# BlackWidow 2.0.2

Theory of Operation
and
Field Installation Manual

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## Introduction:

Most Linux distributions such as RedHat, Slackware, Debian, etc. are general purpose. You can use them for building user workstations, file and print servers, web servers, e-commerce and database servers, or for home uses such as browsing the web, word processing and game playing. BlackWidow is a *special purpose Linux distribution* (SPLD). It is designed to provide secure, efficient access to the Internet for an existing private (home or office) network as easily as possible. While BlackWidow's functionality can be duplicated with other general purpose Linux distributions and even other products (such as Windows98SE, or WindowsNT proxy server), BlackWidow eliminates the need for much of setup, customization, patching, integration and testing that's required for setting up a comparable solution with other products. It's already done for you.

There are a few other SPLDs out there, such as the Linux Router Project (LRP) that BlackWidow could be compared to. These are typically designed to run on a floppy disk and provide Internet connectivity. They work well but the difference is a matter of philosophy and functionality. LRP starts from bare minimum and functionality is added to it. BlackWidow starts from a full function distribution and scales down to what is needed but still maintaining a robust environment. With advances in technology and subsequent decreases in hardware costs, we feel the BlackWidow can provide the best feature/cost ratio.

BlackWidow 2.0.2 is based on the Slackware 4.0 Linux distribution. To save space and reduce complexity, only a subset of the complete package is installed. The components installed include the core (A series), networking (N) and other utilities needed for log file processing (such as perl). In addition to Slackware, diald (dial on demand), a dhcp server, and a caching web proxy (optional) is installed as well as a custom perl scripts used for log file processing.

Linux 2.2.13 is the kernel used for this version. Many of the "packages" that ship with Slackware 4.0 have also been updated to newer versions as well. The kernel is configured with IP firewalling and masquerading (network address port translation) enabled, and optimized as a router. Network interface drivers (ethernet) are now built as modules, so that a variety of NICs may be used just by editing a configuration file.

## System Requirements for BlackWidow:

| CPU | 486-66DX<br>Pentium 90 or higher (recommended) | This is a function of the number of users and how much logging is desired. |
| --- | --- | --- |
| Hard Drive | 200MB IDE | This depends on the amount of logging. |
| RAM | 12MB<br>32MB (recommeded) | This is a function of the number of users and how much logging is desired. |
| I/O | 1x Compatible NIC (see chart)<br>1x (2x for remote diags) 33.6 or 56K Hayes compatible modems<br><br>2x Compatible NICs (see chart) | One of the modems is used for dialing out to the ISP.<br><br><br>This configuration is for cable modem/xDSL. |
| Other | 1.44MB Floppy drive (only used to load software)<br>CD-ROM (only used to load software) | The floppy could be used for system updates, as could the CD-ROM (pref. IDE).  Software can also be loaded via network. |

## Installation Procedure:

BlackWidow 2.0.2 is an upgrade to version 2.0.0.  BlackWidow 2.0.0 must be installed on the system prior to the 2.0.2 upgrade.  The next few paragraphs cover the installation of 2.0.0.

Insert the boot floppy and turn the system on.  During the boot, the system will prompt for an IP address and then finish booting.  Log in as **root** with no password.  Use **cfdisk** to make two primary partitions:  1 linux native and 1 linux swap.  The swap partition should be 1 to 2 times the amount of physical RAM in the system.  Make sure that the Linux native partition is active.  After the partitions have been made, reboot with **Ctrl-Alt-Del**.  Repeat above, except do not run **cfdisk**. Format your swap partition with **mkswap /dev/hda2** (assuming this is your swap partition).  Add your swap partition with **swapon /dev/hda2**.  Format your primary partition with **mke2fs /dev/hda1**. Mount your new partition with **mount /dev/hda1 /mnt** . Change directory to the new partition with **cd /mnt** .  Assuming that the BlackWidow software is loaded on a web server, retrieve it with the following command: **snarf http://*SERVER-URL*/bw-2.0.0.tar.gz** . Uncompress the software with **tar xvzf bw\*** . Delete the archive: **rm bw-2\*** . Prepare the system for booting with **cp /mnt/etc/lilo.conf /etc** . Make the new system bootable with this command: **/mnt/sbin/lilo -r /mnt -C /etc/lilo.conf** .   Remove the floppy disk and reboot with **Ctrl-Alt-Del**.

