JDSU PathTrak WebView

Data Collection, Spectrum Analysis, and Node Certification

Installation and Administration Guide

JDSU

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About This Guide

Purpose and scope

The purpose of this guide is to help you successfully use the PathTrak WebView features and capabilities. This guide includes task-based instructions that describe how to use and obtain support for the PathTrak WebView.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the PathTrak WebView effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication concepts and terminology.

Technical assistance

If you need assistance or have questions related to the use of this product, call or e-mail JDSU's Cable Technical Assistance Center for customer support.

Table 1   Technical assistance centers

Region	Phone Number	E-Mail
Cable TV/Multimedia Products	America: 1-800-428-4424 Ext. 8350 World Wide: 317-788-9351 Ext. 8350	catvsupport@jdsu.com
Brazil	0800-7015370 4617 3839 4617 3729	

Table 1 Technical assistance centers (Continued)

Region	Phone Number	E-Mail
Europe, Africa, and Mid-East	+800 882 85822 (European Freephone)	support.uk@jdsu.com
	(JDSU UK)	support.uk@jdsu.com
	+49 (0) 6172 59 11 00 (JDSU Germany)	hotline.germany@jdsu.com
	+33 (0) 1 39 30 24 24 (JDSU France)	hotline.germany@jdsu.com
Asia and the Pacific	+852 2892 0990 (Hong Kong)	
	+8610 6833 7477 (Beijing-China)	
Australia	+61 3 9690 6700	
All others	1-866-228-3762	tac@jdsu.com

During off-hours, you can request assistance by doing one of the following: leave a voice mail message at the Technical Assistance number in your region; e-mail North American Technical Assistance Center, tac@jdsu.com, or European Technical Assistance Center, support.uk@jdsu.com; or submit your question using our online Technical Assistance Request form at www.jdsu.com.

Conventions

This guide uses naming conventions and symbols, as described in the following tables.

Table 2 Typographical conventions

Description	Example
User interface actions appear in this **typeface**.	On the Status bar, click **Start**.
Buttons or switches that you press on a unit appear in this **TYPEFACE**.	Press the **ON** switch.
Code and output messages appear in this typeface.	All results okay
Text you must type exactly as shown appears in this **typeface**.	Type: **a:\set.exe** in the dialog box
Variables appear in this *typeface*.	Type the new *hostname*.
Book references appear in this *typeface*.	Refer to ***Newton's Telecom Dictionary***
A vertical bar | means "or": only one option can appear in a single command.	platform [a|b|e]
Square brackets [ ] indicate an optional argument.	login [platform name]
Slanted brackets < > group required arguments.	<password>

Table 3 Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive key strokes.	Press **Alt+f,s**

Table 3 Keyboard and menu conventions (Continued)

Description	Example
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Table 4 Symbol conventions

This symbol represents a general hazard.

This symbol represents a risk of electrical shock.

NOTE

This symbol represents a Note indicating related information or tip.

Table 5 Safety definitions

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Installation

1

This chapter describes how to install the PathTrak WebView software. The topics discussed in this chapter are as follows:

– "Installing the software" on page 2

Installing the software

The PathTrak WebView extends the functionality of the PathTrak Return Path monitoring system. The PathTrak WebView is made up of two major components, the data collection server (DCS) and the web based user interface. These components enable you to view live spectrum and reports. These components also share a common SQL relational database. The data collection server interfaces to the PathTrak server to extract configuration information then it periodically polls each active HCU to collect performance history data for each node. The collected data is then placed in a shared relational database. Using a standard web browser the user can request predefined reports and live spectrum to be displayed.

If you plan to install PathTrak WebView on a PC that is running an operating system in a language other than English, you must complete the following changes before installing and using the WebView software.

1 Open the Windows Control Panel (Figure 1).

2 Open the Regional and Language Options.
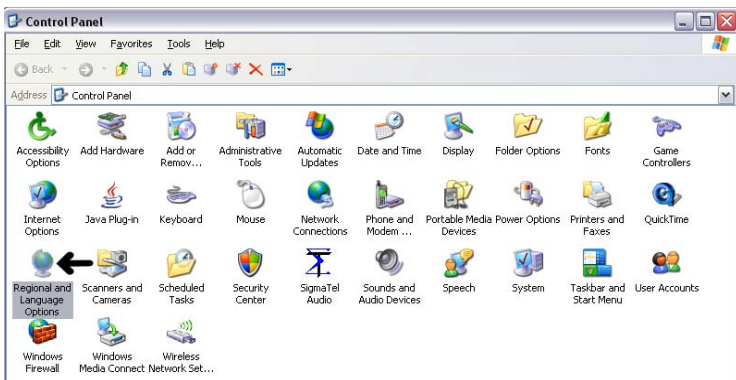
Figure 1 Windows Control Panel

3 Select the "Advanced" tab.
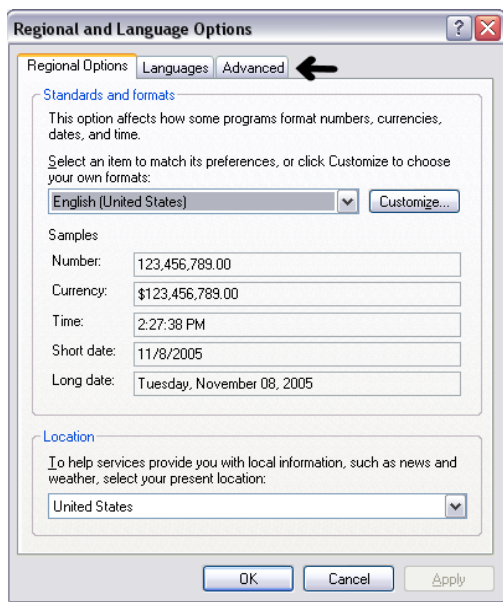
Figure 2 Regional and Language Options - Region Options tab

