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Space efficient Cassegrain antennas optimized to enhance the already peerless performance of each ElvaLink kit provide the solid reliability expected for your mission critical application. At ElvaLink we bring the future of communications to you today.



## 100BaseTx/Fx Wireless Fast Ethernet LAN Bridge

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## Fast Ethernet Connectivity in a Wireless World

Wireless broadband is the leading sector of the wireless communications community. Millimeter wave links provide large bandwidths of interference-free-operation accommodating ever increasing speed rates for connecting data systems. Wireless backhaul for the last mile is more cost effective than with fiber for Enterprise, WiFi, SAN, LAN/WAN and a host of other applications. With a choice of models for either licensed or unlicensed bands and flexible deployment options the ElvaLink series of Millimeter Wave products is designed for transparent high bit rate communications applications.

### PPC-100 Features

- Frequency bands: 40.5-43.5 GHz, 59-64 GHz, 71-76/81-86 GHz, 92-95 GHz
- Fast Ethernet Interface, High Bandwidth Throughput
- True Full Duplex Operation
- Solid reliability with Fiber-like Performance
- Distance Ranges of up to 10 miles [16km]
- Easily Installed, Zero Maintenance
- Compact Cassegrain type antennas
- Quasi-optical propagation of mm-wave emission
- EMI Interference free

### PPC-100 Applications

- Wireless backhaul for cellular and WiFi
- Point-to-point LAN/WAN Connectivity
- ISP Last Mile Connectivity
- FSO [Free Space Optics] Back-up
- Campus Area Networking
- Mesh and Multipoint Networking

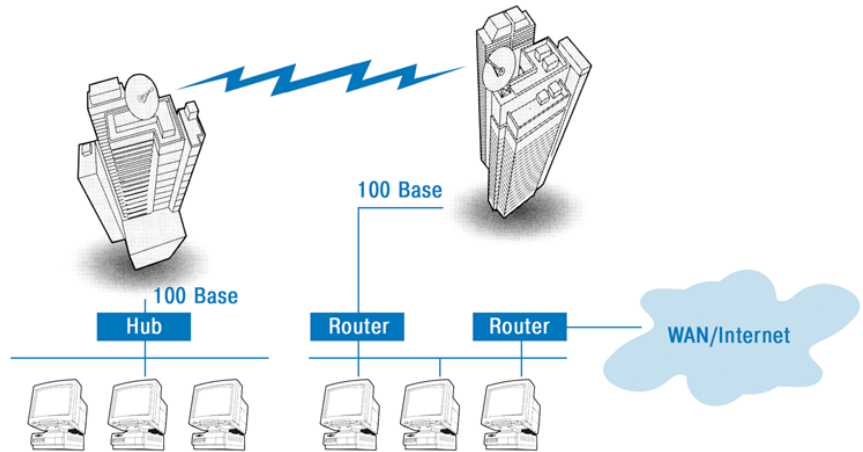


# 100 BaseTx/Fx Wireless Fast

## PPC-100 Brief Technical Description

The wireless bridge system is based on two mm-wave transceivers installed to communicate along a path in the atmosphere. Each radio is equipped with hermetically sealed weather resistant case that also firmly supports our integrated Cassegrain type antenna. There are both azimuth and elevation adjustments on the mounting clamps to speed the alignment process of the antennas with our digital alignment meter. All of the parts necessary to install and optimize the link are included in each kit. This includes mounting clamps, alignment wrench, cabling, outdoor connectors, junction boxes, power supply and many other items - even monitoring software. PPC-100 radios operate at temperatures from -40°C to +50°C and do not require any additional protection from direct sunlight, rain or snowy conditions. Radome covers for our antennas are included to protect the dish surface from accumulated precipitation.

Profile and size of the transceiver case is the same for all frequency bands however antenna size is dependant on the gain required and increases with gain. Some of the choices include 300mm, 450mm and 600mm in diameter. Higher gain antennas improve path performance and minimize climatic losses impact on the link.

