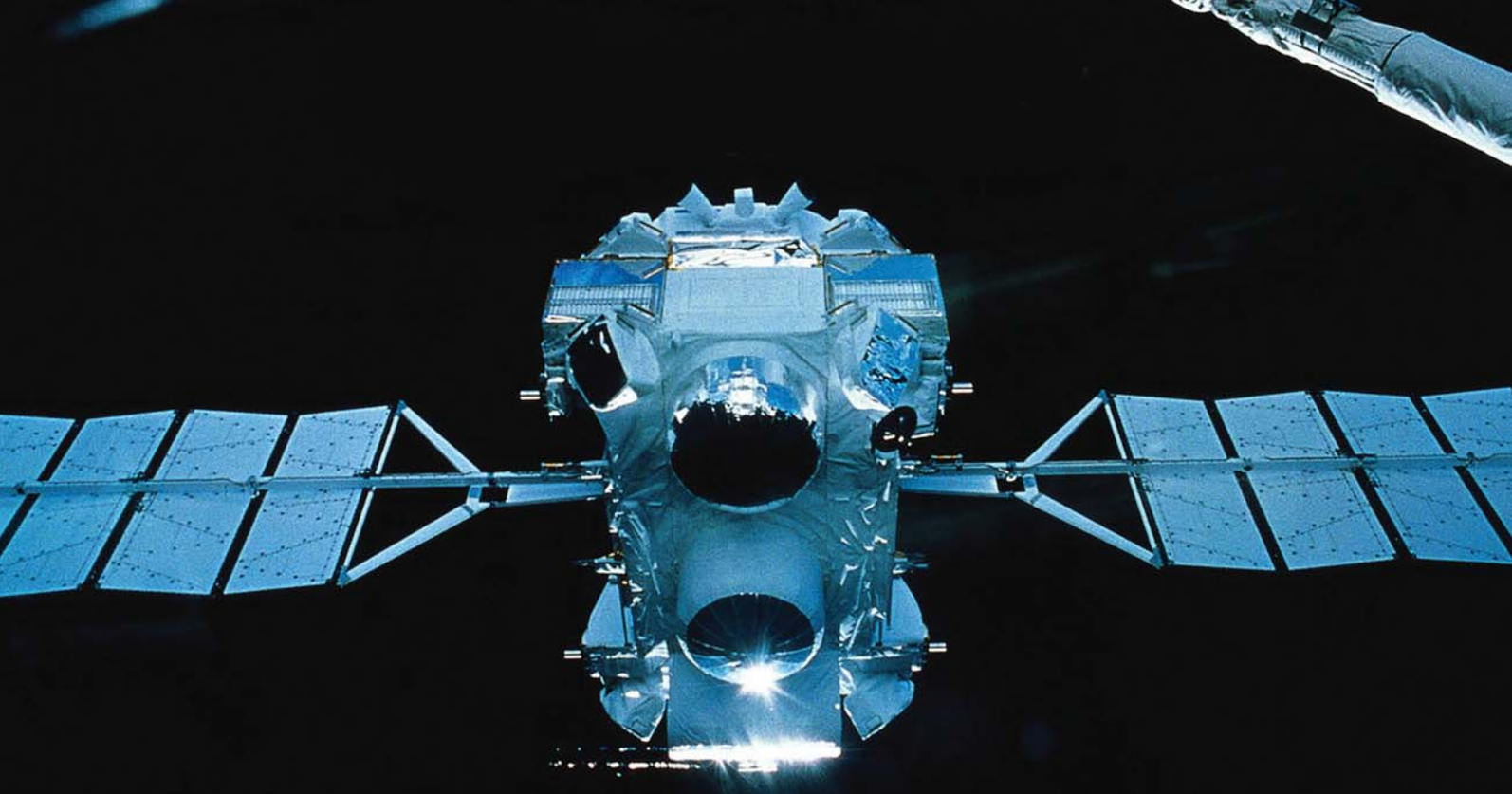

Carrier Monitoring System

Technical Data Sheet

INTEGRASYS

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Controlsat

Satellite Carrier Monitoring Systems

Controlsat is the Fastest Carrier Monitoring on the market able to measure 200 Carrier per second, a completely revolutionary technology. Satellite Carrier Monitoring operations have never been performed as fast and easy, therefore this easy-to-use system allows to save significant operational expenses (OPEX). Controlsat provides a new way of ensuring the Quality of Service and Interference Free service.

Controlsat is scalable allowing multiple users sharing on system capabilities and simultaneous measurements in multiple satellites and frequency plans. Moreover, it is highly customizable for remote monitoring via fiber or satellite link. One of the main applications is High Throughput Satellite, where Controlsat allows the operator to manage, control and monitor the spectrum on all Gateway beams and user beam very cost effectively.

Controlsat allows monitoring Carrier Level, Carrier Center Frequency, Transmission Bandwidth, Carrier to Noise ratio, and Carrier Power over unlimited number of analog or digital modulated carriers. Additionally, Controlsat Multiuser allows the operators to control one or several spectrum analyzers in real-time, reducing drastically the total time for checking the complete satellite payload.

Controlsat allows recording the spectrum data for later analysis and report. These reports have the minimum size for sending by email to customers, providers or regulatory agencies to analyze quality of service or interference events.

Customers worldwide have been using Controlsat during 20 year without stopping the operation, therefore this the most reliable system ever built.

