30 and 60 cm diameters, with narrow beam widths of 0.4 and 0.9 degrees which maximises signal margin across the link and ensures lack of interference from other links or sources.

The MMW-70-FE operating distances vary from 1.5 to 25km for varying weather conditions depending of the link frequency and rain intensity. Planning for millimetre wave spectrum use must take into account the propagation characteristics of radio signals at this frequency range. While signals at lower frequency bands can propagate for many miles and penetrate more easily through buildings, millimetre wave signals can travel only a few miles or less. However, these characteristics of millimetre wave propagation are not necessarily disadvantageous. Millimetre waves can permit more densely packed communications links, thus providing very efficient spectrum utilization, and they can increase security of communication transmissions.

## Specifications

System Variant	MMW-70/80-GE	MMW-60-GE
<b>System Parameters</b>		
Frequency Band	E band	60GHz band
Bandwidth	71-76 GHz & 81-86GHz	57-64 (FCC) or 59-66 (TELEC) GHz
Capacity	125 Mbps Full duplex	125 Mbps Full duplex
Modulation Type	ASK	ASK
Rx Sensitivity	-62 dBm (@ BER 1E-12 or error free)	-62 dBm (@ BER 1E-12 or error free)
Output Power	23dBm (200 mW)	10 mW
Forward Error Correction (FEC)	RS(255, 239) Optional Feature	RS(255, 239) Optional Feature
Network Management	Web based NMS, SNMP Features	Web based NMS, SNMP Features
<b>Data and Aux Interface</b>		
Ethernet Interface	10/100BaseT RJ45, Optional SFP for 100Base-LX/SX (singlemode & multimode fiber)	10/100BaseT RJ45, Optional SFP for 100Base-LX/SX (singlemode & multimode fiber)
Diagnostics Port	RS-485 [with optional RS-232]	RS-485 [with optional RS-232]
<b>Antenna</b>		
Antenna Type	Cassegrain type antenna with radome	Cassegrain type antenna with radome
Antenna Gain/ beamwidth 60 cm	30cm: 45dBi, 0.9° beamwidth 60cm: 51dBi, 0.5° beamwidth	30cm: 42dBi, 1.2° beamwidth 60cm: 47dBi, 0.5° beamwidth
<b>Power / Environment</b>		
Power Supply AC	Input 88-264 Volts, 50/60 Hz	Input 88-264 Volts, 50/60 Hz
Power Consumption	20 W maximum	20 W maximum
DC Power	36 to 72 Volts DC, external AC supply option	36 to 72 Volts DC, external AC supply option
Power Connector Ethernet /	Internal connectors for Power and Ethernet	Internal connectors for Power and Ethernet
Operational Temperature	-30°C to +70°C	-30°C to +70°C
Humidity	0 to 95%, non-condensing	0 to 95%, non-condensing
<b>Physical Dimensions</b>		
Outdoor unit size w/o antenna	330 x 350 x 460 mm	330 x 350 x 460 mm
Weight (with ant, no bracket)	30cm: 1 kg (inc. antenna, no bracket) 60cm: 5kg (inc. antenna, no bracket)	30cm: 1 kg (inc. antenna, no bracket) 60cm: 5kg (inc. antenna, no bracket)

## Product Code

Product Code	Description
CFMMW-70/80-FE-xx	70/80GHz E-band MMW Fast Ethernet radio including IP65-rated outdoor unit, management software, Power supplies with mains 115/230Vac input. Does not include Ethernet cables.
CFMMW-60-FE-xx	60GHz MMW Fast Ethernet radio including IP65-rated outdoor unit, management software, Power supplies with mains 115/230Vac input. Does not include Ethernet cables.
Options: -30 or -60	Antenna sizes 30 or 60cm