Lenovo Systems Solution for SAP HANA™ appliance
Quick Start Guide

Note

Before using this information and the product it supports, read the general information in Appendix B "Notices" on page 29, the *Warranty Information* document, and the *Safety Information* and the *Environmental Notices and User Guide* documents on the *Documentation* CD.

The most recent version of this document is available at http://www.ibm.com/supportportal.

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Contents

Chapter 1. Introduction

The Lenovo Systems Solution for SAP HANA appliance, is a hardware and software solution that integrates the SAPA HANA database with System x X6 enterprise servers. This solution is optimally configured as an optimized system solution for use in your corporate SAP application environment.

Delivered as an optimized system solution based on System x X6 enterprise servers, SAP HANA includes the following features:

- High-performance SAP HANA database and a powerful data calculation engine
- Real-time replication service to access and replicate data from SAP enterprise resource planning (ERP)
- Data repository to retain views of business information
- Highly tuned integration with SAP BusinessObjects Business Intelligence (BI) solutions for insight and analytics
- SQL and MDX interfaces for third-party application access
- Unified information-modeling design environment
- Data services to provide access to virtually any SAP and non-SAP data source

Note: Throughout this document, SAP HANA appliance is referred to as SAP HANA.

License information

This computer system is delivered with the SAP HANA appliance Platform Edition. You are not licensed to use this copy of the SAP software contained in the hardware system until you have purchased or licensed the use of the SAP software from SAP or its authorized distributors. Use of the SAP software is subject to the applicable SAP end-user license agreement. Your purchase of the Lenovo hardware system does not include a license to use the SAP software or to any other SAP software. SAP is under no obligation to license the included SAP software to you. Contact your responsible SAP representative to obtain the applicable license rights to use the SAP software.

Documentation and related information

In addition to this *Quick Start Guide*, the following resources are available on the web:

- **ServerProven program for compatibility information of Servers and selected products**

  You can obtain compatibility information about Lenovo System x from http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
- **Lenovo Systems and servers documentation and technical support**

  Go to http://www.ibm.com/supportportal to locate the most recent versions of all Lenovo System x documentation, and also obtain support for Lenovo hardware and systems-management software.
- **SAP HANA appliance support and information**

  General information about SAP HANA is available on the SAP Developer Network (SDN) website at http://www.sdn.sap.com/irj/sdn/in-memory.

Notices and statements in this document

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.

- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Chapter 2. Overview

This section provides a technical overview of the Systems solutions for SAP HANA.

Benefits of the Lenovo Solutions for SAP HANA

Lenovo Systems Solution for SAP HANA on Lenovo System x enterprise servers offers the following features and technologies.

Leading performance

Lenovo System x enterprise servers offer extreme memory and performance scalability. With improved hardware economics and new technology offerings, Lenovo is helping SAP realize a real-time enterprise with in-memory business applications. Lenovo enterprise servers deliver a long history of leading SAP benchmark performance.

The new System x X6 enterprise server leverages 50% more processor cores, up to three times the amount of memory compared to the previous generation, the latest in Flash memory technologies, 50% more PCIe slots, a unique rack design which incorporates modular component books and more advanced features, providing significant advantages to the Lenovo Systems Solution for SAP HANA.

Future-proof scalability

Based on scalable Lenovo System x technology that is included in Lenovo System x3850 X6 and x3950 X6 servers, SAP HANA on Lenovo System x enterprise servers offer a solution that can help meet the need to analyze growing amounts of transactional data and deliver significant gains in both performance and scalability in a single, flexible appliance.

Lenovo System x enterprise servers feature Intel Xeon E7 series microprocessors. These microprocessors deliver performance that is ideal for your most data-demanding SAP HANA workloads and offer improved scalability along with increased memory and I/O capacity, which is critical for SAP HANA. Advanced reliability and security features work to maintain data integrity, accelerate encrypted transactions, and maximize the availability of SAP HANA applications. In addition, Machine Check Architecture Recovery, a reliability, availability, and serviceability (RAS) feature built into Intel Xeon E7 series microprocessors, enables the hardware platform to generate machine check exceptions. In many cases, these notifications enable the system to take corrective actions that enable uninterrupted SAP HANA application operations when an outage would otherwise occur.

