



# **SUSE LINUX Enterprise Server**

ARCHITECTURE-SPECIFIC INFORMATION

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*Authors:* Wolfgang Engel, Ulrich Hecht, Bernhard Kaindl, Ihno Krumreich,  
Susanne Oberhauser, Hannes Reinecke, Jörg Reuter

*Translators:* Jana Jaeger

*Editors:* Jörg Arndt, Karl Eichwalder, Antje Faber, Berthold Gunreben,  
Roland Haidl, Jana Jaeger, Edith Parzefall, Ines Pozo, Thomas Rölz,  
Thomas Schraitle, Rebecca Walter

*Layout:* Manuela Piotrowski, Thomas Schraitle

*Setting:* DocBook-XML und L<sup>A</sup>T<sub>E</sub>X

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# Introduction

This book describes the procedure for preparing the installation of SUSE LINUX Enterprise Server on IBM S/390 and zSeries systems. It provides all information needed to prepare the installation on the LPHR and z/VM side.

## Structure

Basically, this manual is divided in two parts.

### **General Information and Requirements**

This part provides information about the requirements both on the hardware and the software side that need to be met to install SUSE LINUX Enterprise Server successfully on your machine.

**Preparing for Installation** This part covers the preparation procedure for the installation of SUSE LINUX Enterprise Server on IBM S/390 and zSeries. Learn which basic preparations need to be performed on the LPHR and z/VM side. It guides you to the point where YaST — the SUSE LINUX installation and configuration tool — takes over.

Additionally, the appendix contains a chapter featuring an overview of possible network connection types. The second chapter in the appendix focuses on automated system configuration using the `parmfile`.

---

## Note

### Further Information about SUSE LINUX Enterprise Server on IBM S/390 and zSeries

A short introduction to SUSE LINUX Enterprise Server on IBM S/390 and zSeries can be found in the *Start-up Guide* manual of which you received a printed copy. A detailed description of the installation procedure and the administration of SUSE LINUX Enterprise Server can be found in the *Installation and Administration* manual of which you also received a printed copy.

---

Note

## Required Background

Several assumptions have been made concerning your background knowledge when writing this document.

- You are familiar with IBM S/390 and zSeries terminology.
- You have a good knowledge of the IBM S/390 and zSeries devices attached to your system, especially its network environment.
- You have a basic understanding of handling a Linux or Unix system.

## Typographic Conventions

The following typographic conventions are used in this book:

Example	Meaning
YaST	programs
/etc/passwd	files or directories
<placeholder>	replace the character string \$placeholder\$ (including the angle brackets) with the actual value
PATH	an environment variable called \$PATH\$



<code>§192.168.1.2§</code>	the value of a variable
<code>ls</code>	commands
<code>user</code>	users
<code>(Alt)</code>	press this key
<code>(Ctrl)-(Alt)-(Del)</code>	keys to press simultaneously
<code>"Permission denied"</code>	system messages
<code>'System update'</code>	menu item or button text

---

## Further In-Depth Information about IBM S/390 and zSeries

IBM has published a number of very interesting documents about their S/390 and zSeries platform. They can be found either on the Internet (<http://www.redbooks.ibm.com>) or in your installed system (package redbook) under `/usr/share/doc/packages/redbook/`.

### Hardware

For a first glance at the technical details of some systems, refer to:

- IBM eServer zSeries 990 Technical Introduction (SG24-6863)
- IBM eServer zSeries 900: Technical Guide (SG24-5975)
- Technical Introduction: IBM eServer zSeries 800 (SG24-6515)

### General Documents about Linux on IBM S/390 and zSeries

A general coverage of Linux on IBM S/390 and zSeries can be found in the following documents:

- Linux for S/390 (SG24-4987)
- Linux on IBM eServer zSeries and S/390: ISP and ASP Solutions (SG24-6299)

These documents might not reflect the current state of Linux, but the principles of Linux deployment outlined there remain accurate.

## Technical Issues of Linux S/390 and zSeries

Refer to the following documents to get in-depth technical information about Linux kernel and application topics. Refer to the Internet for up-to-date versions of these documents (<http://www10.software.ibm.com/developerworks/opensource/linux390/index.shtml>) for the most recent code drop.

- Linux for zSeries and S/390: Device Drivers, Features, and Commands
- S/390 ELF Application Binary Interface Supplement
- zSeries ELF Application Binary Interface Supplement
- Linux for zSeries and S/390: Using the Dump Tools

There is another Redbook for Linux application development on <http://www.redbooks.ibm.com>:

- Linux on IBM eServer zSeries and S/390: Application Development (SG24-6807)

## Advanced Configurations for Linux on S/390 and zSeries

Refer to the following redbooks or redpapers for some more complex zSeries and S/390 scenarios:

- Linux on IBM eServer zSeries and S/390: Large Scale Deployment (SG24-6824)
- Linux on IBM eServer zSeries and S/390: Performance Measuring and Tuning (SG24-6926)
- Linux with zSeries and ESS: Essentials (SG24-7025)
- IBM TotalStorage Enterprise Storage Server Implementing ESS Copy Services with IBM eServer zSeries (SG24-5680)
- Linux on IBM zSeries and S/390: High Availability for z/VM and Linux (REDP-0220)
- Saved Segments Planning and Administration  
<http://www.vm.ibm.com/pubs/pdf/hcsq4a00.pdf>

- Linux for zSeries and S/390: How to Improve Performance with PAV
- How to Improve the Performance of Linux on z/VM with Execute-in-Place Technology

## Acknowledgments

The history of Linux is a success story about countless developers all around the world contributing to what originally started as a *one-man show* by Linus Torvalds. Thanks to all of them for their tremendous efforts.

Especially we would like to thank all the people involved in the Linux for zSeries and S/390 project at IBM and SUSE. Thanks to the (information) developers at SUSE and IBM, the test team at SUSE, and all beta-testers and proofreaders at IBM. Thank you for making SUSE LINUX Enterprise Server for IBM S/390 and zSeries possible.



# **Part I**

## **General Information and Requirements**



# System Requirements

This chapter gives basic information about the system requirements. At first, a list of hardware running SUSE LINUX Enterprise Server for IBM S/390 and zSeries is provided. The level of the MicroCode (MCL) used in your IBM S/390 or zSeries system is very important for the installation. Additional software to install and use for installation is mentioned at the end of this chapter.

## 1.1 Hardware

SUSE LINUX Enterprise Server has run successfully on the following platforms (see Table 1.1):

*Table 1.1: Supported Hardware in SUSE LINUX Enterprise Server*

---

<b>S/390</b>	IBM S/390 Multiprise 3000 Enterprise Server (MP3000) 7060
	IBM Parallel Enterprise Server G5 (G5) 9672
	IBM Parallel Enterprise Server G6 (G6) 9672
<b>zSeries</b>	IBM eServer zSeries 800 (z800) 2066
	IBM eServer zSeries 890 (z890) 2086
	IBM eServer zSeries 900 (z900) 2064
	IBM eServer zSeries 990 (z990) 2084

---

## 1.1.1 Memory Requirements

Different installation methods have different memory requirements during installation. After installation is completed, the system administrator may reduce memory to the desired size. SUSE recommends using:

---

256+ MB	for installation from NFS or SMB installation sources
512 MB	for installation via FTP accessible installation sources. The increased memory requirement during installation results from using temporary disk space in memory (RAM disk) during the package transfers.

---

## 1.1.2 Disk Space Requirements

The following disk sizes are required for the installation of SUSE LINUX Enterprise Server:

- Default installation 31-bit: 1.3 GB
- Default installation 64-bit: 1.6 GB

## 1.1.3 Network Connection

A network connection is needed to communicate with your SUSE LINUX Enterprise Server system. This can be one or more of the following connections or network cards:

- OSA-2
- OSA Express Ethernet (including Fast and Gigabit Ethernet)
- Token Ring
- Escon
- CTC (or virtual CTC)
- IUCV
- Hipersockets or Guest LAN
- OSA Express High-Speed Token Ring



### 1.1.4 IPL Options

For an LPAR installation, the 'Load from CD-ROM or Server' option is the preferred way to IPL the installation kernel and initrd (initial RAM disk). If this option is not available and you cannot use z/VM for installing the system, you need to IPL from a tape with the tapeipl kernel, the parmfile, and the initrd. Thus, you need access to a tape unit (3480, 3490, or 3590, for example).