4 On the Advanced tab, select English (United States) from the "Language for non-Unicode programs" pull down menu, and check the box to "apply all settings to the current user account and to the default user"
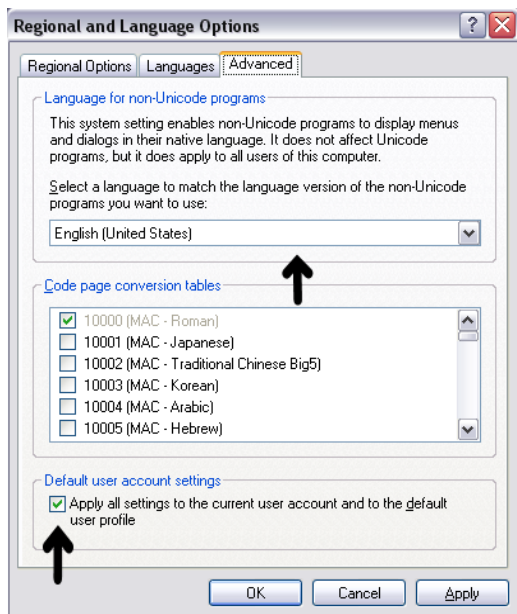
Figure 3 Regional and Language Options - Advanced tab

5 Click the "OK" button and reboot the machine.

6 Continue with the WebView installation after reboot.

ATTENTION

JDSU PathTrak WebView WILL NOT FUNCTION without a valid license file being installed. If you do not have a 3.5" diskette containing the license file that corresponds to the MAC address of the PC that will serve as the PathTrak WebView Server, DO NOT INSTALL THE SOFTWARE. To obtain a license file, contact the JDSU CIC at 1-866-228-3762, and provide them with the MAC address. JDSU PathTrak WebView is structured so that each PathTrak server has its own unique PathTrak WebView server PC. Connecting more than one Path-Trak server to a PathTrak WebView server will result in incorrect readings and corrupt data.

7 Verify communication between PathTrak WebView server, PathTrak server, and all HCU's.

– PathTrak WebView Server machine must be able to ping its PathTrak server.

– PathTrak WebView Server machine must be able to ping all HCU's connected to its PathTrak server.

– PathTrak Server machine must still be able to ping all HCU's.

8 Make certain the time and time zone are set properly for the locale of the PathTrak WebView server machine.

9 Install the PathTrak WebView Software.

10 Place the JDSU PathTrak WebView CD in the Path-Trak WebView Server's CD-ROM drive.

11 In the Run menu, type X:\install.exe where X is the letter of your CD-ROM drive. (Figure 4 on page 6)
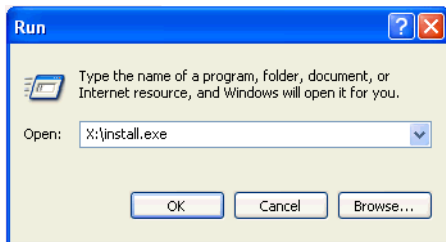
Figure 4 Run dialog

InstallAnywhere begins installing the necessary files.
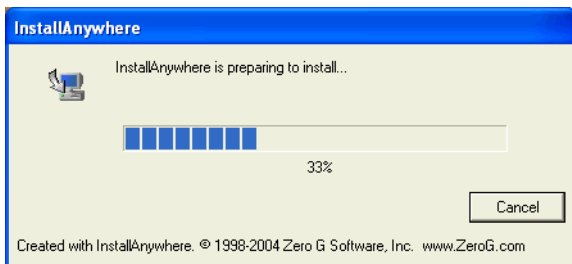
Figure 5 InstallAnywhere dialog

12 Exit all running programs and click the **Next** button.
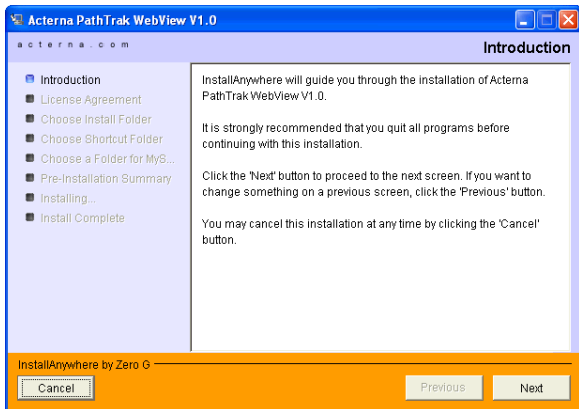
Figure 6 Introduction Window

