FUJITSU

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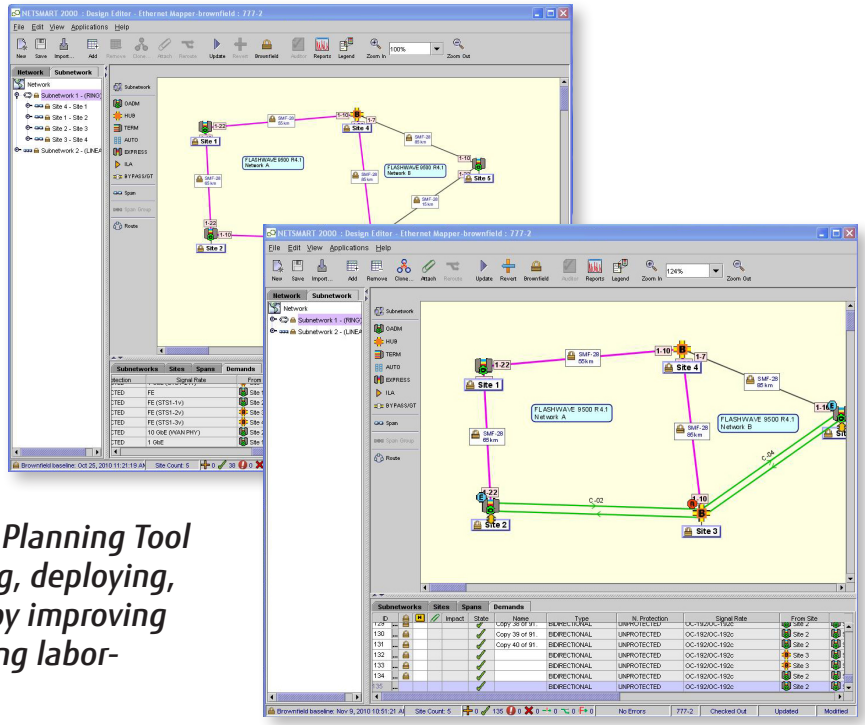
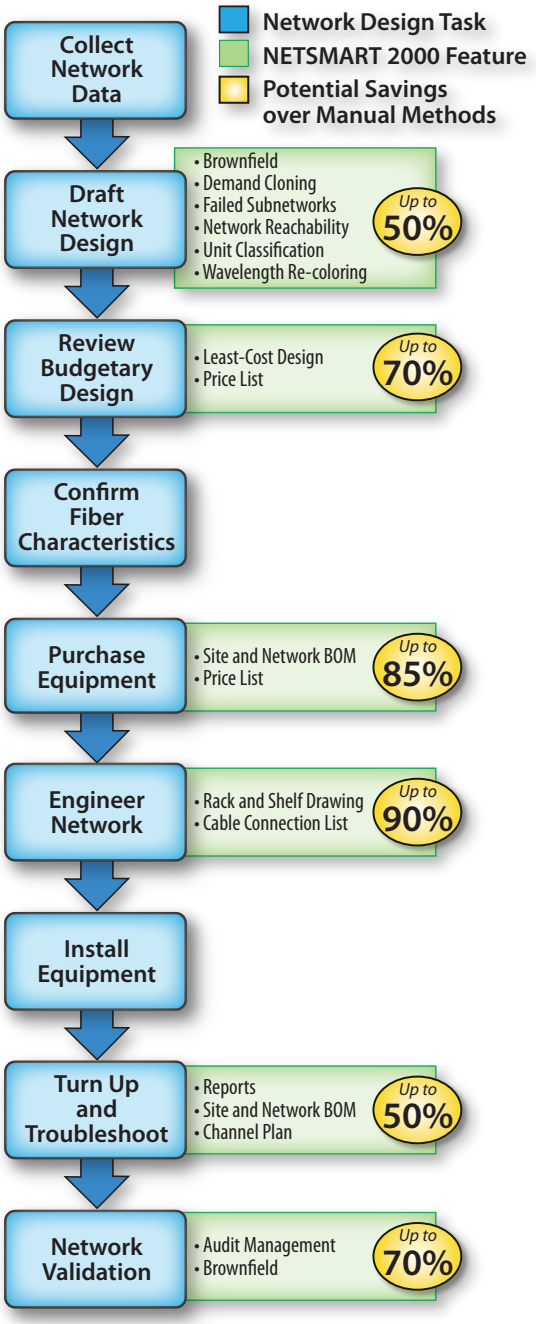
NETSMART® 2000
Design and Planning Tool



The NETSMART® 2000 Design and Planning Tool saves time and money in planning, deploying, and operating DWDM networks, by improving business processes and automating labor-intensive tasks.

NETSMART 2000
Design and Planning Tool

Save Time—Cut Costs



The NETSMART® 2000 Design and Planning Tool saves money by improving design, planning, review, and inventory management processes for Fujitsu DWDM networks. By automating labor-intensive procedures, the NETSMART 2000 tool also drastically reduces the number of person-hours needed to complete essential tasks. Overall, the NETSMART 2000 system puts control in your hands and greatly reduces the cost of planning, deploying and operating a DWDM network.

Plan and Design for Efficient Service Rollout

The NETSMART 2000 system's superior planning and design features ultimately lead to rapid, cost-effective service rollout. The system collects and compiles key data that makes it simpler for you to review and plan your network. Designs created using the NETSMART 2000 system facilitate economical equipment selection, demand aggregation, and wavelength allocation.