The powerful and reliable Intel Xeon E7 series microprocessors allow for extreme scaling to running demanding workloads such as SAP HANA.

High-performance SAP HANA database

SAP HANA allows companies to make smarter business decisions supported by increased visibility into large volumes of operational data, and react faster to business events through real-time analysis and reporting of operational data. The ability to quickly analyze vast amounts of business information with no impact on transactional performance includes the following benefits:

- Optimized in-memory persistence of operational data with zero latency
- Readily available information for real-time, ad hoc analysis and reporting
- Integrated data modeling studio for design of in-memory analytic and reporting scenarios on operational systems
- Native access to SAP enterprise resource planning (ERP) data without traditional extract, transform, and load processes

Real-time replication

With real-time replication service to access and replicate data from SAP ERP, you can offload analytical reporting, minimizing the load on the transactional system.

Rapid deployment

SAP HANA helps organizations streamline the IT network environment without compromising power and functionalityplus, it is simple to deploy and does not disrupt existing network services. Highlights include SAP HANA has the following features:

- Significant rationalization of existing SAP ERP landscapes to help lower total cost of ownership (TCO)
- Optimization as a ready to deploy software and system solution
- In-memory computing that provides primary persistence model for the enterprise data warehouse
- Side-by-side deployment with existing SAP transactional and SAP business warehouse systems for analytic data mart scenarios

IBM General Parallel File System (GPFS)

Note: IBM General Parallel File System (GPFS) is renamed to IBM Spectrum Scale. For brevity and consistency, in this documentation IBM General Parallel File System (GPFS) and IBM Spectrum Scale are often referred to as IBM GPFS.

Rapid increase in the amount of data, and the number of transactions and digitally-aware devices are straining IT infrastructure and operations, while storage costs and user expectations are increasing. IBM General Parallel File System (GPFS), with its high-performance enterprise file management, can help move beyond simply adding storage to optimizing data management for SAP HANA. High-performance enterprise file management using IBM GPFS provides the following benefits to SAP HANA applications:

- Performance to satisfy the most demanding SAP HANA applications
- Seamless capacity expansion to handle the rapid growth of SAP HANA information
- High reliability and availability through storage replication to help eliminate production outages and provide disruption-free maintenance and capacity upgrades

Seamless capacity and performance scaling help your company foster innovation by simplifying your environment and streamlining data workflows for increased efficiency.

Stand-alone configuration with XFS

Starting with release 1.10.102-14 it is possible to use XFS as filesystem.

Limitations and prerequisites:

- SUSE Linux Enterprise Server 12 for SAP Applications as operating system
- Stand-alone configurations only

High availability (HA) can be achieved by using SAP HANA System Replication. The Lenovo Solution for SAP HANA is certified for all stand-alone hardware configurations and meets the same performance requirements as configurations with GPFS.

The hardware configurations for XFS and GPFS do not differ. A later change from XFS to GPFS and vice versa is possible and requires a reinstallation of the appliance. The purchase of additional licenses may be required.

Three-phased guided installation of SAP HANA

The Lenovo Systems Solution for SAP HANA comes with an automated guided installation, both for SLES for SAP and RHEL. You can easily and comfortably install all the necessary components for the SAP HANA appliance without detailed knowledge of the installation routines or dependencies.

Table 1. Installation Process and Phases

Phases	Actions
1	OS installation
2	OS, network configuration
3	RAID, GPFS configuration and installation, HANA configuration and installation

Workload Optimized Solution for SAP HANA on VMware

You can run the SAP HANA appliance within a VMware virtual machine (VM) on Lenovo System x3850/x3950 X6 servers for production use cases under these requirements:

- 2 socket or 4 socket configuration
- Single node configuration
- VMware vSphere 5.5
- SAP HANA SPS07 or higher
- SAP HANA certified hardware
- A single VM on a dedicated server

Other configurations may be used for non-production uses cases only. Find more detailed information in SAP Note 1788665.

Starting with release 1.10.102-14 the automated installer only supports XFS as filesystem in VM configurations.

Note: The Workload Optimized System for SAP HANA appliance you received can either be installed bare metal or with one virtual machine under VMware vSphere. If you intend to run more than one virtual machine on such system, please contact SUSE to upgrade the SLES for SAP Applications operating system to an 'Unlimited Virtualized' version.

