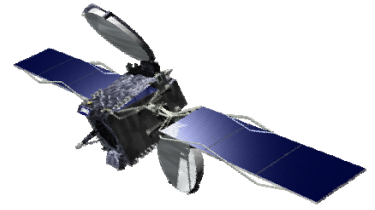




# Glowlink® Model 1000x2

## Dual-Channel Satellite Spectrum Monitoring System



*The Model 1000x2 delivers twice the innovative DSP technology to create a powerful dual-channel monitoring system.*

### Product Overview

The Model 1000x2 from Glowlink Communications Technology is a cost effective, dual-channel Digital Signal Processing (DSP) based interference detection and spectrum monitoring system. It performs automatic spectrum monitoring to detect interferences and unauthorized users, measure carrier and transponder performance, and generate out-of-tolerance alarms.

Based on Glowlink's patented DSP technologies and commercially available hardware, the Model 1000x2 is basically two Model 1000 units in one single 2 or 4U chassis. It can be used as either a stand-alone monitoring system, or as part of a larger monitoring network.

The Model 1000x2's network-centric architecture makes it flexible enough to be operated locally or remotely via standard LAN/WAN. Access to the Model 1000x2 is through an easy to use Windows application which can run on one or more workstations; and with Glowlink's WebAccess™, the Model 1000x2 and its monitoring results can be accessed anywhere via a standard Web browser.

The Model 1000x2 is compatible with standard satellite bands (including L, C, X, Ku, Ka) and RF equipment for independent, dual-channel monitoring across multiple satellites and uplink/downlink signal paths.

### Model 1000x2 Product Features

- Dual-channel system independently monitors two satellite spectrums simultaneously.
- Substantial cost savings when compared to two Model 1000 units.
- Detects and characterizes unauthorized accesses and interference.
- Performs carrier monitoring and generates measurement results and alarms.
- **Monitors Paired Carrier Multiple Access signals.\***
- Integrated data fusion tools for trending and analysis operations.
- Easy to use, with sophisticated database, system robustness and high reliability.
- WebAccess™ provides equipment access via the Web.\*
- **RF signal recorder captures signals digitally for post processing.\***

\*Available as options



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## System Functions and Modes

The Model 1000x2 provides a variety of spectrum monitoring functions and operational modes. Monitoring functions and modes operate independently on each channel, effectively providing two systems in one.

### **System Functions:**

- Carrier measurement
- **Paired Carrier measurement**
- Transponder measurement
- In-band interference detection
- Unauthorized user access detection
- Spectral trace storage and playback
- Cross-polarization measurement
- Antenna pattern measurement
- Inter-facility path calibration
- **Signal Recording**



### **Operational Modes:**

- Background monitoring
- Interactive monitoring
- Spectrum analyzer mode

## Network Architecture

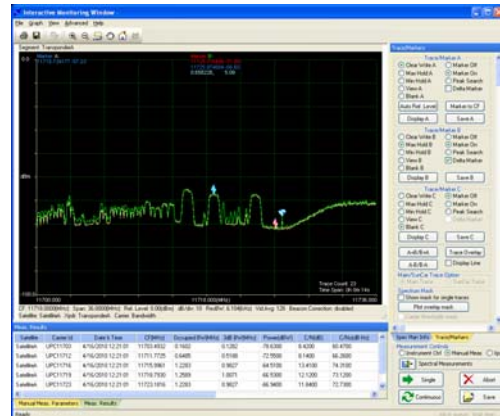
The Model 1000x2's network-centric architecture gives the system the flexibility to operate as a stand-alone system or as part of a monitoring network. In either configuration, the Model 1000x2 is controlled and operated via standard LAN or WAN interfaces. Each Model 1000x2 is simply a node in the network with an IP address.

This network-centric design results in a synchronized, highly transactional system operating environment where operator commands and monitoring data can flow seamlessly between the Model 1000x2 GUI and database and the processing server.

In addition, the Model 1000x2 network architecture ensures the ease of its integration into a customer's particular network and site. For example, the GUI client and the database can be integrated into a single workstation at the customer's network operation center (NOC), or they can be hosted separately on a workstation and a database server, located anywhere in the network.

