BERTL

HIGHLY RECOMMENDED

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Xerox Phaser 4510n

45-ppm Monochrome

Print

100% INDEPENDENT ANALYSIS

What's Inside

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OFFICE

Introduction

In April 2007, Xerox launched the latest addition to its monochrome desktop laser-printer lineup for offices, the Phaser 4510. At Xerox's rated print speed of 45 ppm, the printer is only eclipsed by the Phaser 5500, a 55-ppm Tabloid/B-size printer. The Phaser 4510 ranges in price from $899 to $2,299 (depending on configuration), and Xerox is distributing it via resellers, distributors, authorized sales agents and online at Xerox's Web site.

The Phaser 4510 replaces the Phaser 4500, upon which it is built. Xerox has increased print speed (45 ppm versus 36 ppm), and added a larger optional hard drive (40 GB versus the Phaser 4500's 20 GB). Xerox also upgraded the printer's CPU from 400 MHz to 533 MHz, and increased maximum paper capacity from 1,200 to 1,800 sheets. Also new is what Xerox calls "Personal Print": users can store multiple print jobs in user boxes and then print them simultaneously.

As a monochrome desktop laser printer for offices, the Phaser 4510 is fairly straightforward. With its rated print speed of 45 ppm, maximum recommended monthly volume of up 200,000 pages, and up to 1,800-sheet maximum paper capacity, the printer is suitable for use by mid-size workgroups.

Printer management is provided via Xerox's CentreWare Internet Services (printer home page) and CentreWare Web (for managing and monitoring the Phaser 4510n and compatible network printers). As with many Xerox Phaser printers, CentreWare Internet Services provides a variety of very advanced job-accounting tools, as well as a tool that estimates the toner coverage of pages printed with the Phaser 4510n. Job-accounting reports can be downloaded, saved, printed, etc.

Xerox has included Adobe PostScript 3 (not a PostScript emulation). Of special note is that from both PostScript and PCL print drivers, users can obtain current device status—as well as current toner and paper levels—so that they need not launch a utility or Web page in order to obtain this information. Maximum paper size is 8.5" x 14" (legal) via all paper sources.

BERTL tested the "n" version of the Phaser 4510, which includes network connectivity; the unit was also configured with the duplexing option.

In this test report, BERTL will review the Phaser 4510n's performance as a monochrome, mid-volume office desktop network printer, including its productivity, image quality, ease of use and remote management and monitoring.

Device Features Summary	
Suggested List Price	$999
Monochrome Print Speed	45 ppm
Mono First Page Out Time	8 secs.
Color Print Speed	Not applicable
First Copy Out Color	Not applicable
Warm Up Time	45 secs. from power-on
Maximum Monthly Print Volume	200,000 pages
Internet/Network Fax	No
Network Scan	No
Output Options	500-sheet stacker w/job offset ($249)
Input Options	550-sheet paper drawer ($299)
Other Options	Duplex ($299), wireless network adapter ($219), 128/256 DIMM memory ($499/$599), 20 MB flash memory DIMM ($299), 40-GB hard drive ($449)

BACKGROUND

Printing passed copying as the primary method of reproducing documents years ago. Today, printing is just as important—if not more important—than copying.
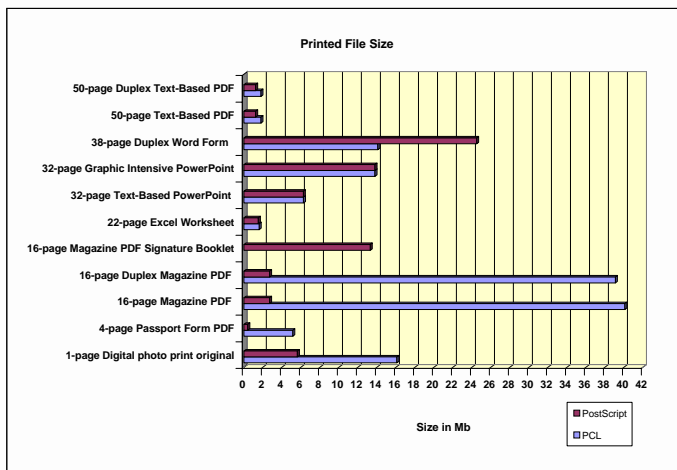
Connectivity

Most devices include Ethernet and USB connectivity out-of-the-box. Some devices also include a parallel interface. In addition, many devices provide a selection of optional connectivity choices such as Wireless 802.11b or g (g is the faster, preferred standard), Bluetooth for cell phone or PDA connectivity, PictBridge photo printing for printing directly from a digital camera, and FireWire for high-speed local connectivity.

Page Description Languages (PDLs)

PCL is the page description language (PDL) provided by most printer and MFP suppliers. Some manufacturers charge for a PostScript upgrade or provide a PostScript Level 3 emulation (clone). Still other manufacturers provide genuine Adobe PostScript Level 3 and bundle in PCL. A few manufacturers also include their own PDL, which are typically loosely based on the Microsoft Windows/GDI printing technology of old. These Windows or GDI drivers often offer significant productivity advantages over traditional PCL and PostScript print drivers, since the bulk of the processing is handled by the more powerful desktop PC, rather than by the less well-equipped printer processor itself.

NETWORK-BANDWIDTH/PRINT FILE SIZE

Print-Features Summary	
CPU	533 MHz
RAM and Hard Drive	128 MB (512 MB max.), 40-GB hard drive
Operating Platforms	Fedora Core 1; HP-UX 10.2 +; IBM Aix 4.2 +; Mac OS X 10.2 +; NetWare 3.x +; Red Hat 9; SUSE; Win 2000 +; Xerox Walk-Up Print Driver; Win 2000 Server w/Citrix MetaFrame 1.8 or XP 1.0, Win 2003 Server w/Citrix MetaFrame XP 1.0, Win 2000 Server w/Citrix Presentation Server 4.0, Win 2003 Server w/Citrix Presentation Server 4.0
Standard Print Drivers	Adobe PS 3, PCL 5e, PCL 6
Optional Print Drivers	No
Standard Interfaces	10/100BaseTX Ethernet, parallel, USB 2.0
Optional Interfaces	10/100BaseTX Ethernet (for some configurations), 802.11 wireless

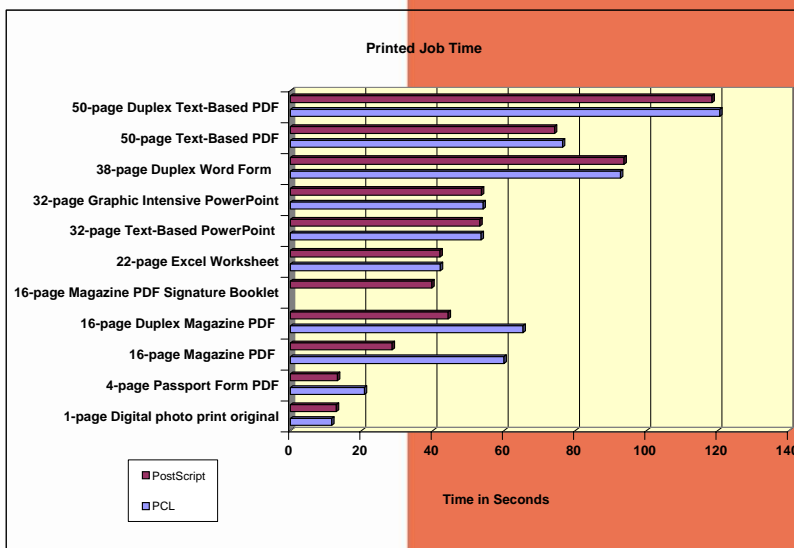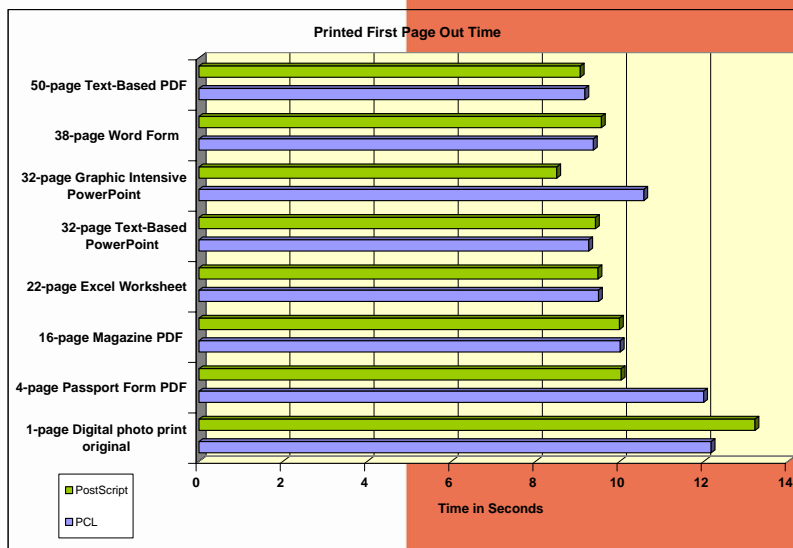| Network-Bandwidth/Print File Size			
	Native File Size	PCL	PS
1- page digital photo PDF	4,483 KB	16.10 MB	5.63 MB
4 page Passport Form PDF	79 KB	5.15 MB	0.40 MB
16-page Magazine in PDF	1,780 KB	40.10 MB	2.71 MB
22-page Excel Worksheet	122 KB	1.610 MB	1.52 MB
32-page Text-Based PowerPoint	232 KB	6.27 MB	6.26 MB
32-page Graphic Intensive PowerPoint	4,200 KB	13.80 MB	13.80 MB
38-page Form Word Document	912 KB	14.10 MB	24.50 MB
50-page Text-Based PDF	170 KB	1.80 MB	1.24 MB