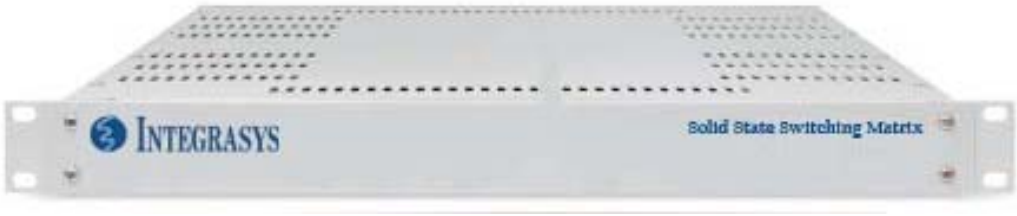
System Architecture

To achieve this dramatically improvement in terms of speed and flexibility, Controlsat uses a network distributed processing architecture and the equipment location does not impose limitations any longer therefore, instruments no longer require to be located at the teleport control room or even at the same teleport, this avoids long runs of microwave cables from shelters.

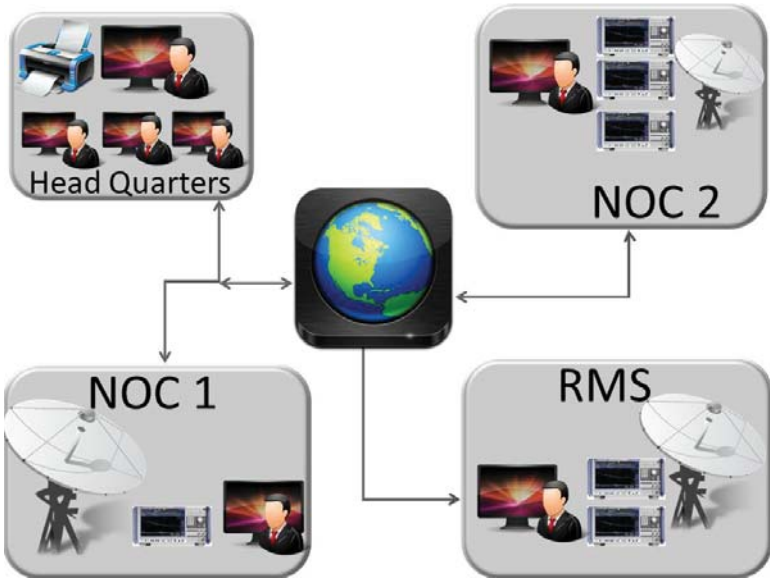
IP control brings a key advantage on remote control and speed. Controlsat uses the minimum bandwidth to control any equipment on the transmission and reception chain. Flexibility and scalability is the key of Integrasys' CMS. Due to its distributed processing architecture, the system can be configured to fit any network topology and monitor a large number of stations worldwide from the main NOC.

Measurement and instrumentation control processes are independent from those related to information and Data-Base management or graphic user interface, thus allowing the distribution of application processing load into separate computers in a transparent way for the users.

Controlsat uses at least one spectrum analyzer from third party to perform the fundamental measurements and if it is required one Solid State matrix in the monitoring band. Several are available for monitoring in L, S, X, C, Ku, and Ka band.



As mentioned the system architecture is very flexible and scalable, here is one example.

