

LINK BUDGET CALCULATOR

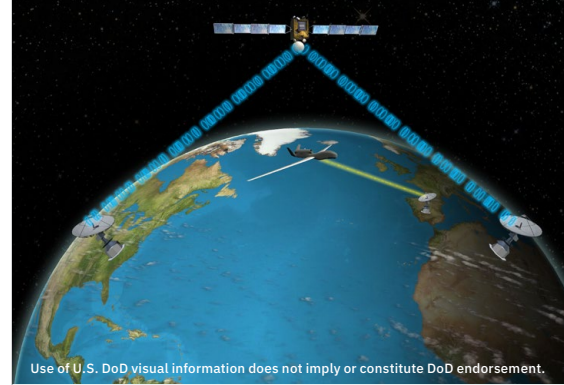
Versatile Propagation Analysis Enhances Network Design

L3Harris' Link Budget Calculator provides systems engineers and other RF data link stakeholders a way to estimate communication systems wireless connectivity performance across various scenarios, hardware configurations, link topologies and atmospheric conditions. It assists the data link engineer in preliminary planning and evaluation of line-of-sight and satellite microwave data links performance.

PRODUCT DESCRIPTION

Link Budget Calculator provides a signal loss and gain budget based on the user-defined link availability required given as a percentage of time due to path fade statistics. The Link Budget Calculator provides an opportunity to make initial assessments of various link parameters to successfully close intended links.

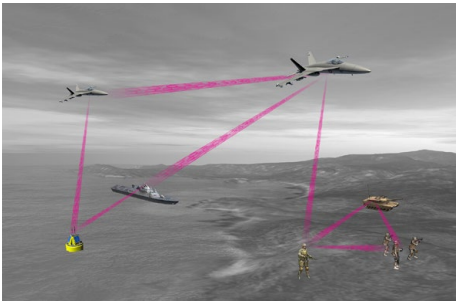
- > Link budget feasibility to establish demonstration/mission link success expectations
- > Comprehensive link budget calculation based on 20+ years of refinement using industry standard models plus our extensive, unique experience with high-bandwidth RF data links
- > Frequencies covered from UHF to V-Band (path loss model dependent)
- > Equipment performance variations used as part of assessment analysis



Flexible data link parameter optimization to minimize potential operational risk

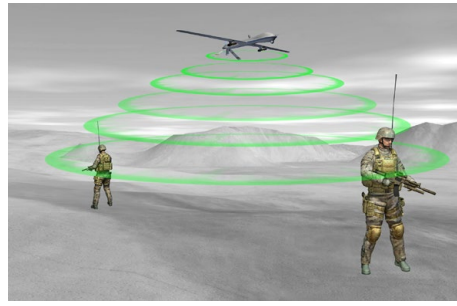
KEY FEATURES

- > Realistic modeling
- > Updated industry-standard models (Crane and ITU)
- > Rain region maps
- > Link closure analysis
- > Importing of actual antenna patterns
- > Scintillation
- > Graphing parameters against each other
- > Establishes basis for frequency coordination
- > Calculates available margin for desired Satellite Communications (SATCOM) links
- > Link balancing function to scale selected parameter(s) to reach 0.0 dB link margin
- > Export link budget results
- > Four different views to enhance the user interface—Notes View, Concise View, Graphical View and Summary View



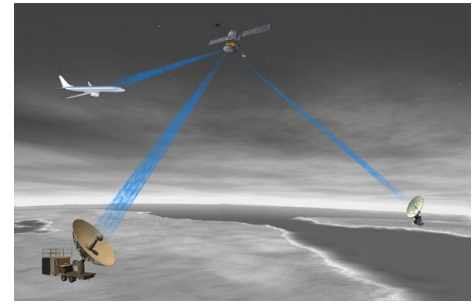
Digital Data Links

- > Surface-to-airborne, multi-tier links
- > Extensive forward error correction and modulation options
- > Communications, ISR, and enhancement of EW-based calculations
- > LOS and BLOS reachback
- > Eb/No based
- > UHF to V-Band (path loss model dependent)



Analog Data Links

- > FM/AM radios
- > VHF/HF systems
- > Calculates SNR available
- > Extensive transmission path variation options
- > Allows for either Noise Figure or G/T models



SATCOM Links

- > Surface/airborne-to-satellite
- > GSO, MEO and LEO constellations
- > Simultaneous assessment of uplink and downlink paths
- > Three satellite models available
- > L-band through lower Q-band

ASSUMPTIONS AND FEATURES

A rudimentary understanding of the basis for link budget calculations is assumed.

The tool provides estimates due to the potential variability of the environment and RF equipment.