This easy-to-use tool enables operations, business planning, engineering, strategic planning, and installation personnel to cost-effectively create, operate, and grow a DWDM network consisting of the FLASHWAVE® 7500 Multifunction ROADM/DWDM Platform or FLASHWAVE 9500 Packet Optical Networking Platform.

Key Features of NETSMART 2000

- ***Audit Management**** for faster, lower-cost equipment reconciliation
- ***Reachability Matrix**** for easy identification of the best wavelength pathways
- ***Custom Profile**** for increased accuracy of field deployments
- ***Models and PIDs**** for exporting rack, shelf, and card data into customer-specific format
- ***TRIB site-additional shelves*** for the FLASHWAVE 7500 and 9500 platforms, enabling assignment for larger sites
- ***Customer-specific support kits*** provide customized Bills of Material (BoMs) to suit customer needs
- ***Site location by vertical and horizontal coordinates*** for increased design flexibility and accuracy
- ***Single Network Design Method*** for reducing time and effort when creating a phased design
- ***Customized Excel and print options*** speed up importing and printing of network information
- ***Large network support*** for networks of more than 1,000 NEs
- ***FLASHWAVE 9500 integration*** with FLASHWAVE 7500 network topology

** This feature is optional and must be purchased separately*

NETSMART 2000
Design and Planning Tool

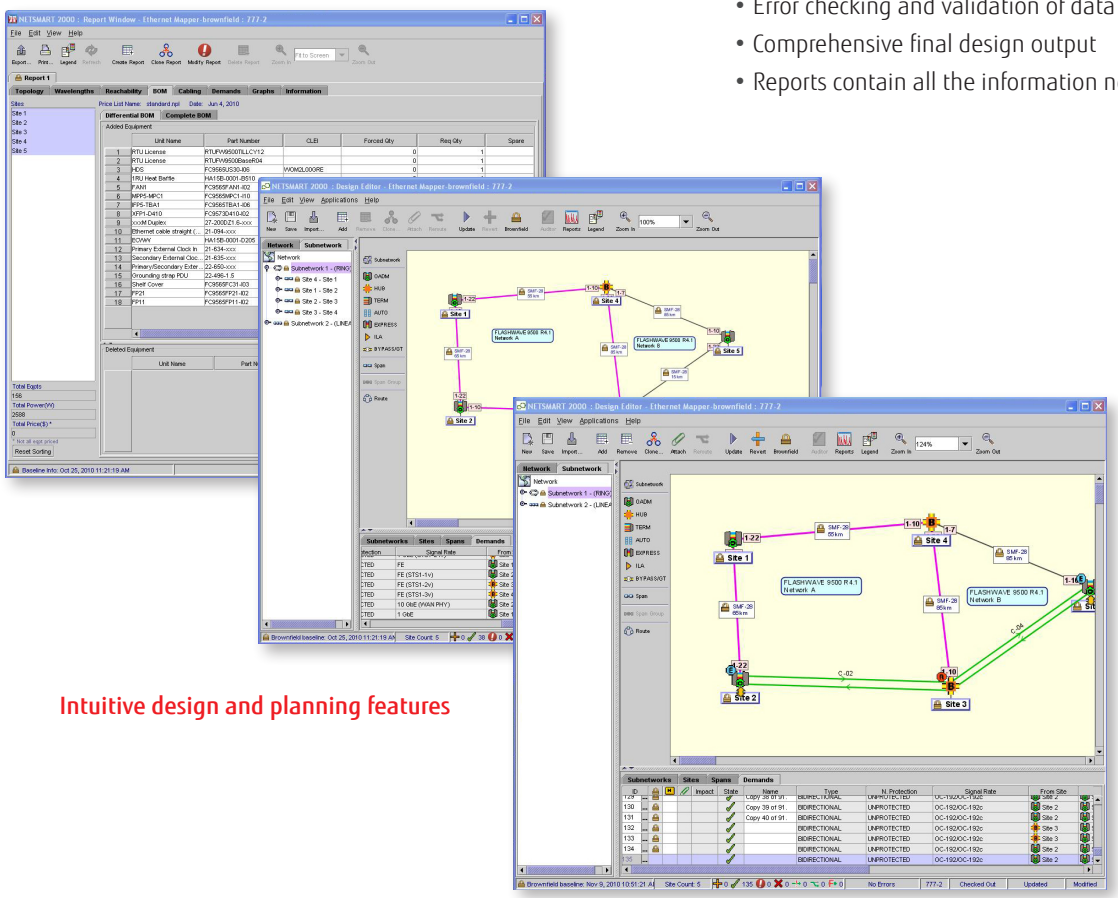
Achieve the Least-Cost Solution

How NETSMART 2000 Controls CAPEX and OPEX

- Reduces manual labor by automating tasks
- Reduces the risk associated with designing a network
- Decreases overall deployment costs
- Reduces the time taken to install equipment
- Increases design accuracy
- Optimizes network performance

Optimize Network Optical Performance and Traffic Demand

The NETSMART 2000 Design and Planning Tool configures the FLASHWAVE 7500 or the FLASHWAVE 9500 platform into a wide variety of topologies. Network designs are quickly and accurately optimized based upon optical performance parameters and traffic demand for initial deployment and future expansion. At the same time, the application supports fine tuning of network capacity for the best possible performance and revenue-generating services, while achieving the lowest-cost design.