## 1.2 MicroCode Level, APARs and Fixes

This release of SUSE LINUX Enterprise Server is based upon the April 2004 codestream from IBM Developerworks ([http://www10.software.ibm.com/developerworks/opensource/linux390/april2004\\_technical.shtml](http://www10.software.ibm.com/developerworks/opensource/linux390/april2004_technical.shtml)). The restrictions and requirements listed at the above website do also apply for this release of SUSE LINUX Enterprise Server, except where stated differently in this manual.

For installation under VM, you need at least z/VM 4.2 with service level 0103. To use Hipersockets under VM on z900 (2064), you need MicroCode EC E26949 level 013 or higher. For an IPL from SCSI on z900, you need SCSI enabler MCL, feature code 9904, EC J12811.

For the installation of SUSE LINUX Enterprise Server 9 on IBM S/390 or zSeries, the MicroCode levels and z/VM APARs outlined in the following are required:

### 1.2.1 OSA-Express QDIO

#### **zSeries 990 MSL**

**zSeries 900 GA3** Driver 3G, OSA microcode level 3.0A

MCLs: J11204.007 and J11204.008 (available May 3, 2002)

**zSeries 900 GA2** Driver 3C, OSA microcode level 2.26

MCLs: J10630.013 and J10630.014 (available May 20, 2002)

**zSeries 800 GA1** Driver 3G, OSA microcode level 3.0A

MCLs: J11204.007 and J11204.008 (available May 3, 2002)

#### **S/390 Parallel Enterprise Servers G5 and G6**

Driver 26, OSA microcode level 4.25

MCLs: F99904.032 and F99904.033 (available May 16, 2002)

## 1.2.2 VM/ESA and z/VM

**z/VM 4.4** All necessary fixes and enhancements included.

**z/VM 4.3** All necessary fixes and enhancements included.

**z/VM 4.2** APAR: VM63181, PTF: UM30610; APAR: VM62938, PTF: UM30225; APAR: VM63034, PTF: UM30290

Negotiate the order of installation with your IBM support, because it might be necessary to activate the VM APARs before installing the new MicroCode levels.

## 1.3 Software

To install SUSE LINUX Enterprise Server via non-Linux based NFS or FTP, you might experience problems with NFS or FTP server software. Especially the Windows standard FTP server can cause errors, so installing via SMB on these machines is generally recommended.

To connect to the SUSE LINUX Enterprise Server installation system, one of the following methods is required:

### **SSH with Terminal Emulation (xterm compatible)**

SSH is standard Unix tool that should be present on any Unix or Linux system. For Windows, there is an SSH client called Putty. It is free to use and is included on CD 1 in the directory `/dosutils/putty`. More information about Putty can be obtained at <http://www.chiark.greenend.org.uk/~sgtatham/putty.html>.

**VNC Client** For Linux, a VNC client called `vncviewer` is included in SUSE LINUX Enterprise Server as part of the `XFree86-xvnc` package. For Windows, a VNC client is included in the present SUSE LINUX Enterprise Server. Find it in `/dosutils/tightvnc` of CD 1. Copy the `tightvnc-1.2.9-setup.exe` file to the hard disk of your Windows machine and install it. Alternatively, use the VNC Java client and a Java-enabled web browser.

**X Server** Find a suitable X server implementation on any Linux or Unix workstation. There are many commercial X Window System environments for Windows and Macintosh. Some of them can be downloaded as free trial versions. A trial version of MI/X (MicroImages X Server) can be obtained at <http://www.microimages.com/mix>.

**Note****Additional Information**

Consult the `README` located in the highest directory of CD 1 of your SUSE LINUX Enterprise Server before installing SUSE LINUX Enterprise Server on IBM S/390 or zSeries. This file completes the documentation presented in this book.

**Note**



# Installation Types

This chapter gives an overview of the different types of installation possible with SUSE LINUX Enterprise Server for IBM S/390 and zSeries. Basically, these three types are given:

**Native** Installation of SUSE LINUX Enterprise Server as a native operating system on your IBM S/390 or zSeries.

**LPAR** Installation of SUSE LINUX Enterprise Server using a logical partition (LPAR).

**VM (z/VM)** Installation of SUSE LINUX Enterprise Server as an operating system within z/VM.

Depending on the mode of installation (Native, LPAR, or VM), there are different possibilities for starting the installation process and IPLing the installed system.

## 2.1 Native

Installing SUSE LINUX Enterprise Server for IBM S/390 and zSeries in native mode means that SUSE LINUX Enterprise Server is the only operating system running on your hardware. SUSE LINUX Enterprise Server uses all physical memory and all processors of your zSeries. You cannot run other operating systems simultaneously on your system.

---

### Note

#### Support for Native Installation

The native installation type is not supported on IBM z990 hardware.

---

**Note**

## 2.2 LPAR

If you install SUSE LINUX Enterprise Server for IBM S/390 and zSeries into a separate logical partition (LPAR), allow SUSE LINUX Enterprise Server to use a special part of physical memory in your system. Also decide how many processors are used by SUSE LINUX Enterprise Server. In this mode, you can run different operating systems simultaneously on your IBM S/390 or zSeries system.

## 2.3 z/VM

Running SUSE LINUX Enterprise Server for IBM S/390 and zSeries in z/VM means that SUSE LINUX Enterprise Server is a guest system within z/VM. An advantage of this mode is that you have full control over SUSE LINUX Enterprise Server from z/VM. This is very helpful for kernel development or kernel-based debugging. It is also very easy to add or remove hardware to and from Linux guests. Creating additional SUSE LINUX Enterprise Server guests is simple and you are able to run hundreds of Linux instances simultaneously.

# IPL Options

This chapter provides the information needed to do an IPL for the first installation. Depending on the type of installation, different options need to be used. The options tape, VM reader, and load from CD-ROM or server are discussed. Installing the software packages, which is done via the network, does not require the IPL medium.

## 3.1 Tape

IPLing from tape is possible on all systems connected to a tape library. The only prerequisite is that the LPAR in which to install (or allowing z/VM to run) is allowed to access the tape unit. For this, the `§IODEVICE§` statement in the IOCDS must have the attribute `§SHARED§` or `§PART=<LPARName>§`.

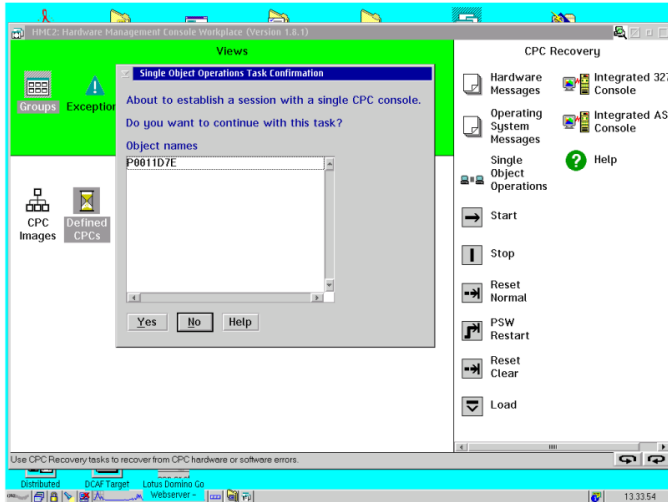
## 3.2 VM Reader

To IPL from VM reader, transfer the necessary files into the reader first. Then multiple IPLs are easily done. This is the preferred way on z/VM. For comfortable administration, it is recommended to create a user `§linuxmnt§` that owns a minidisk with the files and scripts needed for IPL. This minidisk is then accessed read-only by the Linux guests.

## 3.3 Load from CD-ROM or Server

For IPLing into an LPAR, it is possible to load directly from the HMC CD-ROM device. It also allows you to IPL via FTP from a server holding the

SUSE LINUX Enterprise Server zSeries files. Find this button near the 'LOAD' button (if you have upgraded to the latest MCL, see Chapter 1 on page 9).



*Figure 3.1: HMC CPC Group Work Area*

This function can be performed from the HMC. This is done by accessing the 'Defined CPCs' icon in the 'Groups Work Area' on the HMC desktop. From there, access the 'Defined CPCs Work Area'. Select a system image and initiate 'CPC Recovery'. Use 'Single Object Operations' to access the service element remotely.