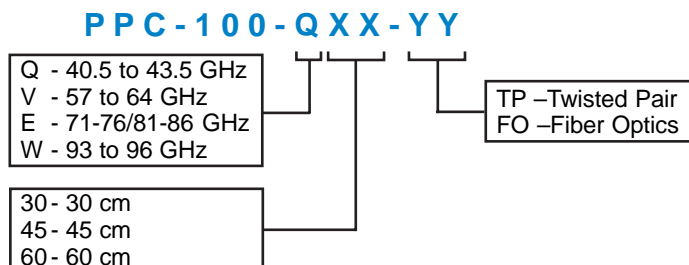


## PPC-100 Model Matrix

PPC-100 is a true 100Mbps fiber substitute for Cellular or WiFi backhaul and most last mile applications. Customers can choose from PPC-100 models according to frequency band and distance range they require. ELVA-1 radios will improve network availability and resiliency to failure while reducing the costs of installation, network integration, administration and maintenance.

| Model code     | Antenna,cm  | Distance range, m |       |       |
|----------------|-------------|-------------------|-------|-------|
|                |             | 30                | 45    | 60    |
| PPC-100-QXX-YY | 40.5-43.5   | 8000              | 11500 | 13200 |
| PPC-100-VXX-YY | 57-64       | 1700              | 2100  | 2300  |
| PPC-100-EXX-YY | 71-76/81-86 | -                 | -     | 7800  |
| PPC-100-WXX-YY | 92-95       | 5500              | 6700  | 8100  |

To choose the right model by its product code please use the following encoding schema:





## Local Climatology Defines Actual Link Range

Link performance of millimeter wave line-of-sight systems is governed by the effects of local climatology and in particular precipitation, which usually includes rain but in lesser extent other hydrometeors such as hail, fog, wet snow and sleet. Rain drops can vary in size from 0.1mm to 10,0mm, and these will effectively disperse millimeter waves, especially with carrier frequencies greater than 38 GHz [38 GHz = 8.0 mm wavelength].

This explains why millimeter wave transmission is affected mostly by rain – just because the carrier wavelength is closer to the size of a rain drop. According to Rain Attenuation chart from FCC Bulletin 70 [issued July, 1997], the maximum attenuation for frequencies 40-100GHz is 50dB/km, measured at rain intensity of 150 mm/hr. To comment what the rain intensities are, it is common to classify the intensities in following way:

- Drizzle 2 mm/hr
- Light rain 5 mm/hr
- Steady rain 12 mm/hr
- Summer cumulus rain 15 mm/hr
- Heavy rain 20 mm/hr
- Tropical Rains 50 mm/hr and more
- Natural disaster 150 mm/hr

On graphs on the next page there are experiment-calculated dependences for rain rate intensity vs. attenuation for 100Mbps point-to-point radios at 40.5 - 43.5 GHz, 57 - 64 GHz, 71-76/81-86 GHz and 92 - 95 GHz bands. These data allow network providers to optimize link range for geographical areas with wet climate and steady rains.

### Note:

For better understanding numbers of atmospheric attenuation in mm-waves it is better to compare them with some other wireless technology attenuation. For example, FSO or Free Space Optics is the main competitor of mm-wave technology in high-bit wireless communications. A comment that grants more points to mm-wave radios is the comparing of mm-wave links availability at rainy weather versus FSO links availability at foggy weather.

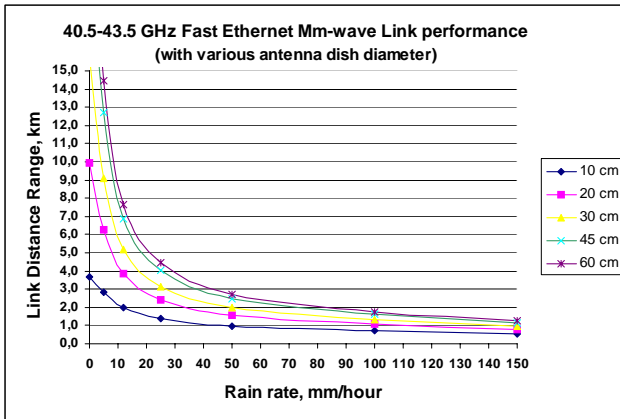
Thus, for example, the average attenuation for FSO links at different foggy weather condition is as following: Fog++ 350 dB/km, Fog+ 310 dB/km, Fog 200 dB/km.