Intuitive design and planning features

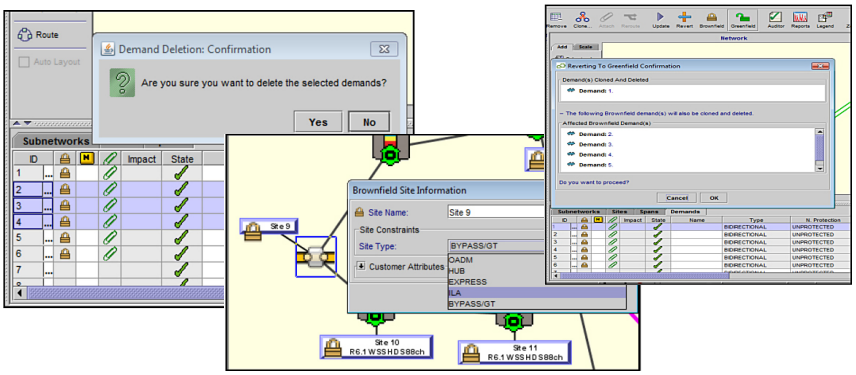
Easy-to-Use GUI Features

The NETSMART 2000 system provides a comprehensive design and planning tool that boosts productivity and accuracy with purpose-built features:

- Graphical view of Network Elements (NEs), spans, and site data
- Flexible auto-complete data entry options
- Design file management offers shared network designs, user roles and user logging
- Revision history and version control
- Audit feature compares as-designed with as-deployed networks for future planning
- Wide range of topology designs and site types supported:
  - Linear
  - Point-to-point
  - Ring
- Error checking and validation of data entries
- Comprehensive final design output
- Reports contain all the information needed for network build-out

NETSMART 2000
Design and Planning Tool

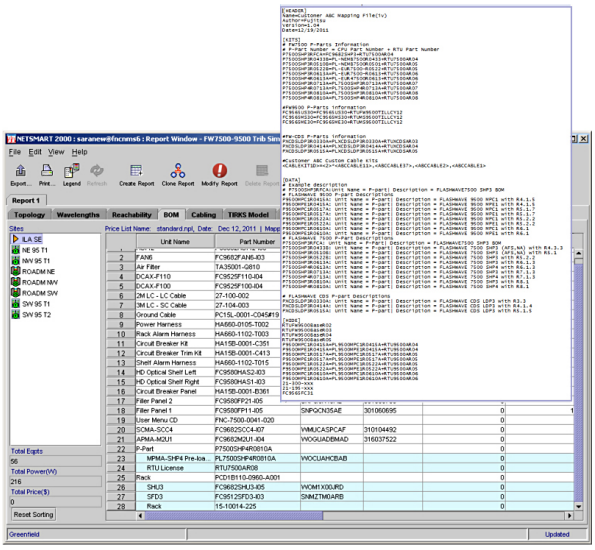
Increase Design Flexibility, Efficiency and Accuracy



Brownfield Designs

Brownfield support in the NETSMART 2000 system increases the usability and convenience of working with brownfield design features:

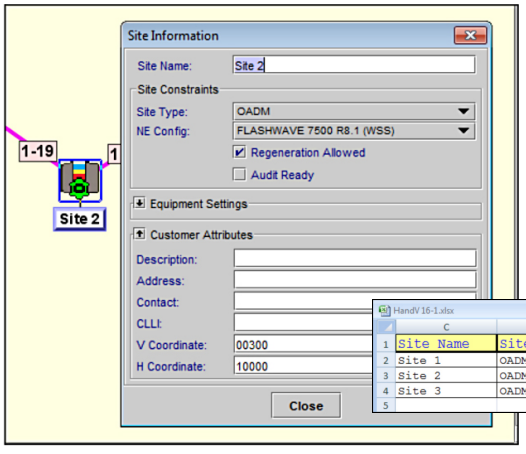
- Revert a demand to greenfield
- Delete a subset of staged/grouped demands
- Change a bypass site to ILA or ROADM
- Insert a greenfield site into a brownfield design



Customer-Specific Support Kits

Customer-specific support kits increase the efficiency and accuracy of BoM updates:

- Modify both site-level and complete BoMs via a modified text file
- Hide parts in a bill of material and remove unnecessary parts such as racks, filler panels, and covers
- Replace parts in a BoM or swap a part for a similar part
- Organize parts into custom kits, and group parts under a preferred part number.
  - Parts can be replacement parts or preferred cables, or line cards with preferred optics