Access the service element's 'Groups Work Area'. Select the LPAR to perform the load from CD-ROM or server and initiate 'CPC recovery' for that LPAR. Initiate the 'Load from CD ROM or Server' from the action menu. Provide information as requested on subsequent panels.



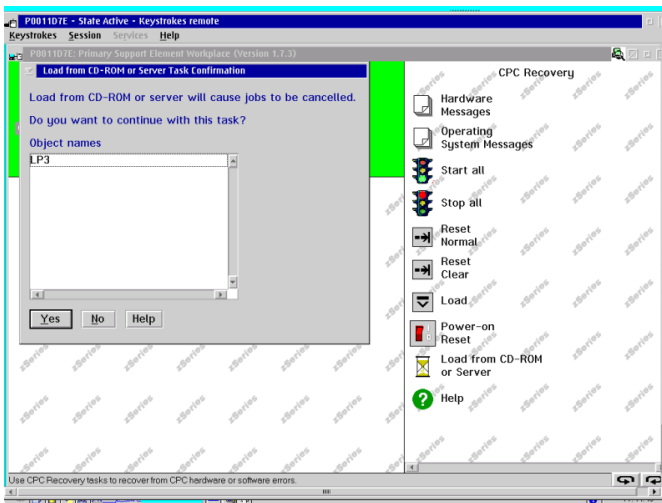


Figure 3.2: Specifying the Load Option on the SE's Groups Work Area



# The IOCDS

This chapter provides some necessary information about the IOCDS and how to customize some settings for sharing network cards or DASDs among several LPARs. In the IOCDS, the §chpid§ and types of the devices connected to the IBM S/390 or zSeries are defined. The resources can be dedicated or shared among LPARs.

## Caution

### Sharing Devices (DASD)

Do not share DASD writable among LPARs as this might result in data loss. Consider the definition of the necessary resources in advance when planning the setup for SUSE LINUX Enterprise Server on IBM S/390 or zSeries.

## Caution

This example shows how to dedicate a DASD to one specific LPAR. This LPAR is referred to as §LPAR1§.

### *Example 4.1: Dedicating DASD to One LPAR*

```
CHPID PATH=FD,TYPE=DSD,SHARED
CNTLUNIT CUNUMBR=FD00,PATH=FD,UNITADD=((00,256)),UNIT=3990-2
IODEVICE ADDRESS=(FD03,1),CUNUMBR=FD00,UNIT=3390,PART=LPAR1
```

To share a DASD among LPARs, delete the §PART=LPAR1§ part in the IOCDS definition. This might be useful for high availability reasons or for sharing data among LPARs read-only.

Several Linux systems can use the same network device if you share it among LPARs or z/VM guests. This reduces the number of network devices that must be provided to the Linux system. On the other hand, you might provide more than one network device to one Linux system to make it more available in case one connection fails.

Network cards like OSA-Express can be used in two different modes. These modes are known as QDIO and non-QDIO mode. These modes can be defined in the IOCDs by using the §TYPE§ statement. QDIO mode is much faster than non-QDIO mode, but uses three device addresses instead of two in non-QDIO. Consider the limited number of device addresses when planning the setup of your IBM S/390 or zSeries Linux environment.

*Example 4.2: Sharing OSA Express Card among LPARs (non-qdio)*

```
CHPID PATH=( FE ) , SHARED , PARTITION=( ( LPAR1 , LPAR2 ) ) , TYPE=OSE
CNTLUNIT CUNUMBR=FE00 , PATH=( FE ) , UNIT=OSA
IODEVICE ADDRESS=( FE00 , 016 ) , CUNUMBR=( FE00 ) , UNIT=OSA
IODEVICE ADDRESS=( FEFE , 001 ) , CUNUMBR=( FE00 ) , UNIT=OSAD
```

*Example 4.3: Sharing OSA Express Card among LPARs (qdio)*

```
CHPID PATH=( FE ) , SHARED , PARTITION=( ( LPAR1 , LPAR2 ) ) , TYPE=OSD
CNTLUNIT CUNUMBR=FE00 , PATH=( FE ) , UNIT=OSA
IODEVICE ADDRESS=( FE00 , 016 ) , CUNUMBR=( FE00 ) , UNIT=OSA
IODEVICE ADDRESS=( FEFE , 001 ) , CUNUMBR=( FE00 ) , UNIT=OSAD
```

## **Part II**

# **Preparing for Installation**



# Making the Installation Data Available

This chapter provides detailed information about making the SUSE LINUX Enterprise Server IBM S/390 and zSeries installation data accessible for installation. Depending on your computer and system environment, choose between NFS or FTP installation. If you are running Microsoft Windows workstations in your environment, you can also use the Windows network including the SMB protocol to install SUSE LINUX Enterprise Server on your IBM S/390 and zSeries system.

---

## Note

### IPL from CD-ROM

When planning to IPL from CD-ROM, keep in mind that only the boot files will be loaded. The other data contained on the CD must be accessed from the network. Make a copy of the CD or copy its contents onto the FTP, NFS, or SMB server first.

---

Note

## 5.1 Using a Linux Workstation or SUSE LINUX CD

If you have a Linux workstation running in your computer environment, use the workstation to provide the installation data to the IBM S/390 and zSeries installation process by NFS or FTP. If the Linux workstation runs

under SUSE LINUX Enterprise Server for x86, you can set up an installation server (NFS or FTP) using the YaST 'Installation Server' module as described in the *Installation and Administration* manual.

### 5.1.1 Via NFS

Use NFS (network file system) to make the installation media available.

---

#### Note

##### Exporting Mounted Devices via NFS

Exporting the file system root (/) does not imply the export of mounted devices, such as CD-ROM. Explicitly name the mount point in `/etc/exports`:

```
/media/cdrom *(ro)
```

After changing this file, restart the NFS server with the command `rcnfsserver restart`.

---

Note

### 5.1.2 Via FTP

Setting up an FTP server on a Linux system involves the installation of the server software itself (such as `wuftp` or `proftpd`) as well as other possible configuration tasks. Using YaST, the installation step is straightforward: select the package to install and start the installation. Skip the configuration of the FTP server if no anonymous FTP should be used for the installation. Instead, use FTP login with a valid user name and password. You might want to create a user account for this task only. The FTP daemon itself does not need to be started by hand. It can be started by `inetd` if an FTP connection is requested. To activate the new settings, enter `rcinetd restart` or `rcxinetd restart` for SUSE LINUX 9.0 and later.

### 5.1.3 SUSE LINUX on CD

CD 1 of the SUSE LINUX Enterprise Server for IBM S/390 and zSeries contains a bootable Linux image for Intel-based workstations. Boot from this CD, answer the questions regarding your language and keyboard layout, and select 'Start rescue system'. You need at least 64 MB RAM for this. No



disk space is needed because the entire rescue system resides in the workstation's RAM. This approach takes some Linux and networking experience, because you need to set up the networking of the workstation manually.

## 5.2 Using a Microsoft Windows Workstation

If there is a Microsoft Windows workstation available in your network, use this computer to make the installation media available. The easiest way to do this is to use the SMB protocol, already included in the Windows operating system. Be sure to activate 'SMB over TCP/IP' as this enables the encapsulation of SMB packages into TCP/IP packages. Details can be found in the Windows online help or other Windows-related documentation that covers networking. Another option is to use FTP. This also requires some third-party software for Windows.

### 5.2.1 Via SMB

To make the installation media available via SMB, just insert the SUSE LINUX Enterprise Server CD 1 into the CD drive of the Windows workstation. Then create a new share using the CD-ROM drive's letter and make it available for everyone in the network.

---

#### Note

##### **SMB Installation Path for YaST**

Consult the README from the highest directory of CD 1 for detailed information about the syntax of the installation path for YaST.

---

**Note**

### 5.2.2 Via NFS

Refer to the documentation provided with the third party product that enables NFS server services for your Windows workstation. The CD-ROM drive containing the SUSE LINUX Enterprise Server CDs must be in the available NFS path.

### 5.2.3 Via FTP

Refer to the documentation provided with the third party product that is enabling FTP server services on your Windows workstation. The CD-ROM drive containing the SUSE LINUX Enterprise Server CDs must be in the available FTP path.

