

SUSE LINUX

ADMINISTRATION GUIDE

Ford Ex. 1065

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Welcome

The SUSE LINUX Administration Guide provides background information about the way your SUSE LINUX operates. This book introduces Linux system administration basics such as file systems, kernels, boot processes, an Apache web server, and secure authentication.

The SUSE LINUX Administration Guide comprises five major categories:

Installation Details about special installation types, updates, LVM, and RAID.

Configuration Configuration of the boot loader, X Window System, printer operation, and mobile computing with Linux.

System Special characteristics of a SUSE LINUX system, details about the kernel, boot concepts, and init processes.

Network Integration in (heterogeneous) networks, configuring an Apache web server, file synchronization, and security aspects.

Appendices File Systems and Access Control Lists

The digital versions of the SUSE LINUX manuals are available in the directory `/usr/share/doc/manuals/`.

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New Features in the Administration Guide

Changes in the documentation since SUSE LINUX 9.0:

- The chapter about using mobile devices has been complemented by a detailed section about the use of Bluetooth (see Section 8.4 on page 206).
- The power management chapter has been expanded with information about the powersave package (see Section 9.5 on page 225 and Section 9.6 on page 232).
- The Apache chapter has been optimized for the use of Apache 2 (see Section 15 on page 373).
- The Samba section has been optimized for the use of Samba 3 (see Section 17.1 on page 418).
- The chapter about printing now focuses on CUPS (see Chapter 5 on page 87).
- The X Window System contains a detailed section about the use of fonts in SUSE LINUX (see Section 4.2 on page 78).

Typographical Conventions

The following typographical conventions are used in this guide:

- YaST: programs
- `/etc/passwd`: file or directory names
- ⟨*placeholder*⟩: replace ⟨*placeholder*⟩ with the actual value
- `PATH`: the environment variable PATH
- `ls`: commands
- `--help`: options and parameters
- `user`: users

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- (Alt): a key to press
- ‘File’: menu items, buttons
- "Process killed": system messages

Acknowledgment

With a lot of voluntary commitment, the developers of Linux cooperate on a global scale to promote the development of Linux. We thank them for their efforts — this distribution would not exist without them. Furthermore, we want to thank Frank Zappa and Pawar. Last but not least, special thanks to LINUS TORVALDS!

Have a lot of fun!

Your SUSE Team

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8.4 Bluetooth — Wireless Connections

Bluetooth is a wireless technology for connecting various devices. Two important characteristics distinguish Bluetooth from IrDA: the individual devices do not need to "see" each other directly and several devices can be connected in a network with a maximum data rate of 720 Kbps (in the current version 1.1). Theoretically, Bluetooth is even capable of communicating through walls. However, in practice this largely depends on the properties of the walls and the device class. There are three device classes with maximum transmission ranges between ten and a hundred meters.

8.4.1 Profiles

In Bluetooth, services are defined by means of profiles, such as the file transfer profile, the basic printing profile, and the personal area network profile. To enable a device to use the services of another device, both must understand the same profile — a piece of information that is often missing on the device package and in the manual. Although some manufacturers strictly comply with the definitions of the individual profiles, others do not. Nevertheless, the communication between the devices usually works smoothly.

8.4.2 Software

To be able to use Bluetooth, you need a Bluetooth adapter (built-in or external), drivers, and a Bluetooth protocol stack. By default, the Linux kernel contains the basic drivers needed for using Bluetooth. The Bluez system is used as protocol stack. Additionally, install all packages associated with Bluetooth (`bluez-libs`, `bluez-bluefw`, `bluez-pan`, `bluez-sdp`, and `bluez-utils`), as these provide some necessary services and utilities.

8.4.3 Configuration

The configuration files described in this section can only be modified by the user `root`. Currently, there is no graphical user interface for setting the parameters. Therefore, the files must be modified with a text editor.

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A PIN number provides basic protection against unwanted connections. Mobile phones usually query the PIN when establishing the first contact (or when setting up a device contact on the phone). For two devices to be able to communicate, both must identify themselves with the same PIN. On the computer, the PIN is located in the file `/etc/bluetooth/pin`. Currently, only one PIN is supported in Linux, regardless of the number of installed Bluetooth devices. Thus, multiple devices cannot be addressed with different PINs. Accordingly, you need to set the same PIN on all devices or deactivate the PIN authentication entirely.

Note

Security of Bluetooth Connections

Despite the PINs, the transmission between two devices may not be entirely secure.

Note

`/etc/bluetooth/hcid.conf`is main configuration file for Linux Bluetooth. Various settings, such as the device names and the security modes, can be modified in this file. Usually, the settings should be adequate. The file contains comments describing the options for the various settings.