PRODUCTIVITY

Evaluating print productivity is not as simple as timing copy jobs. The printing process involves several steps and can be affected by a variety of factors along the way.
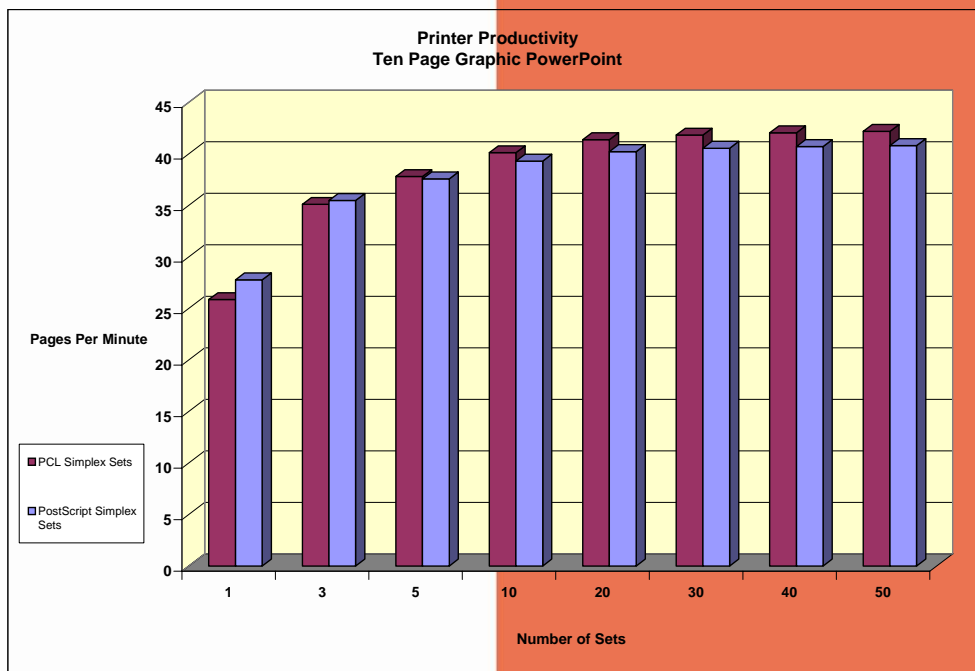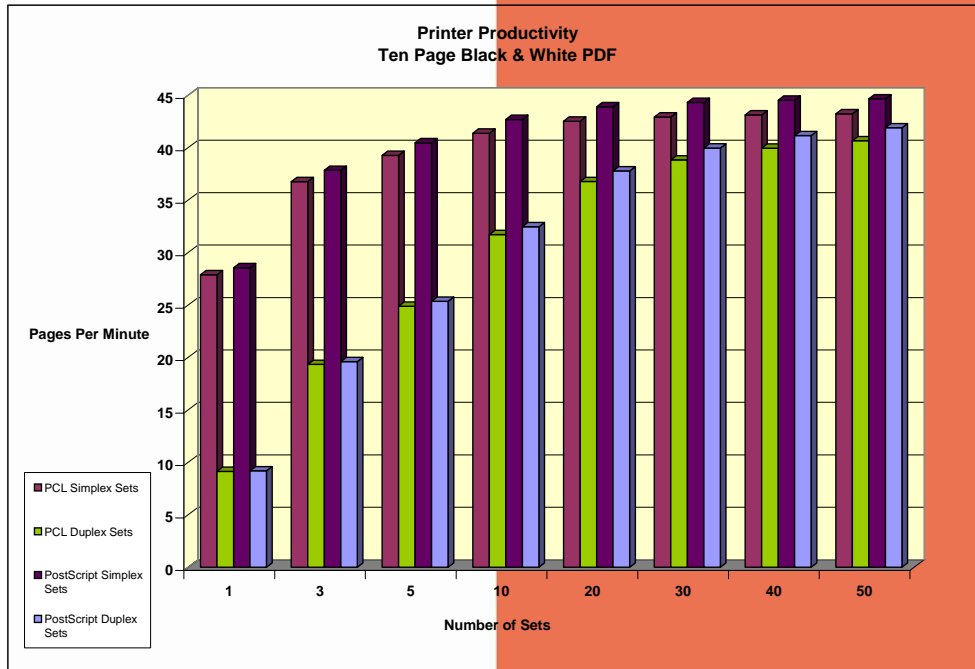
The document must first be spooled by the print driver into a PCL or PostScript file. The PCL or PostScript file is then sent to the printer where it is raster image processed (RIPped) into image data by the device processor. The image data is then sent to the marking engine and output as printed pages.

There are three obvious factors highlighted above (spool time, RIP time, and print engine speed), which can all make or break a device's overall productivity. Other factors include concurrency and contention; for instance, print speed may slow down when the device is being used for other functions, such as scanning.

However, it is possible to time and compare these factors through the use of careful preparation, conditioning and testing. Following are charts that show printing performance when tested under controlled conditions.

Printed First Page Out Time

	PostScript	PCL
50-page Text-Based PDF		
38-page Word Form		
32-page Graphic Intensive PowerPoint		
32-page Text-Based PowerPoint		
22-page Excel Worksheet		
16-page Magazine PDF		
4-page Passport Form PDF		
1-page Digital photo print original		

Time in Seconds

Printed Job Time

	PostScript	PCL
50-page Duplex Text-Based PDF		
50-page Text-Based PDF		
38-page Duplex Word Form		
32-page Graphic Intensive PowerPoint		
32-page Text-Based PowerPoint		
22-page Excel Worksheet		
16-page Magazine PDF Signature Booklet		
16-page Duplex Magazine PDF		
16-page Magazine PDF		
4-page Passport Form PDF		
1-page Digital photo print original		

Time in Seconds

Print

PRODUCTIVITY

Printer Productivity
Ten Page Black & White PDF

Pages Per Minute

Legend:
- PCL Simplex Sets
- PCL Duplex Sets
- PostScript Simplex Sets
- PostScript Duplex Sets

Number of Sets

Printer Productivity
Ten Page Graphic PowerPoint

Pages Per Minute

Legend:
- PCL Simplex Sets
- PostScript Simplex Sets

Number of Sets

Print

WORKFLOW

Concurrency or Contention?
MFPs, by their very nature, are designed to handle multiple tasks, acting as the printer, copier, scanner, and even fax machine. BERTL looks at how these tasks affect each other.

In BERTL's concurrency test, a large print file is submitted for printing. When spooling has completed, the rate at which pages are output is measured. The BERTL analyst then carries out various tasks such as scanning in a copy job, to see if the print output rate is affected.

Batch Printing
Batch Printing: There are situations in which multiple files are combined into a single print job. There are two main reasons for this:

1. Multiple authors contributing to a single document
2. Collated sets comprised of multiple individual documents.

These two workflow scenarios put MFPs and printers to task, as they demand more than just the ability to spool, RIP, and print a file as fast as possible.

Network Workload
Network-printing devices may often face a queue of jobs stacked up for processing during busy periods of the day.

During BERTL's network workload tests, analysts queue a series of jobs at a paused print driver. The jobs are arranged in order of their raw application file size per page. The purpose of the test is to illustrate how well a device handles a stream of jobs and how the queue's make-up can have a major impact on a device's performance. BERTL is not trying to suggest that a series of jobs is an example of a typical office application, as this would be misleading.
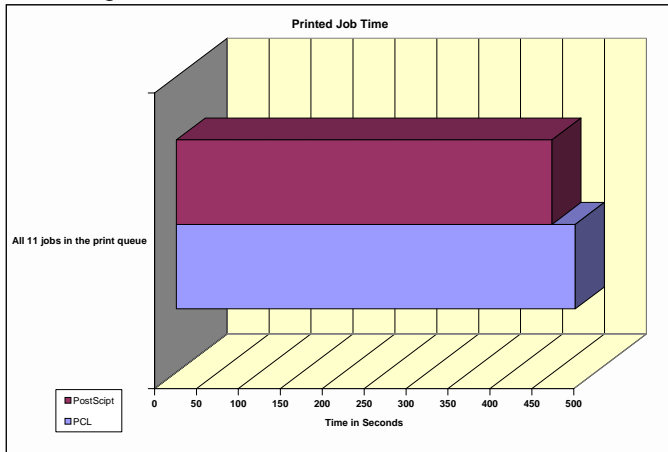
Concurrency Test Results	
Print slowdown when scanning in copy job	Not applicable
Print slowdown when scanning originals	Not applicable
Print slowdown when scan-data transfer underway	Not applicable

Batch-Printing Capabilities	
Multiple jobs all combined into a single finished document	Yes
Multiple jobs all combined into a single finished document with page numbering/watermarking added	No
Multiple jobs sent in collated sets	Yes
Multiple jobs sent in collated sets with finishing/job attribute changes on a job-by-job basis	No
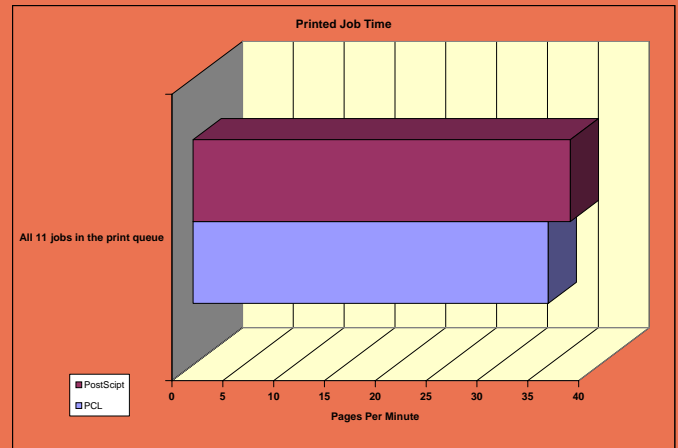
PRINT-ON-DEMAND

Ever since manufacturers began including hard drives with their MFPs and printers, they have looked for ways to offer print-on-demand capabilities. With print-on-demand, users can quickly print a document whenever needed, instead of having to store hardcopy, and then make copie of it.

The most basic print-on-demand is the ability to store a document in device memory for instant reprinting from the walk-up control panel. A growing number of printers and MFPs provide this.

The other major benefit of print-on-demand is the removal of the RIPping process when printing large documents repeatedly. With print-on-demand, the file is stored on the device in a post-RIPed format, eliminating the spooling and RIPping process that usually precedes printing. This saves users time, and reduces the network workload.

With a growing number of devices now supporting direct Adobe PDF printing, many printers and MFPs now also support USB direct interface printing. With this feature, users can simply insert a USB flash memory device containing a PDF (or other supported file format) into the device's USB direct interface (usually located on or near the printer's control panel). The files contained on the USB flash memory device are then displayed on the printer's touch or LCD screen. The user simply scrolls down to the file they would like to print.

Do All Devices Offer the Same Capabilities?
There is a large degree of differentiation between products and manufacturers in this area. Those interested in print-on-demand should look carefully at the functionality offered by each manufacturer.

Areas of differentiation include issues such as the ability to manage stored files, as well as the ability of users to make job settings (such as simplex/duplex, paper size, stapling, etc.). Other systems enable users to combine single files into one job, while still others enable users to view and manage stored jobs from a desktop computer utility.

Print-on-Demand Features Summary	
Job Storage From the Device?	No
Job Storage From the Desktop?	Yes
Finishing Options Included at Time of Storage?	Yes
Document Images (incl. thumbnails) Provided on the Device Touch Screen?	No
Document Images (incl. thumbnails) Provided on the Desktop?	No
Multiple Jobs Can Be Combined and Printed as One Finished Job?	Yes
Stored Jobs Can Be Edited After Storage?	No
Stored Jobs Can Be Combined With Send Feature	Not applicable

WHAT WE LIKED

- Users may store documents in password-protected user mailboxes in optional hard-drive memory for print-on-demand. Documents stored in a user inbox may be combined and printed simultaneously.
- With Delay Printing, users may specify that jobs be printed at a specific time, for instance, after business hours, when the printer is not being used by others.
- Optional Direct Print, so that users may print files without having to launch print drivers or applications.

WHAT WE WOULD LIKE TO SEE

- Overall, the Phaser 4510 performed well in network-printing mode.

IMAGE QUALITY

BERTL evaluates the output of several "test targets" in order to determine image quality. Following are descriptions of key elements of image quality. Note the numbered examples on each of the test targets shown in the right column.