## Easy-to-Use GUI

The Model 1000x2 employs tried-and-true GUI design that eases operator work load. Most system functions are accessible via simple point-and-click, with color-scheme and data display organized for maximum visual clarity and efficiency.



A single button click exports measurement data to an Excel™ spreadsheet for further analysis and report generation.

## Integrated Data Fusion Tools

Available with the Model 1000x2 are a suite of advanced signal analysis tools to assist the user in managing today's complex communications traffic environment.



Together, these data integration and fusion tools allow the user to make a quick and accurate assessment of transponder and carrier performance. Contact Glowlink for more information.

#### **Advanced Reporting and Analysis Tools:**

The advanced reporting and analysis tools support trending and plotting of measured carrier and transponder characteristics. These tools are in addition to the Model 1000x2's ability to export measurement and alarm results directly to Excel™ for further analysis. Contents for each report can be tailored by the operator for a quick and easy summary of carrier or transponder measurements.

#### **Enhanced Alarm Management:**

Carrier and transponder alarm management has been extended to provide independent control of the alarm parameters. Alarm thresholds can be set globally or individually for both carriers and transponders. In addition, the user can select those parameters the system will generate alarms for. This provides the flexibility to manage carrier networks while monitoring the carrier and transponder performance.

Carrier's alarm thresholds can also be overlaid graphically on a measured spectrum display.

#### **Integrated System Database**

The Model 1000x2 has an integrated database (based on Microsoft SQL Server™) for storage of system configuration information and measurement results, including: planned carrier and transponder parameters; earth station configuration information;

antenna to monitoring equipment connectivity; carrier and transponder measurement results; power spectra and alarms.

The database is designed for ease and speed of data ingress and egress, either manually or via database download.

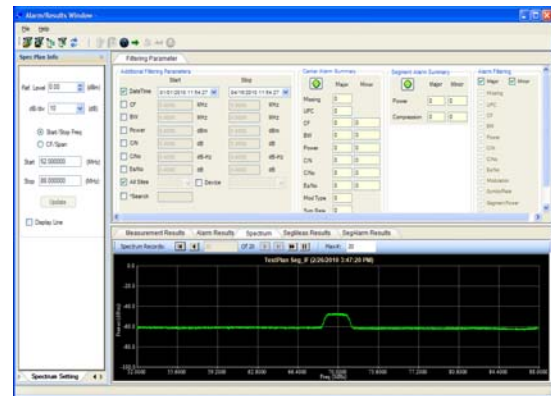
#### **Spectrum Plan Information Entry**

Spectrum plan information can be entered into the database in one of three ways: (1) automatically via database download; (2) semi-automatically with the aid of Interactive Monitoring; and (3) manually using the Model 1000x2 GUI.

These plan entry options provide the flexibility to best fit the needs of a customer, and the volatility of the customer's frequency plan.

#### **Spectrum Playback**

The Model 1000x2's spectrum playback feature displays the power spectra stored in the system.

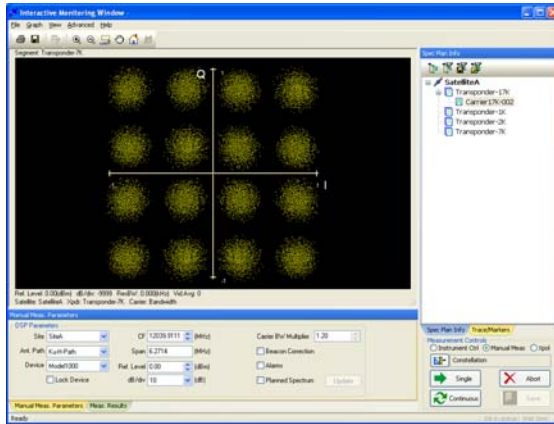


The playback feature can be used to assist the operator during trouble shooting, such as viewing of the power spectrum before, during, and after an alarm event has occurred.