Workload Optimized Solution for SAP HANA

Workload Optimized Solution for SAP HANA, which is based on the 2-socket Lenovo System x3850 X6, 4-socket Lenovo System x3850 X6 and 8-socket x3950 X6 servers, is optimally designed and certified by SAP.

Note: Throughout this document, Workload Optimized Solution for SAP HANA is referred to as the server.

These servers are delivered with key software components to help speed delivery and deployment of SAP HANA.

Lenovo System x X6 Technology

The following illustration shows an Lenovo System x3850 X6 server:

Lenovo System x3850 X6 servers can be configured with 2 or 4 CPUs and 128GB-2TB memory, while Lenovo System x3950 X6 servers can be configured with 4 or 8 CPUs and 256GB-6TB memory. The standard CPU is Intel E7-8880v3. For improved performance Intel E7-8890v3 can be used. E7-4880v3 or E7-4890v3 can be configured in models with up to 4 CPUs, if the customer agrees to not plan an upgrade to 8 CPUs.

The Workload Optimized Solution for SAP HANA does come with the proper storage configuration in order to ensure that the performance requirements for the data and the log volumes are met. The quotas are set to prevent the LOG and SHARE volumes consuming more than the equivalent of the memory capacity in order not to reduce the available storage capacity for the DATA volumes. The size of the LOG has to be monitored according to SAP HANA guidelines and the logs have to be released regularly to avoid a hang situation caused by a filled-up LOG volume.

The software components come preconfigured in form of an installation image with IBM GPFS and SAP HANA included. The media kit for SUSE Linux for SAP Applications, respectively Red Hat Enterprise Linux is included on a DVD.

Chapter 3. Requirements

This section provides requirements of the Lenovo Systems Solution for SAP HANA. You must configure the integrated management module (IMM) for the server and the corresponding network modules in your network based on the requirement from SAP. To perform the initial server configuration and installation, there are both network and information requirements that you must obtain from your IT administrator.

The Workload Optimized Solution for SAP HANA requires the following networks (minimum requirements):

- SAP Business Suite access to customer network
- SAP HANA internal communications (hananode)
- Internal GPFS communications (gpfsnode)
- Lenovo server management via integrated management module (IMM)

Notes:

- In a single node installation, the internal networks are connected to the server. No connection to any external infrastructure.
- In a cluster installation, the internal networks are connected to the internal 10 Gigabit Network Switch which is part of the IBM appliance.

Network requirements

Single Node Configuration

The server provides the following connectivity options in the standard configuration:

- A 100 Mb or 1 Gb network connection using IMM interface
- Four to six 1GbE ports
- Four 10GbE SFP+ ports

Other configuration may be available upon request.

In the single node configuration, depending on your network environment, the 1GbE port or the 10GbE SFP+ port may be used for connecting the server to your network. Any two NIC ports may be used for the connections to your network. Thus, two single, non-bonded ports must be assigned to the internal HANA and GPFS communications and must not be connected to your network.

