*https://wiki.teltonika-networks.com/view/Can_I_use_LTE/3G/Wi-Fi_antennas_other_than_Teltonika%27s%3F*

# Can I use LTE/3G/Wi-Fi antennas other than Teltonika's?

Redirect to:

- Third-party Antennas

Yes, you can use any third party antennas with our routers. Antennas must meet these requirements:

- **Antenna connector**: SMA male for 3G/LTE and RP-SMA male for WiFi
- **Input impedance**: 50 Ω
- **Minimum input power**: 2W for 3G/LTE and 1W for WiFi
- **Frequency range**: WiFi – 2400-2500MHz, 3G/LTE – 698-960/1710-2170/2500-2700MHz (depending on bands being used)

There are more parameters to consider when choosing antennas also:

- **Antenna polarization** is the direction in which electric field oscillates while it propagates through environment. It is important to match broadcasting and receiving antennas polarization: it must be same polarity. In this way the maximum signal is obtained. WiFi antennas are almost always vertically polarized, while mobile antennas are either vertically polarized or cross polarized
- **Antenna gain** describes how much power is radiated in the direction of peak radiation compared to isotropic emitter. Different units are used to express antenna gain
    - Decibels (dB) – 10 dB means 10 times the energy relative to an isotropic antenna in the peak direction of radiation
    - dBi (decibels relative to an isotropic emitter) is the same as dB because isotropic antenna has gain of 1dB
    - dBd (decibels relative to a dipole antenna) – dipole gain has a gain of 2.15dBi so 10dBi antenna has gain of 7.85dBd
        - Therefore 10 dBi = 10 dB = 7.85 dBd

When using antennas of different gain, take note that **a higher dBi value doesn't always mean universally better coverage**. Antennas with a higher gain value (e.g., 7 dBi, 9 dBi) tend to provide better coverage for distant devices, but antennas with lower gain (e.g., 2 dBi, 5 dBi) tend to provide better coverage for devices in close range. A visual representation of this is provided below:

- **Antenna directivity**. Directional antennas radiate energy in one (or some) direction more effectively than others. Usually directional antenna has main lobe and several minor lobes. Omnidirectional antennas have circular radiation pattern in a given plane and a directional pattern in any orthogonal plane. Omnidirectional antennas widely used in most routers. See

omnidirectional and directional antennas examples with their radiation pattern below:

**Omnidirectional antenna (2dBi)**

**Directional antenna (18dBi)**

- **VSWR (voltage standing wave ratio)** is a function of the reflection coefficient Γ, that describes power reflected from the antenna. The smaller the VSWR is, the more power is delivered to antenna. Minimum VSWR is 1, that means that no power is reflected from the antenna (ideal case). We recommend use WiFi antennas with VSWR≤1.5 and 3G/LTE with VSWR≤2.5.
- **Cable (insertion) losses** must be taken into account when using antennas with long cables. It is a measure of the amount of energy that is absorbed by transmission line (cable) as signal travels down and it is measured in decibels (dB). In general, a smaller diameter cable has more loss than larger diameter cable. For a specific cable type (different cable types have different losses), the longer the cable length the greater the amount of energy it absorbs. Also, losses depend on frequency – the higher the frequency the greater the loss.