13 Accept the license agreement, click the **Next** button.
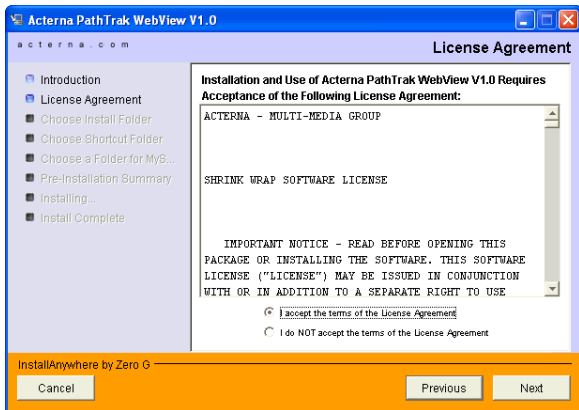
Figure 7 License Agreement Window

14 Select a folder to install the JDSU PathTrak WebView files.
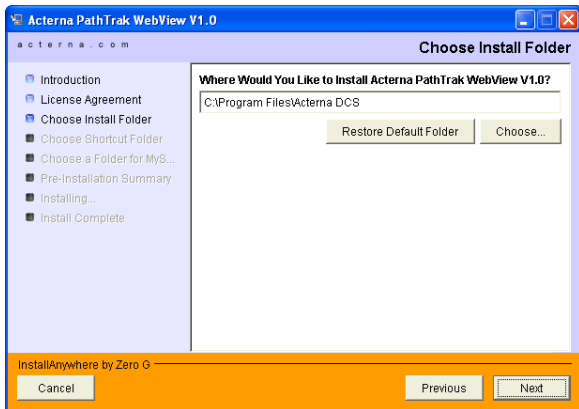
Figure 8   Install Folder Selection Window

15 Select a location for an JDSU PathTrak WebView shortcut.
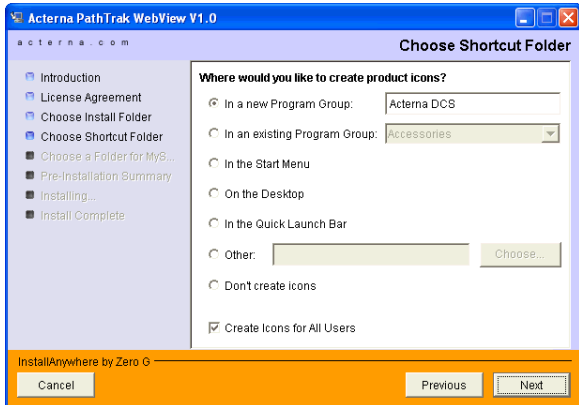
Figure 9   Shortcut Folder Window

16 Choose a location for the MySQL files to be installed.

This will be the location of the JDSU PathTrak WebView database files and could require a considerable amount of disk space (see "Hard Drive Space Requirements" on page 22).
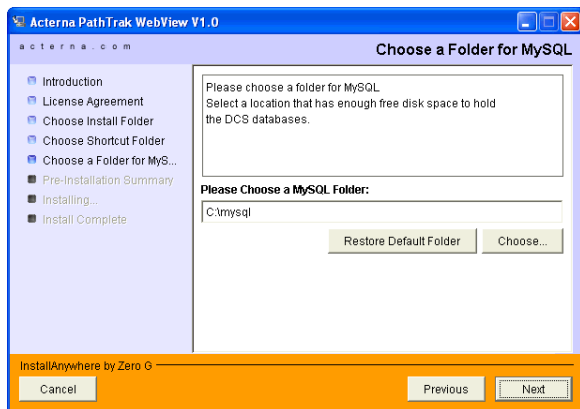
Figure 10 MySQL Window

17 Review the summary information. Click the **Install** button to proceed or click the **Previous** button to make changes.
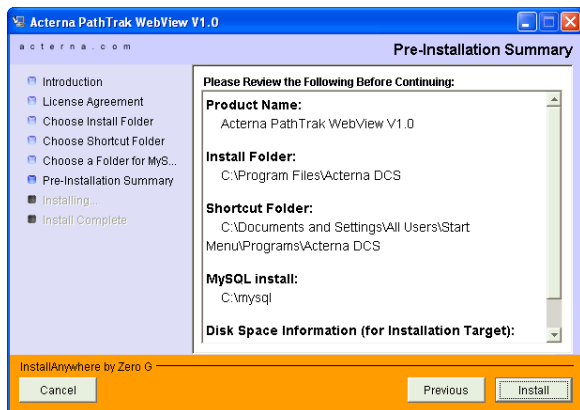
Figure 11 Pre-Installation Summary Window

InstallAnywhere installs the required MySQL files.
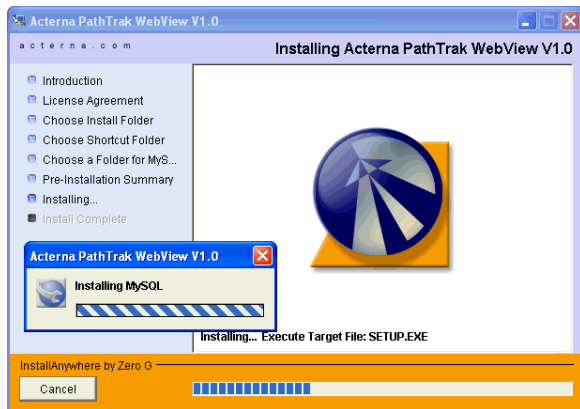
Figure 12 MySQL Installation Window