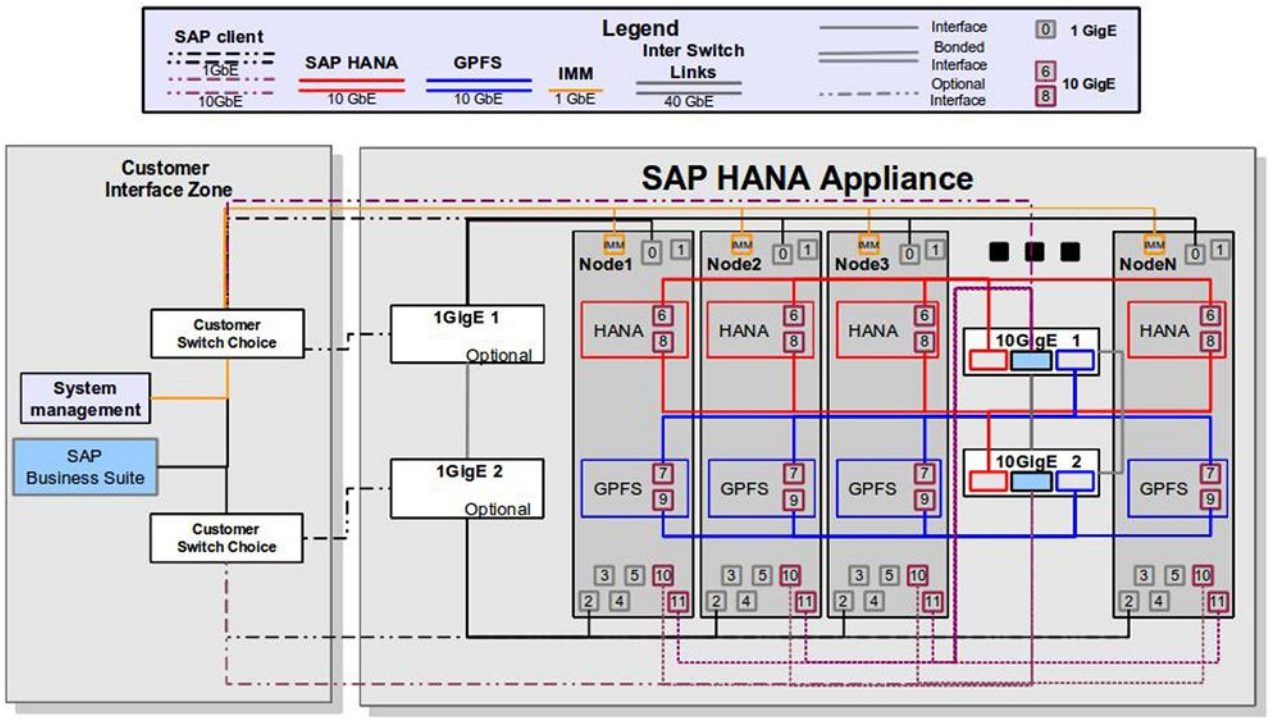
Clustered Configuration

The server provides the same connectivity options in the standard configuration. Other configuration may be available upon request.

- **Non-HA configuration**: Each server uses two of the four 10GbE SFP+ ports for the internal HANA and GPFS communications. Thus, two 10GbE SFP+ ports and four to six 1GbE ports are available for the integration into your network environment.
- **HA configuration**: Each server uses all 10GbE SFP+ ports for creating the internal networks regarding HANA and GPFS communications. Thus, four to six 1GbE ports are available for connecting the server to your network. The integration of the appliance servers into your network can either be done through 1 Gigabit Ethernet switch delivered by IBM as part of the solution (e.g. the IBM G8052 1 Gigabit RackSwitch) or by connecting the servers to other switches provided by you.

Note: If a 10 Gb uplink is needed or the redundant connections are required for higher availability, additional 10 Gb Emulex adapters can be installed into the server. Contact your sales representative for more information.

The following illustration shows a possible network configuration for the clustered configuration.



Note: The "Customer Switch Choice" labeled switches are either 1 Gigabit Ethernet adapter or 10GbE SFP+ switches provided by you or Lenovo. Make the switch uplink redundant when possible.

Network Time Protocol (NTP)

- **Clustered Configuration**: NTP is mandatory and must be configured during the installation. All nodes have to run in the same time zone.
- **Single Node Configuration**: NTP is highly recommended.

Information requirements

Before you configure the server and install SAP HANA, gather the following network information from your network administrator.

Table 2. Server network information

Server ID	Network description	IP address	Host name
Server 1	Customer network		
	GPFS (Private network)	192.168.*x*.0/24 192.168.1.101 (default)	gpfsnode01 (mandatory)
	HANA (Private network)	192.168.*y*.0/24 192.168.2.101 (default)	hananode01 (mandatory)
	IMM remote management		

Table 2. Server network information (continued)

Server ID	Network description	IP address	Host name
Server 2	Customer network		
	GPFS (Private network)	192.168.*x*.0/24 192.168.1.102 (default)	gpfsnode02 (mandatory)
	HANA (Private network)	192.168.*y*.0/24 192.168.2.102 (default)	hananode02 (mandatory)
	IMM remote management		
. . .			
Server *NN*	Customer network		
	GPFS (Private network)	192.168.x.0/24 192.168.1.1*nn* (default)	gpfsnode*nn* (mandatory)
	HANA (Private network)	192.168.y.0/24 192.168.2.1*nn* (default)	hananode*nn* (mandatory)
	IMM remote management		

You may use the following tables to record the DNS and gateway information for your network.

