

# SATELLITE NETWORK CALCULATOR

## Description

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The Satellite Network Calculator provides instant insight into the performance and potential of your satellite network. Based on the capabilities of hub and modem products, full satellite network characteristics are represented in a highly graphical and intuitive manner.

### Managing the Space, Ground and Service Equation

The Satellite Network Calculator manages the between the main components of a satellite network. A satellite network can be split up into three components:

- A space part: The satellite and its available bandwidth.
- A ground part: The gateways and terminals, size and amount.
- The network capabilities: Throughput, efficiency, availability, uplink/downlink rates, etc.

Usually, not all aspects of these components are known at once and calculating the dependencies is a time-consuming matter. As a consequence, insight into new technologies, network optimization possibilities and network potential is limited. This results in conservative technology evolution and satellite networks not providing the full profits they could offer.

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**Newtec**  **iDIRECT**

## Typical Applications

- Planning a new satellite service
- Optimizing an existing network
- Link budget and MODCOD simulations
- Managing terminal populations during planning and operational phases
- Ground and satellite segment technology evaluation
- Mobility route planning
- BSS support for terminal and area selection

## Satellite Service Life Cycle Management

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Satellite service providers are continuously evaluating new business opportunities and trying to find ways to optimize their existing services. During a planning phase, inputs for satellite segments are volatile, incomplete or non-existent, while the service definition has to be optimized to match the business objectives.

The Satellite Network Calculator provides effortless iterations of the satellite network characteristics which enables satellite service providers to maximize the business potential of their networks. During the operational phase, the focus moves towards checking that the network operates the way it was planned. This includes using the right terminals depending on the location, certifying and monitoring terminal installation quality, and planning for capacity extension in line with network growth. As such, the Satellite Network Calculator outputs target different audiences: operational, financial and sales.

## SATELLITE NETWORK CALCULATOR

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### FULL VERSION

#### MODULES INCLUDED

- MODCOD calculator
- Link budget
- Advanced link budget tools
- Network configurator
- Terminal type selector

#### OPTIONAL MODULES

- Capacity sizer
- Beam performance

#### DEPLOYMENTS

- Cloud
- On-Premises
  - Stand-alone
  - Integrated with Dialog

### FREE ONLINE VERSION

#### MODULES INCLUDED

- MODCOD calculator
- Link budget
- Advanced link budget tools

### Key Advantages

#### Planning Phase

- Accurate performance insights matching the operational phase
- Network business benefit evaluations with fast iteration on CAPEX/OPEX
- Simulating different scenarios without any manual work on link budgets
- Highly graphical maps and charts provide a simple way of weighing up costs and benefits of simulated networks

#### Operational Phase

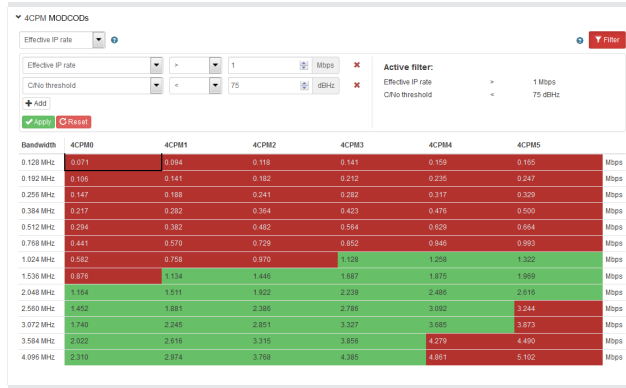
- Single network performance reference supporting sales and operational work flows
- Easy capacity sizing in line with network growth

#### Key Features

- Intuitive web-based graphical user interface
- Support for single beam up to large multi-beam satellite networks
- Single information database for network planning and network operational phases
- Seamless integration with Dialog operational networks
- Open Application Programming Interface (API) for other workflow integration

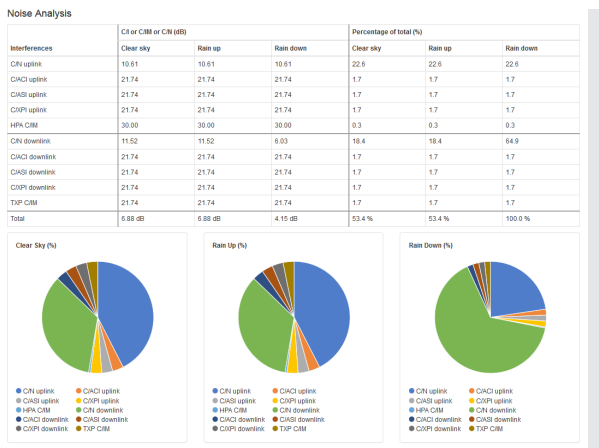
# MODCOD Calculator

The MODCOD calculator allows MODCOD parameters to be looked up and for carrier parameters to be calculated. Based on the transponder and link budget figures, lists and tables can be created to narrow down the list of possible MODCOD and carrier options.



# Link Budget Calculator

The link budget calculator simulates the geo-stationary satellite link, taking into account all of technologies. The results can be shown in a table form with parameters grouped per carrier, uplink, downlink, total and space segment. Alternatively, a summarized noise analysis view can be shown to quickly highlight the weakest link in the chain. Using the latest ITU rain model, availability can be estimated. When this is done in ACM mode, the MODCOD usage and average efficiency of the carrier can be calculated.