Office Image Quality
1. **Density of Solid Areas -** Better contrast; more vivid overall images
2. **Line Work -** Better production of lines and text
3. **Halftones -** Better production of photographic and screened images
4. **Negative/Positive -** Better production of fine detail

Photographic Image Quality
5. **Flesh tones -** Better production of portraits
6. **Banding -** Better solid and dithered fill
7. **Low Contrast -** Better production of dark images
8. **Saturation -** Better production of bright colors
9. **Caste** – Better color fidelity
10. **Fine Detail** – Better reproduction of fine details
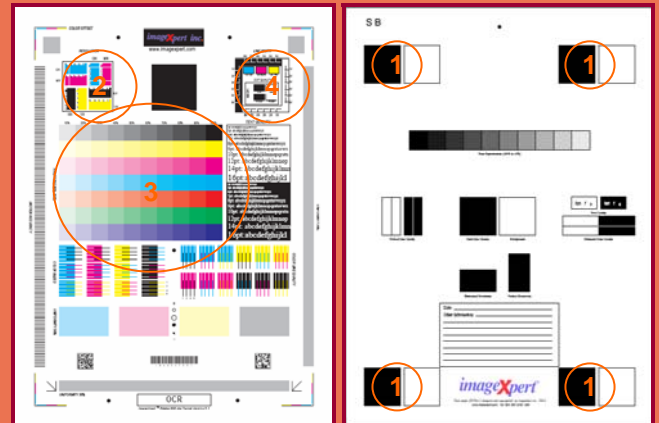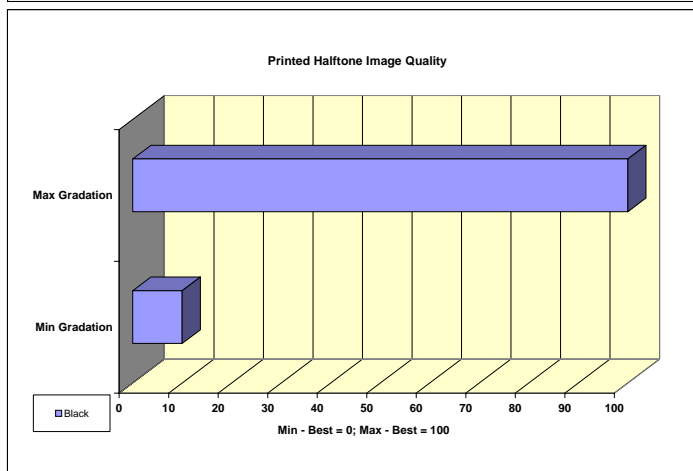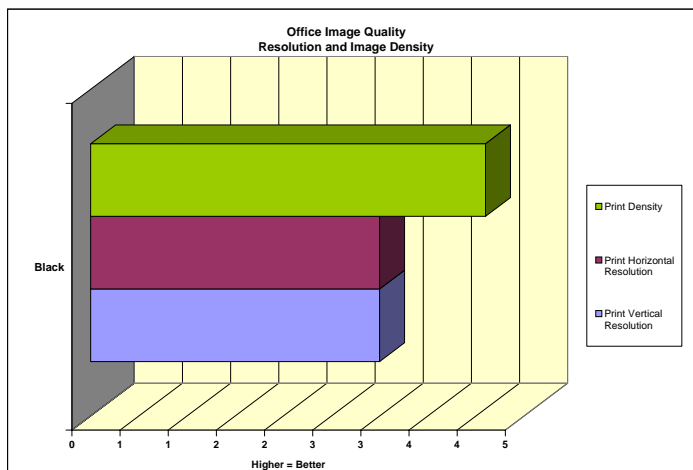
BERTL uses ImageExpert printer test targets for the evaluation of printed image quality. BERTL technician's measure image density and evaluate the device's ability to produce a full range of halftones and various sizes of negative/positive text, dots and lines in each primary printing color (CYMK).
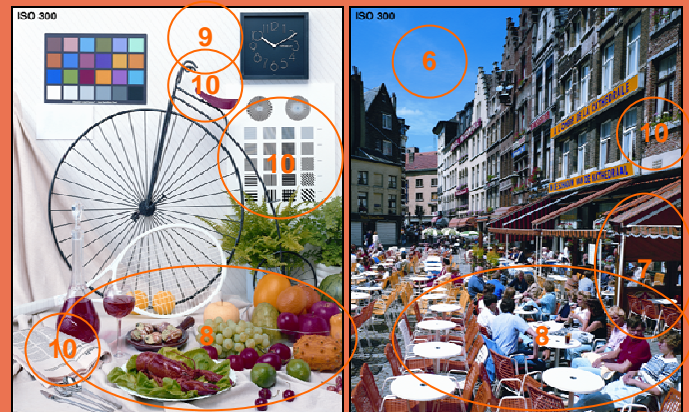
BERTL uses synthetic (photographic) test images obtained from **ISO International Standard 12640--Graphic Technology—Prepress digital data exchange—CYMK Standard Color Image Data (CYMK/SCID)** in order to evaluate the ability to print photographic images.

EDITOR'S NOTE: While in PCL mode and equipped with the standard 128 MB of memory, the Phaser 4510 was able to print BERTL's high-resolution TIFF files shown above. However, it was not able to print these same files in PostScript mode. Consequently, users who have advanced PostScript printing applications should consider a memory upgrade and/or the optional 40-GB hard drive.

Ease of Use

ACCESSIBILITY

In the United States, Section 508 legislation prohibits government agencies from purchasing devices that are not accessible to those with physical impairments. For this reason—and the corporate world's increased focus on delivering a better work environment for all—many MFP manufacturers are increasingly providing more user-friendly features for physically-impaired users.

Common design features include tilting control panels, which give wheelchair-bound users a better view of the screen, and larger display options for those with impaired vision. Voice navigation and Braille also are becoming increasingly popular. Easy access to the paper path for misfeed removal and front access to toner supplies also make a device more user-friendly.

In order to access some misfeeds, users must access the back of the unit—in most cases (depending on how the printer is placed), this will involve turning the printer around, which may be difficult for wheelchair users. Also, some users (such as wheelchair users), may be have difficulty accessing jams that may occur in the area where the toner cartridge is housed.

Accessibility Features Summary	
Routine maintenance tasks performed at front of device	Yes
Remote control-panel software	No
Audible "beeps" indicating error conditions	No
Control panel optimized for visually impaired	No
Voice-recognition software	No
Additional accessibility features	No
Tiltable control panel?	No

The Xerox Phaser 4510n as tested by BERTL.

Ease of Use

PROGRAMMING THE CONTROL PANEL

Visit a few MFP manufacturers' showrooms, and you will see a wide range of control panels and touch screens. The most rudimentary consist of a selection of hard keys and an LCD screen that can often be challenging to navigate. On the other hand, some control panels that utilize hard keys and LCD screens can actually be easier to use than touch screens. However, hard-key/LCD panel systems that require users to scroll through various settings and make a selection can also often be challenging to use.

Among touch screens, some utilize a menu-driven system, while others utilize an icon-based system. Some menu-driven touch screens can involve many complicated sub-menus that can be difficult to navigate.

Most manufacturers try to keep their control panels and touch screens consistent across their MFPs and printers, so that users do not have to spend time learning how to use a new control panel when moving from device to device.

A control panel's ease of use—or lack of—can often have a significant affect on user productivity. The harder it is to select frequently used options such as duplexing, document finishing, etc., the more time the user has to spend programming the device and the less productive they are. In the chart to the right, BERTL assesses how many steps are required to make these commonplace settings.

The Phaser 4510n's control panel.
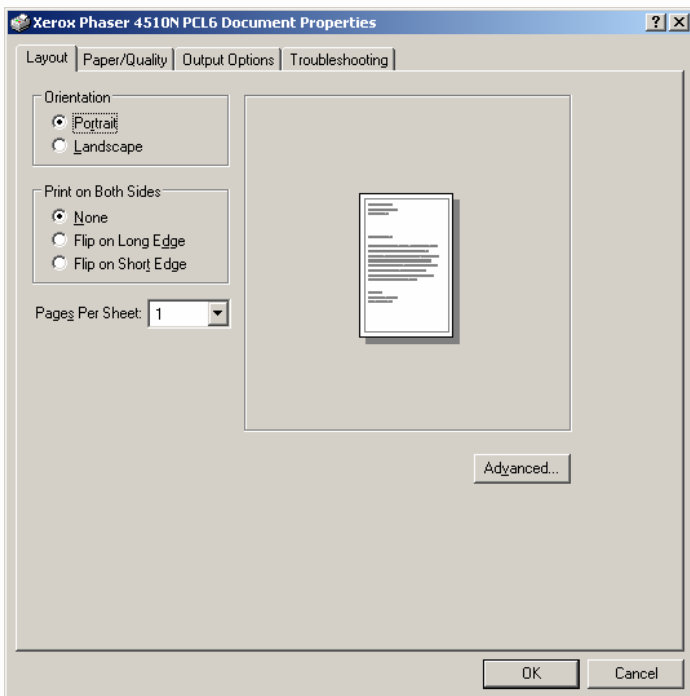

A close-up of the printer's LCD panel.

The printer's LCD panel provides a help screen that assists users with common questions and tasks.
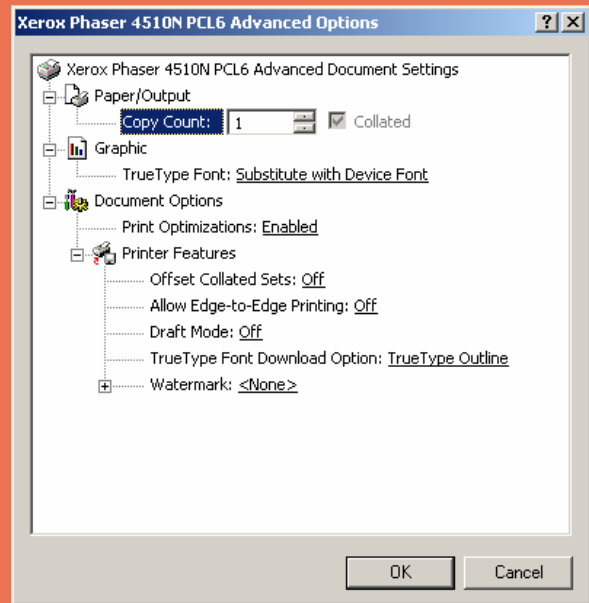
PCL PRINT-DRIVER

As with control panels and touch screens, print-driver design can vary enormously from manufacturer-to-manufacturer. And, as with control panels and touch screens, how easy it is—or isn't—to make selections in the print driver and navigate through it can significantly affect user productivity.

Most vendors provide an emulation of PCL (printer control language) developed by the Hewlett-Packard Company. Some may also provide an emulation of PostScript, developed by Adobe Systems Incorporated, or they may license PostScript directly from Adobe. While the Adobe PostScript driver is not the most user-friendly of print drivers, the advantage is that many users are already familiar with it. Alternately, some manufacturers may use an emulation of PostScript and design their own print-driver user interface, or may license PostScript from Adobe and also design their own print-driver interface.