Table 3. Default network information

Default IPv4 Network Prefix	Default Netmask	Default Gateway

Table 4. SAP HANA appliance routes information

Application	Host Network	Netmask	Gateway[1] on page 9	Interface Labels
SAP Business Suite customer network				
SAP HANA private network	192.168.*x.y*	255.255.255.0	None	
GPFS private network	192.168.*x.y*	255.255.255.0	None	
Lenovo Integrated Management Module				i

Table note:

1. If the network is not accessible using the default gateway in Table 3 “Default network information” on page 9.

Table 5. Network DNS information

Domain	Primary DNS	Secondary DNS

Table 6. Server name information

NTP Server Name	Server Name

Table 7. Network account information

Account Information	Value
System administrator password	
SAP HANA SID	
SAP HANA instance number	
SAP HANA master password	

Important: Make sure not to misplace the information provided with the system.

- SLES for SAP as operating system:
  - SUSE Linux Enterprise Server for SAP Applications media kit (DVD)
  - SUSE Linux Enterprise Server for SAP Applications license key
- RHEL as operating system:
  - Red Hat Enterprise Linux media kit (DVD)
  - Red Hat Enterprise Linux license key
- Non-OS content for Lenovo Systems Solution for SAP HANA media (DVD)
- Confirmation of Software Order Placement and Acknowledgement, and additional paperwork enclosed

This material will be required by the Lenovo approved service technician to complete the installation and configuration of your system.

Chapter 4. Configuring the server and installing SAP HANA

The system configuration is to be performed by an Lenovo educated service technician who is familiar with the required steps. Provide the required information upfront to avoid any delay with the deployment of the server (see Chapter 3 “Requirements” on page 7).

Attention: Installation and configuration through Lenovo approved service technicians is mandatory. If you try to install or configure the system by yourself or by a non-approved technician, the system might get damaged and you would run out of support.

Accessing the system

This section describes how to remotely access the system using the integrated management module (IMM) web interface.

Note: Before you turn on the server for the first time, connect the server to a KVM (keyboard, video, monitor) console for initial remote access configuration.

Obtaining or changing the IP address for the web interface access

To access the web interface and use the remote presence feature, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup utility. To locate the IP address, complete the following steps:

1. Turn on the server.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. From the Setup utility main menu, select **System Settings**.
4. In the next window, select **Integrated Management Module**.
5. In the next window, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup utility.

Logging on to the web interface

To log on to the web interface to use the remote presence functions, complete the following steps:

1. Open a web browser on a computer that connects to the server and in the **Address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   Notes:

   a. If you are logging on to the IMM for the first time after installation, the IMM defaults to DHCP. If a DHCP host is not available, the IMM uses the default static IP address 192.168.70.125.

   b. You can set the DHCP-assigned IP address or the static IP address using the Setup utility on the server (see the documentation that comes with your server for detailed information).

2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the system-event log. A welcome page opens in the browser.

   Note: The IMM is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not the letter O). You have read/write access. For enhanced security, change this default password during the initial configuration.

3. Click **Continue** to start the session. The browser opens the System Status page, which displays the server status and the server health summary.

Chapter 5. Software entitlement

The Workload Optimized Solution for SAP HANA comes with SUSE Linux Enterprise Server for SAP Applications or Red Hat Enterprise Linux 6.6, and the IBM GPFS, and the SAP HANA appliance. All software applications must be installed by a certified SAP HANA installer. To receive support, these products have to be registered with the respective suppliers as described in this section.

If you encounter problems on your SAP HANA system, access the SAP Online Service System (SAP OSS) website to create a service request ticket using BC-HAN as the problem component at https://service.sap.com. Lenovo support works closely with SAP and is dedicated to supporting SAP HANA software and hardware issues.

Red Hat Enterprise Linux for SAP HANA

The Workload Optimized Solution for SAP HANA includes the activation credentials with the unique product registration number that will be needed to access maintenance and support from Red Hat. After the product is registered, you can obtain the latest code updates for Red Hat Enterprise Linux from the Red Hat website at http://www.redhat.com/products/enterprise-linux/server/ and receive support from Red Hat directly.

SUSE Linux Enterprise Server for SAP Applications

The Workload Optimized Solution for SAP HANA includes an activation card with the unique product registration number that will be needed to access maintenance and support from SUSE. After the product is registered, you can obtain the latest code updates for SUSE Linux Enterprise Server from the SUSE website at http://www.suse.com/products/sles-for-sap/ and receive support from SUSE directly.