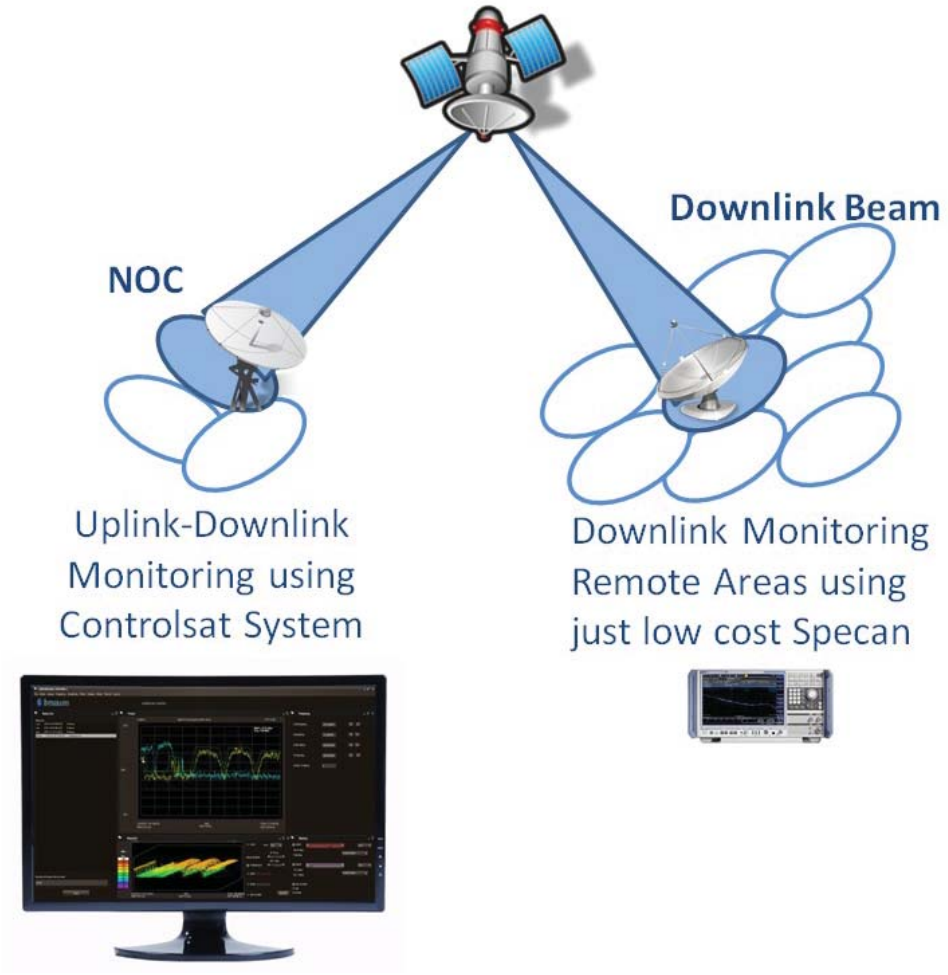


High Throughput Satellite Cost Effective Solution

Today HTS provides much more capacity than the traditional satellite technology; this is achieved by a high level frequency re-use and spot beam technology which enables frequency re-use across multiple narrowly focused, spot beams (usually in the order of 100s of kilometers). By contrast traditional satellite technology utilizes a broad single beam (usually in the order of 1000s of kilometers) to cover wide regions or even entire continents. In the ground station field, HTS brings many advantages however also brings complexity, therefore Integrasys has been working on the best systems for HTS ever built.

A fundamental difference to existing satellites is the fact that HTS are linked to ground infrastructure through a feeder link using a regional spot beam dictating the location of possible teleports. By contrast teleports for traditional satellites can be set up in a wider area as their spotbeams footprints cover entire continents and remote regions. So to set up teleports in all user beams it is not affordable therefore Controlsat brings a key solution for solving this major challenge.

In order to provide an affordable solution, Integrasys has decided to monitor multiple low cost spectrum analyzers with good performances from the same location in real time using TCP/IP protocol. This capability minimizes the cost and installation effort, because many beams will have not any teleport located in that region; because the beam covers remote locations (footprint order of 100s of kilometers). Many times, the only way to monitor these beams will be a remote installation and satellite link; therefore the minimum equipment with maximum performance is required.

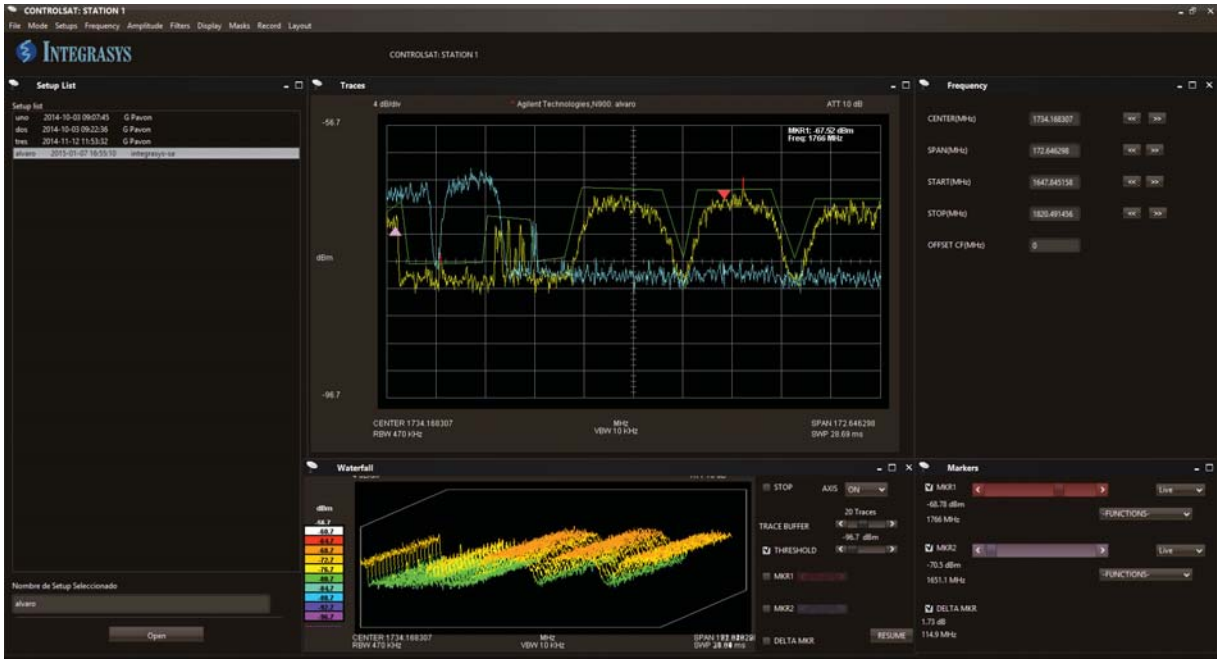


On-Line Operation

ControlSat has two operational modes nevertheless it also has some additional options such as Vectorsat Carrier Under Carrier Interference Detection, Calsat Integrasys´ EIRP Calibration System, or Satmotion Pocket for automating the VSAT installation and commissioning or Satmotion SNG for automating the Satellite News Gathering Line Ups.

Manual Mode

The operator assisted mode allows to control and monitor the spectrum with an extremely user friendly interface which will guide to operator to perform the required measurements in the minimum time. Controlsat Manual mode is inspired by the spectrum analyzer front panel allowing the operator to adjust any parameter of the spectrum analyzer, create mask, visualize frequency plan, enable markers, switch between matrix inputs, measure CF, Level, BW, Power, C/N, CrossPol, and Adjacent Satellite Interference in real time or visualize the spectrum over the time for temporary interferences and atmospheric condition change.The system is also capable of detecting Carrier ID on the interferences, decoding MAC, Latitude, Longitude and Telephone. Controlsat also allows recording the spectrum data (not a movie) for post-measuring and report.