`security auto;` is one of the most important settings. If necessary, a PIN is activated for the identification. If problems are encountered, the option `auto` disables the PIN. Depending on your preferences and your security needs, set this option to `none` never to use PIN numbers or to `user` to use PIN numbers.

Another important section is the one beginning with `device {`. In this section, define the name under which the host should be displayed on the other side. The device class (`Laptop`, `Server`, etc.), authentication, and encryption are defined in this section.

8.4.4 System Components and Useful Tools

The operability of Bluetooth depends on the interaction of various services. At least two background daemons are needed: hcid (*host controller interface*), which serves as an interface for the Bluetooth device and controls it, and sdpd (*service discovery protocol*), by means of which a device can find out which services the host makes available. If they are not activated automatically when the system is started, both hcid and sdpd can be activated with the command `rcbluetooth start`. This command must be executed as `root`.

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The following paragraphs describe the main tools needed for working with Bluetooth. Currently, only command-line programs are available. Extensions for Konqueror (KDE desktop) and Nautilus (GNOME desktop) are under development. This functionality may have been implemented after the editorial deadline. In this case, the URL `sdp://` should display local Bluetooth devices (physically connected to the host) as well as remote Bluetooth devices (accessible by way of a wireless connection).

Note

Other functionalities of the above-mentioned Bluetooth applications can be viewed with `man <program_name>`.

Note

Some of the commands can only be executed as `root`. This includes the command `l2ping <device_address>` for testing the connection to a remote device.

hcitool

hcitool can be used to determine whether local and remote devices are detected. The command `hcitool dev` should list your devices. The output generates a line in the form `<interface_name> <device_address>` for every detected local device.

The command `hcitool name <device_address>` can be used to determine the device name of a remote device. If, for example, another computer is detected, the displayed class and device name corresponds to the information in the file `/etc/bluetooth/hcid.conf` on the remote computer. Local devices addresses generate an error output.

hciconfig

Get more information about the local device with `/sbin/hciconfig`. Search for remote devices (that are not connected physically to the host) with the command `hcitool inq`. Three values are displayed for every detected device: the device address, the clock offset, and the device class. The device address is important, as other commands use it for identifying the target device. The clock offset mainly serves technical purposes. In the class, the device type and the service type are encoded as a hexadecimal value.

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sdptool

The program sdptool can be used to check which services are made available by a specific device. The command `sdptool browse <device_address>` returns all services of a device. The command `sdptool search <service_code>` can be used to search for a specific service. This command scans all accessible devices for the requested service. If one of the devices offers the service, the program prints the (full) service name returned by the device together with a brief description. A list of all possible service codes can be viewed by entering `sdptool` without any parameters.

8.4.5 Examples

The following two examples demonstrate some of the capabilities of Bluetooth.

Network Connection between Two Hosts

The first example shows the establishment of a network connection between two hosts with pand (*personal area networking*). The following commands must be executed by the user `root`. The description focuses on the Bluetooth-specific actions and does not provide a detailed explanation of the network command (ip):

Start pand with the command `pand -s` on one of the two hosts (referred to as *H1*). Determine the device address of the second host (*H2*) by running `hcitool inq` on this host. Run `pand -c <device_address>` to establish a connection. If you query the available network interfaces with `ip link show`, an entry such as the following should be displayed (the local device address should be displayed instead of `00:12:34:56:89:90`):

```
bnep0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop qlen 1000
   link/ether 00:12:34:56:89:90 brd ff:ff:ff:ff:ff:ff
```

This interface must be assigned an IP address and activated. This can be done with the following two commands. On *H1*:

```
ip addr add 192.168.1.3/24 dev bnep0
ip link set bnep0 up
```


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On *H2*:

```
ip addr add 192.168.1.4/24 dev bnep0
ip link set bnep0 up
```

Now *H1* can be accessed from *H2* under the IP `192.168.1.3`. Use the command `ssh 192.168.1.4` to access *H2* from *H1* (provided *H2* runs an sshd, which is activated by default in SUSE LINUX). The command `ssh 192.168.1.4` can also be run as a "normal" user.

File Transfer from a Mobile Phone to the Host

The second example shows how to transfer a photograph created with a mobile phone with a built-in digital camera to a computer (without incurring additional costs for the transmission of a multimedia message). Although the menu structure may differ on various mobile phones, the procedure is usually quite similar. Refer to the manual of your phone, if necessary. This example describes the transfer of a photograph from a Sony Ericsson mobile phone to a laptop. The service Obex-Push must be available on the computer and the computer must grant the mobile phone access. In the first step, the service is made available on the laptop. This is done by means of the opd daemon from the package `bluez-utils`. Start the daemon with the following command:

```
opd --mode OBEX --channel 10 --daemonize --path /tmp --sdp
```

Two important parameters are used: `--sdp` registers the service with the sdpd and `--path /tmp` instructs the program where to save the received data — in this case to `/tmp/`. You can also specify any other directory to which you have write access.