IBM General Parallel File System

The new Workload Optimized Solution for SAP HANA contain the IBM GPFS Single Server. IBM GPFS server licenses are required for the scale-out configurations. Contact your sales representative or business partner to know what components and licenses are required with such configurations.

Note: In the scale-out configurations with more than three servers, if you use *n* servers in your scale-out configuration, you have to acquire 3 GPFS server licenses and *n*-3 GPFS File Placement Optimizer (FPO) licenses. Make sure you acquire the correct number of licenses for both license types.

Customers receive **Confirmation of Software Order Placement and Acknowledgement** and **IBM International Passport Advantage Express Agreement - Registration** with the shipment of the Workload Optimized Solution for SAP HANA.

IBM

Confirmation of Software Order Placement and Acknowledgment

Keep this document for your records. This offering entitles the end user to three years of software subscription and support. Registration by the end user indicates acceptance of Passport Advantage® or Passport Advantage Express™ Terms and Conditions and initiates the entitlement processes. Registration for this offering should be completed prior to receipt of this form.

Thank you for your order.

Name: _____

Company: _____

Address: _____

_____

City: _____ **State:** _____ **Zip:** _____ **Country/Region:** _____

Customer PO Number: _____

Quantity	Part Number	Description
_____	_____	_____

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International Passport Advantage Express Agreement - Registration

International Passport Advantage Express Agreement – Registration

Customer Contact Information	Customer Company Data
Passport Advantage Express Site # (if known): ***First Name:** ***Last Name:** ***Telephone Number:** **Fax Number:** ***Email Address:** Reseller Name Reseller IBM Customer Number (If Applicable): Purchase Order Number:	***Company Name** (full legal name required): ***IBM Customer number:** ***Street Address:** ***City, State/Province, Zip/Postal Code:** ***Country:** **Telephone Number:** *EU Countries: Value Added Tax Number (or equivalent): *Israel - VAT *France - VAT and SIRET *Netherlands - Need VAT and KVK *Greece - Need VAT, Tax office # *Turkey - Need Tax Office address and Tax office # *Australia – ABN # *Revenue for the Orders:

Language preference for Passport Advantage Express communications from IBM:

You must provide all information requested above in order to be registered.

Note:

The terms of the IBM International Passport Advantage Express Agreement ("Agreement"), including the Attachment for Sub-Capacity Terms ("Attachment"), govern your acquisition of certain IBM Programs, authorizations to increase your use of a Program, and annual IBM Software Subscription and Support renewals, whether you obtain them from IBM or a reseller. IBM is providing these documents to you with this IBM International Passport Advantage Express - Registration form.

IBM's acceptance of your order is conditioned upon 1) your prior acceptance of the Agreement and the Attachment that are in effect at the time of each transaction, and 2) your return to IBM of a completed IBM International Passport Advantage Express – Registration form.

IBM Programs that you obtain under the Agreement are governed by the terms of the IBM Program License Agreement ("IPLA"). If there is a conflict between the terms of the Agreement and those of the IPLA, including its License Information document, the terms of the Agreement prevail.

By registering, you

1. acknowledge that you have had the opportunity to read and understand the Agreement, including the Attachment, and the IPLA before you completed this form;
2. accept the terms of these documents and represent and warrant that you have full authority to do so on behalf of the registering Site; and
3. agree that each of us may communicate with the other by e-mail and that such communication is acceptable as a signed writing to the extent permissible under applicable law. Both of us agree that for all such communication, an identification code (called a "user ID") contained in the e-mail is sufficient to verify the sender's identity and the document's authenticity. If a signed writing is required, notify IBM.

Completed Forms should be returned to: TReX Project Office/Brazil/IBM or trexpo@br.ibm.com

In the enrollment forms, customers have to provide a primary contact person, an administrative contact person, and a site technical contact person who will be authorized to manage the account with the program. After completing the enrollment, customers will receive entitlement forms, support renewal forms, and technical information about IBM GPFS, respectively.

To receive country-specific language support, the enrollment forms are provided at http://www.ibm.com/software/lotus/passportadvantage/paenrollments.html.