InstallAnywhere installs the required Java RunTime Environmental files.
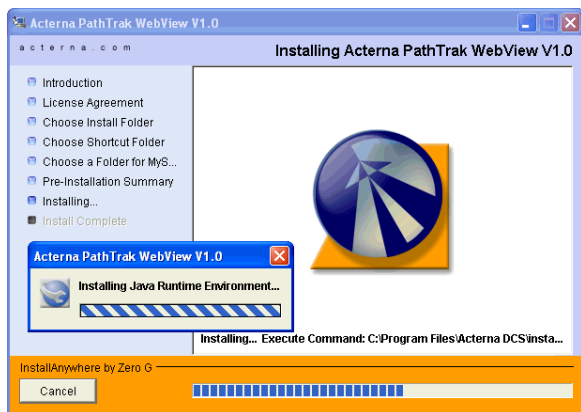
Figure 13 Java Runtime Installation Window

InstallAnywhere installs the required Apache Tomcat files.

▬▬▬▬ **NOTE**

Apache Tomcat is a Java application server. Loading Apache Tomcat allows you to access PathTrak Web-View by using your internet browser.
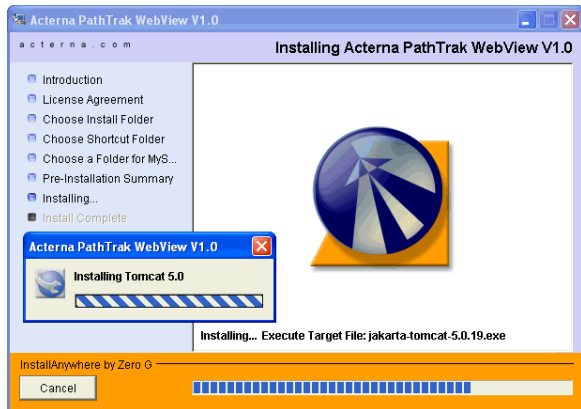
Figure 14 Tomcat Installation Window

18 Once the installation is complete, click the **Done** button

19 When InstallAnywhere is finished close **all PathTrak WebView windows**.
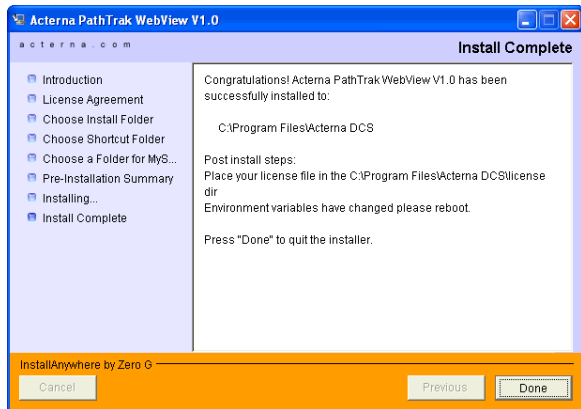
Figure 15 Installation Complete Window

20 Copy the license file from the 3.5" floppy to the C:\Program Files\ActernaDCS\license directory and reboot the **PC**.

The reboot is necessary for the data collection to start working.

21 If the HCU is going to reside on a different network than the PathTrak WebView Server, modify the **HCU routing table**.

22 To modify the routing table, you need to log into the HCU using Telnet or Hyper Terminal and type: **HcuRouteAdd "0.0.0.0","yyy.yyy.yyy.yyy"**.

CAUTION

The HCU routing table must be modified to send data to the PathTrak server and the PathTrak WebView server through a gateway. This command line is case-sensitive. The "0.0.0.0" indicates that the data will be sent to both destinations, and the "yyy.yyy.yyy.yyy" series is the gateway address to which the HCU is connected. The IP Address must be in quotes. There is a space before the "0.0.0.0" address. A comma must separate the two addresses. If the command is accepted, the value 0=0x0 is displayed on the HyperTerminal screen.

CAUTION

If there is not gateway (switch/router) between HCU and PathTrak WebView server modification to the HCU Routing table is not necessary.

NOTE

In order to view the Live Spectrum feature in PathTrak WebView, the Adobe SVG Viewer (freeware) must be loaded on the PC (web client) used to access PathTrak WebView.

Depending on the PC browser settings you may not get automatic notification to download the SVG Viewer.

Adobe SVG Viewer can be downloaded at http://www.adobe.com/products/main.html. The Adobe SVG Viewer is located under the Print and Web Publishing category.

NOTE

The WebView server must be restarted after any adjustment to the Time or the Time Zone. This includes daylight savings (summer) time.

NOTE

All regional settings for the WebView server must be set to English/U.S.