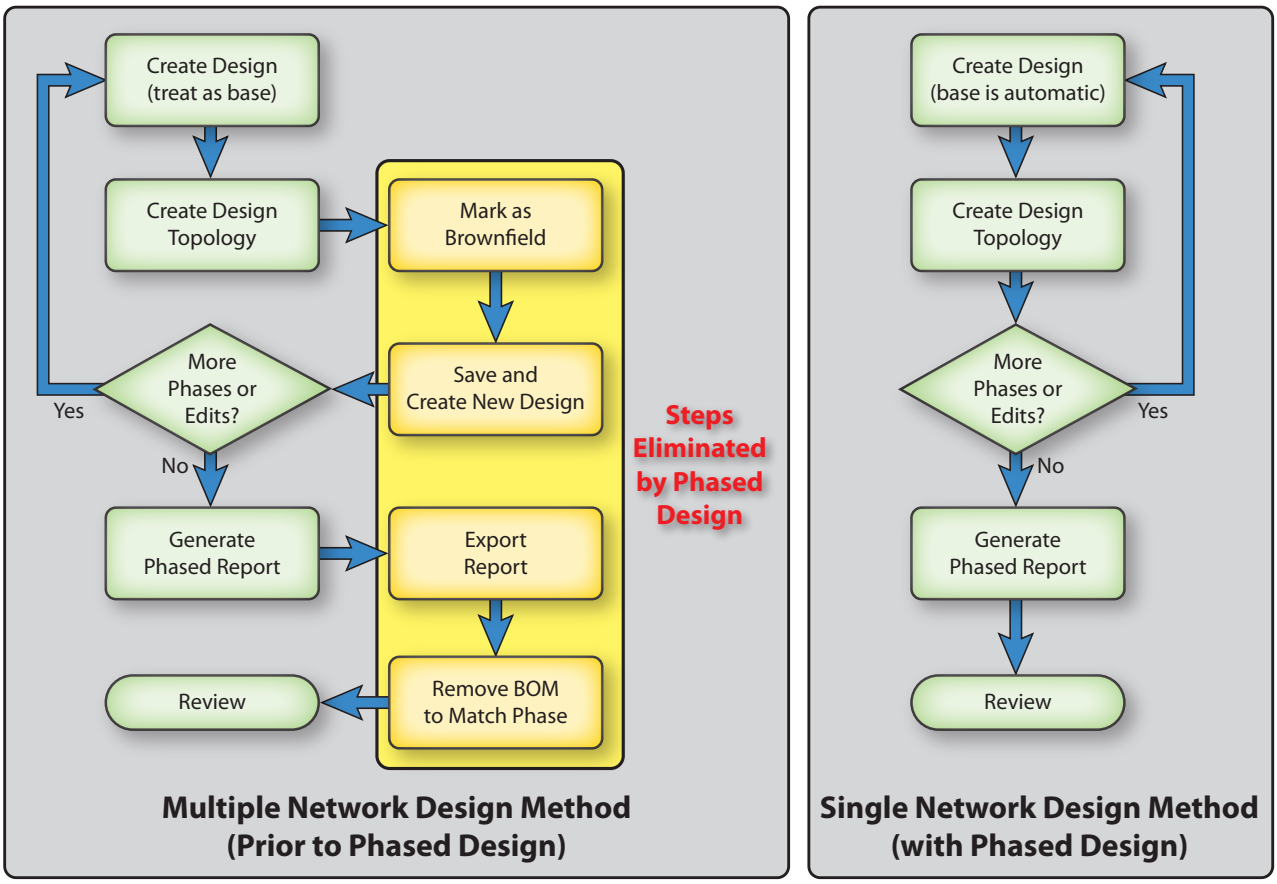
HandV 16-1.xlsx

	C	D	E	AP	AQ	AR	AS
1	Site_Name	Site_Type	Requested_Si	V_Coordinate	H_Coordinate	X_Coordinate	Y_Coordinate
2	Site 1	OADM	OADM	10	110	36.0	314.0
3	Site 2	OADM	OADM	105	115	305.0	319.0
4	Site 3	OADM	OADM	225	5	422.0	119.0
5							

Site Location by Vertical and Horizontal Coordinates

The ability to view site location by vertical and horizontal coordinates offers increased design flexibility and accuracy by maintaining topologies for imported designs as well as previously supported exported designs. This feature also enables you to import designs from Excel and maintain site locations in the topology view.

Eliminate Manual Design Steps



Phased Design

The single network design method provides efficient, reliable, and accurate designs, BOMs, and reports for tracking equipment changes and network reachability associated with phased designs. This approach eliminates redundant manual steps when designing a network and incorporating changes over time.

Single network design is possible with the phased design feature. The phased design feature tracks network design revisions, additions or deletions per phase. Each phase is represented by name and date. Summaries are tracked automatically, ensuring efficient, reliable, and accurate network designs. The information associated with a phase is incorporated into generated reports and detailed in exported reports including bill of material, sites, spans and subnetworks.

NETSMART 2000
Design and Planning Tool

Cut Network Auditing Time

Audit Management for Fast, Accurate Design Verification

In comparison to manual methods, the NETSMART 2000 Audit Management feature* cuts network auditing time by 50%. The audit management feature provides an actual equipment review against the planned network design, centralizes the data storage, and speeds up the process of verifying equipment selection and network placement. Used in conjunction with the NETSMART 1500 Management System, operations and planning personnel can review the state of the network remotely. The audit management feature accurately compares inventory with proposed network equipment changes and enables discrepancies to be identified without the need for site visits. The audit management tool also increases equipment lifespan by confirming that deployed and planned fiber characteristics are within a comparable range of designated values.