Using just one spectrum analyzer up to 100 carriers can be monitored. Controlsat allows operating 10 users simultaneously using just one system; this brings an important advantage on cost reduction and scalability.

Moreover, several spectrum analyzers can be displayed and operated simultaneously from a single operator terminal for convenience. And also, management can visualize the NOC operation without interfering in the teleport operations.

Manual mode is the best tool for Line Up management, Antenna pattern, Cross polarization Isolation, and Adjacent Satellite Interference (ASI) Isolation and set up storage and retrieval.

Auto Mode

Controlsat fully automated or unattended mode, a list of carriers is user defined or retrieved from the system´s Data-Base. The system performs a definable carrier sequencing process according the frequency plan monitoring list. Carrier parameters such as Carrier Center Frequency, Carrier Level, Transmission Bandwidth, Carrier Power and Carrier to Noise ratio are measured and compared against several adjustable thresholds fixed automatically or fixed by the user.

Auto mode allows ensuring the quality of service and availability, and notifies with alarms and warnings in the following events: interferences, intruding carriers, transponder saturation, atmospheric events such as rain, isolation, sun outage and other degradation causes. This way the operator can take actions rapidly for come back to normal operation.

The Controlsat Auto mode allows monitoring unlimited number of carrier in multiple satellites, beams, teleports and remote locations fully automated in just one PC.

Additionally Controlsat allows creating all setups and store them on the Data-Base manually or by loading the frequency plan on XML file, which can be generated by using GeoBeam link budget tool or other softwares on the market. This capability brings a significant operation time reduction and simplicity to use the system as it is automated end to end operation.

Moreover, Auto mode allows using the manual mode simultaneously by clicking in the desired carrier spectrum plot and enabling the Waterfall or spectrum over the time analysis.

Alarms and Events

Alarms allow quickly identifying and detecting any possible service degradation or interference, Controlsat has two types of alarms depending on the spectrum degradation Warning (Yellow color) and Alarm (Red color).

These alarms are fully adjustable by the operator configuring the desired thresholds or automatically configured by Controlsat when the setup is created.

Alarms trigger different type of notifications depending on the user needs, such via display, sound, alarm email report, snmp or most common record on alarm capability, which allow to digitally recording the spectrum which allows to post visualize and measure the spectrum during the event and generate email reports to measure the spectrum on the browser, very convenient for customers and providers.

Controlsat allows to false alarms management and prevention, so the user can easily adjust the time for making the event a definitive alarm and trigger the email notifications. This capability allows the system to not generate spam and large number of emails.

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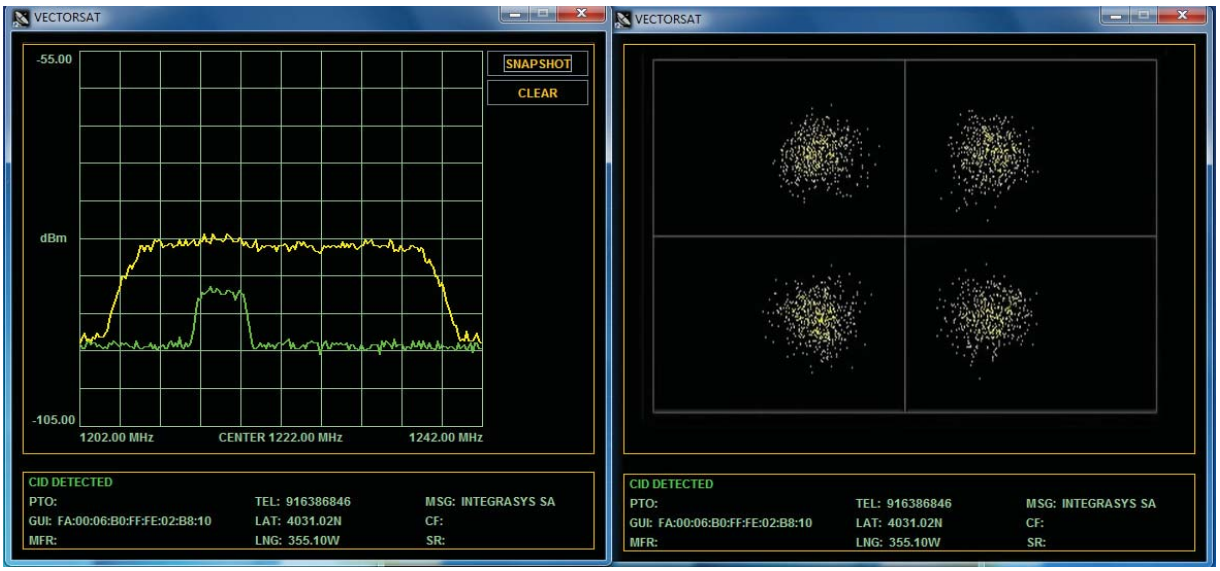
Vectorsat

Vector Mode

Controlsat Carrier Monitoring System can be upgraded to Vectorsat for adding Vector mode adding Carrier Under Carrier Interference Detection, I/Q Demodulation, constellation display and automated modulation measurements such as Symbol rate, MER, FEC and Constellation.

Vectorsat is very easy to use system for solving a complex challenge such as signal modulation distortion and hidden interference inside carriers. Vectosat nowadays is the most powerful Carrier Under Carrier Interference Detection System.

Verctorsat is also capable of detecting the Carrier ID for locating the interference on carrier under carriers.