Administration

2

This chapter describes various administration tasks for the PathTrak WebView application. The topics discussed in this chapter are as follows:

Product Overview

The PathTrak WebView extends the functionality of the PathTrak Return Path monitoring system. The PathTrak WebView is made up of two major components, the data collection server (DCS) and the web based user interface. These components enable you to view live spectrum and reports. These components also share a common SQL relational database. The data collection server interfaces to the PathTrak server to extract configuration information then it periodically polls each active HCU to collect performance history data for each node. The collected data is then placed in a shared relational database. Using a standard web browser the user can request predefined reports and live spectrum to be displayed.

Figure 16 System Context

System Context

This product is an add-on the PathTrak Return Path Monitoring System. It requires a configured and monitoring PathTrak as a source of data.

System Interfaces

The PathTrak WebView system will interface to the PathTrak Version 2.3 and greater. Refer to http://www.acterna.com/global/customer_care/Software_Updates/cable.html for the latest software version available. The WebView DCS portion will interface to the PathTrak Server to extract the configured devices (HCU, RPM, & RPM Ports), and with each HCU to extract the performance history data.

User Interfaces

The JDSU PathTrak WebView has 2 user interfaces.

– The DCS Configuration Application, which will reside on the DCS Server and will be responsible for configuration of the Data Collection Service, is discussed in the DCS Configuration Application App Note.

– The Web Interface will provide the end user access to the data through a series of web pages that allow the user to select a node and a report to be displayed. The administration of the Web Interface will be discussed here.

The Web Interface

The Apache Tomcat web server is installed and automatically configured during the JDSU PathTrak WebView software installation. Any machine with network connectivity

to the PathTrak WebView Server may access the Web Interface by entering the following address in a web browser.

– http://dcs_server_hostname_or_IP_address:8080/ ActernaDCS

Default User Accounts

There are two default user accounts for PathTrak WebView web access created at the time of installation.

– Username: admin. Password: ptdcs
– Username: user. No password

Default Access Groups

There are two default access groups with different levels of permissions.

– The **admin** access group.
    – Members of this group can perform any and all functions of the system.
– The **users** access group.
    – Members of this group can only view performance history reports and change their own password.

Launching the JDSU PathTrak WebView Web Application

1 Type http:// dcs_server_hostname_or_IP_address:8080/ ActernaDCS in the address field of your browser.

You may user either the hostname of the PathTrak WebView PC, or the IP address of the PathTrak WebView PC.

The PathTrak WebView login page (Figure 17 on page 19) is loaded.
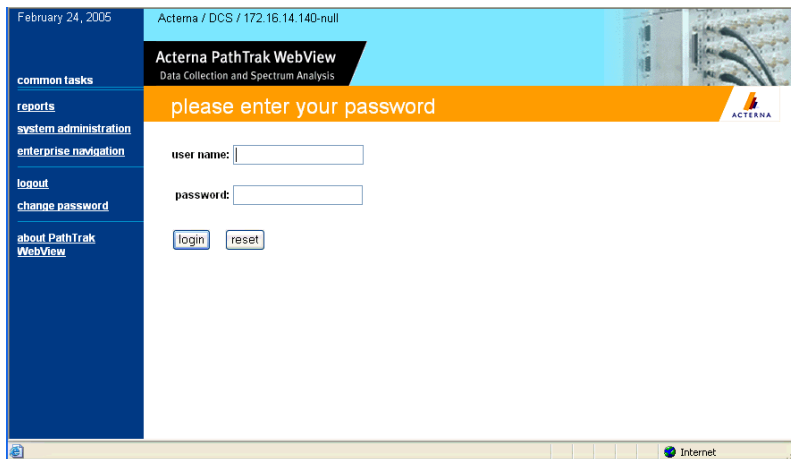
Figure 17 Log In Page

Logging In 1 Enter a valid username and password and click the **login** button (Figure 17 on page 19).

Requirements

A

This appendix describes the PathTrak WebView requirements. Topics discussed in this appendix are as follows:

PathTrak WebView Server PC Requirements

PathTrak WebView may be installed on a dedicated PC or on the PathTrak server if desired. Each type of installation has its own minimum requirements. It is not required that the PathTrak Web View server be a seperate PC from the PathTrak server, but if both applications are installed on the same machine, PC requirements must be met in order to insure proper function of both PathTrak and PathTrak WebView.

Minimum requirements for the following are listed below:

– CPU and RAM

– Hard drive space

– Server Operating System

CPU and RAM Requirements The **minimum** CPU and RAM requirements for a dedicated **WebView server** are as follows:

– P4, 1GHz CPU

– 512 MB RAM

The **minimum** CPU and RAM requirements for a dedicated **WebView and PathTrak server** are as follows:

– P4, 2GHz CPU

– 1 GB RAM

Hard Drive Space Requirements Hard Disk should be determined by the amount of data to be collected. Each RPM card will require approximately 5.6MB of storage space for each day of 15 minute intervals. This multiplied by the number of days of data kept on hand (purge interval) would give an approximate hard disk size requirement.

EXAMPLE:

31 day purge internal (default setting) with 1 fully loaded HCU1500 (15 cards) would require 2.6GB of hard drive space.