Key Audit Management Capabilities

For a site or subnetwork, an audit is conducted by importing data generated from a NETSMART 1500 report and correlating site names to the TIDs in the inventory report, either manually or using a global mapping file. Once the sites are mapped, an audit of the network is executed by selecting the Audit icon from the toolbar. A report is generated detailing discrepancies for the following items:

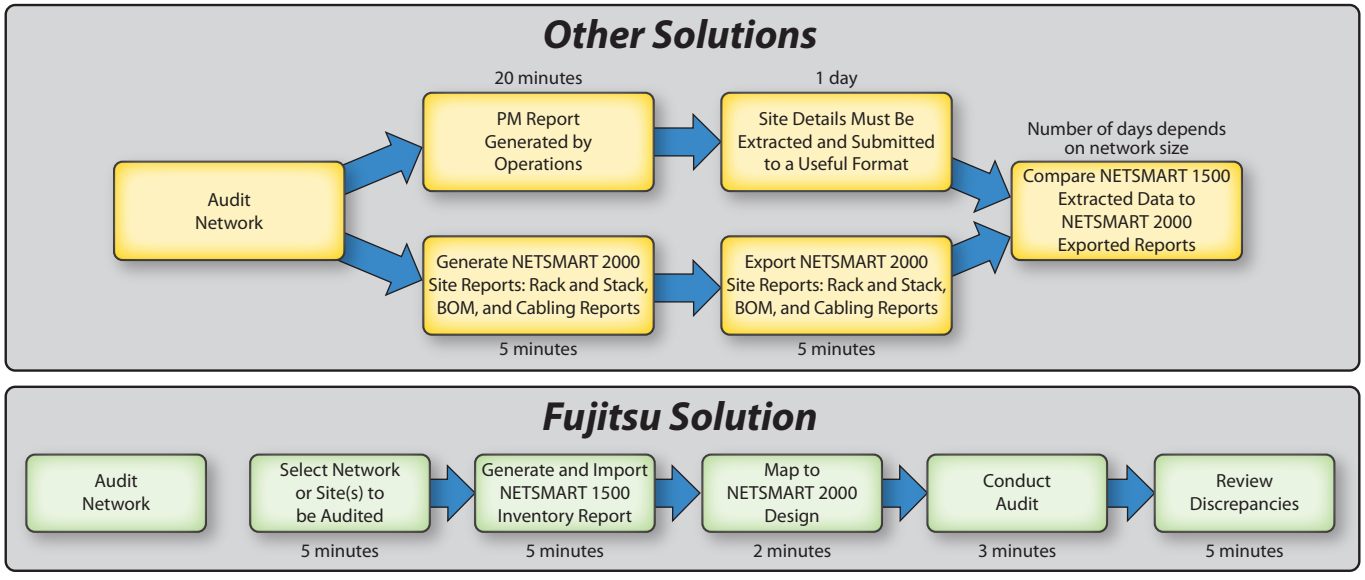
- Site
- Shelf
- Amplifier
- Common
- DCM
- Line card
- SFPs
- Fiber connection
- Fiber characteristics

The audit management feature provides objective validation of network deployment. With other vendors' auditing systems or services, subjective reports are gathered manually, a time-consuming and error-prone process. The NETSMART 2000 Design and Planning Tool offers an economical, accurate, time-sensitive method.

The automatic polling interface for the audit management feature uses federation creation provided to aid in communication to the NETSMART 1500 server. There is an online mode for automated edits and an offline mode for setup and manual edits. The interface reduces setup time to execute an audit by automatically scheduling audits, eliminating manual intervention.

* *The Audit Management feature is optional and must be purchased separately from the latest NETSMART 2000 software release. It is only available on a server-based deployment of the NETSMART 2000 system.*

Audit management cuts network auditing time



NETSMART 2000
Design and Planning Tool

Speed Up Equipment Installation

Efficient Reporting and On-Demand Rack Face Drawings

The NETSMART 2000 system provides the most comprehensive reporting available on the market for a service provider-controlled network design tool. These reports allow personnel to quickly evaluate network designs:

- Performance and cabling reports deliver accurate information for quick troubleshooting of network errors with optical performance characteristics.
- Rack face drawings reduce the time needed to engineer and install a site, and consequently speed up time to market for new service offerings.

These printable reports and drawings are generated in just a few seconds, with critical network information presented in an easy-to-review graphical format. The NETSMART 2000 system replaces numerous tedious, time-consuming tasks with a single reporting menu.

Installation, Troubleshooting and Turn-Up in Less Time

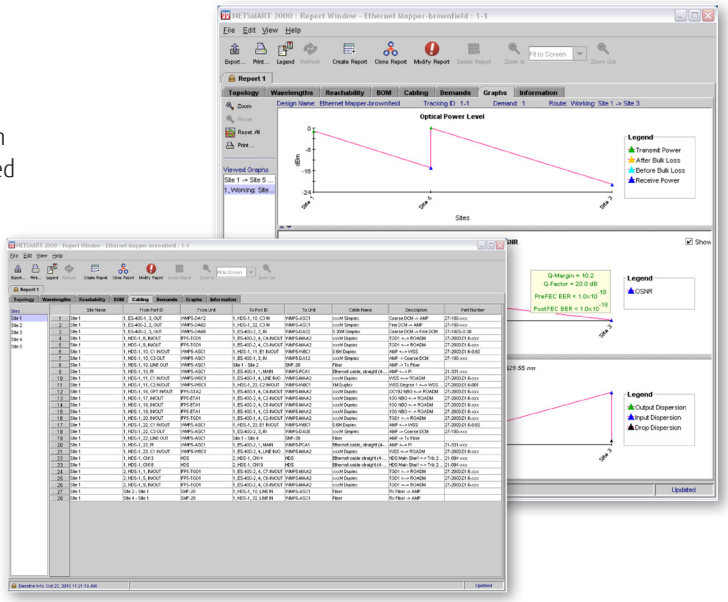
NETSMART 2000 reports are particularly useful for operations and planning personnel who need to improve troubleshooting accuracy by improving access to information about the network. The NETSMART 2000 performance reporting features are also particularly useful for installers and turn-up technicians when activating a site.