The FTP server that is part of some Microsoft Windows releases implements only a subset of the FTP command set and is not suitable for providing the installation data. However, other products, such as the FTP server that is part of Hummingbird Exceed or WAR-FTPD, have been reported as functional.

# Installation Types on IBM S/390 and zSeries

This chapter provides information about which steps must be performed to install SUSE LINUX Enterprise Server for each of the installation modes and where to find the appropriate information. After the preparations mentioned in the previous chapters have been accomplished, follow the installation overview of the desired installation mode below to install SUSE LINUX Enterprise Server on your system.

As described in Chapter 2 on page 15, there are three different installation modes for Linux on IBM S/390 and zSeries:

- ESA Native Installation
- LPAR Installation
- z/VM Installation

---

## Note

As Native and LPAR installation closely resemble each other, some sections describe the procedure for both of them. Installation with YaST is summarized in one chapter. Minor differences between the installation types are appropriately highlighted.

---

**Note**

## 6.1 Installation Overview of ESA Native Installation

1. Prepare the devices needed for installation. See Section 7.1 on page 33.
2. IPL the installation system. See Section 8.1 on page 39.
3. Configure the network. See Section 9.1 on page 45.
4. Connect to the SUSE LINUX Enterprise Server installation system. See Chapter 10 on page 49.
5. Start installation using YaST and IPL the installed system. See the chapter *Installation with YaST* in the *Installation and Administration* manual.

## 6.2 Installation Overview of LPAR Installation

1. Prepare the devices needed for installation. See Section 7.1 on page 33.
2. IPL the installation system. See Section 8.2 on page 41.
3. Configure the network. See Section 9.1 on page 45.
4. Connect to the SUSE LINUX Enterprise Server installation system. See Chapter 10 on page 49.
5. Start installation using YaST and IPL the installed system. See the chapter *Installation with YaST* in the *Installation and Administration* manual.

## 6.3 Installation Overview of z/VM Installation

1. Prepare the devices needed for installation. See Section 7.2 on page 34.

2. IPL the installation system. See Section 8.3 on page 42.
3. Configure the network. See Section 9.2 on page 46.
4. Connect to the SUSE LINUX Enterprise Server installation system. See Chapter 10 on page 49.
5. Start installation using YaST and IPL the installed system. See the chapter *Installation with YaST* in the *Installation and Administration* manual.



# Preparing the IPL of the SUSE LINUX Installation System

## 7.1 ESA Native Installation and LPAR Installation

Configure your zSeries system to start in ESA mode with an appropriate activation profile and IOCDS. Consult IBM documentation about how to achieve this.

### 7.1.1 IOCDS: Attaching and Configuring Devices

A SUSE LINUX Enterprise Server installation needs at least two devices: a DASD and a network connection device. For an IPL from tape, a tape device should also be accessible. Devices are configured and attached to an LPAR in the IOCDS (input output configuration data set). Example 7.1 defines one DASD, one OSA-2 network device, and a tape device for LPAR Z1. For further information about how to set up the IOCDS for Linux, refer to IBM hardware documentation of your machine (<http://www.s390.ibm.com/linux/press.html>).

*Example 7.1: An Example IOCDS*

```
CHPID PATH=FD,TYPE=DSD,PART=(Z1)
CHPID PATH=FE,TYPE=OSA,PART=(Z1)
CHPID PATH=10,TYPE=CNC,PART=(Z1)
```

```
CNTLUNIT CUNUMBR=FD00,PATH=FD,UNITADD=((00,1)),UNIT=3990-2
IODEVICE ADDRESS=(FD00,1),CUNUMBR=FD00,UNIT=3390
```

```
CNTLUNIT CUNUMBR=FE20,PATH=FE,UNIT=OSA,UNITADD=((20,1))
IODEVICE ADDRESS=(FE20,1),CUNUMBR=FE20,UNIT=OSA,PART=Z1
```

```
CNTLUNIT CUNUMBR=100A,PATH=10,UNIT=3480,UNITADD=((0A,1))
IODEVICE ADDRESS=100A,CUNUMBR=100A,UNIT=3480,PART=Z1
```

---

## Note

### Where Next

For ESA native installation proceed with Section 8.1 on page 39. For LPAR installation, proceed with Section 8.2 on page 41.

---

Note

## 7.2 z/VM Installation

### 7.2.1 Adding a Linux Guest

The first step is to attach and format one or multiple DASDs in the system to be used by the Linux guest in z/VM. Next, create a new user in z/VM. Example 7.2 on the facing page shows the directory for a user §LINUX1§ with the password §LINPWD§, 256 MB of memory (extendable up to 512 MB), 32 MB of expanded RAM (XSTORE), some minidisks (MDISK), two CPUs, an OSA QDIO device, and virtual CTC definitions.

---

## Note

### Assigning Memory to z/VM guests

When assigning memory to a z/VM guest, make sure the memory size suits the needs of your preferred installation type. See Section 1.1.1 on page 10.

---

Note



*Example 7.2: Configuration of a z/VM Directory*

```

USER LINUX1 LINPWD 256M 512M G
*
* _____
* LINUX1
* _____
* This VM Linux guest has two CPs defined.

CPU 01 CPUID 111111
CPU 02 CPUID 111222
IPL CMS PARM AUTOCR
IUCV ANY
IUCV ALLOW
MACH ESA 10
OPTION MAINTCCW RMCHINFO
SHARE RELATIVE 2000
XSTORE 32M
CONSOLE 01C0 3270 A
SPOOL 000C 2540 READER *
SPOOL 000D 2540 PUNCH A
SPOOL 000E 3203 A
* OSA QDIO DEVICE DEFINITIONS
DEDICATE 9A0 9A0
DEDICATE 9A1 9A1
DEDICATE 9A2 9A2
*
LINK MAINT 0190 0190 RR
LINK MAINT 019E 019E RR
LINK MAINT 019D 019D RR
* MINIDISK DEFINITIONS
MDISK 201 3390 0001 0050 DASD40 MR ONE4ME TWO4ME THR4ME
MDISK 150 3390 0052 0200 DASD40 MR ONE4ME TWO4ME THR4ME
MDISK 151 3390 0253 2800 DASD40 MR ONE4ME TWO4ME THR4ME

```

This example uses minidisk 201 as the guest's home disk. Minidisk 150 with 200 cylinders is the Linux swap device. Disk 151 with 2800 cylinders holds the Linux installation.

Now add (as the user MAINT) the guest to the user directory with DIRM FOR LINUX1 ADD. Enter the name of the guest (§LINUX1§) and press (F5). Set up the environment of the user with:

```

DIRM DIRECT
DIRM USER WITHPASS

```

The last command returns a reader file number. This number is needed for the next command:

```
RECEIVE <number> USER DIRECT A (REPL)
```

Now assign the directories to the guest with `DIRMAP USER DIRECT A`. You can now log in on the guest as user `LINUX1`.

## 7.2.2 Setting up CTC

z/VM guests often communicate with each other through CTC connections. This requires some setup on the z/VM host and the z/VM guest. The virtual CTC devices were defined in Example 7.2 on the preceding page. Now, couple the virtual CTC devices in `§LINUX§` with the virtual CTC devices in `§TCPIP§`.

Add the following lines to the user's (i.e., `§LINUX1§`) `PROFILEEXEC` and adjust them to your needs:

```
DEF CTC 120
DEF CTC 121
COUPLE 120 TCPIP 01F1
COUPLE 121 TCPIP 01F0
```

In this example, the CTC port pair has the numbers 120 and 121 and access ports 1F1 and 1F0 on the z/VM host.

---

### Note

#### Setting up CTC

Make sure to couple an even (read) address with an odd (write) address.

