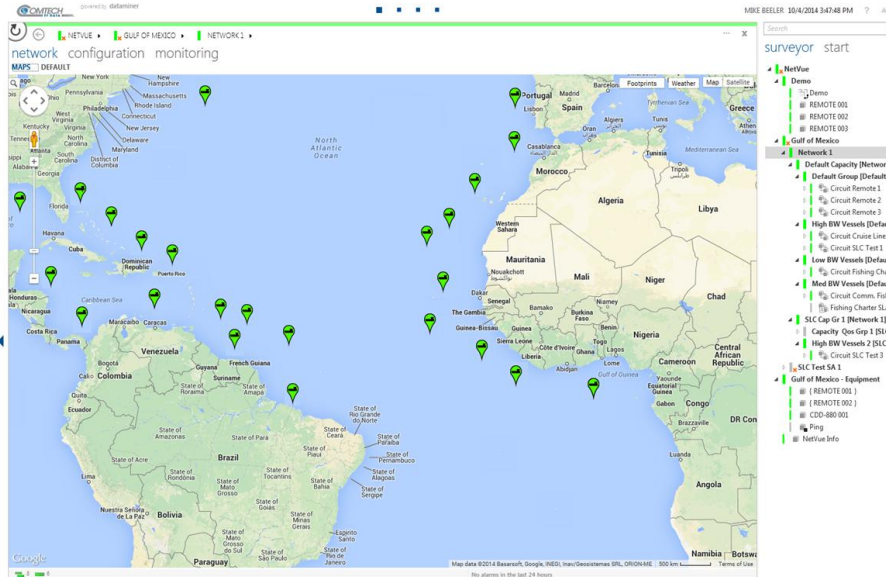


# NetVue™ Integrated Management System

## Network & Bandwidth Management



### Overview

The NetVue Integrated Management System (IMS) is our powerful network management system with advanced monitoring and diagnostic capabilities and an easy-to-use graphical user interface (GUI). It is designed to be scalable from small private networks to global HTS networks. NetVue's intuitive GUI acts as a user-friendly front-end to monitor and control the Heights Networking Platform, the Advanced VSAT Solutions, and other Comtech EF Data networking or point-to-point architectures. NetVue features a robust, comprehensive network management and analytics engine that allows users to intelligently maximize resources and to ensure that your Key Quality Indicators (KQIs) meet and exceed Service Level Agreements (SLAs).

The strengths of NetVue are found in its integration and management attributes. NetVue integrates our products, our dynamic bandwidth management (dSCPC) engine, spectral analysis overlay on network hardware and IP views, and Application Programming Interfaces (APIs) for flexible Operations Support Systems / Business Support Systems (OSS/BSS) integration. NetVue manages networks and elements for IP and baseband, trend analysis and event correlation, inventory and assets, real-time data traffic statistics and SLA monitoring, applications performance, customized applications such as automation, and Virtual Network Operator (VNO) capabilities.

The NetVue system architecture is built upon centralized, regionalized or distributed intelligence platforms. It is designed to provide administrative, Hub Network Operation (HNO), VNO or read only access. NetVue is a web-based, client/server architecture providing unlimited client access from any location/device, and can support numerous configurations such as standalone, 1:1 redundant, or distributed servers.

Commissioning and deployment are greatly improved with NetVue. All configurations are built using wizards which guide the users through the entire process in a step-by-step logical manner. The enhanced intelligence of NetVue with its increased level of automation can speed up and simplify network deployment. And, when using NetVue with the Heights Networking Platform or the Advanced VSAT Solutions, only four parameters need to be configured for a remote site – management IP address, WAN label, receive frequency, and receive symbol rate. The remote site automatically learns the rest of the parameters and joins the network.

Even more advanced capabilities are possible with NetVue, such as event correlation and automation. The event correlation engine when combined with the user-definable knowledge base provides for the intelligent processing of alarms. This facilitates pinpointing issues and aids in root-cause analysis. Automation adds another powerful capability; complex operational procedures across all equipment types can be automated by executing pre-defined scripts based on events. Some examples are bandwidth assignment, site switching, tracking correlation, and automated line-up procedures.

NetVue is based on Skyline's DataMiner platform, a field-proven and widely deployed open-architecture platform. Limited generic DataMiner drivers were significantly enhanced, fully developed and tested for Comtech EF Data equipment.