Selections available from the PCL driver's Advanced options

The PCL driver's first tab, Layout, provides basic settings such as simplex/duplex, portrait/landscape orientation, etc. When users select the Advanced option, options such as advanced image-quality and TrueType font substitution options are provided.
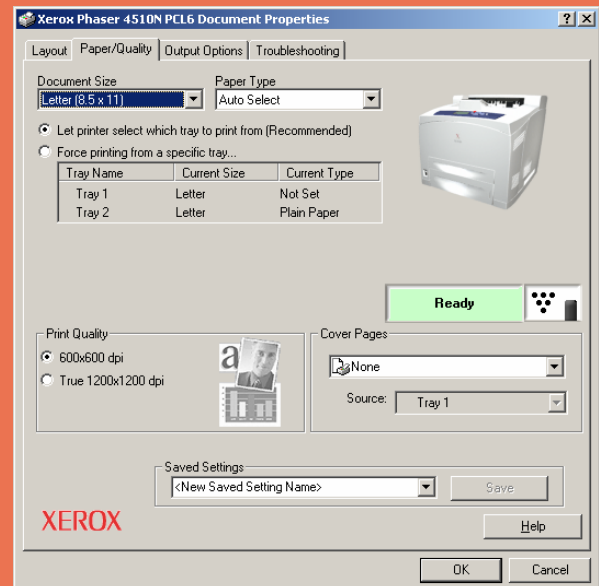

The PCL driver's Paper/Quality tab enables users to select document size, document source, covers and resolution. Of special note is that both the Phaser 4510n's PCL and PostScript print drivers provide bidirectional communication, as that they indicate current device status ("Ready" as seen above), as well as currently installed paper sizes and types, and the current toner level. This tab also provides an option, "Saved Settings," for storing frequently used print-job settings for later recall. This eliminates users having to repeatedly specify frequently used print-job settings.

PCL PRINT-DRIVER
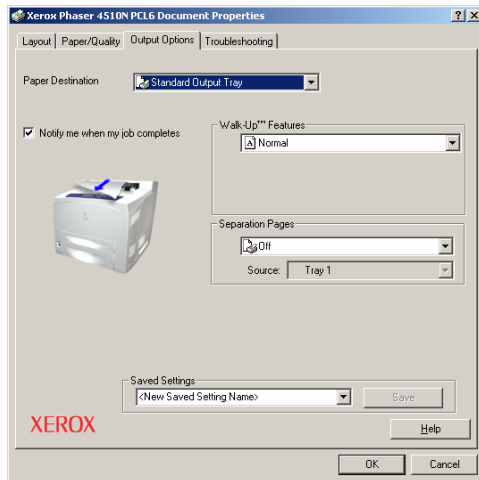
When equipped with the optional hard drive, the Phaser 4510n provides proof printing, storage of files in hard-drive memory, secure printing (users must enter their password at the control panel for the job to print), etc. The Phaser 4510n was not equipped with the optional hard drive in testing, so these capabilities could not be evaluated.

Also note that users can enable Xerox's PrintingScout utility to automatically notify them via a "pop-up" window when the print job has been completed.
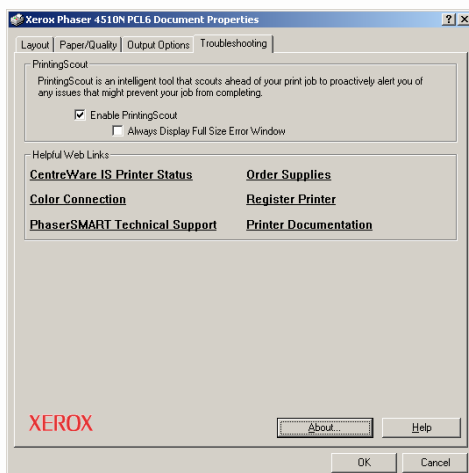

On the PCL driver's Troubleshooting tab, users can enable Xerox's PrintingScout utility. PrintingScout automatically notifies users of completed print jobs and errors via "pop-up" windows on their computer desktop. This tab also provides links to Xerox's CentreWare Internet Services Web-based monitoring and management utility for the Phaser 4510n. It also includes a link to technical support via Xerox's Web site, a link for ordering supplies via Xerox's Web site, and a link to printer documentation, the last of which includes various user manuals.

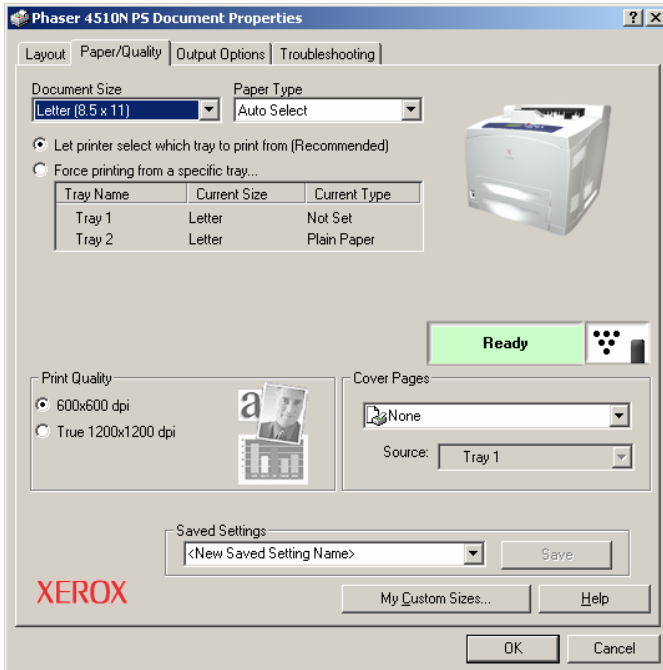## POSTSCRIPT PRINT-DRIVER
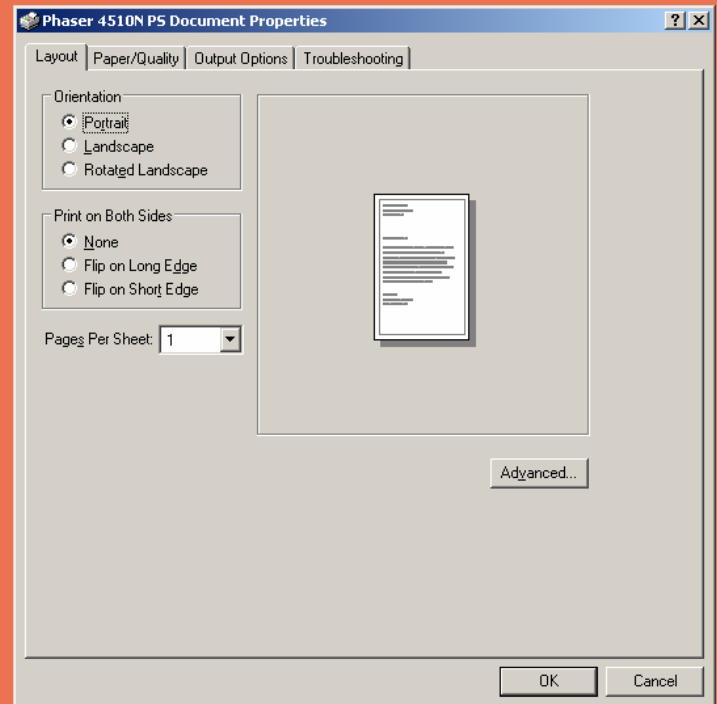
Both the Phaser 4510's PCL and PostScript drivers have nearly identical user interfaces and capabilities.
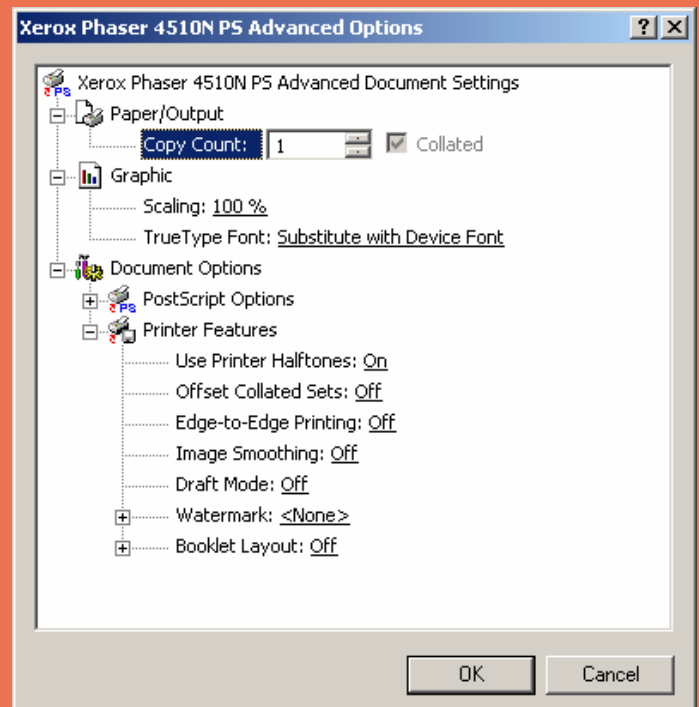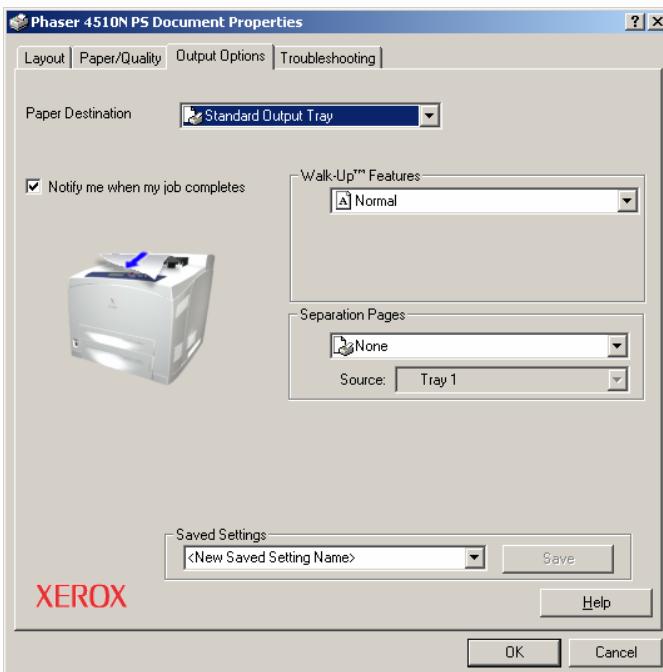

The PostScript driver's "Advanced Options" tab provides PostScript options, TrueType font substitution and advanced image-quality settings.

POSTSCRIPT PRINT-DRIVER

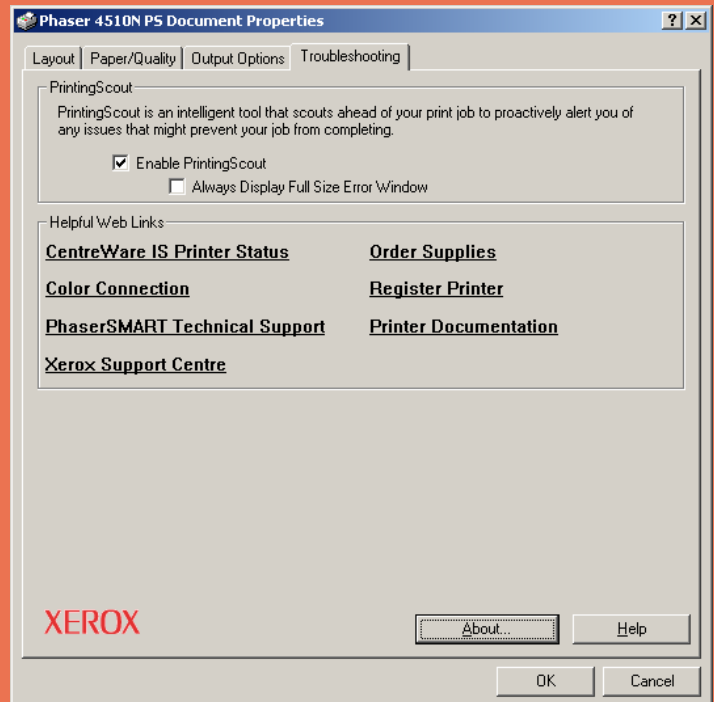As with the PCL driver, the PostScript driver's "Paper/Quality" tab provides real-time device status (here indicating that the device is "Ready") and current toner level.