---

### Note

On the z/VM host, first make sure to have CTC devices defined for user `TCPIP` in `USER DIRECT`:

```
SPECIAL 01F0 CTCA
SPECIAL 01F1 CTCA
```

Now configure these ports as user `TCPMAINT` by changing the file `PROFILE TCPIP`. First add the appropriate `DEVICE` and `LINK` statements, in this example:

```
DEVICE LIN1CTC CTC 1F0
LINK LIN1C CTC 0 LIN1CTC
```

Assign the IP address for the z/VM host to this interface in the HOME section:

```
HOME
  192.168.0.17 LIN1C
```

Then add a static route to the z/VM guest in the GATEWAY section:

```
GATEWAY
  192.168.0.18 = LIN1C 1500 HOST
```

Finally, start the interface with the following line at the end of PROFILE TCPIP:

```
START LIN1CTC
```

Save your changes then restart the TCP/IP subsystem with:

```
OBEYFILE PROFILE TCPIP B
```

If this fails although you have made sure that PROFILE TCPIP is correct, try restarting the TCP/IP subsystem as user MAINT:

```
FORCE TCPIP
XAUTOLOG TCPIP
```

## Caution

### Restarting the TCP/IP Subsystem

FORCE TCPIP disconnects all TCP/IP clients from the service, making them unreachable through TCP/IP. This includes running VM guests. Keep VM usable by running the above commands from a terminal that is not connected over TCP/IP (e.g., a directly-connected 3270 terminal or the HMC) and shutting down all VM guests and services using TCP/IP prior to the execution of FORCE TCPIP. This applies to Linux guests using CTC or IUCV through the TCPIP user.

**Caution**

## Note

### Where Next

Proceed with Section 8.3 on page 42.

**Note**



# IPLing the SUSE LINUX Installation System

## 8.1 ESA Native Installation

There are different ways to IPL SUSE LINUX Enterprise Server natively on IBM S/390 and zSeries systems. The preferred way is the 'Load from CD-ROM or server' feature of the SE or HMC.

### 8.1.1 IPL from CD-ROM

Mark the 'Images' icon and select 'Load from CD-ROM or server'. Leave the field for the file location blank or enter the path to the root directory of the first CD-ROM then select 'Continue'. In the list of options that appears, choose the default selection. 'Operating system messages' should now show the kernel boot messages.

### 8.1.2 IPL from Tape

If you cannot IPL from CD-ROM or from a VM reader, create a tape from which to IPL the SUSE LINUX Enterprise Server installation image. Use the 'LOAD' button in the SE or HMC with the tape device address as the load address to IPL the SUSE LINUX Enterprise Server installation system.

There are many ways to create an iplable tape. One is to copy the files:

```
/boot/tapeipl.ikr  
/boot/parmfile  
/boot/initrd
```

as binary files from CD 1 into the z/VM (for example, using FTP from a Linux workstation).

Name them

```
SLES9 IMAGE
SLES9 PARM
SLES9 INITRD
```

and write them onto a tape with the REXX script in Example 8.1.

---

**Note****Transferring Binaries using FTP**

Do not upload the files as `§fixed 80§`. Store them as `§fixed 1024§`. Use the FTP command `loc site fix 1024`.

---

**Note**

*Example 8.1: REXX Script to Create an IPLable Tape*

```
'REWIND 181'
'FILEDEF IN1 DISK' SLES9 IMAGE A
'FILEDEF IN2 DISK' SLES9 PARM A
'FILEDEF IN3 DISK' SLES9 INITRD A
'FILEDEF OUT TAP1 (RECFM F BLOCK 1024 LRECL 1024 PERM'
say 'Writing: ' left(file1,23)
'MOVEFILE IN1 OUT'
say 'Writing: ' left(file2,23)
'MOVEFILE IN2 OUT'
say 'Writing: ' left(file3,23)
'MOVEFILE IN3 OUT'
say 'Done.'
'REWIND 181'
exit
```

The tape in this script is attached as 181. Adjust the script to your needs.

### 8.1.3 Emulated I/O

This option is only available on the Multiprise architecture. Insert the SUSE LINUX Enterprise Server CD into the CD-ROM and select 'LOAD' with the device address for emulated I/O as set up in the IOCDS. If the LOAD fails with a busy error, simply try again a few times. Do a rewind of the CD-ROM prior to each LOAD (remember that it is emulated as a tape) by entering `awsmount 080 /REW /D /R` on the OS/2 console. §080§ is the device number of the emulated CD-ROM. IBM will provide a fix for that in the near future. The 'Operating system messages' should now show the kernel boot messages.

#### Note

##### Where Next

To continue the installation, proceed with Section 9.1 on page 45.

#### Note

## 8.2 LPAR Installation

There are different ways to IPL SUSE LINUX Enterprise Server into an LPAR. The preferred is the 'Load from CD-ROM or server' feature of the SE or HMC.

### 8.2.1 IPL from CD-ROM

Mark the LPAR to install and select 'Load from CD-ROM or server'. Leave the field for the file location blank or enter the path to the root directory of the first CD-ROM then select continue. In the list of options that appears, choose the default selection. 'Operating system messages' should now show the kernel boot messages.

### 8.2.2 IPL from Tape

Follow the procedure described for ESA Native Installation (see Section 8.1 on page 39).

### 8.2.3 Emulated I/O

Follow the procedure described for ESA native installation (see Section 8.1 on page 39).

---

**Note****Where Next**

To continue the installation, proceed with Section 9.1 on page 45.

---

**Note**

## 8.3 z/VM Installation

This chapter is about IPLing the installation system to install SUSE LINUX Enterprise Server for IBM S/390 and zSeries on a z/VM system.

### 8.3.1 Transferring the Installation System via FTP

You need a working TCP/IP connection and an FTP client program within your newly defined z/VM guest. Setting up TCP/IP for z/VM is beyond the scope of this manual. Refer to the appropriate IBM documentation.

Login as the z/VM Linux guest to IPL. Make the content of the directory /boot/ on CD 1 of the SUSE LINUX Enterprise Server for IBM S/390 and zSeries available by FTP within your network. From this directory, get the files `vmrdr.ikr`, `initrd`, and `parmfile`. Example 8.2 shows the steps necessary. In this example, the required files are accessible from an FTP server at the IP address 192.168.0.3 and the login is `slininst`. It may differ for your network.

*Example 8.2: Transferring the Binaries via FTP*

```
FTP 192.168.0.3
VM TCP/IP FTP Level 320
Connecting to 192.168.0.3, port 21
220 ftpserver FTP server (Version wu-2.4.2-academ[BETA-18](1)
Fri May 07 19:16:59 GMT 2004) ready.
USER
lininst
331 Password required for lininst
```



```
PASS
*****
230 User lininst logged in.
Command:
binary
200 Type set to I
Command:
locsite fix 80
Command:
get /media/cdrom/boot/vmrdr.ikr sles9.image
200 PORT Command successful
150 Opening BINARY mode data connection for vmrdr.ikr
(1581060 bytes)
226 Transfer complete.
1581060 bytes transferred in 2.065 seconds.
Transfer rate 766.70 Kbytes/sec.
Command:
get /media/cdrom/boot/initrd sles9.initrd
200 PORT Command successful
150 Opening BINARY mode data connection for initrd
(12194534 bytes)
226 Transfer complete.
12194534 bytes transferred in 15.919 seconds.
Transfer rate 766.70 Kbytes/sec.
Command:
asc
200 Type set to A
Command:
get /media/cdrom/boot/parmfile sles9.parm
150 Opening BINARY mode data connection for parmfile
(38 bytes)
226 Transfer complete.
38 bytes transferred in 0.092 seconds.
Transfer rate 0.38 Kbytes/sec.
Command:
quit
```

Transfer the files with a fixed block size of eighty characters. Specify it with the FTP command `locsite fix 80`. It is important to copy `VMRDR.IKR` (the Linux kernel) and `INITRD` (the installation image) as binary files, so use the `binary` transfer mode.

## 8.3.2 Creating a Start Script

It is convenient to write a small REXX script to IPL the Linux installation system. This script, shown in Example 8.3 loads the kernel, parmfile, and the initial RAM disk into the reader for IPL.

### *Example 8.3: SLES9 EXEC*

```
XEDIT SLES9 EXEC

/**/
'close rdr'
'purge rdr all'
'spool punch * rdr'
'PUNCH SLES9 IMAGE A (NOH'
'PUNCH SLES9 PARM A (NOH'
'PUNCH SLES9 INITRD A (NOH'
'change rdr all keep nohold'
'ipl 00c clear'
```

Save the script with the command FILE.

Now you can IPL the SUSE LINUX Enterprise Server Installation System with the command SLES9. The Linux kernel then starts and prints its boot messages.

---

#### **Note**

#### **Where Next**

To continue the installation, proceed with Section 9.2 on page 46.

---

**Note**

# Network Configuration

## 9.1 ESA Native Installation and LPAR Installation

After the kernel has completed its start-up routines, open the ‘Operating System Messages’ on the HMC or SE. There, answer a few questions regarding the network setup.