At this point, BlackWidow is functioning, but needs to be configured for the customer environment.  Log in as root and set the password with the **passwd** command.  You should also

use the **passwd operator** command to set the password for the operator login.  As of BlackWidow 2.0.0, logging in via telnet as root is no longer allowed.  You must login as operator and use the **root** command to become the administrator (or root).

After 2.0.0 has been successfully installed, copy the update file to /tmp.  Make the file executable by using chmod <filename>, then run the file with ./<filename>.  The archive should automatically expand and prompt you to continue the installation.  After the upgrade is installed, reboot the system.

## System Configuration and Operation:

At this point, the software is installed and must be configured to your environment. BlackWidow keeps it's configuration in standard ASCII text files. These files are located in various locations in the filesystem, but most have been linked to a common directory. Use the **config** command from anywhere to change to this directory. Use **edit** *filename* on the following files to change the hostname and IP address to the appropriate values:

```
dhcp.conf                        (if using DHCP)
dns.param
dns.server
hosts
net.init
dnsfiles/db.*
web.proxy                        (if using cache)
cache.config/squid.conf          (subdirectory)
cache.config/ipauth
```

BlackWidow 2.0.x features a web based Administration Console (Webmin) which can also be used to configure and control the system. The console requires a valid username/password and is encrypted with 40/128 bit SSL (depending on your browser's capability).

**net.init**

This file configures the internal network interface (eth0).

```
UW PICO(tm) 3.5                     File: net.init

/sbin/ifconfig lo 127.0.0.1
/sbin/route add -net 127.0.0.0 netmask 255.0.0.0 lo

# IF YOU HAVE AN ETHERNET CONNECTION, use these lines below to configure the
# eth0 interface. If you're only using loopback or SLIP, don't include the
# rest of the lines in this file.

# Edit for your setup.
IPADDR="192.168.2.1"     # REPLACE with YOUR IP address!
NETMASK="255.255.255.0"  # REPLACE with YOUR netmask!
NETWORK="192.168.2.0"    # REPLACE with YOUR network address!
BROADCAST="192.168.2.255"        # REPLACE with YOUR broadcast address, if you
                         # have one. If not, leave blank and edit below.
GATEWAY=""       # REPLACE with YOUR gateway address!

# Uncomment the line below to configure your ethernet card.
/sbin/ifconfig eth0 ${IPADDR} broadcast ${BROADCAST} netmask ${NETMASK}

# If the line above is uncommented, the code below can also be uncommented.

^G Get Help   ^O WriteOut   ^R Read File  ^Y Prev Pg   ^K Cut Text   ^C Cur Pos
^X Exit       ^J Justify    ^W Where is   ^V Next Pg   ^U UnCut Text ^T To Spell
```

Replace the values for IPADDR, NETMASK, NETWORK, and BROADCAST for ones that are suitable for your environment.

If the BlackWidow is to be used in a cable modem/xDSL environment, use **edit startup** and uncomment the entries for the DHCP client on eth1.  If a traditional analog dialup modem is to be used, uncomment the entries for diald instead and use the **console_isp** command to setup the ISP information or manually edit the **connect** file.

By default, web caching, DHCP, and demand dialing are turned OFF after installation.  After the system has been configured to the environment, type config and then edit startup to enable (uncomment) the appropriate functions.  As a minimum, demand dialing should be enabled.  If web-caching is to be enabled, run **/usr/local/squid/bin/squid -z** first to create the cache directories.