The PostScript driver's "Troubleshooting" tab provides the same options as the PCL driver's "Troubleshooting tab.

The PostScript driver's "Output Options" tab provides the same options as the PCL driver's ""Output Options" tab.

CLIENT UTILITIES

In order to take the best and most efficient advantage of a device and its capabilities, as well as ensure maximum uptime, clients need an efficient way to access and monitor the device. This is true whether the device is an MFP, printer or scanner.

Most general users want to know first if a device is capable of handling a particular job—for instance, if it has duplexing, color capability; supports specific paper sizes, or provides certain document finishing, such as stapling or saddle-stitch booklet making.

Second, users want to know a device's current status—if it is ready to print or is offline, for instance. Third, they may also wish to know whether it is equipped with sufficient supplies, such as toner, paper and staples, to be able to produce their job. Fourth, when the device is shared, they may wish to know how many other jobs may be lined up ahead of them.

Manufactures typically provide the user with this information either via a client software utility that is installed on the client's workstation, or via a printer Web page that is accessed via the Web and a Web browser. Some manufacturers may also provide software that automatically indicates (via a pop-up window) when the user's job is completed or if there is a problem with the device, such as depleted paper.
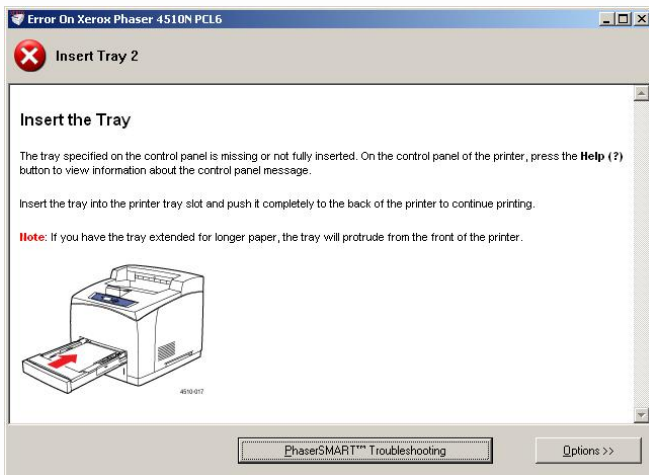
PrintingScout is built into the print driver and provides automatic "pop-up" alerts indicating when there is a printer error (such as a paper drawer is empty or open). Printing Scout also indicates when print jobs are completed. Since Printing Scout is built into the print driver, IT does not have to support additional resident software or client utilities so that users can enjoy effective and time-saving client printer monitoring capabilities.
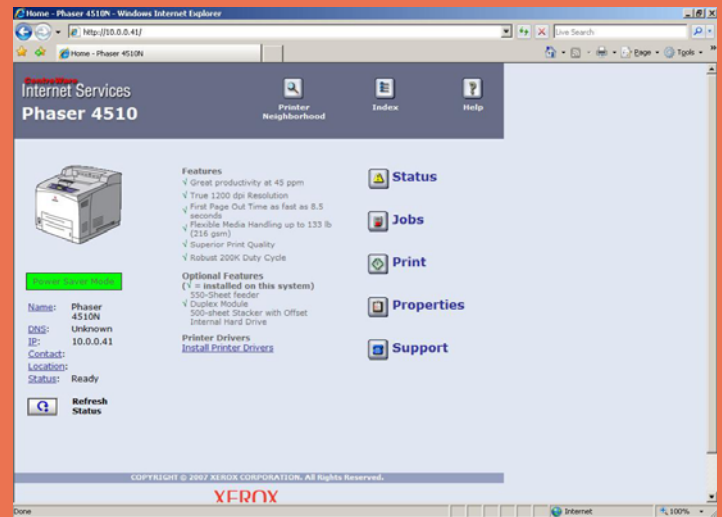
Xerox's Web-based CentreWare Internet Services (first tab), is available from links in PrinterScout and both the PCL and PostScript print drivers. CentreWare Internet Services provides monitoring and management of the Phaser 4510n. The first tab indicates device status, and includes links to supply status and the job queue.
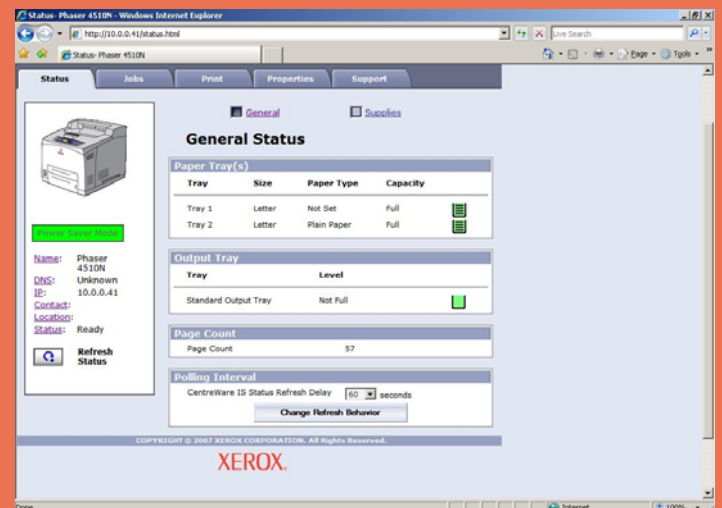
CentreWare Internet Services indicates printer status, the status of paper drawers (installed sizes and current levels), and the current page count.

ROUTINE MAINTENANCE

Workgroup devices sold through retail and traditional IT distribution outlets usually are maintained by office workers who change the all-in-one cartridge units that encase the entire imaging system, including the toner cartridge. Units sold through resellers and dealers are usually maintained by office workers and/or trained service engineers. While separate long-life parts are more complex to install (i.e., separate toner cartridges, imaging drums, transfer belts), they tend to cost less than low- yield, all-in-one alternatives.

Toner Replacement

Changing the toner or imaging cartridge is a necessary task that is traditionally is avoided by some for fear of toner dust leaking on clothing or hands, or they fear that it might be too complicated. However, most units today offer clean replacement of toner supplies, and there is very little risk of toner leakage, and toner replacement is usually easy.

Clearing Paper Misfeeds

The main issue that office users attempt to avoid is the removal of an occasional paper misfeed. As a general rule, the faster a device engine, and the more paper handling and finishing options it has, the more complex is the process of removing paper misfeeds.

Common paper-misfeed sources involve the duplex unit and poor loading of paper supplies. The position of the duplex unit may be a major factor in the removal of many paper misfeeds. How easy or difficult it is to load paper supplies can also be a factor in the overall number of misfeeds that may occur

Loading Paper

It goes without saying that loading paper should be as easy as possible, but sometimes that is not the case. Among the factors that affect ease-of-use are:

- The user should be able to load an entire ream (500 sheets) in a single step.
- Mechanisms such as corner separators and ramps in the paper drawer can impede loading paper.
- The most critical factor involved in ease-of-loading paper is automatic paper-size detection. Ultimately, the device should be able to recognize the new paper size and reflect it on its control panel/touch screen and across the network in print drivers and printer-management software. Without automatic paper-size detection, users must remember to program-in the new paper size—something they often neglect to do, or do incorrectly. This can result in jobs printed on the wrong paper size, backed-up job logs, etc.

Maintenance-Features Summary	
Black Toner Yield*	Standard Capacity: 10,000 pages ($159.99); High-Capacity: 19,000 pages ($224.99)
Color Toner Yield*	Not applicable
Fuser Life	200,000 pages
Developer Life	Included in toner cart.
Toner Refill During Printing?	No
User Replaceable Drum?	Yes**
User Replaceable Fuser Unit?	Yes**
User Replaceable Waste Container?	No
User Replaceable Original/Paper Feed Rollers?	No

*Manufacturer's stated toner yield using originals with 5% area coverage per color.
**Maintenance Kit ($269.99) is rated to yield 200,000 pages and includes the drum and fuser unit.

Ease of Use

REPLACING TONER

To replace the Phaser 4510n's toner cartridge, the user first opens the door located on top of the printer.

Grasping its handle, the user pulls out the toner cartridge. Removing and replacing the toner cartridge is a simple procedure.

ADDING PAPER

The printer's bypass tray, standard 550-sheet paper drawer and optional 550-sheet paper drawer are completely removable, which makes it easier to load paper than with drawers that cannot be removed. Users can easily load a full ream of paper in the 550-sheet drawers. The 550-sheet drawer has a convenient out-stop that prevents users from pulling it out of the machine and accidentally dropping it to the floor.

In order to load any of the paper sources with paper, users must first remove (and then replace) a thin plastic dust cover as shown above.

The Phaser 4510's flush mounted paper drawers have an elegant look and save an appreciable amount of counter space.

Ease of Use

ADDING PAPER

Above and below: the user squeezes these guides in order to adjust the drawers so that they can accommodate different size paper.
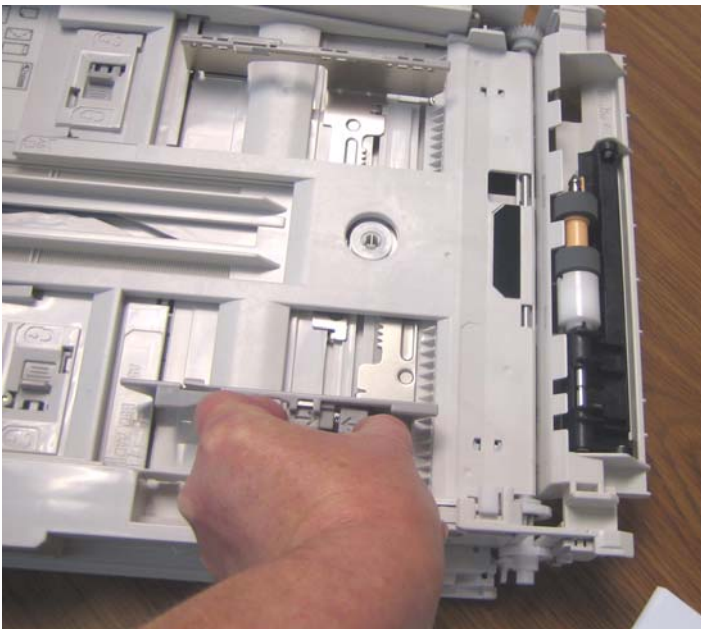
MISFEED ACCESS
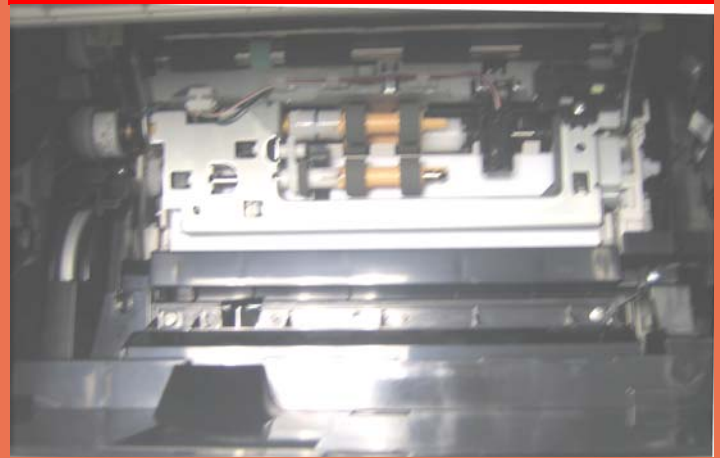
To remove any misfeeds that may occur in the area where the toner cartridge is housed, users first open the front cover, and then remove the toner cartridge.