First, select the type of network connection to use: Token Ring, Ethernet, Express Gigabit Ethernet, CTC, ESCON, IUCV, Hipersockets, or Express High-speed Token Ring. In this example installation, ethernet is used. Enter the device address of the ethernet network device next (§FC20§ in our example). Then enter the port to use. SUSE LINUX Enterprise Server now tries to load the network module by building a parameter line with the information provided then displays all loaded modules. If loading was successful a module named §lcs§ is listed.

For information about the driver parameters, read the manual *LINUX for zSeries Device Drivers, Features, and Commands* at [http://www10.software.ibm.com/developerworks/opensource/linux390/april2004\\_documentation.shtml](http://www10.software.ibm.com/developerworks/opensource/linux390/april2004_documentation.shtml).

Next, enter the full host name, the IP address, and the netmask. If you install via token ring, ethernet, gigabit ethernet, or high-speed token ring, also enter the broadcast address and the gateway address. For CTC, ESCON, and IUCV, the gateway is the IP address of your peer. Finally, the IP address of the DNS server, the DNS search domain, and the MTU are requested. The MTU size should always match the one used by the network to which to connect.

A summary is then displayed. Confirm whether your input is correct. Before the network is started, enter a password that is valid only during the

installation. After having IPLed the installed system, enter the *real* root password.

Take a look at the output of `ifconfig`, which should contain two entries: a loopback (`lo`) connection and one connection (`tr0`, `eth0`, `ctc0`, `escon0`, `iucv0`, or `hsi0` with correct settings. To ensure that all IP addresses are reachable, a ping is sent to the local IP, the gateway, and the name server.

---

**Note****Where Next**

Proceed with Chapter 10 on page 49.

---

**Note**

## 9.2 z/VM Installation

After the kernel has completed its start-up routines, answer a few questions regarding the network setup.

First, select the type of network connection to use: Token Ring, Ethernet, Express Gigabit Ethernet, CTC, ESCON, IUCV, Hipersockets, or Express High-Speed Token Ring. In this example installation, CTC is used.

The system now displays a possible CTC configuration. If you prefer another setup, enter the device address of the CTC read channel (0.0.0600 in this example) then the one of the CTC write channel (0.0.0601). The protocol mode switches to one of several modes supported by CTC. By default, mode §0§ (compability mode) is selected.

---

**Note****Using IPv6 with the CTC Device**

To use IPv6 with the CTC device, protocol mode §1§ (extended mode) must be selected. IPv6 is not supported in protocol mode §0§.

---

**Note**

SUSE LINUX Enterprise Server now tries to load the network module by building a parameter line with the information provided then displays all loaded modules. Loading was successful if you get an output like the one in Example 9.1.

*Example 9.1: Network Device Driver Parameters*

```
Loading CTC module:
CTC driver Version: 1.58.2.1 initialized
List of first 10 CTC Channels that were detected:
Device   Channel type
0.0.0600 3088/08
0.0.0601 3088/08
Device address for read channel (0.0.0600):

Device address for write channel (0.0.0601):

Select protocol number for CTC:
0) Compatibility mode, also for non-Linux peers other
   than OS/390 and z/OS (this is the default mode)
1) Extended mode
3) Compatibility mode with OS/390 and z/OS
Enter your choice (0):

ctc0: read: ch-0.0.0600, write: ch-0.0.0601, proto: 0
ctc0 detected.
ctc0 is available, continuing with network setup.
```

Next, enter the full host name, your IP address, and the IP address of your peer (the 'other' side of the CTC connection). CTC connections are always point to point connections. To install via token ring, ethernet, or gigabit ethernet, enter additional information, like the netmask, broadcast, and default gateway, but no peer IP address.

Finally, the IP address of the DNS server, the DNS search domain, and the MTU size are requested. The MTU size should always match the one used by the network to which to connect. Refer to Section A on page 57 to get an overview of the recommended MTU size.

Now a summary is displayed. Confirm whether your input is correct. Before the network is started, enter a password that will be valid only during the installation. After having IPLed the installed system, enter the *real* root password..

With all basic parameters set up, the network will be started. Check the output of `ifconfig`, which should contain two entries: a loopback (`lo`) connection and one connection (`tr0`, `eth0`, `ctc0`, `escon0`, `iucv0`, or `hsi0`) with correct settings. See Example 9.2. To ensure that all IP addresses are reachable, a ping is sent to the local IP, the gateway, and the name server.

*Example 9.2: Example ifconfig*

```
ifconfig ctc0 192.168.0.20 pointopoint 192.168.0.1 mtu 1500
ctc0: connected with remote side
/sbin/ifconfig ctc0 :
ctc0      Link encap:Serial Line IP
          inet addr:192.168.0.20  P-t-P:192.168.0.1
          Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
```

Trying to ping my IP address:

```
PING 192.168.0.20 (192.168.0.20) 56(84) bytes of data.
64 bytes from 192.168.0.20: icmp_seq=1 ttl=64 time=0.084 ms
64 bytes from 192.168.0.20: icmp_seq=2 ttl=64 time=0.099 ms
64 bytes from 192.168.0.20: icmp_seq=3 ttl=64 time=0.132 ms
```

--- 192.168.0.20 ping statistics ---

```
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.084/0.105/0.132/0.020 ms
```

Trying to ping the IP address of the peer:

```
PING 192.168.0.1 (192.168.0.1) 56(84) bytes of data.
64 bytes from 192.168.0.1: icmp_seq=1 ttl=64 time=0.407 ms
64 bytes from 192.168.0.1: icmp_seq=2 ttl=64 time=0.366 ms
64 bytes from 192.168.0.1: icmp_seq=3 ttl=64 time=0.336 ms
```

--- 192.168.0.1 ping statistics ---

```
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 0.336/0.369/0.407/0.036 ms
Peer seems to respond to our pings, continuing.
```

Trying to ping the IP address of the DNS Server:

```
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.
64 bytes from 192.168.0.2: icmp_seq=1 ttl=61 time=1.59 ms
64 bytes from 192.168.0.2: icmp_seq=2 ttl=61 time=1.78 ms
64 bytes from 192.168.0.2: icmp_seq=3 ttl=61 time=1.70 ms
```

--- 192.168.0.2 ping statistics ---

```
3 packets transmitted, 3 received, 0% packet loss, time 2020ms
rtt min/avg/max/mdev = 1.599/1.695/1.785/0.076 ms
```

Proceed with Chapter 10 on the facing page.

# Connecting to the SUSE LINUX Installation System

After the network setup has been successfully completed, specify the source of the installation data. Chapter 5 on page 25 describes the various sources of input. You must reference the source of input (installation data) selected when working through that section. Currently, the options `§ nfs §`, `§ smbfs §`, and `§ ftp §` are supported.

Enter the option of your choice and specify the source directory on the installation server when prompted to do so. Finally, choose the connection method to the installation system from `§ VNC §`, `§ X §`, or `§ ssh §`. Then proceed with the appropriate initiation of the installation process.

## 10.1 Initiating the Installation for VNC

1. After the installation option `§ VNC §` has been chosen, the VNC server starts. A short note displayed in the console provides information about which IP address and display number is needed for a connect with `vncviewer`. Alternatively, a URL is given here for entry into your Java-enabled browser to connect to the installation system.
2. Start a VNC client application on your client system. Either use `vncviewer` or the VNC Java client and a Java-enabled web browser.
3. Enter the IP address and the display number of the SUSE LINUX Enterprise Server installation system when prompted to do so.

If you connect via a Java-enabled browser, enter a URL containing the IP address of the installation system and the appropriate port number in the format:

`http://<IP address of installation system>:5801/`

4. After the connection has been established, start installing SUSE LINUX Enterprise Server with YaST.

## 10.2 Initiating the Installation for the X Window System

### Note

#### X Authentication Mechanism

The direct installation with the X Window System relies on a primitive authentication mechanism based on hostnames. This mechanism is disabled on current SUSE LINUX versions. Therefore installation with SSH or VNC is preferred.

### Note

1. Make sure the server allows the client (the system that is installed) to connect to the server. Do this with the following command: `xhost <client IP address>`. Set the variable `DISPLAYMANAGER_XSERVER_TCP_PORT_6000_OPEN="yes"` in file `/etc/sysconfig/displaymanager` and restart the server.
2. Enter the IP address of the machine with the X server.
3. Wait until YaST opens then start installation.