Now the mobile phone must "get to know" the computer. To do this, open the 'Connect' menu on the phone and select 'Bluetooth'. If necessary, click 'Turn On' before selecting 'My devices'. Select 'New device' and let your phone search for the laptop. If a device is detected, its name appears in the display. Select the device associated with the laptop. If you encounter a PIN query, enter the PIN specified in `/etc/bluetooth/pin`. Now your phone knows the laptop and is able to exchange data with the laptop. Exit the current menu and go to the image menu. Select the image to transfer and press 'More'. In the next menu, press 'Send' to select a transmission mode. Select 'Via Bluetooth'. The laptop should be listed as a target device. Select the laptop to start the transmission. The image is then saved to the directory specified with the opd command. In the same way, you can also transfer audio tracks to the laptop.

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8.4.6 Troubleshooting

If you have difficulties establishing a connection, proceed as follows:

- Check the output of `hcitool dev`. Is the local device listed? If not, the hcid may not have been started at all or the device may not be recognized as a Bluetooth device (either because the driver is not able to do this or because the device is defective). Restart the daemon with the command `rcbluetooth restart` and check `/var/log/messages` to see if any errors occurred.
- Does the computer "see" other devices when you execute `hcitool inq`? Try the command twice — the connection may have been faulty, as the frequency band for Bluetooth is also used by other devices.
- Make sure that the PIN in `/etc/bluetooth/pin` is the same as the PIN of the remote device.
- Try to establish the connection from the other device. Check if this device sees the computer.
- The first example (network connection) does not work. This may be due to various reasons. Possibly one of the two hosts does not understand the ssh protocol. Try if `ping 192.168.1.3` or `ping 192.168.1.4` works. If it does, check if sshd is active. Another problem could be that you already have other addresses that conflict with the address `192.168.1.X` used in the example. If this is the case, try other addresses, such as `10.123.1.2` and `10.123.1.3`.
- In the second example, the laptop does not appear as the target device. Does the mobile device recognize the Obex-Push service on the laptop? In 'My devices', select the respective device and view the list of 'Services'. If Obex-Push is not displayed (even after the list is updated), the problem is caused by the opd on the laptop. Is the opd active? Do you have write access to the specified directory?
- Does the second example work in reverse order? If obexftp is installed, this should work with `obexftp -b <device_address> -B 10 -p <image>` on some devices (Siemens and Sony Ericsson have been tested, other devices may or may not support this action).

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8.4.7 For More Information

An extensive overview of various instructions for the use and configuration of Bluetooth is available at `http://www.holtmann.org/linux/bluetooth/`.

Useful information and instructions:

Connection to PalmOS PDA:

`http://www.cs.ucl.ac.uk/staff/s.zachariadis/btpalmlinux.html`

Official howto for the integrated Bluetooth protocol stack in the kernel:

`http://bluez.sourceforge.net/howto/index.html`

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The most important option is number 15:

Example 18.1: *Firewall Configuration: Option 15*

```
#
# 15.)
# Which accesses to services should be redirected to a local port
# on the firewall machine?
#
# This can be used to force all internal users to surf via your
# Squid proxy, or transparently redirect incoming web traffic to
# a secure web server.
#
# Choice: leave empty or use the following explained syntax of
# redirecting rules, separated with spaces.
# A redirecting rule consists of 1) source IP/net,
# 2) destination IP/net, 3) original destination port and
# 4) local port to redirect the traffic to, separated by a colon,
# e.g. "10.0.0.0/8,0/0,80,3128 0/0,172.20.1.1,80,8080"
#
```

The comments above show the syntax to follow. First, enter the IP address and the netmask of the internal networks accessing the proxy firewall. Second, enter the IP address and the netmask to which these clients send their requests. In the case of web browsers, specify the networks `0/0`, a wild card that means "to everywhere." After that, enter the original port to which these requests are sent and, finally, the port to which all these requests are redirected. As Squid supports more protocols than HTTP, redirect requests from other ports to the proxy, such as FTP (port 21), HTTPS, or SSL (port 443). The example uses the default port 3128. If there are more networks or services to add, they only need to be separated by a single blank character in the corresponding entry.

```
FW_REDIRECT_TCP="192.168.0.0/16,0/0,80,3128 192.168.0.0/16,0/0,21,3128"
FW_REDIRECT_UDP="192.168.0.0/16,0/0,80,3128 192.168.0.0/16,0/0,21,3128"
```

To start the firewall and the new configuration with it, change an entry in the `/etc/sysconfig/SuSEfirewall2` file. The entry `START_FW` must be set to `"yes"`.