To access some misfeeds, the user opens the door in the back of the unit, exposing the area where the user-replaceable fuser unit is housed.

WHAT WE LIKED

- Users can obtain device status from the print drivers—they do not have to launch a printer Web page or other status-monitoring utility. Instead, with just a glance at the print driver, users can see if the Phaser 4510n is ready to print, current toner level, and currently installed paper sizes and types. Network administrators can disable bi-directional communication if they wish to conserve network bandwidth.

- The two print drivers—PCL and PostScript—are also easy to navigate, and provide an exceptionally easy-to-use user interface.

- PrintingScout provides automatic "pop-up" alerts that notify users when their job has been printed, and when the printer may require attention, such as when paper is depleted or a paper drawer is open.

- CentreWare Internet Services provides Web-based device and supplies monitoring, and will be easy for clients to use.

- BERTL had no difficulty removing and replacing the toner cartridge or the user-replaceable fuser unit, and access to misfeed points was easy in most cases (although no misfeeds occurred in testing).

- The 550-sheet drawer conveniently has a convenient out-stop that prevents users from pulling it out of the machine and accidentally dropping it to the floor.

WHAT WE WOULD LIKE TO SEE

- In order to access some misfeeds, users must access the back of the unit—in most cases (depending on how the printer is placed), this will involve turning the printer around, which may be difficult for wheelchair users. Also, some users (such as wheelchair users), may be have difficulty accessing jams that may occur in the area where the toner cartridge is housed.

PAPER INPUT

Substrate (paper) handling is a core requirement of every device. If a device cannot print a file on specific paper desired by the user, it hardly matters how fast the print engine is, or how many pages it can produce.

A device's paper-handling capability basically concerns how it can handle two key criteria: the paper size and paper weight it can feed, as well as the maximum number of pages that can be loaded in the device's drawers, trays, etc. The greater the paper capacity, the less time users will spend reloading paper.

The Phaser 4510n's standard 150-sheet bypass tray and 550-sheet paper drawer.

Paper Handling: Input-Features Summary	
Standard Paper Capacity	700 sheets: 150-sheet bypass tray, 550-sheet paper drawer
Optional Paper Supplies	550-sheet paper drawer
Maximum Paper Capacity	1,800 sheets
Maximum Paper Size	8.5"x14" (216mmx356mm)
Minimum Paper Size	3.9"x5.8" (99.06mmx147.32mm)
Minimum/Maximum/ Paper Weight (main trays)	16 lb. bond – 110 lb. bond (64 – 216 gsm)
Maximum Paper Size (bypass)	8.5"x14" (216mmx356mm)
Minimum/Maximum Paper Weight (bypass)	16 lb. bond – 110 lb. bond (64 – 216 gsm)
Minimum/Maximum Paper Weight (duplex)	Info not available
Automatically Senses Paper-Size Changes?	Yes
Drop-In Loading of Entire Ream of Paper?	Yes

Paper Handling

PAPER OUTPUT AND FINISHING

Office workgroup devices' paper-output handling options range from duplex printing to saddle-stitch booklet making. Many devices offer a choice of finisher/staplers, which provide a low-cost, minimum footprint solution, or a high-capacity, fully featured solution such as multi-position stapling, saddle-stitch booklet maker and/or document whole puncher.

BERTL evaluates these functions looking at how the same job outputs at different speeds when different finishing options are specified. The impact of the finishing selection is determined by timing jobs that are sent to a device with various finishing settings.

Stapling

Lower-cost finisher/stapler units often have a 15- to 30-sheet maximum stapling capability and are often limited to corner stapling. Floor-standing, higher-cost finishers typically provide 50-sheet capability and provide both corner and double stapling.

Saddle-stitch booklet making allows users to create folded, center-stapled booklets. Some saddle-stitch finishers only handle 10 sheets (for producing 40-page booklets), while others handle up to 15 sheets (for producing 60-page booklets).

Mail Bin Units and Offset Output

Many workgroup devices provide offset stacking (each set is offset from the next) to make it easier to separate jobs. Some also provide physical mailbox units that allow each user to send jobs to their own mailbox tray. However, most mailbox units do not accept finished (such as stapled) jobs. A multi-tray finisher can also offer some form of job separation typically used to separate different types of jobs (fax, print, copy) for easier identification.

Post-Process Insertion (PPI)

A post-process insertion unit can be used to automatically insert pages into completed print or copy jobs. These inserts can include chapter covers, color pages and specialty material, such as heat-sensitive materials that may be damaged if run through the device. The advantage of course is that no human intervention is required to manually insert pages into completed jobs.

Output/Finishing Features Summary	
Standard Output Tray Capacity	1,000 sheets
Optional Output Option(s)	500-Sheet Stacker w/Job Offset
Maximum Stapling Capacity	Not applicable
Maximum Stacking Capacity	1,000 sheets
Maximum Saddle-Stitch Capacity	Not applicable
Hole-Punch Option(s)	No
Physical Mail Bin Option(s)	No
Folding Option(s)	No
Post Process Inserter Option(s)	No
PPI Capacity	No

The Phaser 4510n's top output bin.

WHAT WE LIKED

- All paper sources accept up to legal-size paper (8.5" x 14") and up to 110 lb. cover stock.

- Accepts a wide range of paper stock from all sources—bond, card, coated, cover, envelopes, hole-punched, labels, transparencies, etc.

- A gauge located on the outside of the paper drawers indicates the current paper level inside.

- The generously-sized output trays holds up to 1,000 sheets.

WHAT WE WOULD LIKE TO SEE

- Paper additions would be easier if the dust cover was eliminated from both standard paper trays.

BACKGROUND

An efficient device-management software system is critical in order to take maximum advantage of a device's feature set, be it a printer, fax, scanner or multifunctional peripheral (MFP).

Device management is typically provided via a Web server on the device controller. This Web server is accessed using any desktop Web browser. The user simply enters the device's IP address into the address line of their Web browser. Note that administrators and office users have different management and monitoring needs.

General Office Users

As noted previously, end users want to know if a device is capable of handling a particular job, current status (such as "Ready"), and current supply levels (paper, toner), as well as if there are any other jobs waiting to be printed.

Administrators

The aim of most network administrators is to obtain greater control over networked devices without having to leave their own desk. From their computer desktop, they would like to be able to set up the device on the network, establish security for IP filter ranges, apply cost-control measures, check supply levels, and set up automated e-mail alerts for different staff members when problems occur or maintenance needs must be met.

Due to the nature of a device's Web server, this capability is usually limited to an individual device. However, many manufacturers also include a network device- management fleet tool, which allows for the concurrent monitoring and management of multiple devices connected to the network. Many also provide plug-ins for the most popular IT device-management utilities in order to ensure that the maximum amount of information can be relayed from their device to the third-party application.

| Device-Management Features Summary	
Web-based device monitoring	CentreWare Internet Serices Embedded Web Server; CentreWare Printer Managment for Microsoft, Novell, and UNIX; CentreWare Web Network Management Utility; CentreWare for HP OpenView, Tivoli NetView, Unicenter TNG, Xerox Support Centre
Executable-based device monitoring	PrintingScout Alert Notification
Group management of network devices	Yes
Monitor 3rd-party MIB-compliant network devices	Yes
HP Web JetAdmin compatible	No

Device Management
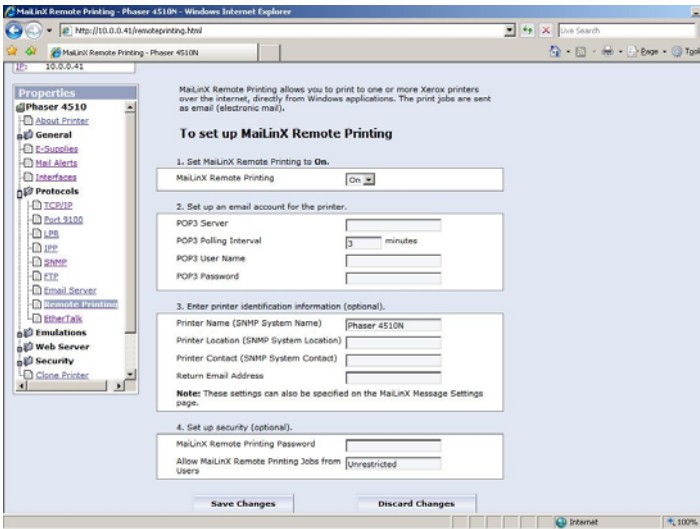
CentreWare Internet Services provides a remote-printing tool that enables users to print to remote Xerox printers via e-mail. In this way, users can print to other Xerox printers that are not connected to the user's network. The printers may be located in another building, state, country, etc.
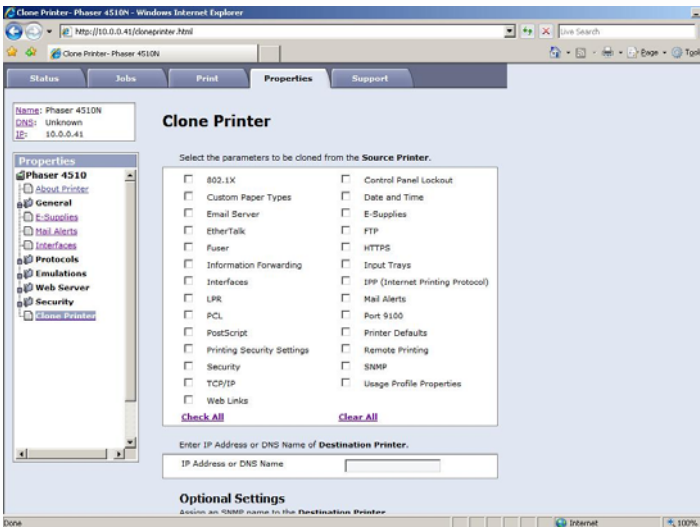
With CentreWare Internet Services' "Clone Printer," tool, administrators can quickly copy settings from one network printer to the Phaser 4510n. This saves time, and ensures that the printer's settings are properly configured.
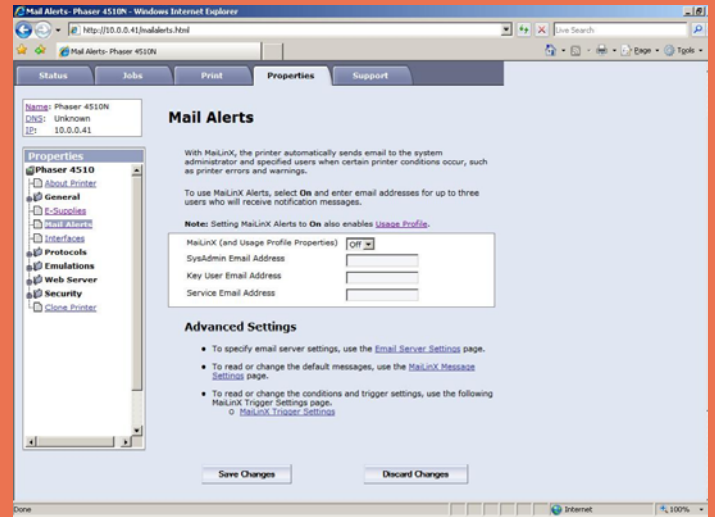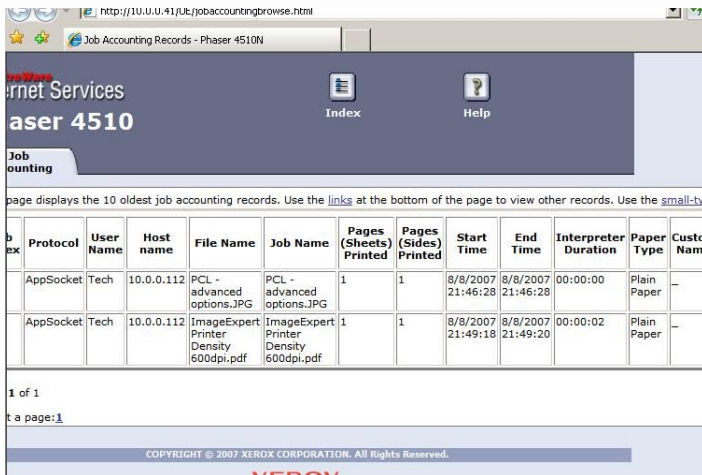