## 10.3 Initiating the Installation for SSH

To connect to the installation system using SSH, execute `ssh earth`. If your workstation runs on Microsoft Windows, use the `ssh` and `telnet` client and terminal emulator `putty`, which is available on CD 1 in the directory `/dosutils/putty/`.

A login prompt appears. Enter `§root§` and log in with your password. Then enter `yast2` to start YaST.

Proceed with the detailed description of the installation procedure that can be found in the chapter *Installation with YaST* of the *Installation and Administration* manual.



# **Part III**

## **Appendix**



# Network Connection Types

SUSE LINUX Enterprise Server for IBM S/390 and zSeries includes network drivers for OSA devices (Token Ring, Ethernet, and Gigabit Ethernet), CTC, Escon, Hipersockets, and IUCV. This chapter describes the configuration within the SUSE LINUX Enterprise Server installation system.

## Ethernet and Token Ring with the lcs Module

Select §1§ from the list of network devices (Example A.1) for a token ring network. For ethernet, select §2§.

### *Example A.1: Supported Network Connection Types*

```
=
==-- Welcome to SUSE Linux Enterprise Server 9 for zSeries --==
=
```

Please select the type of your network device:

- 0) no network
- 1) OSA Token Ring
- 2) OSA Ethernet
- 3) OSA-Gigabit Ethernet or OSA-Express Fast Ethernet
- 4) Channel To Channel
- 5) Escon
- 6) IUCV
- 8) Hipersockets
- 9) OSA-Express High-speed Token Ring (qdio)
- 10) Show subchannels and detected devices

Enter your choice (0-10):

When prompted, enter the network device number of the network card (e.g., FC20) and the relative port number on this device (Output A.2).

*Example A.2: Network Device Driver Parameters*

```
Enter the read channel device number, e.g. 'FC20' (0c30):
fc20
Please enter the relative port number on device address fc20
Relative port, e.g. '0' (0):
2
Writing 'noauto;lcs0,0xfc20,0xfc21,0,1' to /proc/chandev
Using /lib/modules/2.4.version/net/lcs.o
Starting lcs module
with chandev support,with multicast support, with ethernet support,
with token ring support.
debug: lcs: new level 0
eth0: ip v6 supported yes enabled yes
eth0: multicast supported yes enabled yes
lcs: eth0 configured as follows read subchannel=162
write subchannel=163
read_devno=fc20 write_devno=fc21
hw_address=00:04:AC:E3:53:88 rel_adapter_no=1
lcs                27584    0 (unused)
eth0      Link encap:Ethernet  HWaddr 00:04:AC:E3:53:88
BROADCAST MULTICAST  MTU:1500  Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
eth0 is available, continuing with network setup.
```

Next, enter the full host name, the IP address, and the netmask as well as the broadcast address, the IP address of the gateway, and the IP address of the DNS server. Finally, enter the DNS search domain and the MTU size (Output A.3).

*Example A.3: Network Device Name*

```
Please enter your full host name:
earth.cosmos.com
Please enter your IP address:
192.168.0.20
Please enter the net mask:
```

```

255.255.255.0
Please enter the broadcast address:
192.168.0.255
Please enter the gateway's IP address:
192.168.0.1
Please enter the IP address of the DNS server
or 'none' for none:
192.168.0.2
Please enter the DNS search domain:
cosmos.com
Please enter the MTU (Maximum Transfer Unit),
leave blank for default: (1500):

```

A summary is displayed. Confirm whether your input is correct.

## Gigabit Ethernet with the qeth Module

Select §3§ from the list of network devices. When prompted, enter the network device number of the network card (e.g., 0x0808,0x0809, 0x080a). Specify three device addresses (read, write, status) and the port name.

### *Example A.4: Network Device Driver Parameters*

```

Possible configuration: read: 0x0808, write: 0x0809, data: 0x080a
Enter the device addresses for the qeth module, e.g. '0x0808,
0x0809,0x080a'
(0x0808,0x0809,0x080a): 0x0808,0x0809,0x080a
Please enter the portname (case sensitive) to use (suselin7):
SUSEPORT
Writing 'reset_conf' to /proc/chandev
Writing 'noauto;qeth0,0x0808,0x0809,0x080a;add_parms,0x10,0x0808,
0x080a,portname:SUSEPORT' to /proc/chandev
Using /lib/modules/2.4.version/net/qeth.o
qeth: loading qeth S/390 OSA-Express driver
qeth: Trying to use card with devnos 0x808/0x809/0x80A
qdio : CHSC returned cc 2. Using all SIGAs for sch xd.
qeth: Device 0x808/0x809/0x80A is an OSD Express card (level: 0223)
with link type Fast Eth (portname: FEF400)
qeth          173040    0 (unused)
qdio          47664    1 qeth
eth0 detected!

```

```
eth0      Link encap:Ethernet  HWaddr 00:02:55:09:D2:5D
          NOARP MULTICAST  MTU:1492  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
          Interrupt:11
```

eth0 is available, continuing with network setup.

Next, enter the full host name, the IP address, and the netmask as well as the broadcast address, the IP address of the gateway, and the IP address of the DNS server. Finally, enter the DNS search domain and the MTU (Output A.5).

#### *Example A.5: Network Device Name*

```
Please enter your full host name:
earth.cosmos.com
Please enter your IP address:
192.168.0.20
Please enter the net mask:
255.255.255.0
Please enter the broadcast address:
192.168.0.255
Please enter the gateway address:
192.168.0.1
Please enter the IP address of the DNS server
or 'none' for none:
192.168.0.2
Please enter the DNS search domain (e.g. suse.com):
cosmos.com
Please enter the MTU (Maximum Transfer Unit,
leave blank for default) [1492]:
```

A summary is displayed. Confirm whether your input is correct.

## CTC and Escon with the ctc Module

Select §4§ from the list of network devices for CTC connection. For Escon, select §5§. The driver is the same. The only difference to the user is the name of the device (ctc0 for CTC and escon0 for Escon).

CTC and Escon connections always come with pairs of device addresses. Enter the device address of the read and write channel. Additionally, the protocol mode for the CTC device must be set. By default, protocol mode §0§ (compatibility mode) is selected.

To use IPv6 with the CTC device, protocol mode §1§ (extended mode) must be selected. IPv6 is not supported in protocol mode §0§.

### *Example A.6: Network Device Driver Parameters*

```
List of first 10 CTC Channels that were detected:
Device Channel type
0.0.0600 3088/08
0.0.0601 3088/08
0.0.0602 3088/08
0.0.0603 3088/08
0.0.0604 3088/08
0.0.0605 3088/08
Device address for read channel (0.0.0600):
Device address for write channel (0.0.0601):
Select protocol number for CTC:
0) Compatibility mode, also for non-Linux peers other
   than OS/390 and z/OS (this is the default mode)
1) Extended mode
3) Compatibility mode with OS/390 and z/OS
Enter your choice (0):
ctc0: read: ch-0.0.0600, write: ch-0.0.0601, proto: 0
ctc0 detected.
ctc0 is available, continuing with network setup.
```

Next, enter the full host name, the IP address, the netmask, the IP address of the peer (the 'other' side of the connection), and the IP address of the DNS server. Finally, enter the DNS search domain and the MTU size (Output A.7).

### *Example A.7: Network Device Name*

```

Please enter your full host name, e.g. 'linux.example.com' (linux.example.com):
earth.cosmos.com
Please enter your IP address, e.g. '192.168.0.1' (192.168.0.1):
192.168.0.20
Please enter the IP address of your peer, e.g. '192.168.0.254' (192.168.0.254):
192.168.0.1
Please enter the IP address of the DNS server or 'none' for no DNS (none):
192.168.0.2
Please enter the DNS search domain, e.g. 'example.com' (suse.de):
cosmos.com
Please enter the MTU (Maximum Transfer Unit),
leave blank for default: (1500): 1492

```

A summary is then displayed. Confirm whether your input is correct..

## IUCV with the netiucv Module

Select §6§ from the list of network devices (Output A.8) for the IUCV device driver. Like CTC, IUCV provides virtual point-to-point connections.