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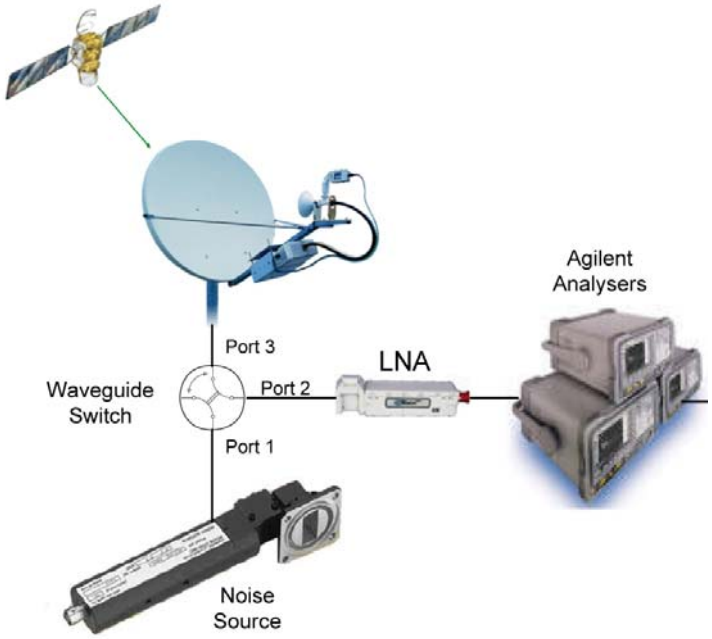
Calsat

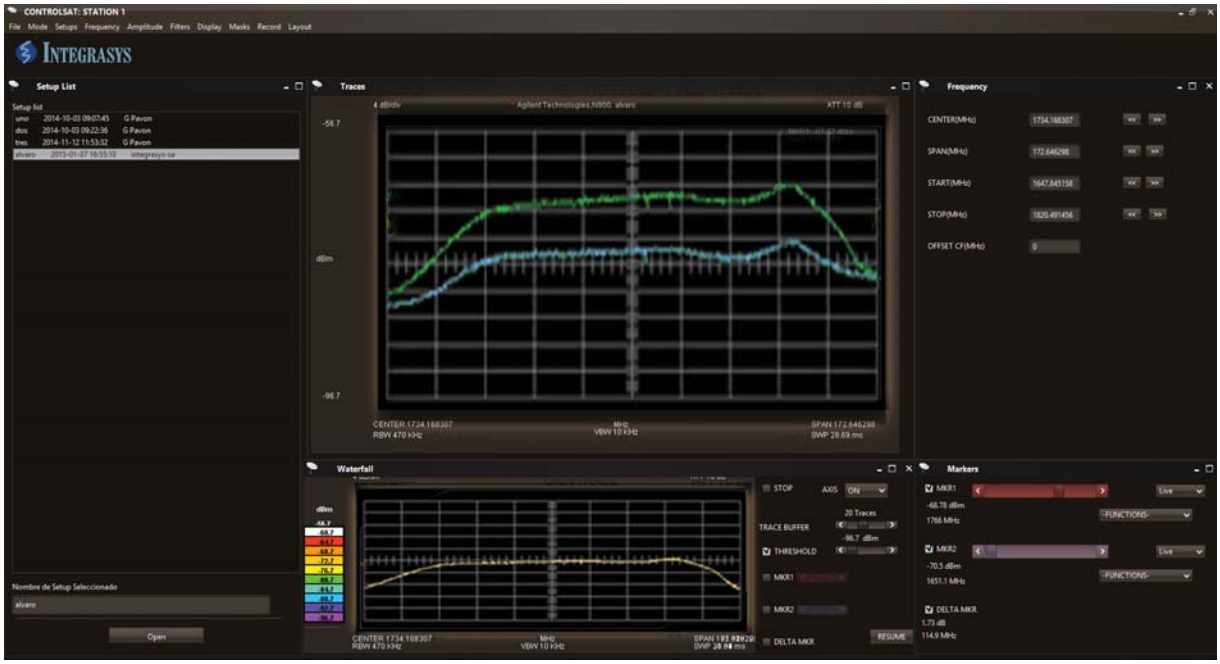
Cal Mode

Calsat is the fastest automated calibration system on the market for satellite ground stations, it is able to calibrate a full frequency band in just two seconds and with an accuracy of +/- 0,2 dB for providing the Carrier Monitoring with Absolute EIRP measurement of satellite carriers.

Calsatuses a broadband calibrated noise source as reference standard which injects a signal just before the LNA/LNB compensating the RF attenuation and uncertainty on the path.