Compare max 50dB/km attenuation for mm-wave with max 350 dB/km for FSO we see tremendous advantage of mm-wave links on resiliency to failure at bad weather.





## Rain Rate Diagrams for Millimeter Wave Bands



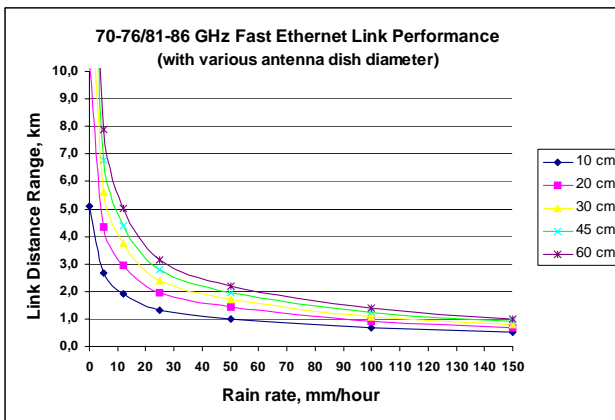
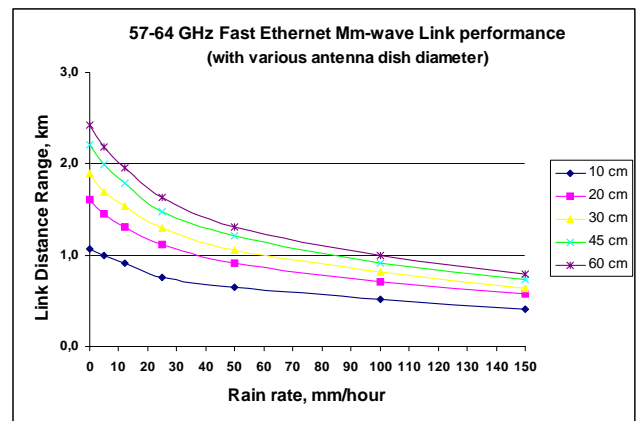
### 40.5-43.5 GHz

This is European band for broadband wireless access for Enterprise interconnect solutions, Mobile Operators BTS backhaul and backup, ISP last mile connectivity, SAN [storage area network], digital on-demand entertainment services.

According to ETSI recommendations, 40.5-43.5 GHz band is intended for point-to-multipoint communications, but many European countries have national frequency allocations and regulations allowing point-to-point links at 40.5-43.5 GHz.

### 57-64 GHz

Available in USA and Canada for FCC part 15 license free usage [unlicensed devices]. The band is well secure due to atmospheric absorption providing a cone of silence around your homeland Security links. It is interference resistant as up to 1000 systems can operate simultaneously in a 1sq kilometer area without interference!

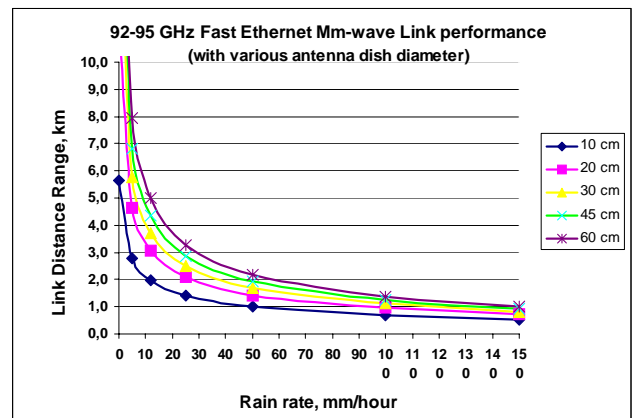


### 71-76 GHz and 81-86 GHz

Newly opened FCC dualband with licensed coordination offer the flexibility of paired or unpaired 1.25 GHz segments in each band. Ideal for internet connectivity, transparent LAN service, L2VPN [PtP/ PtMP LAN to LAN], SAN, and VoIP for Enterprise and commercial customers. Metro Ethernet services have a new tool that allows freedom from fiber or wire connections for their network applications.