### *Example A.8: Supported Network Connection Types*

```

=
== Welcome to SUSE Linux Enterprise Server 9 for zSeries ==
=

Please select the type of your network device:
 0) no network
 1) OSA Token Ring (lcs)
 2) OSA Ethernet
 3) OSA-Gigabit Ethernet or OSA-Express Fast Ethernet
 4) Channel To Channel
 5) Escon
 6) IUCV
 8) Hipersockets
 9) OSA High speed Token Ring (qdio)
10) Show subchannels and detected devices
Enter your choice (0-10):

```

Enter the name of the IUCV peer. Leave it blank to use the default §\$TCPiP§ user (Output A.9 on the facing page).



### *Example A.9: Network Device Driver Parameters*

Please enter the name(userid) of the target VM guest here.  
In VIF this is normally \$TCPIP, in VM normally TCPIP.

```
The name of the peer guest, e.g. 'TCPIP' (TCPIP): ROUTER01
Trying to start the netiucv module now...
modprobe netiucv:
IUCV lowlevel driver Version: 1.27.2.1 initialized
NETIUCV driver Version: 1.48.2.1 initialized
netiucv module is loaded, activating it.
iucv0: 'ROUTER01'
checking interface iucv0.
iucv0      Link encap:Serial Line IP
           POINTOPOINT NOARP  MTU:9216  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:50
           RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
```

iucv0 seems to exist, continuing with network setup.

Next, enter the full host name, the IP address, the netmask, the IP address of the peer, and the IP address of the DNS server. Finally, enter the DNS search domain and the MTU (Output A.10).

### *Example A.10: Network Device Name*

```
Please enter your full host name, e.g. 'linux.example.com' (linux.example.com
earth.cosmos.com
Please enter your IP address, e.g. '192.168.0.1' (192.168.0.1):
192.168.0.18
Please enter the IP address of your peer, e.g. '192.168.0.254' (192.168.0.254):
192.168.0.17
Please enter the IP address of the DNS server or 'none' for no DNS (none):
192.168.0.2
Please enter the DNS search domain, e.g. 'example.com' (suse.de):
cosmos.com
Please enter the MTU (Maximum Transfer Unit),
leave blank for default: (9216):
```

A summary is displayed. Confirm whether your input is correct.



# The parmfile — Automating the System Configuration

The installation process can be partly automated by specifying the crucial parameters in the `parmfile`. The `parmfile` contains all the data required for network setup and DASD configuration. In addition to that, it can be used to set up the connection method to the SUSE LINUX Enterprise Server installation system and the YaST running there. User interaction is thus limited to the actual YaST installation controlled by YaST dialogs.

The following parameters can be passed to the installation routine, which takes them as default values for installation. All IP addresses, server names, and numerical values are just examples. Replace these values with the ones needed in your installation scenario.

The number of lines in the `parmfile` is limited to ten. Specify more than one parameter on a line. Separate the parameters by spaces. You may specify the parameters in any order. Always keep the `§PARAMETER=value§` string together in one line. For example:

```
IP_HOST=s390zvm01.suse.de IP_ADDR=10.11.134.65
```

Some of the following parameters are required. If they are missing, the automatic process pauses and ask for the value interactively.

## General Parameters

**AUTOINSTALL=<yes/no>** This parameter controls whether the other parameters are only default values that still must be acknowledged by the user. Set this parameter to `§yes§` if all values should be accepted and no questions asked.

**INST\_PASSWORD=<your password>**

The temporary root password for access during the installation. The password must have between three and eight characters.

## Configuring the Network Interface

### Note

#### Configuring the Network Interface

All settings discussed in the section below only apply to the network interface used during installation. Configure additional network interfaces in the installed system by following the instructions given in the *Installation and Administration* manual in *Manual Network Configuration*.

### Note

**IP\_ADDR=192.168.55.23** Enter the IP address of the interface to configure.

**IP\_HOST=earth.cosmos.com** Enter the FQDN (fully qualified domain name) of the host to install.

**IP\_GATEWAY=192.168.55.254** Specify the gateway being used.

**IP\_DNS=192.168.123.123** Specify the DNS server in charge.

**IP\_SEARCH=example.com** Specify the search domain for DNS requests.

**IP\_MTU=1500** Specify an appropriate MTU size.

**IP\_INTERFACE=ctc** Enter the type of interface to configure. Possible values are `§ctc§`, `§escon§`, `§iucv§`, `§eth§`, `§qeth§`, `§tr§`, `§hsi§`, and `§qeth-tr§`.

For the interfaces of type `§hsi§`, `§eth§`, `§qeth§`, `§qeth-tr§`, and `§tr§`, specify an appropriate netmask and an optional broadcast address:

`IP_NETMASK=255.255.255.0`

`IP_BROADCAST=192.168.255.255`

For the interfaces of type `§ctc§`, `§escon§`, and `§iucv§`, enter the IP address of the peer:

```
IP_PEER=192.168.55.20
```

Each of the interfaces requires certain setup options:

- Interface `§ctc§` and `§escon§`:

```
READ_DEVNO=0424
WRITE_DEVNO=0425
```

`READ_DEVNO` specifies the READ channel to use. `WRITE_DEVNO` is the WRITE channel.

- For the `§ctc§` interface, specify the protocol that should be used for this interface:

```
PROTOCOL=<0/1/3>
```

Valid entries would be:

---

§0§ Compatibility mode, also for non-Linux peers other than OS/390 and z/OS (this is the default mode)

§1§ Extended mode

§3§ Compatibility mode with OS/390 and z/OS

---

- Interface `§eth§` and `§tr§`:

```
DEVNO=0124
PORTNO=1
```

`DEVNO` stands for the channel number used in this setup. A second port number can be derived from this by adding one to `DEVNO`. `PORTNO` is used to specify the relative port.

- Interface `§iucv§`:

```
PEER=PARTNER
```

Enter the name of the peer machine.

- Interface `§qeth§` for OSA-Express Gigabit Ethernet and `§qeth-tr§` for OSA-Express High-speed Token Ring:

```

READ_DEVNO=0524
WRITE_DEVNO=0525
DATA_DEVNO=0526
PORTNAME=FEF400

```

For `READ_DEVNO`, enter the number of the READ channel. `DATA_DEVNO` specifies the DATA channel. For `PORTNAME`, enter an appropriate port name. Make sure the READ channel carries an even device number. The WRITE channel is derived from READ channel by adding one, so is not explicitly specified in this setup.

- Interface `§hsi§` for Hipersockets and VM guest LANs:

```

READ_DEVNO=0624
WRITE_DEVNO=0625
DATA_DEVNO=0626

```

For `READ_DEVNO`, enter the appropriate number for the READ channel. For `WRITE_DEVNO` and `DATA_DEVNO`, enter the appropriate channel numbers.

## Specifying Installation Source and YaST Interface

`INST_INFO=nfs` Specify the type of installation to perform. Possible values are `§nfs§`, `§SAMBA§`, and `§ftp§`.

If `§INST_INFO=ftp§` is chosen, specify the user and password for FTP installation. If these are not set, anonymous login is assumed:

```

FTPUSER=<a user name>
FTPPASSWORD=<a password>

```

If `§INST_INFO=SAMBA§` is chosen, specify the user, password, and domain that should be used for SAMBA installation. If these three parameters are not set, guest login is assumed:

```
SAMBAUSER=<a user name>
SAMBAPASSWORD=<a password>
WORKDOMAIN=<a domain>
```

**INST\_IP\_ADDR=129.168.44.33**

Enter the IP address of the machine used as the installation server.

**INST\_IP\_DIR=/s390** Enter a directory on the installation server, which holds the installation data of the SUSE LINUX Enterprise Server CDs.

**INST\_SCREEN=<VNC/X/SSH>** Decide whether an X server should be used for installation or whether to use VNC or SSH installation. Enter §X§ to use an X server and §VNC§ or §SSH§ for VNC or SSH installation.

### Note

#### X authentication mechanism

The direct installation with the X Window System relies on a primitive authentication mechanism based on hostnames. This mechanism is disabled on current SUSE LINUX versions. Therefore installation with SSH or VNC is preferred.

### Note

For §X§, specify the IP address of the X server to use for installation:

```
INST_X_ADDR=10.10.10.10
```

Enter the IP address of the X server. To enable a connection between YaST and the X server, run `xhost <IP_ADDR>` on this machine.

For §VNC§, specify a password of six to eight characters to use for installation:

```
VNC_PASSWORD=<a password>
```