Manually creating a rack face drawing is very labor-intensive process and requires in-depth knowledge of equipment. The drawing may need to be separately acquired from a specific department or group. With NETSMART 2000, users can create customizable rack configuration designs which match their network standards, significantly decreasing the time required to configure the expansion racks. Users can also align OADM equipment and fibers with deployed networks to document "as built" states. NETSMART 2000 reporting features also speed up the process of creating demand reports detailing equipment for sites and demands. This includes information about slot placement, and characteristics such as protection schemes, latency values, demand endpoints and intermediate sites. Optical performance reports provide accurate information about metrics such as Optical Signal-to-Noise Ratio (OSNR) and power levels. This speeds up testing and troubleshooting times. Cabling reports list each individual cable together with information about the end units and port connections.

NETSMART 2000 Performance Reports

- ***Cabling*** – Reduces the time needed to produce an installation plan by providing complete information about network needs
- ***Channel plan*** – A graphical representation of the channels in use on each segment of a subnetwork
- ***Demands*** – Comprehensive information including add/drop endpoints, signal rate, protection for client and network, equipment selection and wavelength, attached sub-rates for staged demands, equipment shelf and slot location, and working path latency
- ***Network reachability*** – A graphical representation of viable paths from node to node in a subnetwork, with details about supported line rates and failed lightpaths
- ***Optical graphs*** – Graphical representations of power levels for a subnetwork, showing both transmit and receive power (dBm) for each site of a subnetwork, in addition to optical power levels (dBm), OSNR level (dB), and chromatic dispersion (ps/nm)
- ***Rack and shelf illustrations*** – Graphical shelf illustrations showing unit placement
- ***Models and PIDs*** – Enables site-level BOMs to be formatted to match specified models and exported to Excel. The report details equipment for a site at the rack, shelf, and card level. This report requires the purchase of the Models and PIDs optional feature.

Detailed performance reports



NETSMART 2000
Design and Planning Tool

Decrease Total Ownership Costs

Network Reachability Reporting Determines Optimal Network Pathways

Network reachability and Network Reachability Matrix* reduce the cost of network deployment by identifying and selecting the lowest cost paths for 10, 40 and 100 Gbps wavelengths at designated FEC rates. The feature enables service providers to evaluate optimized routes in ring, linear, and mesh networks. Reachability matrix reviews the viability of every possible route and documents the viable paths. Reachability provides data that can be displayed on demand for any selected path, segment or subnetwork, and reachability matrix is able to review the entire network.

Unique Demand-Planning Capabilities

Network reachability has high value for managing large networks in determining the most effective route for a particular demand. Reachability matrix is the only demand planning feature on the market that automates the process of reviewing network traffic from subnetwork to subnetwork. Without the NETSMART 2000 system, this critical demand planning process is manual, extremely time-consuming, and carries a high error margin. In comparison, network reachability decreases the effort required to review traffic for demand planning activities by up to 50%.

Least-Cost Design and Price-List Management Features

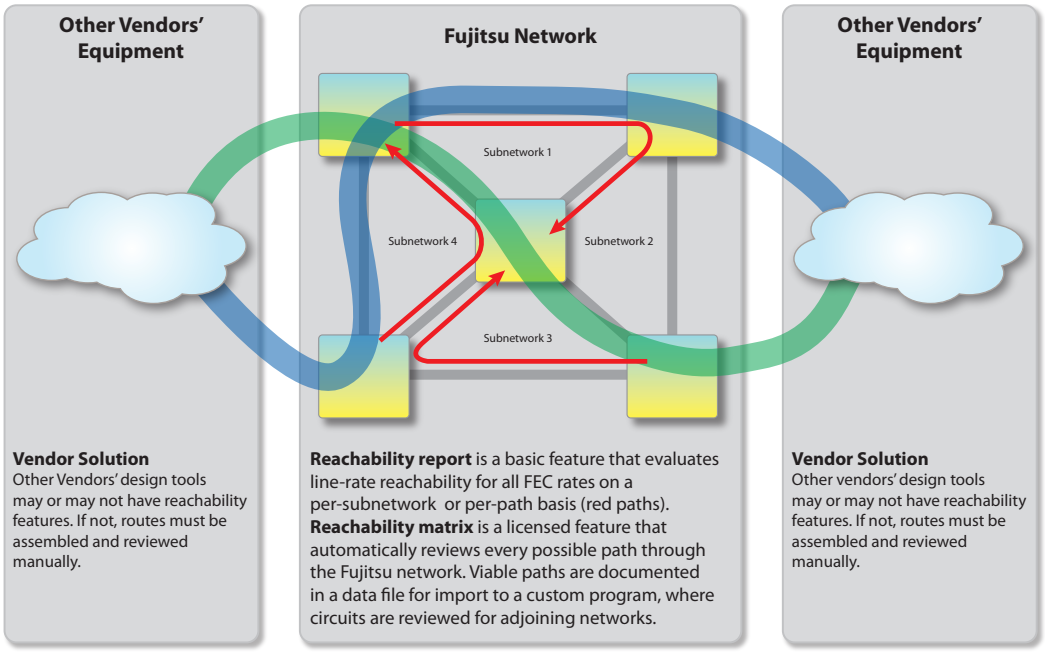
The least-cost design and price-list management features decrease the total cost of ownership of a new network design and increase the accuracy and cost-effectiveness of the budgeting process by:

- Simplifying the network design selection process by verifying that the desired network design represents the lowest possible total cost of ownership
- Increasing the accuracy of budgetary processes with the ability to remove obsolete price lists

The network reachability scheduler feature increases scheduling flexibility. Reporting activities can be scheduled at any time during the day, even after normal business hours or holidays.

* *The Network Reachability Matrix feature, which provides data for all subnetworks and paths, is an optional feature and must be purchased separately from the latest NETSMART 2000 software release. It is only available on a server-based deployment of the NETSMART 2000 system. Standard network reachability reporting only applies to a selected path or subnetwork.*

Network Reachability report and Network Reachability Matrix reduce deployment costs



Deploy Networks in Alignment with Design

Custom Profile Improves Organization and Recordkeeping

The Custom Profile feature* allows service providers to organize and constrain possible line card and interface module selections for use in network designs. Custom profiles can save service providers thousands of dollars each year by reducing the variety of hardware needed for the network and consequently streamlining the range of needed spare parts. The feature reduces the variety of card types and reduces manpower needed to properly manage inventory. Line cards are selectable using parameters such as OSMINE compliance, card type, pricing and SFP types. Custom profile also allows users to designate card placement in a shelf. Designers can align card deployment with company standards. The feature also aids in realigning network designs with deployed networks, resulting in an increase in the accuracy of equipment management.

In addition to line card filtering and line card placement, it is possible to adjust cable length in the BoM generated in the NETSMART 2000 reports. The result is accurate cable selection for a site by providing parts that align with established customer standards.

Core card override, a custom profile v5 enhancement, enhances user configuration usability and increases accuracy of field deployments. This function allows user to align field deployment with planned designed (even after the fact). Core cards include lambda access modules, switch fabrics, PE mappers, dispersion compensation modules, sync cards, and single channel amplifiers

** TheCustom Profile feature is optional and must be purchased separately from the latest NETSMART 2000 software release. It is only available on a server-based deployment of the NETSMART 2000 system.*

Wavelength Recoloring Speeds Up Demand Routing

The process of identifying new wavelength paths has historically been performed manually by network engineers. This is particularly labor-intensive when routing wavelengths through several subnetworks, increasing the likelihood of error. The menu-driven wavelength recoloring feature automatically reviews wavelength paths, saving time and increasing the accuracy with which subnetwork capacity can be reviewed. The feature eliminates the need to manually track available wavelengths from subnetwork to subnetwork when evaluating network capacity and adding demands.

Brownfield Support Reduces Error Potential

Brownfield support improves accuracy and reduces the potential for error when designing new subnetwork deployments or adding demands to an existing deployment. The brownfield feature assists in the process of preplanning and predesigning networks prior to deployment. A revision of the network design can be locked down, limiting impact to existing traffic. Brownfield support ensures that networks are deployed to the intended design and configuration. The feature also:

- Prevents equipment re-selection in revised designs by locking unit selections and placement of the original network design
- Minimizes impact to the original design for the life of the network through extensive review of incremental changes
- Provides clear and detailed information about the equipment needed to support new demands and subnetworks
- Provides flexibility by allowing sites, spans, and subnetworks to revert to greenfield state for either site upgrades, site additions, or fiber modification
- Provides flexibility by permitting wavelength number change for brownfield demands
- Aligns degree to fiber and amplifier feature to synchronize network design with deployed equipment
- Increases design convenience and usability by the ability to revert a demand to greenfield and change a bypass site to an ILA or ROADM site

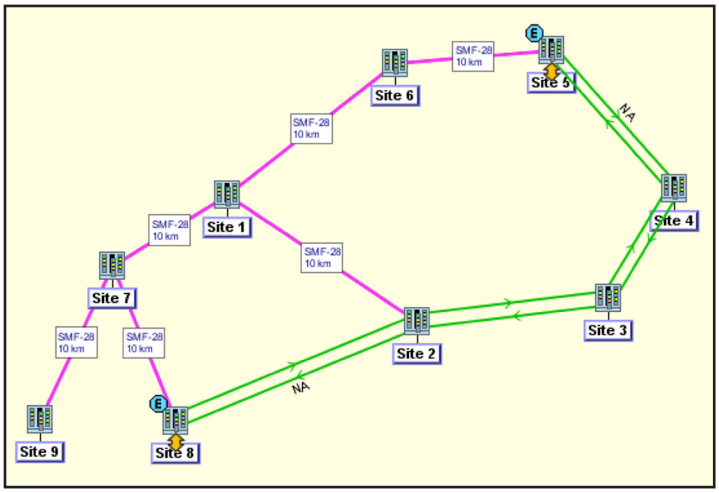
Brownfield support enables new subnetworks and demands to be tracked in an incremental BoM. The incremental BoM tracks additions and deletions that result from revised design. Brownfield support also enables phased design approaches. Overall, brownfield support reduces the risk and manual labor associated with new network implementations and changes.