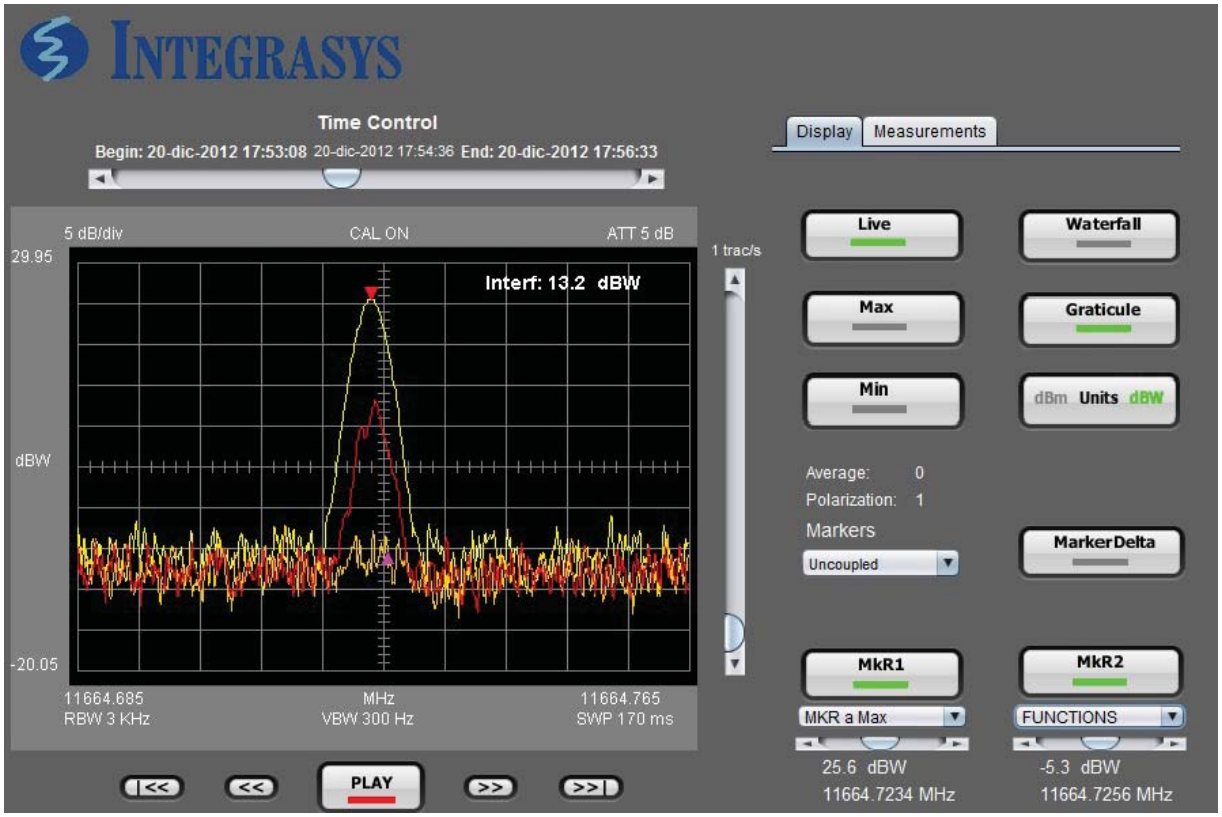
Calsat interface is fully integrated and managed by Controlsat Carrier Monitoring System.



Spectrum Recording and Playback

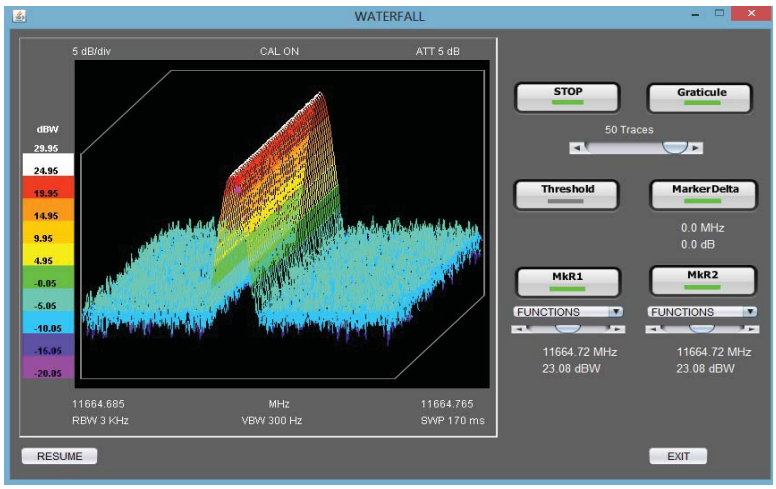
ControlSat Carrier Monitoring System allows recording the spectrum data to post visualize it on the Controlsat playback and also to export to a browser for reporting customers, providers and regulatory agencies.

The recording is available in Manual, Auto, or Vectosat modes.



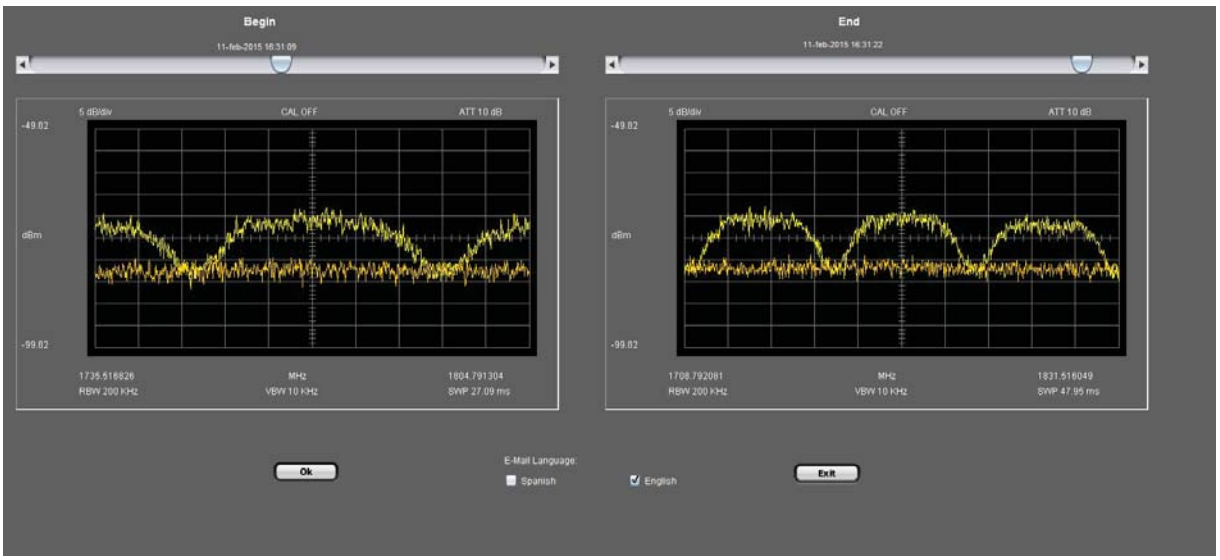
Recordings allow the operator to retrieve and post measure the spectrum. In this case it is a broadcaster Line Up and measure CrossPol and ASI isolations and Controlsat displays automatic measurements such as ASI interf 13.2 dBW or using markers control for manual measurements such as Cross-Pol in this example with 26.6 dB.