The Link Budget Calculator integrated models are evaluated periodically for relevant utility and to keep them current, which results in reliable predictability for most link propagation environments.

The Calculator comes with an integrated Operator's Manual to provide activation instructions and selected details of parameters and their intended use. The tool is capable of importing and exporting data.

SPECIFICATIONS

SOFTWARE

- > Windows XP, 7, 10

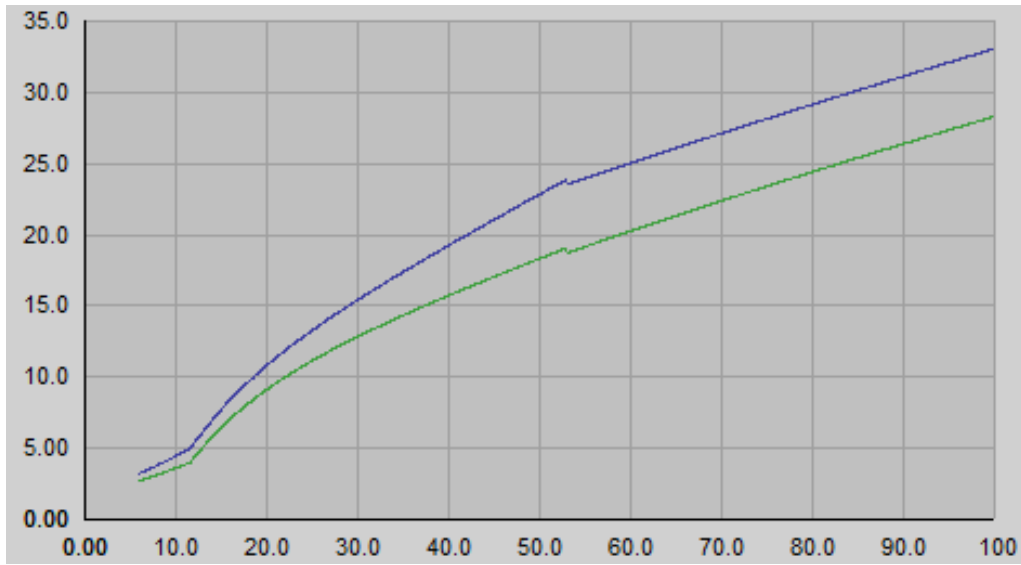
HARDWARE

- > Laptops and desktops

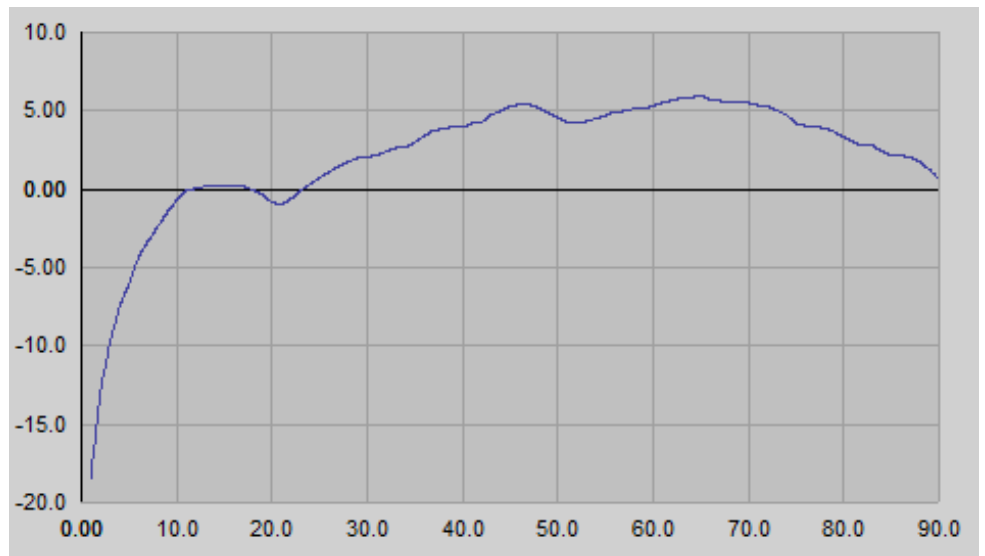
The Link Budget Calculator comes with a software license, providing a yearly seat and maintenance.