With CentreWare Internet Services, administrators can configure e-mail alerts (above and below) that automatically alert designated users when the printer needs attention, such as when paper is depleted.
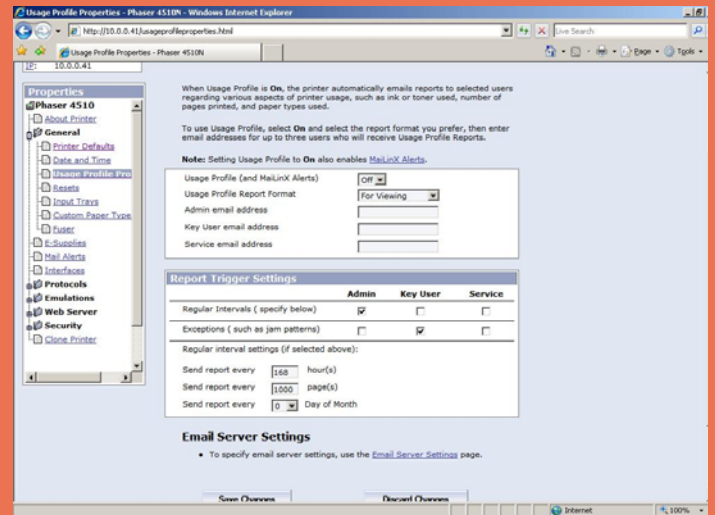
Device Management

CentreWare Internet Services provides a variety of advanced job-accounting tools for the Phaser 4510. Job-accounting reports can be downloaded, saved, printed, etc.

The Phaser 4510n's job-accounting log showing printed jobs. This log indicates the host computer workstation, file name, job name, pages printed, start and completion time, and paper type used.
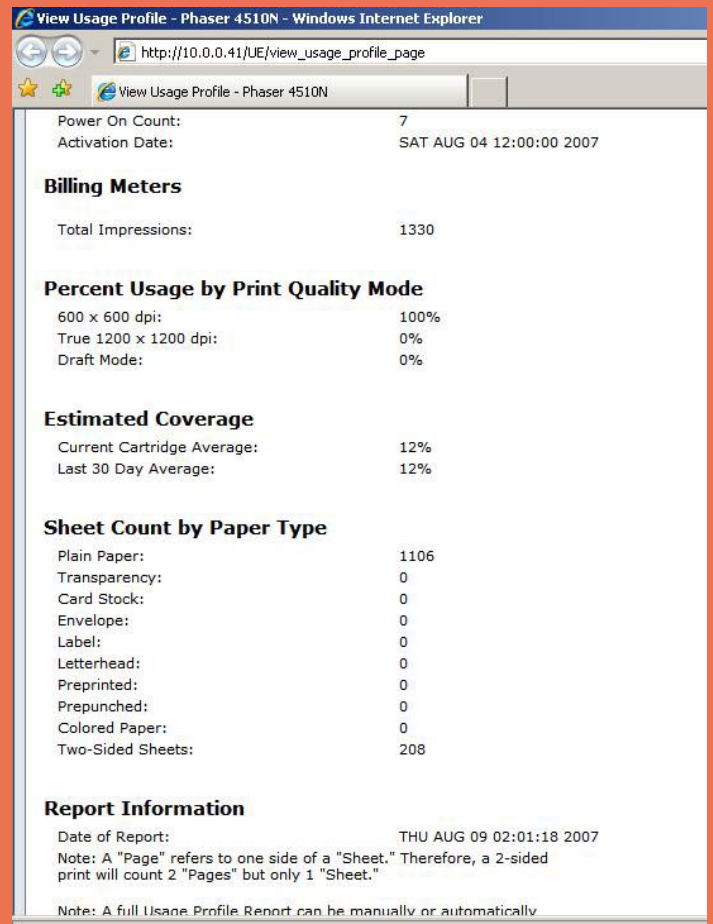
CentreWare Internet Services also provides detailed usage reports for the Phaser 4510n. Above is a portion of a usage report indicating total number of pages printed, and paper type used. It also includes an estimate of average toner coverage used, as well as an estimate of average toner coverage used in the last 30 days.

Device Management
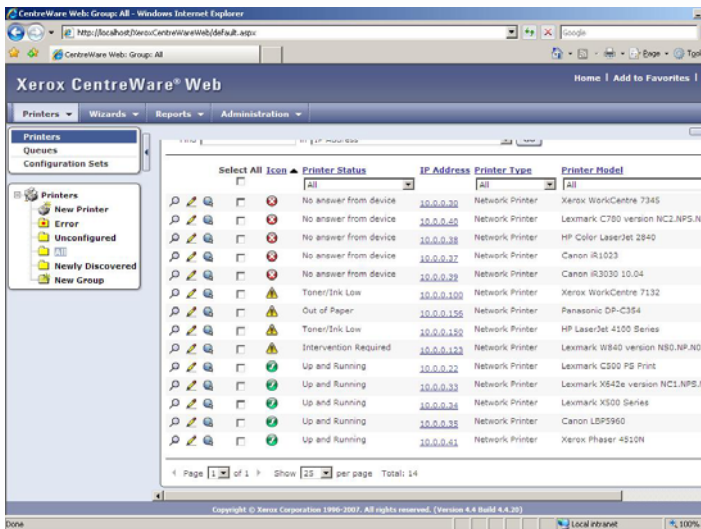
The Phaser 4510 also features Xerox's Web-based CentreWare Web for managing the Phaser 4510 and MIB-compliant third-party devices. With CentreWare Web, administrators can discover, install, configure, maintain and monitor network devices. When the administrator selects a network device from the list above, CentreWare Web indicates more information about that device (see right).
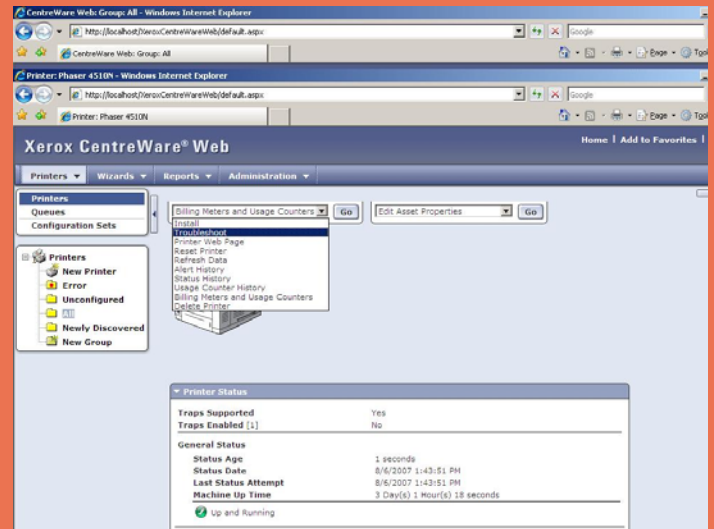
Aside from indicating current device status and information, CentreWare Web can also be used to link to the device's Web page (such as CentreWare Internet Services), reset the device, view alert and status history, etc.

WHAT WE LIKED

- With CentreWare Web, administrators can efficiently discover, install, configure, maintain and monitor network devices. It provides easy and convenient network-device monitoring, so that administrators and users can quickly see if network devices are ready for printing. Indicates toner and supplies status of networked Xerox devices.

- CentreWare Internet Services enables administrators to set up e-mail alerts automatically alerting designed users when the printer needs attention. A cloning tool enables administrators to copy another network printer's settings to the Phaser 4510n for quickly configuring it.

- CentreWare Internet Services provides a remote-printing tool that enables users to print to remote Xerox printers via e-mail. That means users can print to other Xerox printers that are not connected to the user's network, and the printer may be located in another building, state, country, etc.

- CentreWare Internet Services also provides detailed usage reports for the Phaser 4510n. These reports indicate total number of pages printed, paper type used, and an estimate of average toner coverage used, as well as an estimate of average toner coverage used in the last 30 days. This would be an invaluable tool, for instance, for office-equipment dealers who wish to formulate cost-per-page plans based on a customer's average toner coverage.

WHAT WE WOULD LIKE TO SEE

- As with most network-printer management solutions, the most information is provided for the vendor's brand.

BACKGROUND

It seems high-tech security is never out of the news, with reports of information theft and hacking making headlines almost every day. And, unfortunately, by their very nature, network printers and MFPs are security risks if not managed correctly.

For instance, advanced network connectivity options open ports to hackers. Industry-standard Java and Web browser design elements are vulnerable to virus attack. Large hard drives store a latent copy of every document flowing through the device data for years. Devices link directly to core network components such as the LDAP address list or the central file server. Plus, fast communication options let insiders send information to the outside with no method of being traced.

Security and data-compliance regulations such as Common Criteria (CC) certification, HIPAA, Gramm Leach Bliley, FERPA, SEC, FSMA, and the Patriot Act are aimed at safeguarding information, and force companies to conform to best practices in document and data-security management.