## I,Q Constellation Display

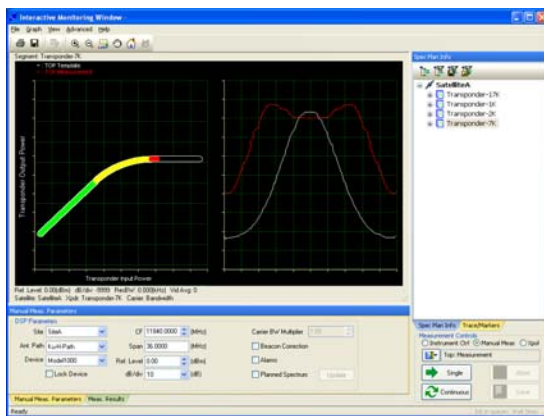
The Model 1000x2 comes complete with an I,Q constellation display tool. Operators have a graphical tool to view and diagnose carrier performance problems in addition to the numeric data measured by the Model 1000x2.



The I,Q constellation display tool can be used to assist the operator with troubleshooting I,Q quadrature distortion problems.

## Transponder Saturation Avoidance

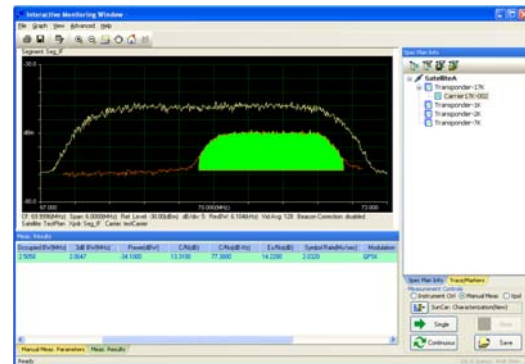
As an optional feature, the Model 1000x2 uses a Glowlink patented technique to determine transponder compression – a measurement that helps the operator and bandwidth user avoid saturation of the transponder.



The technique, called TOP™ (Transponder Operating Point) is an accurate, non-intrusive and robust measurement to detect transponder compression and saturation. With the TOP measurements, carrier powers can be closely monitored and adjusted to prevent transponder power lockup. It can also be used to detect other anomalies such as HPA or upconverter saturation.

## Signal Under Carrier (SunCar™)

Signal Under Carrier, is another optional feature of the Model 1000x2. Based on patented Glowlink technology, this feature detects, measures, characterizes and displays in-band noise and interference, all while the desired carrier remains in service.



This completely non-intrusive capability uses advanced digital signal processing techniques to look underneath the carrier – providing direct visibility into otherwise hidden noise and interferences.

This feature is the only one on the market that is robust enough to work against various system perturbation with minimum probability of false detect and false negative.

With the Signal Under Carrier feature, the Model 1000x2 gives the user an



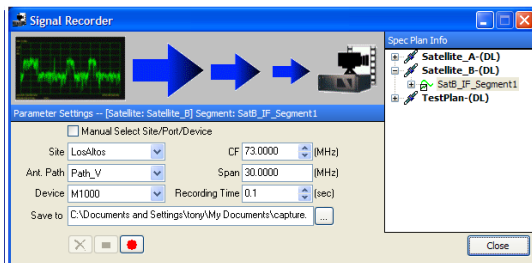
effective tool to troubleshoot problems such as cross-polarization interference or locally generated interference, while the traffic-bearing carrier remains in service.



### Signal Recorder

As an optional feature, the Model 1000 records interferences, anomalies and other RF signals in a baseband I,Q format.

With this capability, users can capture signals digitally, preserving frequency and phase coherence for post-processing.



### Enterprise Management System (EMS) Connectivity

To allow for seamless integration into an Enterprise Management System (EMS), the Model 1000x2 includes the optional Simple Network Management Protocol (SNMP) Agent feature.