### 92-95 GHz

This is the upper band from available by FCC for commercial communications today. It offers the maximum in atmospheric transparency at higher frequencies for clear communication at enhanced distances in this region. The most known advantage is a quasi-optical propagation [like laser beams] for radio communications. With both Part 15 and Part 101 applications possible this range is the most adaptable to a wide variety of services.





## Product Specifications

### System Parameters

|                              |   |   |                    |                      |
|------------------------------|---|---|--------------------|----------------------|
| Frequency Band               | 42 GHz [Q-band]*  | 60 GHz [V-band]   | 70-80 GHz [E-band] | 94 GHz [W-band]      |
| Bandwidth                    | 40.5-43.5 GHz   | 57-64 GHz   | 71-76 / 81-86 GHz  | 92-94.0, 94.1-95 GHz |
| Capacity                     | 100 Mbps Full duplex  |   |                    |                      |
| Modulation Type              | ASK   |   |                    |                      |
| Rx Sensitivity               | -95 dBW   | -95 dBW   | -94 dBW            | -93 dBW              |
| Frequency Stability, ppm/KHz | 15 ppm/630 KHz  | 15 ppm/900 KHz  | 20 ppm/1600 KHz    | 20 ppm/1900 KHz      |
| Output Power **              | 50 mW   | 18 / 34 / 55 mW<br>for 30/45/60cm<br>antennas<br>respectively | 50 mW              | 50 mW                |
| ATPC / AGC Range             | 45 dB[ATPC]   | 60dB[AGC]   |                    |                      |
| Network Management           | SNMP Enabled  |   |                    |                      |
| Parameters Monitoring        | Proprietary adapter in ODU with software application [Windows 98/2000/XP] |   |                    |                      |
| Remote Monitoring Ability    | Software application based on Windows terminal services                   |   |                    |                      |

### Data and Aux Interface

|                    |  |
|--------------------|--|
| Ethernet Interface | 100BaseTX [RJ-45 connector] or 100BaseFX [SC/PC optical connector] |
| Diagnostics Port   | RS-485 [with optional RS-232]                                      |

### Antenna

|                        |                                     |            |              |            |
|------------------------|-------------------------------------|------------|--------------|------------|
| Antenna Type           | Cassegrain type antenna with radome |            |              |            |
| Antenna Gain/beamwidth |                                     |            |              |            |
| ■ 30 cm                | 38 dB/1.6°                          | 42 dB/1.0° | 43.5 dB/0.9° | 45 dB/0.7° |
| ■ 45 cm                | 42 dB/1.0°                          | 45 dB/0.7° | 46.5 dB/0.6° | 48 dB/0.5° |
| ■ 60 cm                | 44 dB/0.7°                          | 47 dB/0.5° | 50 dB/0.4°   | 50 dB/0.4° |

### Power / Environment

|                               |   |                     |
|-------------------------------|---|---------------------|
| Power Supply AC Input         | 88-132 / 176-264 Volts, 50/60 Hz [with manual voltage range switch] |                     |
| Transceiver Power Consumption | 20 W [+15W heating]   | 35 W [+15W heating] |
| DC Power                      | 48 to 60 Volts DC   |                     |
| Power Connector               | Ethernet / Power connector IP-65 [optional IP-68]                   |                     |
| Operational Temperature       | -40°C to 50°C / -40°F to 122°F                                      |                     |
| Humidity                      | 0 to 95%, non-condensing  |                     |

### Physical Dimensions

|                               |                    |
|-------------------------------|--------------------|
| Outdoor unit size w/o antenna | 330 x 350 x 460 mm |
| Weight (ODU w/o antenna)      | 14 kg              |

### Note:

- [\*] 40.5-43.5 GHz band is intended for Point-to-multipoint broadcasting in Europe, according to ETSI recommendations
- [\*\*] Output power level for 60 GHz band depends on antenna size

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