Start Squid as shown in Section 18.3.4 on page 446. To check if everything is working properly, check the Squid logs in `/var/log/squid/access.log`.

To verify that all ports are correctly configured, perform a port scan on the machine from any computer outside your network. Only the web services port (80) should be open. To scan the ports with nmap, the command syntax is `nmap -O IP_address`.

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the program will also have ceased to be a potential security risk. You might take a similar approach with world-writable directories and files.

- Disable any network services you do not absolutely require for your server to work properly. This will make your system safer. Open ports, with the socket state LISTEN, can be found with the program netstat. As for the options, it is recommended to use `netstat -ap` or `netstat -anp`. The `-p` option allows you to see which process is occupying a port under which name.

  Compare the netstat results with those of a thorough port scan done from outside your host. An excellent program for this job is nmap, which not only checks out the ports of your machine, but also draws some conclusions as to which services are waiting behind them. However, port scanning may be interpreted as an aggressive act, so do not do this on a host without the explicit approval of the administrator. Finally, remember that it is important not only to scan TCP ports, but also UDP ports (options `-sS` and `-sU`).

- To monitor the integrity of the files of your system in a reliable way, use the program `tripwire`, available on the SUSE LINUX distribution. Encrypt the database created by `tripwire` to prevent someone from tampering with it. Furthermore, keep a backup of this database available outside your machine, stored on an external data medium not connected to it by a network link.

- Take proper care when installing any third-party software. There have been cases where a hacker had built a trojan horse into the tar archive of a security software package, which was fortunately discovered very quickly. If you install a binary package, have no doubts about the site from which you downloaded it.

  SUSE's RPM packages are gpg-signed. The key used by SUSE for signing is:

  ID:9C800ACA 2000-10-19 SUSE Package Signing Key <build@suse.de>

  Key fingerprint = 79C1 79B2 E1C8 20C1 890F 9994 A84E DAE8 9C80 0ACA

  The command `rpm --checksig package.rpm` shows whether the checksum and the signature of an uninstalled package are correct. Find the key on the first CD of the distribution and on most key servers worldwide.

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Bibliography

[1] *SUSE LINUX* (*User Guide*). SUSE, 9. Edition ©2004 .

[2] EDWARD C. BAILEY. *Maximum RPM*. ©1997 . ISBN 1-888172-78-9.

[3] BRYAN COSTALES, ERIC ALLMAN, NEIL RICKERT. *sendmail*. ©1993 . ISBN 1-56592-056-2.

[4] WERNER ALMESBERGER. *LILO User's guide*.
`file:///usr/share/doc/lilo/user.dvi`.

[5] OLAF KIRCH. *LINUX Network Administrator's Guide*. ©1995 . ISBN 1-56592-087-2.

[6] SIMON GARFINKEL, GENE SPAFFORD. *Practical UNIX Security*. ©1993 . ISBN 0-937175-72-2.

[7] CRAIG HUNT. *TCP/IP Netwerk Administration*. ©1995 . ISBN 3-930673-02-9.

[8] TIM O'REILLY, GRACE TODINO. *Managing UUCP and Usenet*. ©1992 . ISBN 0-937175-93-5.

[9] MATT WELSH. *Linux Installation and Getting Started*. 2. Edition ©1994 . ISBN 3-930419-03-3.

[10] LINDA LAMB. *Learning the vi Editor*. ©1990 . ISBN 0-937175-67-6.

[11] MATT WELSH, LARS KAUFMAN. *Running Linux*. ©1995 O'Reilly. ISBN 1-56592-100-3.

[12] WILLIAM R. CHESWICK, STEVEN M. BELLOVIN. *Firewalls and Internet Security* (*Repelling the Wily Hacker*). 2. Edition ©2003 Addison-Wesley Pub Co. ISBN 0-201-63466-X.

Ford Ex. 1065

[13] BRENT CHAPMAN, ELISABETH D. ZWICKY. *Building Internet Firewalls*. ©1995 O'Reilly and Associates. ISBN 1-565-92124-0.

[14] CLIFFORD STOLL. *Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage* . ©2000 Pocket Books. ISBN 0-743-41146-3.

[15] BRIAN TUNG. *Kerberos: A Network Authentication System*. ©1999 Fischer-TB. Verlag. ISBN 0-201-37924-4.

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