### Model 1000x2 GUI Client & Database Requirements

The Model 1000x2 GUI Client and Database have the flexibility to operate in a variety of configurations:

#### **Client and database installed on the same Windows PC**

- Windows 2000/XP/2003 Server OS
- Microsoft SQL Server 2000 or 2005
- Pentium Processor, 2 GHz or faster
- 4 GByte memory or greater
- 300 GByte hard drive or greater
- 10/100 BaseT Ethernet

#### **Client installed on its own Windows PC**

- Windows 2000/XP/2003 Server OS
- Pentium Processor, 2 GHz or faster
- 1 GByte memory or greater
- 80 GByte hard drive or greater
- 10/100 BaseT Ethernet

#### **SQL Server database installed on its own Windows PC**

- Windows 2000/XP/2003 Server OS
- Microsoft SQL Server 2000 or 2005
- Pentium Processor, 2 GHz or faster
- 4 GByte memory or greater
- 300 GByte hard drive or greater
- 10/100 BaseT Ethernet



## Model 1000x2 Options:

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### Monitoring

- Transponder Operating Point (TOP™)
- Signal Under Carrier (SunCar™) for Assorted PSK, QAM Modulations
- SunCar™ for OQPSK
- Paired Carrier Monitoring
- 4x Acceleration for Signal Characterization
- Audible and Visual Alarm

### System Functionality

- Cross-Pol Isolation
- Interfacility Link Calibration
- Antenna Pattern Measurement
- Signal Recorder
- WebAccess™
- Email Notification
- User Account Manager

### Hardware Solutions

- 2U Rack mount chassis
- Redundant, hot swappable power supply
- Removable disk drive

Contact Glowlink to learn more about other features, capabilities and support-related services for a worry-free ownership experience.



# Technical Specifications

## Measurement Accuracy

Carrier Power:	+/- 0.2dB <sup>1</sup>
Center Frequency:	+/- 0.75% of BW <sup>2</sup>
Carrier Frequency:	+/- 0.05% of BW + 100 Hz <sup>1</sup>
Carrier Bandwidth:	+/- 0.5% <sup>1</sup>
C/N, C/kT:	+/- 0.25 dB <sup>1</sup>

1. Accuracy measured with C/N = 10 dB
2. Typical for C/N = 14 dB

## Characterization Capabilities

Modulation Type*	Identifies: BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16QAM, 64 QAM, Open Standard DVB-S2*, QPSK, 8PSK, 16 APSK, and 32 APSK
Symbol Rate	Measured for BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16QAM, 64 QAM, 16 APSK, 32 APSK
Carrier Frequency	Carrier frequency of digital carrier
Transmission rate	Demodulator output bit rate
Es/No	Measured from carrier
Eb/No	Referenced to demodulator
FEC*	Convolutional code rates of 1/2, 3/4, 7/8 for BPSK, QPSK, OQPSK, Rate 2/3 Trellis for 8PSK, LDPC* for 16APSK, 32APS

\*Optional Capability

## Front End Characteristics

Input Frequency	70 MHz
Instantaneous BW	36 MHz (per channel)
Resolution Bandwidth	97.66 kHz, 48.83 kHz, 24.41 kHz, 12.21 kHz, 6.10 kHz, 3.05 kHz, 1.53 kHz, 763 Hz (381 Hz, 191 Hz, 95 Hz, 48 Hz, 24 Hz, 12 Hz Optional)
Full Bandwidth Input Power	-20 to +25 dBm
Max Input Level	+30 dBm
Dynamic range	115 dB nominal
Minimum Carrier Level	1 kHz carrier BW: -65 dBm 10 kHz carrier BW: -55 dBm 100 kHz carrier BW: -45 dBm 1 MHz carrier BW: -35 dBm 10 MHz carrier BW: -25 dBm
Connector Type	50 ohm, BNC

## Control Interface

Network	Ethernet (RJ-45)
Downconverter or switch	RS232 (RS422, IEEE-488 Optional)

## Physical

19-Inch Rack mount	EIA RS-310C Standard, 4U Height (2U optional)
Power	110/220VAC ± 10%, 47-63 Hz



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**Glowlink Related Patents**

With respect to the Glowlink product(s) described in this document, the following patents may apply:  
United States Patent No(s): 8,004,459; 7,667,640; 7,663,547; 7,639,761; 7,466,767; 7,120,392; 6,549,755; New Zealand Patent No(s): 529266; 533787, Singapore Patent No(s): 100422; 105251, Australia Patent No(s): 2002340512; 2003213579, Europe Patent No(s): 1393472, Canada Patent No(s): 2446301, China Patent No(s): ZL02812548.7, Hong Kong Patent No(s): 1066941.

**Other U.S. and International Patents Pending**



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