15 cards x 5.6MB x 31 days = 2,604,000,000 or 2.6GB

Server Operating System Requirements The Server operating system requirements are as follows:
– English Windows XP SP1 or Higher
– English Windows 2000 Server SP3 or Higher
– English Windows 2003 Server

PathTrak Server Software Requirements

PathTrak Server is required to be at V2.3 or higher. One PathTrak WebView server is required per PathTrak Server. The latest PathTrak server software can be found at http://www.acterna.com/global/customer_care/Software_Updates/cable.html.

Web Client Requirements

The web client requirements are based on the PC from which you are accessing the PathTrak WebView server.

Browser Support
– Internet Explorer V6.0 or higher

Graphic support for displaying live spectrum
– Adobe SVG Viewer (freeware) can be downloaded at http://www.adobe.com/products/main.html. The Adobe SVG Viewer is located under the Print and Web Publishing category.

Network Port Requirements

The default communication port between the PathTrak WebView Server and the Web Client is port 8080 (Web HTTP port).

User editable to other port if needed (for example, if other web application is running on the same PC). Contact JDSU TAC for details (See "Technical assistance" on page vi).

Customer Services

B

This chapter describes the customer services available through JDSU. Topics discussed in this chapter include the following:

About our services

JDSU offers an unmatched portfolio of services to deploy, support and innovate purchased equipment through its Customer Care and Global Services and Solutions organizations. Customer Care is standard with every product sale and consists of business hour technical assistance, in-warranty repair, calibration, and upgrade services. Global Services and Solutions provides professional services to optimize product capabilities and maximize efficiencies, including field engineering and deployment, technical training, product support, consulting and custom software development. Together these organizations supply the services necessary successfully utilize purchased equipment.

Customer care

Customer Care is accompanied with the sale of every JDSU product. Customer Care services include:

– Needs Analysis on Products and Services

– Comprehensive Product and Service Literature

– Pre-Sales Consulting

– Technical Assistance (Business Hour)

– Instrument Repair (Under Warranty Repair and Calibration Services)

– Immediate Return Authorizations

Contact a Customer Care representative through your local distributor or by accessing www.jdsu.com for information on upgrades, calibration, warranty policies or any of Global Services and Solutions offerings. Representatives also provide assistance with product repairs and returns.

Technical assistance (business hour) Expert business hour technical support, including help with product configuration, circuit qualification, and complete network trouble sectionalization is provided with your product (see"Technical assistance" on page vi). For around-the-clock support, 7x24 technical assistance may be purchased through Global Services and Solutions FleetCare program (see "Product support" on page 34).

Instrument repair Our service centers provide repair, calibration and upgrade services for under warranty equipment. JDSU understands the impact of equipment down time on operations and is staffed to ensure a quick turnaround. Available services include the following:

Product Repair — All equipment returned for service is tested to the same rigorous standards as newly manufactured equipment. This ensures products meet all published specifications, including any applicable product updates.

Calibration — JDSU's calibration methods are ISO 9001 approved and based on NIST standards.

Factory Upgrades — Any unit returned for a hardware feature enhancement will also receive applicable product updates and will be thoroughly tested, ensuring peak performance of the complete feature set.

Additional repair, calibration and upgrade services are available for purchase through Global Services and Solutions (see "Product support" on page 34).

Equipment return instructions Please contact your local Customer Care location via telephone or web site for Return or Reference Authorization to accompany your equipment. For each piece of equipment returned for repair, attach a tag that includes the following information:

– Owner's name, address, and telephone number.
– The serial number, product type, and model.

– Warranty status. (If you are unsure of the warranty status of your instrument, contact JDSU Customer Care.)

– A detailed description of the problem or service requested.

– The name and telephone number of the person to contact regarding questions about the repair.

– The return authorization (RA) number (US customers), or reference number (European Customers).

If possible, return the equipment using the original shipping container and material. If the original container is not available, the unit should be carefully packed so that it will not be damaged in transit; when needed, appropriate packing materials can be obtained by contacting JDSU Customer Care. JDSU is not liable for any damage that may occur during shipping. The customer should clearly mark the JDSU-issued RA or reference number on the outside of the package and ship it prepaid and insured to JDSU.

Warranty information The warranties described herein shall apply to all commercially available JDSU products. Any additional or different warranties shall apply only if agreed to by JDSU in writing. These warranties are not transferable without the express written consent of JDSU.

Hardware Warranty — JDSU warrants that Hardware Product sold to customer shall, under normal use and service, be free from defects in materials and workmanship. Information regarding the specific warranty period for this product can be obtained by contacting your local JDSU Customer Service Representative, or at our web site www.jdsu.com. If installation services have been ordered, the warranty period shall begin on the earlier of (1) completion of installation, or (2) thirty (30) days after shipment to Customer. If Installation Services have not been ordered, the warranty period

shall begin upon shipment to Customer. Hereafter these periods of time shall be collectively referred to as the "Initial Warranty Period."

JDSU's obligation and customer's sole remedy under this Hardware Warranty is limited to the repair or replacement, at JDSU's option, of the defective product. JDSU shall have no obligation to remedy any such defect if it can be shown: (a) that the Product was altered, repaired, or reworked by any party other than JDSU without JDSU's written consent; (b) that such defects were the result of customer's improper storage, mishandling, abuse, or misuse of Product; (c) that such defects were the result of customer's use of Product in conjunction with equipment electronically or mechanically incompatible or of an inferior quality; or (d) that the defect was the result of damage by fire, explosion, power failure, or any act of nature.