### Typical Users

- Satellite Service Providers
- Mobile & Telecom Network Operators
- Offshore & Maritime Network Operators
- Enterprise Network Operators
- Internet Service Providers (ISPs)

### Common Applications

- Network Management

## Network Monitoring Features

### Support for Comtech EF Data Products & Select Third-Party Equipment

The core of the NetVue system is a cutting-edge protocol engine and consolidated platform that enables the integration of serial, Ethernet, contact closure devices or systems. NetVue includes drivers for most Comtech EF Data products and select third-party equipment. For the latest list of drivers, contact our Support department at <http://www.comtechefdata.com/support>.

### Web-Based Client

The web-based client, the NetVue Cube, is an innovative application that provides smooth and intuitive navigation through the entire operational environment. It provides comprehensive features for real-time data gathering, trend analysis, alarm management, dashboard reporting, notification, and more. The NetVue Cube dynamically presents the managed network in multiple views, including map view, site views, rack diagrams, and Key Performance Indicators (KPI), and provides unlimited client web access from any location. Access and control rights can be configured and controlled to allow read/write or read-only access to all or part of a network. All actions are tracked on a user basis for real-time audit trailing, a great benefit whether using the tool to manage your own network or your customer's network.

Microsoft® Visio® is the basis for elements of the NetVue UI, including network views, circuit views and device views. We supply several default drawings with the product, which can be utilized or modified. Users can also create new drawings suited to the network needs.

There is unlimited client web access from any location with a standard PC. NetVue Cube supports both Microsoft Internet Explorer (IE) and the NetVue Standalone Cube for users who do not use IE.

### LDAP-Based Access & Control

NetVue utilizes LDAP for role-based access rights to the network. Rights can be configured and controlled to allow read/write or read-only access to all or portions of the network. Additionally, all actions (add, change, delete, etc.) are tracked on a user basis for real-time audit trailing. This is beneficial whether using the tool to manage your own network or your customer's network.

### Dashboards

Dashboards is a comprehensive web application that enables operators to efficiently tap into the vast amount of valuable real-time and historical information. Dashboards are a collection of reports organized on the same virtual page to be included/exported as part of the same view/document. The Dashboards are customizable, combining critical information and key performance indicators (KPI) from devices, locations, services and SLAs available in the operational environment.

This application significantly reduces the time to respond to system issues, and enables users at all levels of the corporation to get a better understanding of the operation. With one click, operators can visualize and track a selection of KPIs in affected system segments, while managers can view comprehensive real-time and historical SLA information.

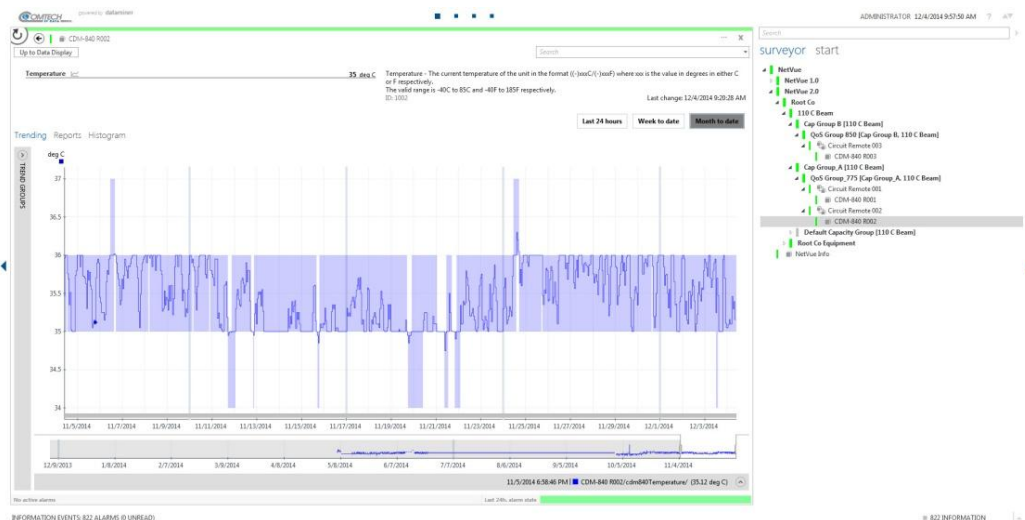
Examples of operational information that can be viewed are:

- Intelligent alarm console featuring sorting, smart filtering, masking and acknowledging, user customization and exporting (e.g. to Excel® or CSV)
- Short- and long-term intelligent trending, with analysis featuring data export, and automatic statistical analysis
- Continuous tracking, logging and reporting of user-defined KPIs like bits per second (bps) rates, packets per second rates (pps), Receive Signal Level (RSL), BER, and Es/No
- Web-based statistical reporting based on real-time data, historical alarms and trend data
- Detailed historical tracking of key performance readings

### Reporter

NetVue Reporter provides powerful statistics and operational metrics based on active alarms, historical alarms, trend data, real-time data, etc. It provides the insight into how systems behave in user-defined time-spans. With a single click, operators can get an overview of the top-ten devices generating the majority of alarm messages, detailed information about the duration of alarm events, distribution of alarms across time, and much more. By leveraging the Reporter information, operators can identify the weakest point(s) in the network so intelligent investment decisions can be made.

Reporter also features a comprehensive report builder allowing operators to create custom report templates. These templates can be used to automatically distribute professional email reports to the applicable stake holders. The email reports can be triggered by a time schedule or by events occurring in the operational system.



## Real-time SLA Monitoring

SLA Monitoring provides a business perspective of operations. Operators define SLAs to be tracked by NetVue in real-time. While NetVue provides device and service information, SLA Monitoring adds the historical performance weighed against the defined objective. This combination yields valuable business impact information.

A partial list of SLA features includes:

- User-defined alarm thresholds
- Predictive compliance
- Notifications
- Reporting
- Trending

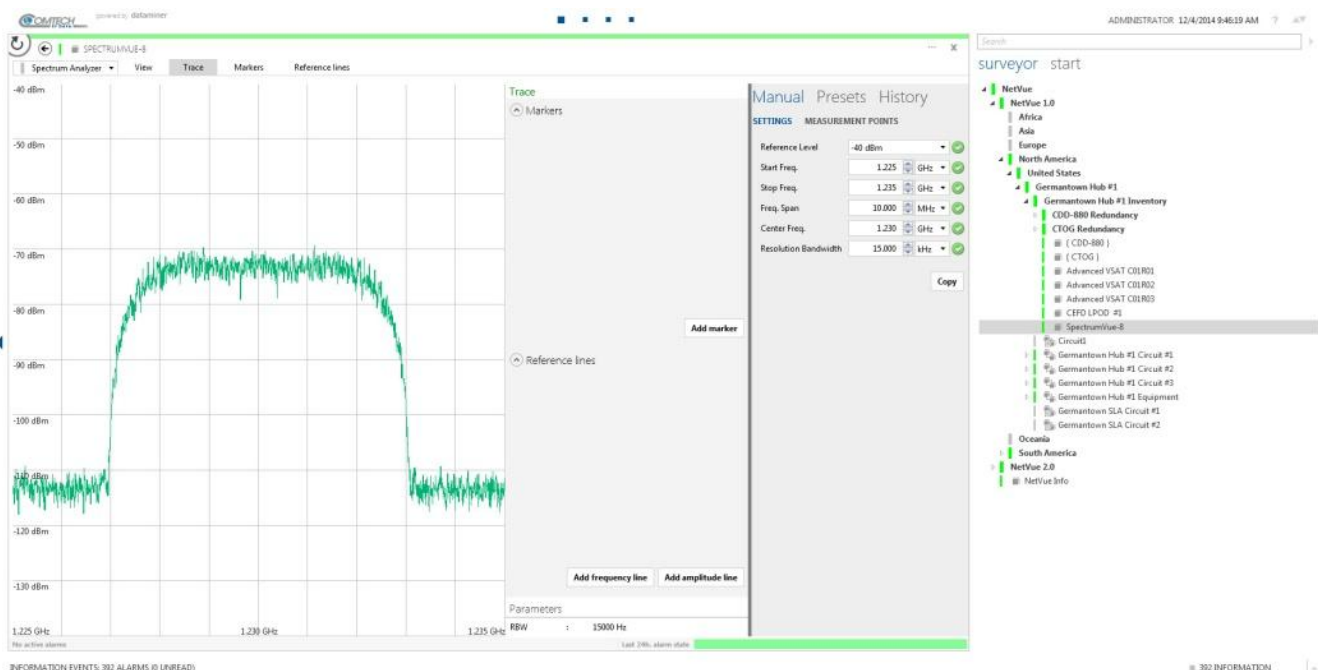
## Notifications

For real-time network monitoring, NetVue will send notifications when specific events occur. The notifications can be sent via email or SMS to groups of users, individual users or just the users on duty when the Work Force Schedule is configured.