  After logging in, you should see the following:
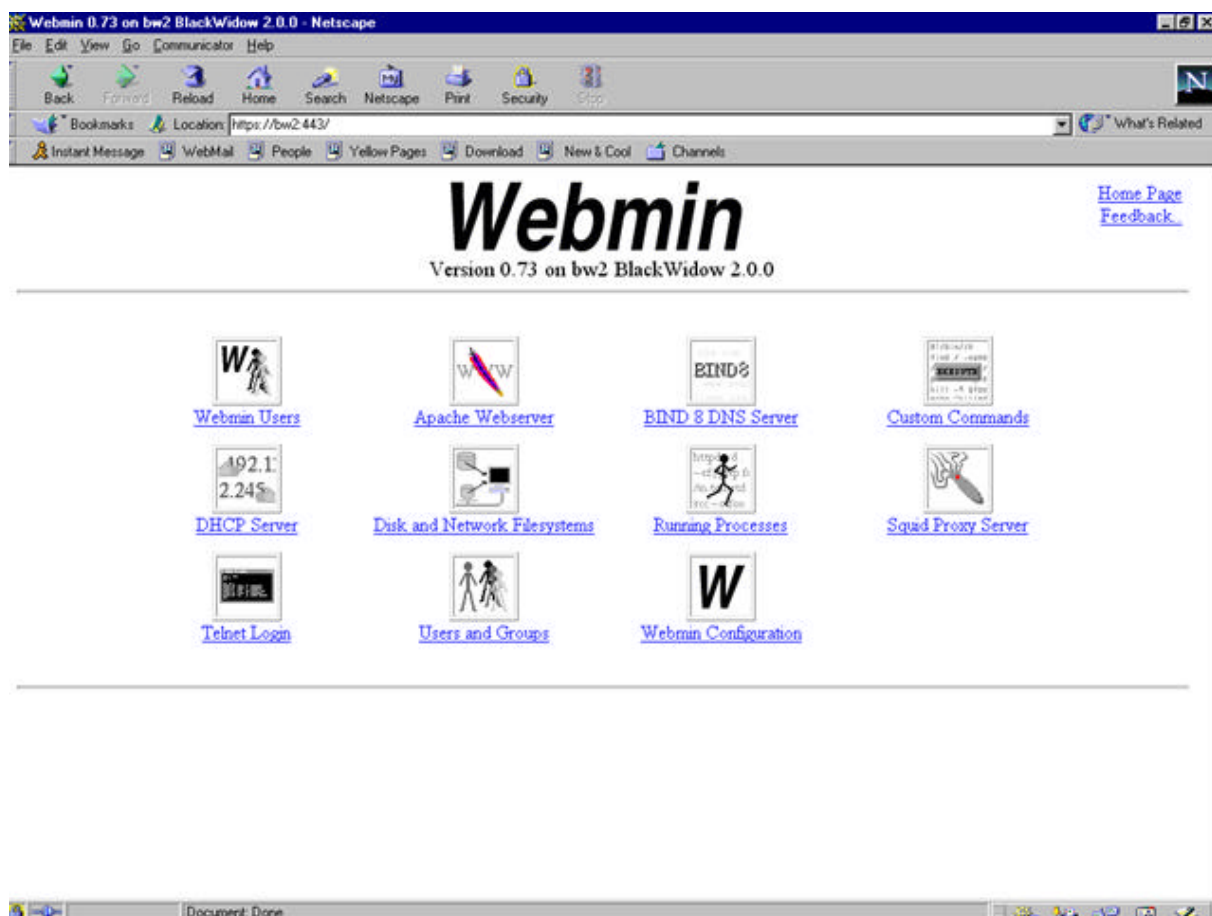


The <u>Webmin Users</u> button lets you create additional users of the Administration Console and set different access privileges for them.  The <u>Bind 8 DNS Server</u> button lets you update BlackWidow about the names of the various systems on your network if they don't use DHCP.  The <u>Custom Commands</u> button brings up a web pages that lets the administrator (or their delegated users) to restart the BlackWidow, shutdown the BlackWidow, or reset the analog dialup connection.  The other buttons are all active and are hopefully self explanatory.  More controls will be added to the console in future releases.  Command line configuration is still available, as in previous versions.

The files in **/var/named** are preconfigured with the address of the BlackWidow.  DHCP users will automatically be entered into DNS.  Static entries can be made with the dnsupdate command or by manually updating the db files.

The **passwd** command is used to change a user's password.  You can change the password of the user you are logged in as by typing **passwd**.  If you are root, you can change any user's password with **passwd user**.  The **webpasswd** (**webpasswd user**) command is used to add a user to the web proxy, or to change their password.  Access to BlackWidow reports is granted by the files in config/access.  The "require user" directive tells BlackWidow which users are allowed to view that report.  The user id/password is the same as the web proxy and is modified the same way.