JDSU performed repairs shall be warranted from defective material and workmanship for a period of one-hundred-eighty (180) days, or until the end of the Initial Warranty Period, whichever is longer. Risk of loss or damage to Product returned to JDSU for repair or replacement shall be borne by customer until delivery to JDSU. Upon delivery of such product, JDSU shall assume the risk of loss or damage until that time that the product being repaired or replaced is returned and delivered to customer. Customer shall pay all transportation costs for equipment or software shipped to JDSU for repair or replacement. JDSU shall pay all transportation costs associated with returning repaired or replaced product to customer.

Software Warranty — JDSU warrants that Software Products licensed to Customer shall, under normal use and service, and for a period of ninety (90) days from the date of shipment of the Software to Licensee (the "Warranty Period"), perform in all material respects in accordance with the published specifications for such Software as established by JDSU. However, JDSU does not warrant that the Software

will operate uninterrupted or error free, operate in the combination with other software, meet Customer's requirements, or that its use will be uninterrupted.

JDSU's obligation and Customer's sole and exclusive remedy under this Software Warranty is limited to, at JDSU's option, either (i) correcting the material errors reported to JDSU in writing by Customer during the Warranty Period and which JDSU is able to reproduce, (ii) replacing such defective Software, provided that JDSU received written notice of such defect within the Warranty Period, or (iii) provided that JDSU received written notice of such defect within the Warranty Period, terminating the License and, upon return to JDSU of the Software, Documentation and all other materials provided by JDSU under the applicable License, providing Customer with a refund of all charges paid with respect thereto. JDSU shall have no warranty obligations hereunder if (a) the Software is altered or modified or is merged with other software by Customer or any third party or (b) all or any part of the Software is installed on any computer equipment other than the Designated Server or used with any operating system for which the Software is not designed.

Services Warranty — JDSU warrants that the Services provided by JDSU, if any, shall be performed promptly, diligently and in a professional manner in accordance with the commercial standards of the industry. JDSU shall not, however, be responsible for any delays that are not due to JDSU's fault or negligence or that could not have reasonably been foreseen or provided against.

WARRANTY DISCLAIMER — FOR HARDWARE, SOFTWARE, AND/OR SERVICES FURNISHED BY JDSU, THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTEES AND CONDITIONS, EXPRESS OR IMPLIED. JDSU SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, ON ANY HARDWARE, SOFTWARE, DOCU-

MENTATION OR SERVICES INCLUDING BUT NOT LIMITED TO WARRANTIES RELATING TO QUALITY, PERFORMANCE, NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AS WELL AS THOSE ARISING FROM ANY COURSE OF DEALING, USAGE OR TRADE PRACTICE. UNDER NO CIRCUMSTANCES WILL JDSU BE LIABLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES RELATED TO BREACH OF THIS WARRANTY.

Global services and solutions

Global Services and Solutions markets a broad portfolio of services to enable customers to aggressively build their competitive advantage within the markets they serve. Global Services and Solutions innovative offerings respond to our customers' dynamic needs:

– System deployment and field engineering services
– Technical training
– Product support
– Consulting
– Custom software development
– Integrated service programs

Additional information can also be found on our web site under Services.

System deployment and field engineering JDSU offers a range of support services for our centralized test systems, designed around the needs of the customer's network. Field engineering and deployment services provide a variety of options for implementing the test system into the network.

Deployment — Thorough deployment process covers the initial site survey through hardware and software installation, allowing rapid integration of systems product into customers' environment without the use of their own resources. Deployment includes survey, configuration,

installation of hardware and software, site planning, cabling, acceptance testing, staging, certification and system documentation.

Basic Service for Systems — In today's fast-paced world of communications, network operators are deploying increasingly complex communications test and management systems. JDSU's Basic Service for Systems is designed to provide the system experts, support and methodologies to facilitate the integration of systems products into customers' environments. Basic Service for Systems encompasses system deployment, training, software upgrades, technical assistance and repair. This service is subject to availability, please visit www.jdsu.com or contact Customer Care for additional information.

Training JDSU delivers training in instructor-led or alternative learning formats that are flexible, convenient, and timely. Our training solutions portfolio consists of network-specific test and management tools for optical transport, cable, access, data, and wireless environments.

Instructor-led **Public courses (JDSU sites)**
training: Public courses help participants quickly acquire fundamental skills or broaden their communications knowledge with advanced instruction. Our courses deliver the ideal mix of theory and practice.

On-site training (Customer site)

JDSU provides practical, customized instruction at the customer's designated site. Whether your goal is to shorten turn-up times or increase operation-wide efficiency, on-site training can be a cost-effective way to train from one to 10 participants. Prior to training, the instructor contacts the customer to ensure the course content is aligned with the organization's training needs. We conduct

step-by-step reviews of current technologies and products to help both new and experienced technicians translate theory into practical, hands-on expertise.

When scheduling an on-site course, please note that JDSU requires a minimum commitment of two consecutive days of training. Courses that are only one day in duration may either be paired with another course for a minimum total of two training days, or presented on two consecutive days to different groups of participants.