## Spectrum Monitoring

NetVue integrates with our Spectrum VUE-8, a next generation spectrum measurement and analysis unit with an integrated 8-port RF switching capability. It is ideal for either local or remote monitoring of multiple feeds and carriers in satellite, cable or terrestrial wireless networks. Spectrum VUE-8 provides real-time remote interfacing, script-based performance monitoring, trend analysis, thumbnail confidence monitoring and more. It can function as an independent spectrum analyzer or can be easily integrated into a larger measurement network.

Refer to the Spectrum VUE-8 datasheet for additional information.



## Network Provisioning and Control Features

### Virtual Network Operator (VNO) Capability

Unique capability to create virtual customer network access based on the secured access policies.

### Simplified Site/Network Provisioning

The system is scalable from small systems to corporate wide deployments.

While NetVue is a proven, fully integrated platform that is deployed on a large scale by leading operators across different market segments and continents, it also features a highly open architecture. This unique flexibility enables you to integrate NetVue with your own operational ecosystem. Examples of the type of customization you can do include designing views, reports and dashboards. Should you not have the expertise to perform the integration and customization, our Professional Service Organization (PSO) can assist you.

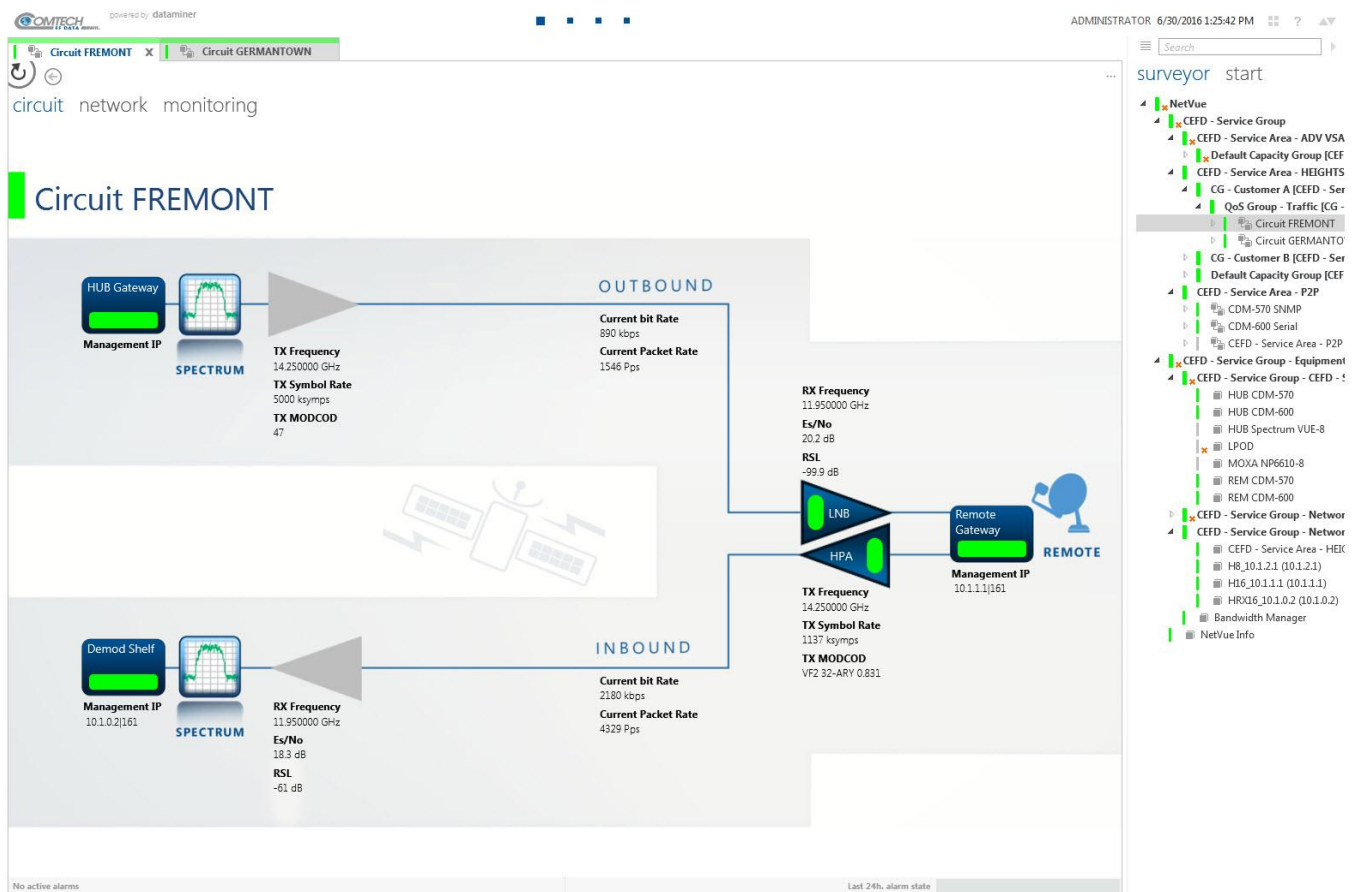
### Time Synchronization

To ensure harmonized operation and reporting, all of the managed gear is time synchronized.

## Inventory & Asset Management

For inventory and asset management, NetVue provides lists of the equipment (elements) that are included at a site or given location. Operators can create additional rack or computer room views with Visio. The Visio views are drawings with active elements, enabling the drill down to view device status and detail.

Also included is a canned reporting engine that provides the status of equipment inventory and the firmware release versions.



## Redundancy Control

NetVue servers may be setup as stand-alone, in 1:1 redundant configurations or clustered in a manner that allows multiple locations to be part of a single cluster for redundancy and simplified user management and security. Clustering allows security policies to be established and enforced throughout the network.

## Optional Features

### Custom Reporting

NetVue allows custom report creation using any statistic that is currently actively monitored by NetVue. The user may enable or disable any parameter that is available to be reported or trended over time.

### Event correlation & Root-Cause Analysis

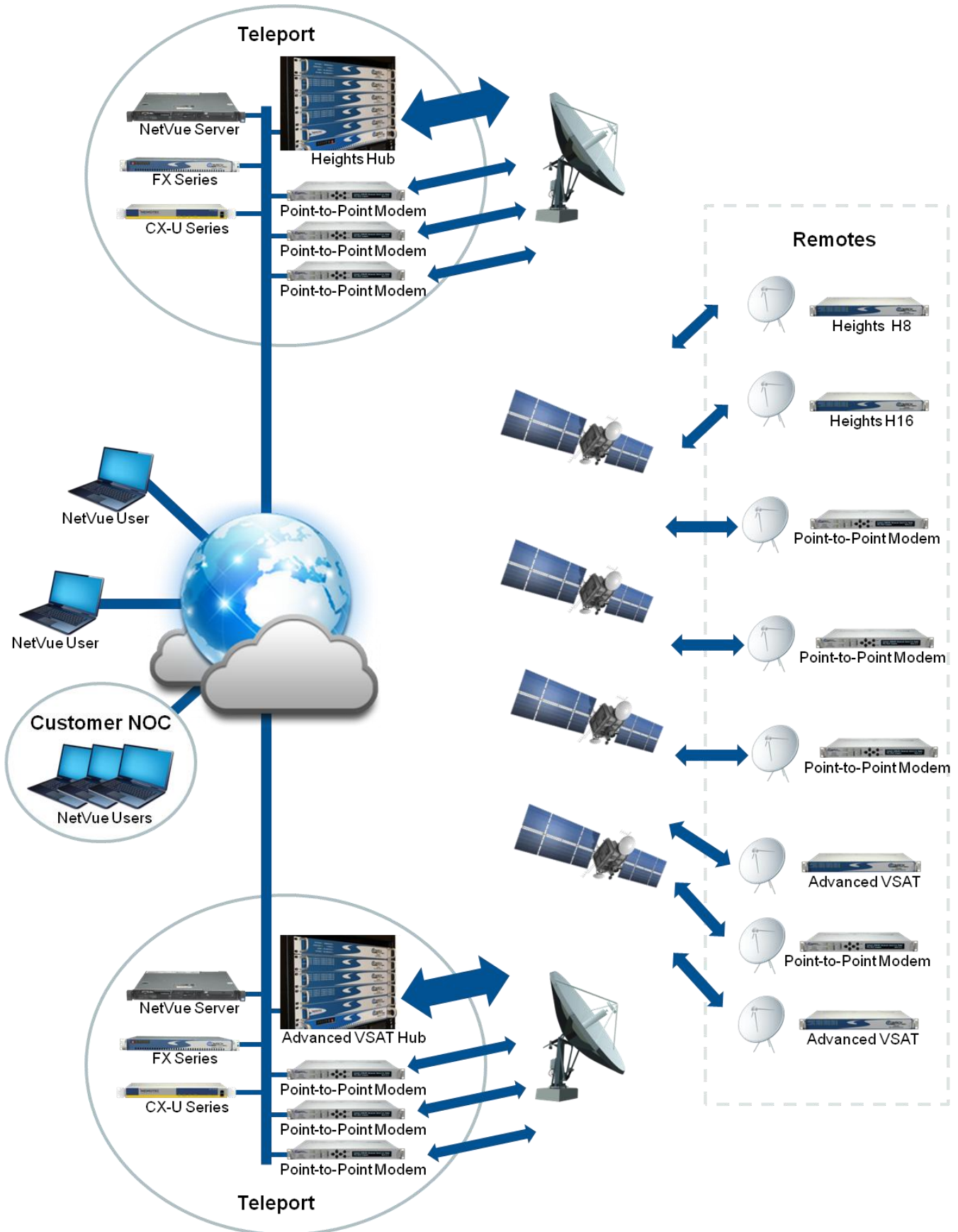
The correlation engine combined with the user-definable knowledge base provides intelligent processing of alarms. This facilitates pinpointing issues and automated root-cause analysis.