Security-Features Summary	
Hard-Drive Overwrite	Yes
Removable Hard Drive	No
Private Print	Yes
Encrypted Printing	No
Secure Fax	Not applicable
Encrypted PDF Send	Not applicable
Network Authentication	No
LDAP Authentication	No
Kerberos Authentication	Yes
SNMP v3.0	Yes
IPv6	No
SSL	Yes
IP Filtering	Yes
MAC Filtering	No

PRIVATE/SECURE PRINTING

The purpose of private/secure printing is to keep printed documents secure. It is an important feature when devices are shared and/or out of sight of the user.
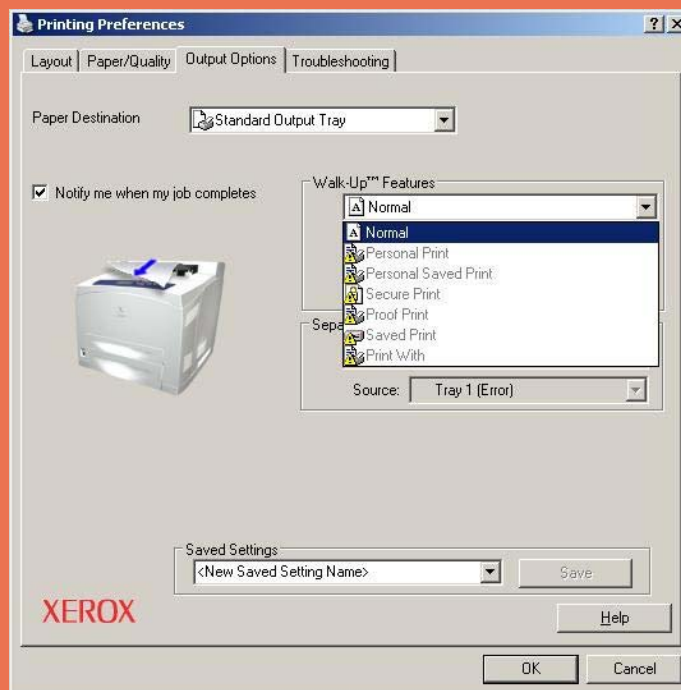
In the past, when a user printed a document containing sensitive or confidential information, unless the user "stood guard" at the printer, the printed document would simply be output to a tray or bin. Other users, including those searching for *their own* print jobs, could then easily view and read any other jobs lying in the tray.

With printers that provide private printing, however, the user typically enters a code of their choosing in the print driver before printing. Even after the user executes the print command, the device will not actually print the job until the user enters their code at the device's control panel.

Some printers' control panels display the file names of all held private jobs. This can be a problem if even a file name (such as one detailing a merger or litigation) must be kept confidential. Other control panels only display the file name when the user actually enters their code, providing more security.

Both PCL and PostScript print drivers provide a Secure Print option, which is provided on each driver's first tab. The user is prompted to enter a passcode, which they must enter at the printer's control panel in order for the WorkCentre 4510n to actually print the job. However, this capability requires the addition of an optional hard drive, which was not available in testing.

WHAT WE LIKED

- Device security includes Kerberos authentication, SNMP v3.0, IP filtering and SNMP v3.0. Also provides hard-drive overwrite for the optional hard drive, and private/secure printing when equipped with the optional hard drive.

WHAT WE WOULD LIKE TO SEE

- IPv6 and MAC filtering would provide additional security.

Throughout BERTL's extensive testing program, Xerox's Phaser 4510n proved to be a straightforward, no-nonsense network laser printer that efficiently "gets the job done." In this case, "the job" will be printing black-and-white primarily text applications in the office at Xerox's rated print speed of up to 45 ppm. BERTL found the printer solidly built, and, at its maximum recommended monthly volume of up to 200,000 pages, this efficient workhose should be quite capable of meeting the demands of most mid-volume office workgroups.

In testing, BERTL observed the following:

- Tested First Page Out Time (FPOT) was as fast as a little over 8 seconds (Adobe PostScript mode).
- Print-file sizes were overall smaller in Adobe PostScript mode versus PCL mode.
- The Phaser 4510n was slightly faster in Adobe PostScript mode versus PCL mode when printing BERTL's 10-page black-and-white PDF test file.
- The printer was also slightly faster printing BERTL's 10-page graphics test file in Adobe PostScript mode versus PCL mode.
- Tested print speed was as fast as approximately 44 ppm.
- Print resolution (horizontal and vertical) was average, and printed halftones were good. The printer's image quality will be most appropriate for printing black-and-white, primarily text office files.
- BERTL's test unit was equipped with 128 Mb of standard memory but would not print large graphic files in PostScript mode. Consequently, users who have advanced PostScript printing applications should consider a memory upgrade and/or the optional 40 GB Hard Drive.

As with nearly all printers, the Phaser 4510n's control panel consists of an LCD panel and hard keys (not a touch screen). BERTL found this control panel easy to use and straightforward, and unlike with some competitors' LCD panels, the Phaser 4510n's LCD panel is exceptionally clear and easy-to-read. The printer's print drivers are a step-above its competitors' print drivers, as they feature bi-directional communication with the printer (administrators may also disable bi-directional communication if they wish to conserve network bandwidth). With just a quick glance at the print driver, we could see if the device was ready to print, current toner level, and currently installed paper sizes and types—there was no need to launch a Web browser or utility in order to obtain this information.

Xerox's PrintingScout utility is also a nice addition. We liked that it automatically notified us via a "pop-up" window when our job was completed. In many offices, shared network printers such as the Phaser 4510n may often be located out-of-sight of some users. Tools such as PrintingScout can eliminate a lot of walking back-and-forth from one's desk to the printer in order to see if a job has been printed. PrintingScout also automatically notifies users of printer errors, so that they can rectified as soon as possible, minimizing downtime.

Routine maintenance was also straightforward and non-intimidating to perform. Wheelchair users though may have difficulty accessing the toner cartridge, which is accessed by opening the top cover, and accessing the back of the area where some misfeeds may occur was a bit awkward (although no misfeeds occurred in testing).

The Phaser 4510n is equipped with Xerox's highly capable CentreWare Web for administrative management and monitoring of the printer and compatible network printers. Xerox's CentreWare Internet Services printer home page also makes it easy for clients to see the Phaser 4510n's device status and configuration information. In addition, CentreWare Internet Services also provides several useful tools for administrators, including a "cloning" tool that enables administrators to copy settings from one network device to the Phaser 4510n for exceptionally easy set-up. CentreWare Internet Services also provides extensive job-tracking and accounting tools, as well as the ability to estimate the approximate toner coverage of all pages by printed by the Phaser 4510n, and pages printed in the last 30 days.

Overall, considering the Phaser 4510's excellent productivity performance in testing, good black-and-white office image quality, exceptional ease of use, and CentreWare Internet Services and Web management and monitoring solutions, BERTL was impressed with the Phaser 4510n. We recommend the Xerox Phaser 4510 for mid-volume office workgroups that require a no-nonsense, very user-friendly, mid-volume monochrome network laser printer for printing black-and-white, primarily text office volumes.

OFFICE

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HIGHLY RECOMMENDED

Summing Up

WHAT WE LIKED

- With CentreWare Web, administrators can efficiently discover, install, configure, maintain and monitor the Phaser 4510n and compatible network devices.

- CentreWare Internet Services (the Phaser 4510n's printer home page) provides Web-based device and supplies monitoring for the Phaser 4510n, and will be easy for clients to use.

- CentreWare Internet Services enables administrators to set up e-mail alerts automatically alerting designed users when the printer needs attention. A cloning tool enables administrators to copy another network printer's settings to the Phaser 4510 for quick configuration

- CentreWare Internet Services provides a remote-printing tool that enables users to print to remote Xerox printers via e-mail. This enables users to print to other Xerox printers that are not connected to the user's network, such as a printer in another building, state, country, etc.

- CentreWare Internet Services also provides detailed usage reports for the Phaser 4510n. These reports indicate total number of pages printed, paper type used, and an estimate of average toner coverage used, as well as an estimate of average toner coverage used in the last 30 days. This would be an invaluable tool, for instance, for office-equipment dealers who wish to formulate cost-per-page plans based on a customer's average toner coverage.

- Users can obtain device status from the print drivers—they do not have to launch a printer Web page or other status-monitoring utility. Instead, with just a glance at the print driver, users can see if the Phaser 4510n is ready to print, current toner level, and currently installed paper sizes and types. Network administrators can disable bi-directional communication if they wish to conserve network bandwidth.

- The two print drivers—PCL and Adobe PostScript—are also easy to navigate, and provide an exceptionally easy-to-use user interface.

- Xerox's PrintingScout utility is built into the print driver (does not require the support of resident or executable printer monitoring utilities) provides automatic "pop-up" alerts that notify users when their job has been printed, and when the printer may require attention, such as when paper is depleted or a paper drawer is open.

- Hard-drive overwrite for the optional hard drive and private/secure printing (when equipped with optional hard drive).

- BERTL had no difficulty removing and replacing the toner cartridge and user-replaceable fuser unit, and access to misfeed points was easy in most cases (although no misfeeds occurred in testing).

- Users may store documents in password-protected user mailboxes in optional hard-drive memory for print-on-demand. Documents stored in a user inbox may be combined and printed simultaneously.

- With Delay Printing, users may specify that jobs be printed at a specific time, for instance, after business hours, when the printer is not being used by others.

- Optional Direct Print, so that users may print files without having to launch print drivers or applications.

- Provides Adobe PostScript 3, not a PostScript emulation, as some users insist on only Adobe-brand PostScript.

- All paper sources accept up to legal-size paper (8.5" x 14") and up to 110 lb. cover.

- Accepts wide range of paper stock from all sources—bond, card stock, coated, cover, envelopes, heaveyweight, hole-punched, labels, transparencies, etc.

- A guide located on the outside of the paper drawers indicates the current paper level inside.

WHAT WE WOULD LIKE TO SEE

- Easier access to misfeeds that may occur in the back area (although no misfeeds occurred in testing). As it stands, in order to access some misfeeds, users must access the back of the unit—in most cases (depending on how the printer is placed). This will involve turning the printer around, which can be a bit awkward. Also, some users (such as wheelchair users), may be have difficulty accessing jams that may occur in the area where the toner cartridge is housed.

- BERTL's test unit was equipped with 128 Mb of standard memory but would not print large graphic files in PostScript mode. Consequently, users who have advanced PostScript printing applications should consider a memory upgrade and/or the optional 40-GB hard drive.

About BERTL -

The success of an organization depends on its ability to manage its information and assets. An effective workflow process requires the complex integration of information, devices, software, and people.

IT managers, office managers, and other knowledge management professionals need to know what digital imaging devices would best serve their specialized workflow processes.

BERTL's services are designed around this real-world framework, delivering business consumers the independent analysis and insight needed to make critical decisions about digital imaging's role in their organization.

Independent Analysis and Insight

BERTL's reports, comparative data, and strategic guides look at digital imaging through the eyes of the business user. The research examines not only the technical features, but also vertical market applications, and business benefits. The impact on worker productivity is a primary concern.

BERTL is 100 percent independent. It receives no funding from manufacturers and all product evaluations and reports are published at BERTL's own expense for its subscribers. Business users worldwide trust BERTL for objective, unbiased analysis of digital imaging systems.

BERTL Services

Reports and Star Ratings
BERTL analysts provide detailed reports on the technical and practical benefits of thousands of color and monochrome workgroup, office, graphic arts, and production devices.

Product Specifications
DataCheck Gen II provides the most current competitive data on printers, copiers, MFPs, fax devices, wide format printers, scanners, and more.

News, Interviews, and Analysis
The ITchat online magazine provides insight into the dynamics and trends of the digital imaging marketplace through interviews, feature articles, and software reviews.

BERTL Awards
BERTL analysts recognize the leading devices and software solutions in the annual BERTL's Best awards. BERTL also honors the performance of manufacturers in the annual Readers' Choice selections.

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