Recordings allow visualizing and measuring the waterfall spectrogram as well. Waterfall provides the measurement of the carrier during the time, very useful for detecting temporary service degradation or interferences. Markers and fuctions can be used for measuring in Waterfall spectrogram as well.

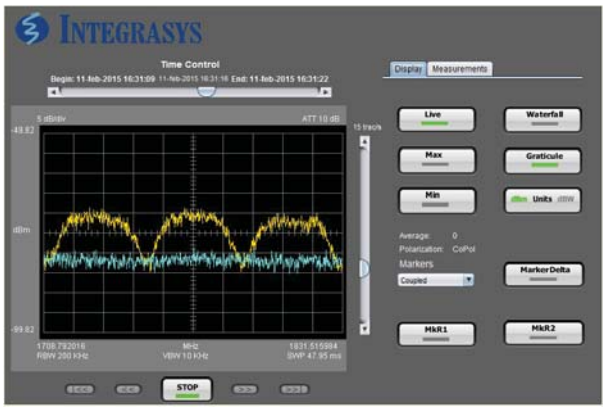


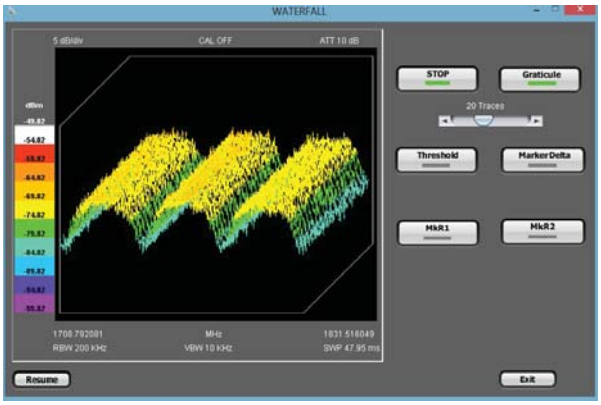
Recording Email Report

The recording can be extracted from ControlSat CMS very easily by genereting an email file for reporting any Customer which does not require having Controlsat, a browser. This email report can be customized and edited by selecting the time and duration by choosing desired start and stop date and time.



The email receiver will be able to reproduce, visualizes and measure all desired parameter as they would have Controlsat on their NOC.





Controlsat recording allows the customer to measure Center Frequency, Level, Bandwidth, Power, C/N, Cross-Pol and ASI if where measured at the NOC, and additionally to visualize the spectrum over the time on Waterfall.

This recording and reporting capability is accessible by Vectorsat as well, for recording and reporting the carrier under carrier interferences. The customer will be able to measure the hidden interference on the browser. Moreover, Vectorsat will record MER and Symbol Rate for post measuring.

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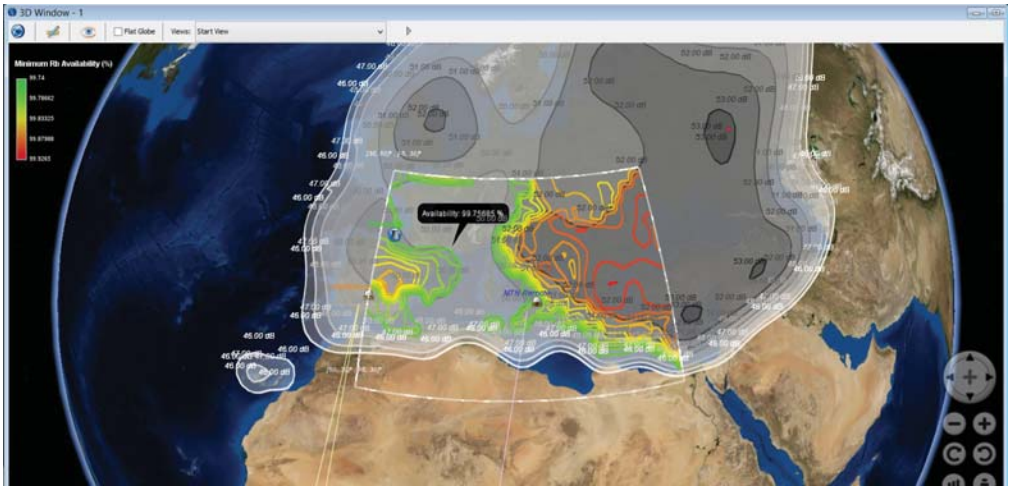
Geobeam