### Automation

NetVue automates complex operational procedures across all equipment types and scripts responses based on events and equipment events. Examples are bandwidth assignment, site switching, redundancy switching, tracking correlation, and automated line-up. The result is improved to drive desired configuration and operation. This functionality improves and secures your operation.

## The Architecture

NetVue features a unique, powerful and distributed architecture. The architecture provides the ultimate in intelligence, scalability and availability. A typical NetVue system consists of one or more NetVue Servers, which intelligently and transparently interact with each other to behave like a single entity without the need to deploy a central server. Below is a depiction of a distributed network with a combination of hubs, remotes and NetVue users.





## Hardware Specifications

### NetVue Server (Comtech EF Data Provided)

Size	1RU rack mount (Dell®)
Family	Intel Quad Xeon (or similar)
Minimum PassMark CPU Mark	4000
Memory	16 GB
Hard Disk	2 TB SAS or SCSI
NIC	Dual Ethernet
Operating System	Windows Server 2012
Database software	MySQL™ Server & MySQL Workbench
Other Microsoft software	Microsoft .NET® Framework 3.5 SP1 Microsoft .NET Framework 4.0 Microsoft MSXML 4.0 SP2 Microsoft Visual C++® Redistributable Packages 2005 SP1 and 2010 SP1 Web Services Enhancements (WSE) 2.0 SP3 for Microsoft .NET
Power Supply	90 – 264 VAC / 47 – 63 Hertz (250 Watt) with a maximum inrush of 25 Amps for less than 10 mS
Power Efficiency	82 – 85% @ 115 VAC 82 – 85% @ 230 VAC
Operating Temperature	10°C to 35°C
Operating Humidity	20% to 80%

### Available Configurations

NetVue-IMS-050	NetVue Server and application to manage up to 50 devices
NetVue-IMS-110	NetVue Server and application to manage up to 110 devices
NetVue-IMS-250	NetVue Server and application to manage up to 250 devices
NetVue-IMS-500	NetVue Server and application to manage up to 500 devices
NetVue-IMS-000	NetVue Server only as cold standby
NetVue-IMS-AD-25	Add 25 managed devices to existing NetVue (NetVue-IMS-XXX)
NetVue-IMS-B-050	Hot standby Server to backup NetVue-IMS-050
NetVue-IMS-B-110	Hot standby Server to backup NetVue-IMS-110
NetVue-IMS-B-250	Hot standby Server to backup NetVue-IMS-250
NetVue-IMS-B-500	Hot standby Server to backup NetVue-IMS-500

### NetVue Client PC (Customer Provided)

Processor	Multi-core processor
Memory	4 GB (minimum)
Graphics memory	256 MB
Operating System	Microsoft Windows XP SP3, Microsoft Windows Vista, or Microsoft Windows 7
Other required Software	Microsoft .NET Framework 3.5 SP1 Microsoft .NET Framework 4.0 Security certificates
Supported Web Browsers	Microsoft Internet Explorer (version 6.0 or later)



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