Blu Wireless

Powering Connectivity

mmWave Link Budget Calculator

How-To Guide

Welcome

The tool is ideal for examining connectivity in high bandwidth applications. With the plotter you can easily compare, analyse and experiment with range and throughput estimations for a point-to-point link connection using our 60GHz Evaluation Kit. Best of all, you can download your session as a PDF document to ensure you have previous results available for future sessions.

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Using the Tool:

The main objective of a session is to assess the number of sites and the spectrum needed to carry a 1Gbit service.

With this tool you can change a variety of parameters, adding curves to the plotter to test different requirements such as:

- Showing maximum range in channel 5
- Finding range in channel 2
- Modyfing your comparisons for heavy rain
- 2x Power Supply units

While it depends much on your specific application, the most commonly tested parameters are the channel itself, the possible rain rate and channel width.

Key Parameters Explained

A variety of parameters are crucial for accurate results and our tool addresses the most important ones:

Transmit Power

In most applications this is limited by regulation, either in absolute power or Equivalent Isotropic Radiated Power. For the 60GHz unlicensed band the limit is usually 40dBmi EIRP which is calculated by Tx power – Tx feeder loss + Tx directivity

Directivity

Sometimes called antenna 'gain,' this is a measure of how much the transmit or receive antennas focus their energy in a specific direction (compared with a theoretical isotropic radiator or receiver) and is related to the electrical size (or aperture) of the antenna.

QAM Back-Off

Transmitters are often designed to be as power-efficient as possible for their longest range of operation at the regulated maximum transmit power. At shorter ranges, where a higher throughput can be supported using Quadrature Amplitude Modulation, the transmitted power generally has to be reduced to achieve the required Error Vector Magnitude.

Error Vector Magnitude

For QAM, the signal makes use of closely spaced 'constellation' points which the receiver has to differentiate precisely to demodulate the signal without errors. Error Vector Magnitude quantifies the effect of distortion and phase noise in the transmitter and receiver and ultimately limits the maximum throughput that can be achieved at short range.

Effective Rx Noise Figure

Receiver noise figure quantifies how much the receiver's internal sources of noise raise the background level of thermal noise produced by the environment. Together these sources of noise limit the range that can be achieved.

Datapaths

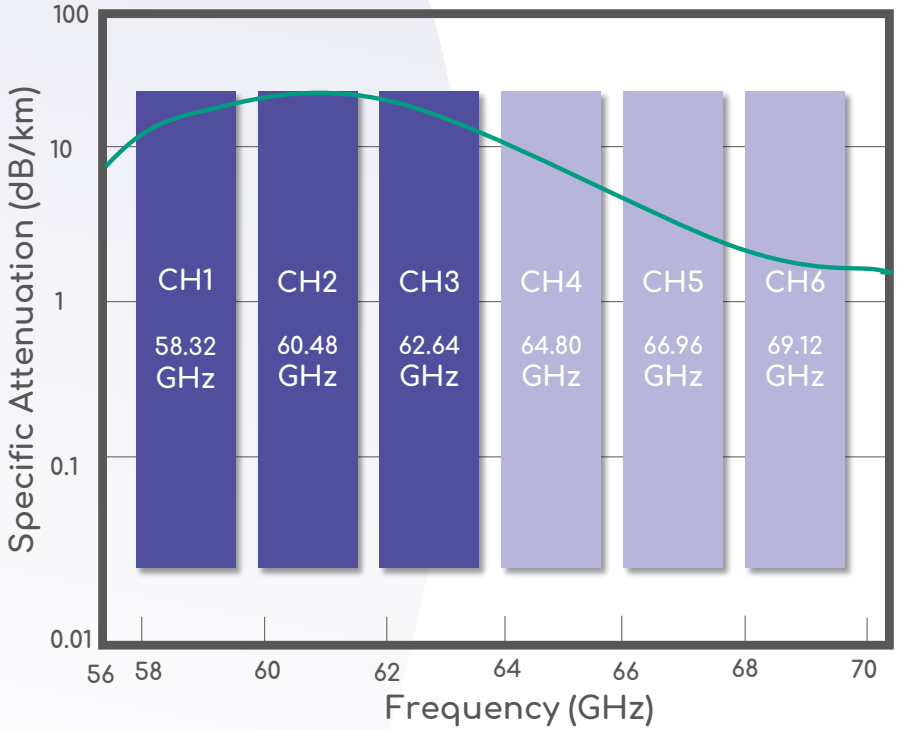
This parameter simply multiplies the throughput for scenarios where a connection may be served by a number of paths in parallel.

Rain Rate

Precipitation absorbs and scatters mmWave energy reducing available range. ITU define a number of geographic zones and rain rates that can be used to estimate availability of a particular throughput in a specific region.

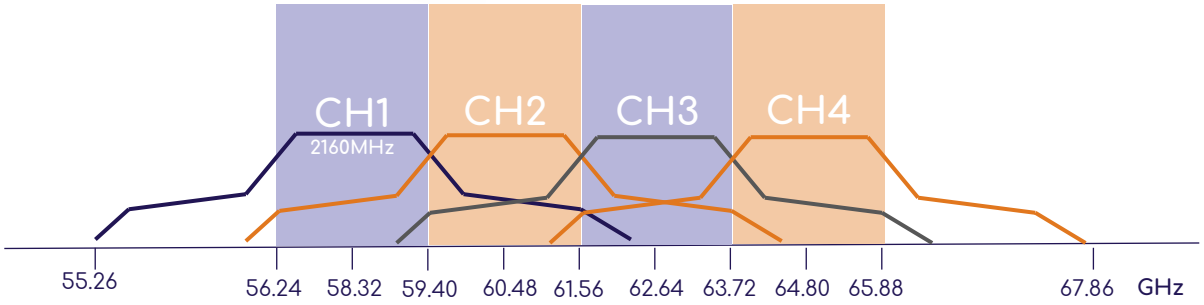
Channel

The 60GHz unlicensed band covers 57GHz to 71GHz with six nominal full-channel centre frequencies defined across the 14GHz of bandwidth. A tightly-spaced cluster of molecular oxygen absorption lines fall within the lower three channels decreasing link range available in air but improving opportunities for frequency re-use. The upper two channels are largely unaffected by atmospheric oxygen absorption.



Bandwidth

In unlicensed bands, transmit power is generally limited per transmitter, regardless of the amount of spectrum occupied. At extreme range it becomes more efficient to reduce bandwidth to maintain an error-free link than apply additional coding overhead. In a highly congested deployment narrower channels might also be useful to avoid interference (at the cost of throughput on each link). Conversely, wider channels can carry more data at short range.



Why not try our link budget calculator tool today and learn more about our world leading multi-gigabit 60Ghz solutions.

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We welcome any feedback or questions; simply use the feedback box on our Link Budget Calculator page.