NETSMART 2000
Design and Planning Tool

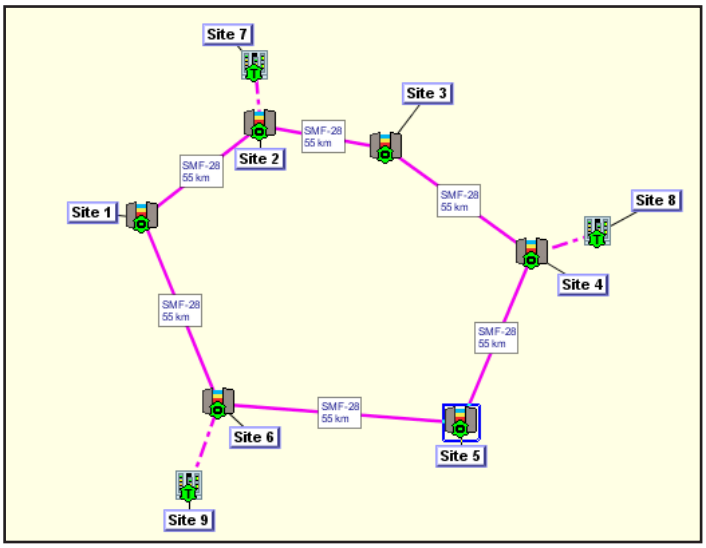
FLASHWAVE 7500 and FLASHWAVE 9500 Platform Support

FLASHWAVE 7500 Extension Shelf Support

NETSMART 2000 supports the FLASHWAVE 7500 Extension Shelf for standalone non-ROADM service applications. The software supports topologies created solely with 7500 Extension shelves for transport of services from remote locations to the core, or to other remote locations. The feature delivers high-capacity services to the customer premises where OADM infrastructure is not needed. The software reduces operational expenses by consolidating the complete DWDM infrastructure, from the customer to the network core, onto a unified platform. SAS topologies are limited to the 23" shelf over SMF fiber.



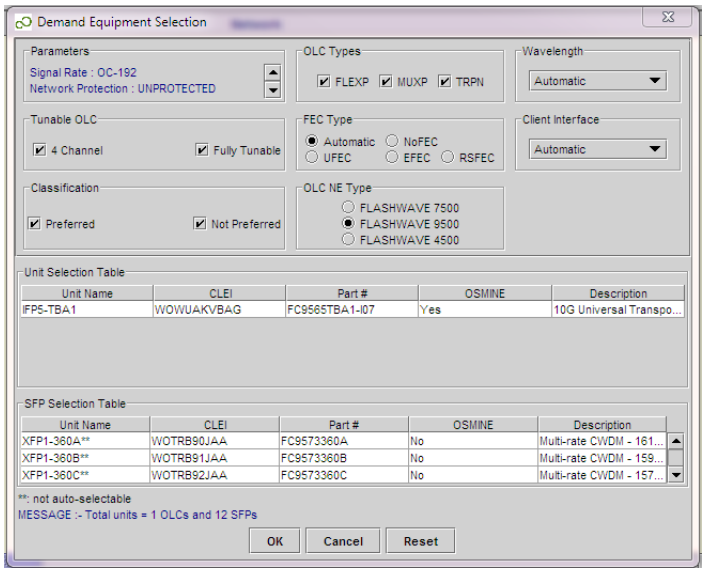
Remote SAS topology



FLASHWAVE 9500 trib site for integration to FLASHWAVE 7500 network

Platform Integration of FLASHWAVE 9500 and FLASHWAVE 7500 Systems

The NETSMART 2000 system now includes support for FLASHWAVE 9500 optical line cards with FLASHWAVE 7500-designed networks. This capability facilitates easier transition to the FLASHWAVE 9500 platform, while maintaining deployed FLASHWAVE 7500 systems. The feature is available when a demand is created. It is possible to choose FLASHWAVE 9500 optical line cards in the Equipment Selection menu when creating new demands. FLASHWAVE 9500 optical line cards are reflected in the BoM.



FLASHWAVE 9500 platform integration

Summary of Supported Systems and Requirements

Microsoft Windows standalone	• Pentium Processor 2 GHz or greater • 40 GB free disk space • 16-bit sound card • 256 MB video RAM • Monitor with 1024 x 768 resolution • 10/100 Ethernet card • Microsoft Windows 7 (32- or 64-bit) • DVD-ROM drive
Microsoft Windows client	• Intel Pentium IV 2.0 GHz or faster processor • RAM requirements: • Windows 7: 3 GB RAM • 40 GB free disk space • 256 MB video RAM • DVD-ROM drive • Monitor with 1024 x 768 resolution • 10/100 Ethernet card • Microsoft Windows 7
Linux OS server	• IBM X3550 M3 server • Six-core X3 GHz CPU • 32 GB RAM • DVD-ROM drive • 292 GB total storage • (2) 100Base-T ports • Red Hat Enterprise Linux release 6.1 or 6.3
Virtual Server Environment	• KVM Linux VSE software • VMWare™-certified software

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