- > Built-in activation key function
- > L3Harris offers link budget analysis as a service. Call for details.
- > Technical assistance on a time and materials basis

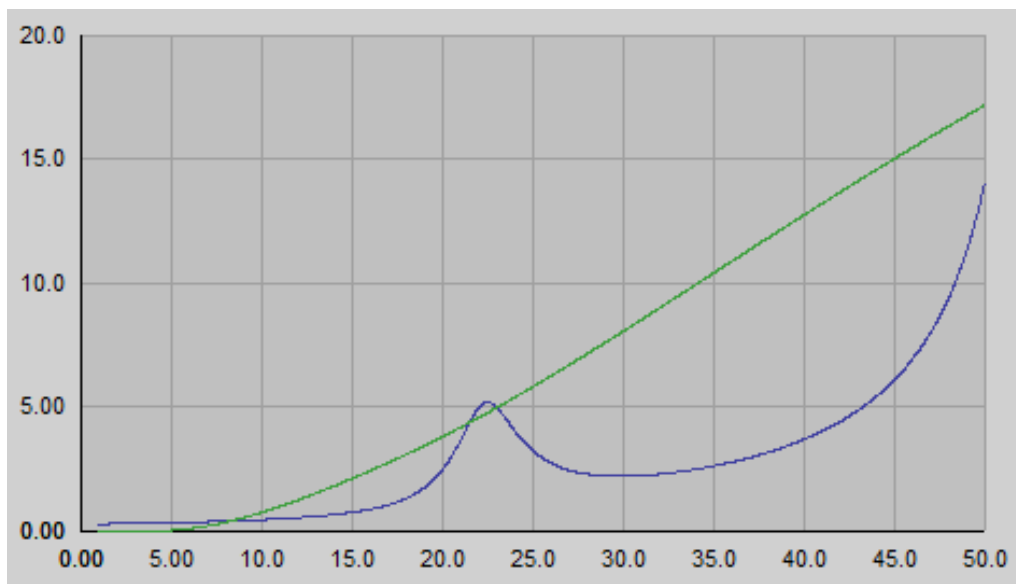
OPERATOR DEFINED PLOTS



Rain RF Attenuation (green line) and Total Atmospheric RF Attenuation (blue line) in dB as a function of Range



Antenna Gain vs. Elevation Angle




Rain (green) and Gaseous (blue) Attenuation vs. Frequency

SAMPLE OF FULL SATCOM LINK BUDGET

Title:
SATCOM Link Budget

Description:
Input values shown are for illustration only and are not representative of any specific SATCOM link or any specific satellite system.



Saved: not saved

Frequencies

Uplink Freq. GHz

Downlink Freq. GHz

Data Rate kb/s

Tx Antenna

Antenna Gain dBi

Net EIRP 60.49 dBW

Downlink Path

Absorptive Loss dB

Non-Absorp. Loss dB

FS Loss 205.58 dB

Total Loss 205.58 dB

Modulation/Coding

FEC Decoder

BER

Modulation

Theoretical Eb/No 11.98 dB

Imp. Loss dB

Eb/No Req. 11.98 dB

Uplink Path

Absorptive Loss dB

Non-Absorp. Loss dB

FS Loss 207.22 dB

Total Loss 207.22 dB

Rx Antenna

Rx Flux -128.24 dBW/m2

Antenna Gain dBi

Rx Power -126.04 dBW

Geometry

Sat. Lng. (East +) degree

Tx Lat. (North +) degree

Tx Lng. (East +) degree

Tx Alt. km

Tx EL Angle 39.33 degree

Tx Range 37832.01 km

Rx Lat. (North +) degree

Rx Lng. (East +) degree

Rx Alt. km

Rx EL Angle 27.21 degree

Rx Range 38864.51 km

Satellite

Transponder BW MHz

Purchase BW MHz

Satellite G/T dBi/K

SFD dBW/m2

Sat. EIRP dBW

Input Backoff dB

Output Backoff dB

Uplink C/No 89.67 dB-Hz

Net C/No 89.67 dB-Hz

Carr. Flux Den. -102.06 dBW/m2

Carrier IBO dB

Carrier OBO dB

Carrier EIRP dBW

Trans. BW Used %

Trans. Pwr. Used %

Rx System Noise

CS Sys. Temp. K

Atm. Loss dB

Atm. Temp. K

Sys. Temp. 160.0 K

Clear Sky G/T 22.96 dBi/K

G/T 22.96 dBi/K

Effective G/T 22.46 dBi/K

C/(No + Io) 80.02 dB-Hz

Link Budget Results

Eb/No Required 11.98 dB

Uplink Eb/No 27.79 dB

Downlink Eb/No 18.63 dB

Composite Eb/No 18.13 dB

Link Margin 6.15 dB

Transmitter

Saturated Power W

Output Backoff dB

Feed Losses dB

Feed Power 15.49 dBW

Example of the details provided by Link Budget Calculator

Link Budget Calculator

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