BlackWidow automatically synchronizes its internal clock to the atomic clocks that are available on the internet.  Synchronization happens every hour if there is an active connection to the Internet.  BlackWidow will initiate a connection if it has not been synchronized in three days.  Other systems inside of your network can now synchronize to BlackWidow and be assured of accurate time keeping.  If you have an active connection, you can also force time synchronization with the **timesync** command.

There are times when BlackWidow's connection to the Internet must be reset, i.e. poor performance.  The command **dialreset** accomplishes this.  After this command is issued, the link will drop and 30 seconds will elapse before a connection can be reestablished.

BlackWidow includes the **sysinfo** and **version** commands as well.  **sysinfo** shows information about the cpu (description & utilization) uptime, and memory and disk utilization.  **version** shows the version of BlackWidow software, including kernel version & build time.

The system is shutdown with **halt** or rebooted with **reboot**.  The system will beep once to indicate the beginning of a shutdown (or reboot) and beep again when it can be safely powered down.  On restart, the system will beep (after disk activity) when it has finished booting.

## Command Reference:

The following is a table of some of the most commonly used commands on the BlackWidow. Because it is Linux based, the standard commands such as ps, vi, kill, etc. all work in addition to those listed.

| Command | Description |
| --- | --- |
| `config` | changes directory /root/config, where most of the configuration files are located |
| `console_isp` | configures dialup parameters (phone number, login id, password, etc.) |
| `dialreset` | shuts down current dialup connection |
| `dir (or ls -la)` | lists the contents of current directory |
| `dnsupdate add` *host.domain ip* | adds a static DNS entry |
| `dnsupdate delete` *host.domain ip* | removes a static DNS entry |
| `edit` *filename* | edit a file |
| `exit` | logout of the command line |
| `halt` | shutdown the system |
| `passwd` *user* | change user's password |
| `ping` *name or ip address* | test connectivity to another system |
| `nslookup` *name or ip address* | check what ip address another system uses |
| `reboot` | restart the system |
| `root` | change to root user (administrative account) |
| `sysinfo` | get system resource information |
| `timesync` | synchronize clock via NTP |
| `version` | show the BlackWidow and kernel versions |
| `webpasswd` *user* | change a caching/proxy user's password |

## Configuration Files:

Because the BlackWidow is based on Linux, it has a filesystem just like any other Linux/UNIX system. This version of BlackWidow is the first where configuration files are stored in a central location (actually, they are symbolic links to the real files). Simply type **config** and the prompt will change to **config**. Configuration files can be edited by typing **edit** *filename*. Typing **ls** will show the following files and directories:

| | |
|---|---|
| access | This directory contains links to files that determine access to BlackWidow reporting features. |
| ----> dial_connect | dial_connect grants access to the "System Connect Logs" report. |
| ---->proxy_reports | proxy_reports grants access to the "User Access" reports. |
| cache.config | Link to the directory (/usr/local/squid/etc) where caching proxy settings are located. |
| connect | Link to /usr/lib/diald/connect. The script that diald executes when a dial on demand is required. The username, password, and telephone number of the ISP are located here. For security, only root should be able to read this file. |
| dhcpd.conf | Link to /etc/dhcpd.conf. Sets parameters for the dhcp server. |
| diald.filters | Link to /usr/lib/diald/standard.filter. This is the policy that diald uses for bringing up and tearing down connections (and how long connections should stay up). |
| dns.param | Link to /etc/named.boot. Main configuration file for named (DNS). Tells named where in /var/named it can find what it needs. Also should include the IP addresses of ISP name servers. |
| dns.server | Link to /etc/resolv.conf. Lists the DNS servers that the system can use and what domain the system is in. BlackWidow should have its own address here. |
| dnsfiles | Link to the directory (/var/named) where the IP address to name bindings are stored. |

| | |
|---|---|
| drivers.conf | Link to /etc/rc.modules.  Here is where you can tell BlackWidow which network card driver to load.  NE2000 cards need to I/O address specified as well. |
| hosts | Link to /etc/hosts.  Local hosts file.  Name <--> IP resolution. |
| net.init | Link to /etc/rc.d/rc.inet1.  Configures (IP, netmask, etc.) the ethernet interface on boot. |
| shutdown | Link to /etc/rc.d/rc.6.  This is what BlackWidow runs when it is being halted or rebooted. |
| startup | Link to /etc/rc.d/rc.local.  Starts diald, log_parse.pl (access logging), IP firewalling & masquerading, samba, caching, dhcp, etc. |
| web.config | Link to the directory (/var/lib/httpd/conf) where the configuration files for the Apache web server are located. |
| web.proxy | Link to /var/lib/httpd/htdocs/proxy-conf/proxy.pac.  This is a proxy configuration file that web browsers can use to determine if they should use the proxy or not. |