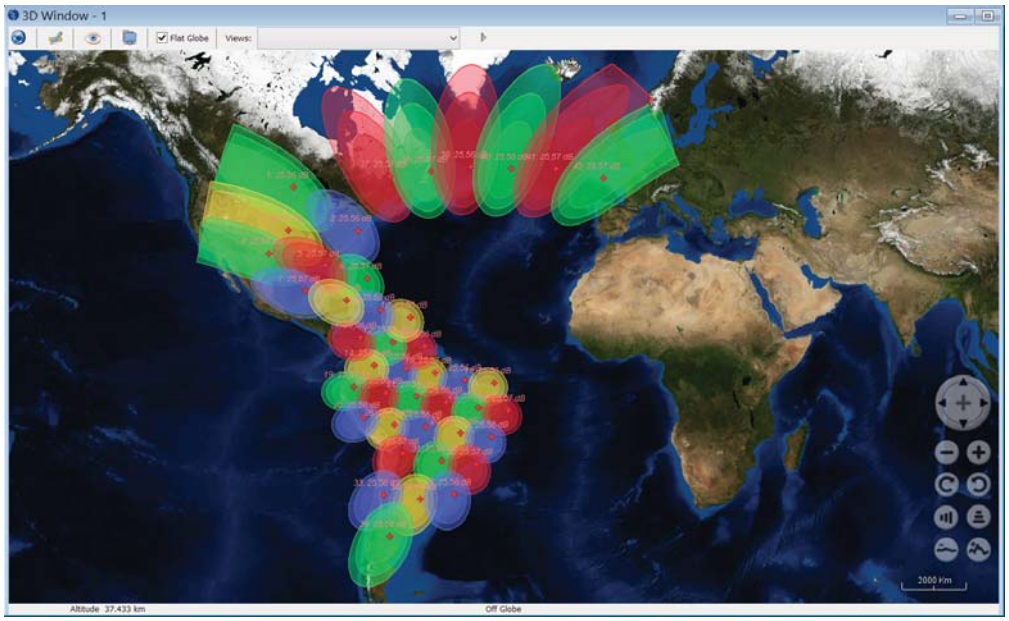
Link Budget and Frequency Plan Management

Controlsat Auto mode can upload XML from link budget tool such as Geobeam. Geobeam allows an easy regional link budget calculation and to design a transponder transmission and reception plan.

Geobeam is capable of providing Return and Forward link availability, antenna diameter, Nominal Rb optimizing bitrate or bandwidth, Nominal Rb in clean skies, HPA, C/N and C/I. Geabeam takes in to account the ITU rain maps attenuation and several types of formats to load satellite antenna patterns, ground station antenna patterns and user antenna patterns for fix terminals and comms on the move terminals.



Geobeam is fully compatible with High Throughput Satellite topologies, frequency reuse link budget calculation and frequency plan design.



Geobeam is the best tool for simplifying link budget and designing and loading frequency plans on Controlsat Carrier Monitoring System.

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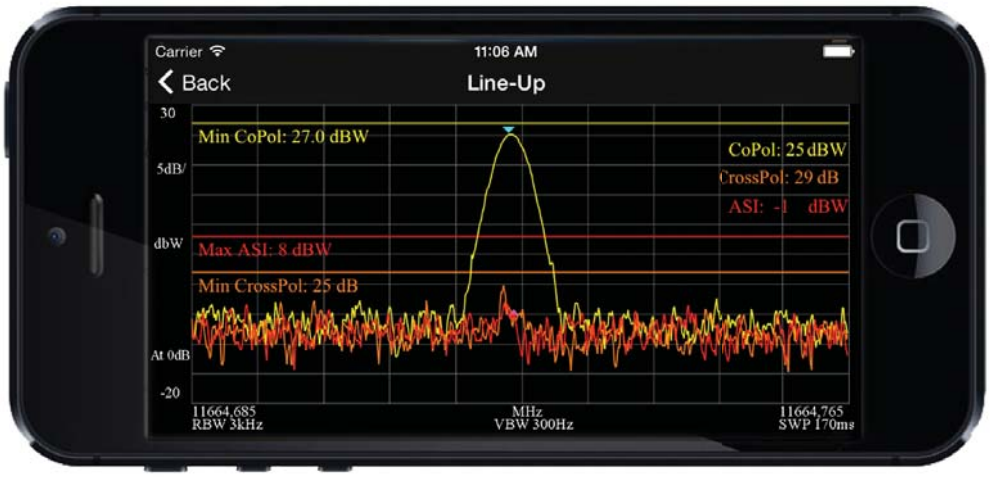
Satmotion

Line Up Automation

Preventing interference is the key, as preventing is much easier, cheaper and quicker. Preventing is done on the installation rather than detecting, geolocating and reinstalling.

Satmotion allows a fully automation of the VSAT and SNG commissioning and Line Ups maximizing pointing in transmission, minimizing Cross-Pol and ASI interferences; while minimizes time and difficulty for operators. These capabilities drive to a significant OPEX reduction, because calling to the NOC is no longer required.



Satmotion Pocket is available on laptops, Android and Apple smartphones as nowadays cellphone are more popular than laptops. With a simple app, the installer is feed by Satmotion Carrier Monitoring System powered by Controlsat with the most accurate measurement of Copol Power, Cross-Pol Isolation and Adjacent Satellite Interference in real time. Satmotion Pocket provides to the field operator with one spectrum plot refreshment per second. Additionally, Satmotion Pocket perform the 1dB Compression Point to automate the calculation the transmiter saturation point.

Satmotion allows simultaneous Line Ups without interference between each other's. Satmotion SNG shares the measurement with cellular connectivity as SNG transmit in non-rural areas. Satmotion SNG eliminates the need of coordination between SNG operator and NOC operator by feeding the broadcaster on several types of smart devices or laptops.