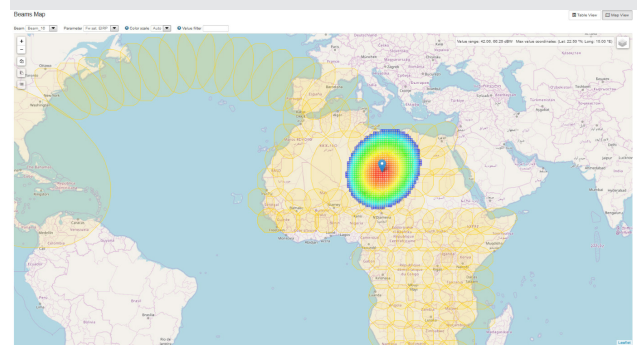
ACM result

ModCod	CR (Bps/Hz)	BY (dBHz)	Info rate (Mbps)	CR/Hz (dB)	Code th. (dB)	C/I access margin (dB)	Up all. degr. (dB)	Up avail. (%)	Down all. degr. (dB)	Down avail. (%)	Total avail. (%)	Usage (%)
HRC 32AFSK38-100 (C/BI)	3.510	2.849	10.017	15.02	14.08	0.44	7.99	99.987	1.19	94.333	94.333	94.333
HRC 32AFSK37-50	3.422	2.940	10.000	15.02	13.89	0.63	8.04	99.987	1.00	97.086	97.086	2.765
HRC 32AFSK18-25	3.329	3.011	10.021	15.02	13.67	0.85	8.18	99.987	2.16	98.400	98.400	1.362
HRC 16AFSK17-20	3.147	3.200	10.004	15.02	13.39	1.13	8.19	99.987	2.76	99.216	99.216	0.768
HRC 16AFSK3-40	3.052	3.302	10.079	15.02	12.82	1.60	8.64	99.989	3.67	99.073	99.073	0.458
HRC 16AFSK4-5	2.959	3.399	10.056	15.02	12.42	2.10	8.93	99.989	4.66	99.025	99.025	0.152
HRC 16AFSK3-140	2.868	3.490	10.026	15.02	12.02	2.50	9.21	99.989	5.22	99.882	99.882	0.050
HRC 16AFSK3-4 (R)	2.773	3.530	10.005	15.02	11.69	2.93	9.49	99.989	5.99	99.917	99.917	0.035
HRC 16AFSK23-40	2.683	3.755	10.074	15.02	11.19	3.33	9.76	99.989	6.48	99.938	99.938	0.021
HRC 16AFSK17-10	2.589	3.855	10.056	15.02	10.79	3.73	10.00	99.989	7.05	99.952	99.952	0.014
HRC 16AFSK27-140	2.496	4.014	10.026	15.02	10.48	4.04	10.16	99.989	7.47	99.960	99.960	0.008
HRC 8PSK4-5	2.313	4.335	10.036	15.02	9.82	4.65	10.41	99.989	8.21	99.971	99.971	0.012
HRC 8PSK4-5	2.219	4.532	10.007	15.02	9.28	5.24	10.60	99.989	9.03	99.979	99.979	0.006
HRC 8PSK23-30	2.128	4.720	10.000	15.02	8.85	5.67	11.11	99.989	9.06	99.983	99.983	0.004
HRC 8PSK11-15	2.034	4.920	10.010	15.02	8.37	6.15	11.43	99.989	10.14	99.985	99.985	0.002
HRC 8PSK7-10	1.940	5.179	10.048	15.02	7.90	6.62	11.68	99.989	10.89	99.989	99.989	0.004

Clear sky efficiency: 3.510 bps/Hz  
 Average ACM efficiency: 3.033 bps/Hz  
 Max total avail.: 99.989 %

# Network Configurator

In the network configurator, a model of the RF part of the network is created. Networks consist of one or more satellites, beams, gateways, terminal types, service profiles and terminal clusters. The beam patterns can be loaded in different ways, either via a grid file or via a contour description.



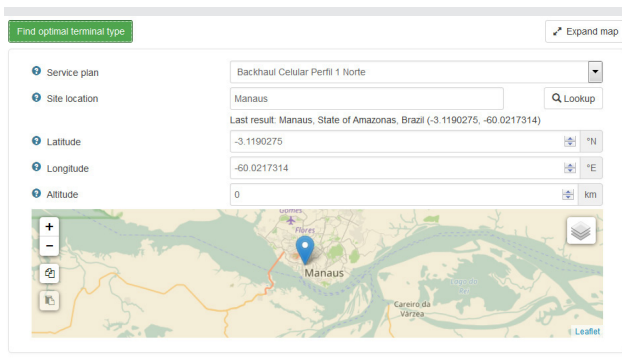
# Beam Performance Calculator

Once the network is configured, the tool will simulate the network performance. Simulation can be done per terminal or per beam. This will allow operators to receive an easy overview of which efficiency and availabilities can be expected per terminal type and per beam. The effect of changing the Saturation Flux Density (SFD) or transponder output back-off is immediately visible in the beam performance calculator.

## Terminal Type Selector

The tools are not only useful during the planning phase but can also be used during the deployment and installation phase. Different users can be created and granted different access levels. Virtual Network Operator (VNO) users can only see the beams they are using and are only allowed to change their service plans. Network Operations Center (NOC) users have the ability to change satellite configuration or gateway uplink EIRP. Installers can request which terminal should be installed at a certain location for a certain service plan.

The figure below shows which terminal should be installed in Manaus if the customer wants the Profile 1 service. This user does not have access to any other page, other than the terminal selection. The only freedom they have is to select the location, based on the address or the latitude and longitude, and to select the service profile. The actual terminal selection is fully automated, based upon pre-defined rules and does not require any link budget knowledge.



## Capacity Sizer

By using the simulated beam performance data, operators can create terminal clusters. Using filters, operators are able to create maps where certain terminals should and shouldn't be used. For example, to maintain an overall minimum beam efficiency, it might be necessary to use