Below is a table of other key system files not located in ~/config and what they do.

| | |
|---|---|
| /vmlinuz | System kernel.  DO NOT DELETE |
| /etc/HOSTNAME | Tells the system what it is called. |
| /etc/passwd /etc/shadow | Files that contain usernames and passwords on the system.  The encrypted passwords actually are in the shadow file. |
| /etc/inittab | Tells the system what commands it should run and when (such as at reboot, start-up, etc.).  The command for the remote modem login is in here. |
| /etc/rc.d/rc.inet2 | Starts the routing, name service, and other network daemons at boot. |
| /etc/rc.d/rc.serial | Configures serial ports (speed, irq) at boot. |
| /etc/rc.d/rc.httpd | Starts Apache web server. |
| /var/named/db.192.168.x | Named uses this to perform IP --> name binding.  This file should be specified in /etc/named.boot. |
| /var/named/db.domain | Named uses this to perform name -->IP binding.This file should be specified in /etc/named.boot. |

## What's new in 2.0.2

- .profile and  timesync, updated
- Improved security (removal of unneccessary services, retuning config files)
- fixed DHCP/DNS synchronization

## Differences between 1.3.0 and 2.0.0

- Updated kernel (2.2.13)
- New web based control panel (Webmin 0.73) with SSL encrypted connections.
- Support for dual ethernet configurations (cable modem & xDSL).
- DHCP client on second ethernet interface.
- Updated DNS server (8.2.2pl5).  Security fixes.
- Updated caching proxy server (2.2 ST 5)
- Updated user access reports (2.9.2).
- Updated, more user friendly system connection reports.
- Updated ftp daemon (2.5.0+patches).  Security fixes.
- Updated ppp driver (2.3.7)
- More secure remote administration.  Two successful logins are now required.
- Updated web based help for automatic proxy configuration.  Includes example for Netscape & Internet Explorer.
- Console support via serial connection.  Eliminates the requirement for a video card (still recommended)
- System information is available via SNMP (disabled by default for security purposes)
- Updated base architecture (Slackware 4.0 vs. 3.3)

## Differences between 1.3.0 and 1.2.0

- Updated kernel (2.0.38)
- Updated DHCP server (version 2.0)
- Updated DNS server (version 8.12).  Allows for dynamic DNS updates.
- DHCP & DNS servers synchronize.  DNS entries are automatically created & maintained for DHCP stations.  DNS uses the "machine name" (Win95/98/NT) for the entry.
- Automatic synchronization to NTP (network time protocol).
- Updated caching proxy server (2.2 st 2)
- Easier, more automated proxy configuration with web based help.
- Setup utility for connection to ISP (easier to setup & make changes)
- New commands (**console_isp, dialreset, dnsupdate, sysinfo, timesync, version**)
- Easier installation

## Differences between  1.2.0 and 1.1.0

- More modular kernel configuration.
- Smaller disk foot print (down 20MB to 49MB, not including web cache)
- DHCP server.
- Audible startup/shutdown indicators.
- PCI support (for NICs, disk controllers, and video only).
- Improved dial on demand process stability (fewer reboots).
- New commands: **config, edit, reboot, halt**, and **webpasswd**.
- Easier configuration (~/config area).
- Y2K compliant (see Y2K Compliance Statement)
- The software version is no longer displayed with the login prompt (a single dot is shown instead).  It is only revealed after a successful login.  This is for security purposes.

## Differences between 1.0.0 and 1.1.0

- Later, more stable kernel
- Much more secure.  Unneeded services are disabled.  Passed testing with Nessus
- More automated instalation
- Smaller disk footprint (by 4MB)
- Optional caching web proxy option with user authentication, tracking, and access control lists.

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