Alternative **Courseware licensing program and train-**
learning: **the-trainer**

Recommended for customers with internal training departments, JDSU's Courseware Licensing Program is a fast, affordable alternative that allows our customers to train their own staff using JDSU's courseware. Each course provides comprehensive instructor and participant materials to ensure consistent content delivery for the length of the agreement. A critical part of Courseware Licensing is the Train-the-Trainer program, which prepares the organization's own instructors to deliver JDSU training courses. Courseware Licensing is sold in increments of one, two, or three years.

Computer-based training (CBT)

By blending learning with technology, JDSU's CBT program provides our customers with a cost-effective way to learn technology fundamentals and product applications. Topics include ATM, Frame Relay, ISDN, LAN Basics, Fiber Optics, and more. CBTs are designed to complement both public and on-site training; they can serve to prepare students for classroom JDSU courses or be used after instructor-led training to reinforce learning. In addition to our pre-packaged CBTs, JDSU custom-develops CBTs to meet your organization's training needs.

To enroll in a course or for more information on the variety of JDSU training programs available, call 1-800-638-2049 or visit www.jdsu.com and complete the Training Requirement Form.

Product support To continue repair, maintenance and upgrades after a product's warranty expires, JDSU offers a variety of product support plans.

FleetCare — Designed for customers with ten or more JDSU products, FleetCare extends each product's initial factory warranty to include repair parts, labor and one-way shipping. FleetCare allows customers to upgrade the base package with a variety of options, including Calibration Plans, Calibration Plan with Manager, Loaners, 7x24 Technical Assistance and Software Enhancement Agreements.

Software Enhancement Agreements — In response to new developments in technology, JDSU continually upgrades and revises the software that drives many of its products. Software Enhancement Agreements automatically ships the latest software revisions, releases and upgrades to ensure products are operating at the most technologically advanced level.

Product Maintenance Agreements — Yearly repair and calibration maintenance agreements simplify billing and help ensure equipment is always operating at optimum levels. Product maintenance agreements can be used to extend a current warranty or provide protection for out-of-warranty units.

Repair Pricing Options — For out-of-warranty repairs, JDSU offers two additional pricing options: time and material pricing and flat rate pricing. Under time and material pricing, customers are billed for the actual cost of the repair, making this a cost-effective method for minor repairs. Under flat rate pricing, customers pay a fixed service charge to repair unit failures (excluding damage or abuse).

Consulting services To quickly improve our customer's efficiency and productivity, JDSU offers personalized consulting programs designed to meet specific client needs. Our consulting staff will work as part of your team, providing a valuable blend of subject matter proficiency, an in-depth test and measurement systems perspective, and trusted telecommunications industry vision.

Methods and Procedure Development — JDSU's Methods and Procedure Development services include consulting with your staff and assessing your network plant's current test and turn-up procedures. After evaluating the skill level of your workforce in specific technologies and procedures, an JDSU team of experts identifies potential areas of improvement and makes appropriate recommendations in a formal implementation plan. Depending on your staff 's level of expertise, test procedures can be written to any level of detail, from general methods and procedures to detailed "button-by-button" test and network equipment-specific procedures. In addition, JDSU's experts offer hands-on training for your field technicians and can resolve specific problems at the central office. JDSU develops test plans and procedures for Service Providers, End-users and Manufacturers of Network Equipment.

Test Automation — With JDSU's Test Automation Development, a team of experts can develop customized automated and remote testing solutions so that you can keep your network functioning at peak levels. After consulting with you, the JDSU team can determine which of JDSU's test and analysis equipment and automation platforms can best streamline your testing processes, data analysis, and test result storage methods. The consulting team can develop and integrate automated testing applications on customers' currently installed computer platforms that match existing methods and procedures. An JDSU team of consultants can assist customers throughout every stage of the development and implementation of automated and remote testing solutions. Services range from

developing automated scripts to integrating customized software applications to developing drivers to automated manufacturing tests.

On-site Test and Measurement Service — JDSU On-site Test and Measurement Service provides testing expertise to expedite the implementation, turn-up, and provisioning of network services. Applying their knowledge to your specific network requirements, JDSU's network consultants can quickly verify transmission systems' implementation, assess a fiber plant's suitability for advanced services, future-proof your system. Because incomplete testing often results in crippling losses of revenue, carriers and providers must operate their networks with a very low margin of error. Difficulties in ensuring network performance are further compounded when technicians must employ unfamiliar yet critical test and measurement processes. But with JDSU's dedicated, highly skilled team of professionals providing communications test and measurement solutions, your staff can concentrate on performing value-added services that will maximize your profitability.

Integrated service programs

Service Dollars (North America only) — To deliver the highest level of support with your product purchase, JDSU offers Service Dollars. Services Dollars can be purchased at anytime, for each JDSU instrument. If purchased at the same time as your product, Service Dollars are discounted 20 percent. This is a significant savings, as Service Dollars can be used towards the purchase of any of Global Services and Solutions offerings. Service Dollars are also flexible in the fact that they can be purchased at anytime and then used later towards the specific service that best fits your support needs.

JDSU