These documents together with the registration form are required to be returned to Lenovo for proper registration. After registering successfully, the support for GPFS is granted. Thus, Lenovo can provide timely support regarding GPFS related issues.

SAP HANA appliance

You have to acquire the license for the SAP HANA appliance from SAP. The Workload Optimized Solution for SAP HANA provides the platform for running the software and the software preloaded. You have to obtain and activate a license key for running the SAP HANA appliance.

XFS

When using XFS instead of GPFS no GPFS entitlement is needed. XFS support is included in the SUSE Linux Enterprise Server 12 entitlement.

Chapter 6. Software updates

The Lenovo Systems Solution for SAP HANA appliance contains several different components that may be required to be upgraded (or downgraded) at times based on the respective recommendations from the SAP, SUSE, Red Hat, and Lenovo support representatives. These components can be divided into four general categories: firmware, operating systems, hardware drivers, and software. The Lenovo System x SAP HANA development team, once informed, reserves the right to perform basic system tests on these levels when they are deemed to directly affect the SAP HANA appliance. In general, specific recommendations to which levels are allowed for the SAP HANA appliance will not be given by the Lenovo System x SAP HANA development team.

The Lenovo System x SAP HANA development team provides new images for the SAP HANA appliance at regular intervals. These images have dependencies regarding the hardware, operating systems, and hardware drivers. The use of the latest image for maintenance and installation of SAP HANA appliance is recommended.

Whenever the firmware level recommendations (fixes for known firmware issues) for the Lenovo components of the SAP HANA appliance are given by the individual Lenovo System x support representatives, it is the customers' responsibility to upgrade (or downgrade) to the recommended levels as instructed by Lenovo System x support representatives.

Whenever the operating systems recommendations (fixes for known operating systems issues) for the Linux components of the SAP HANA appliance are given by the SAP, SUSE, Red Hat, or Lenovo support representatives, it is the customers' responsibility to upgrade (or downgrade) to the recommended levels as instructed by SAP through an explicit SAP Note or a Customer OSS Message. SAP describes their operational concept, including updating of the operating system components in SAP Note 1599888 - SAP HANA: Operational Concept. If the Linux kernel is updated, you have to recompile the GPFS software as described in the *Operations Guide* for SAP HANA.

Whenever the GPFS recommendations (fixes for known issues) is given by the individual Lenovo support representatives (for example, System x, Linux, GPFS) to update the software, ask the Lenovo System x SAP HANA development team via a SAP OSS Customer Message before performing the update.

Whenever other hardware or software recommendations (fixes known issues) for IBM components of the SAP HANA appliance are given by the individual Lenovo support representatives, it is the customers' responsibility to upgrade (or to downgrade) to the recommended levels as instructed by Lenovo support representatives.

If software and documentation updates are available, you can download them from the respective Lenovo, IBM, SUSE, Red Hat or SAP website. To check for updates, go to the following websites. Follow the procedure in the included documentation to update the software.

- Firmware and drivers for Lenovo System x3850/x3950 X6You can obtain updates for Lenovo System x3850/x3950 X6 servers on the support website at http://www.ibm.com/support/fixcentral/systemx/selectFixes?product=ibm/systemx/6241&&platform=All&function=all.
- IBM General Parallel File System (GPFS) updatesYou can obtain updates for IBM General Parallel File System (GPFS) on the support website at http://www.ibm.com/support/fixcentral/.
- SUSE Linux patches and updatesYou can obtain the latest code updates for SUSE from the Novell's SUSE website at http://download.novell.com/patch/finder/.
- SAP HANA appliance updatesYou can obtain the latest code updates from SAP at the SAP Service Marketplace at http://service.sap.com/swdc.

Upgrading SUSE Linux Enterprise Server for SAP Applications 11 SP2 to SP3

Upgrade SUSE Linux Enterprise Server (SLES) for SAP Applications 11 SP2 to SUSE Linux Enterprise Server for SAP Applications 11 SP3.

Upgrade SUSE Linux Enterprise Server for SAP Applications 11 SP1 before April, 30th 2015. It requires software updates of various components of the system. See the latest version of the *Systems Solution for SAP HANA Appliance Operations Guide* (SAP note 1650046) for further information.

Maintain GPFS 3.5.

Note: The upgrade is disruptive and should be executed in one maintenance window. Contact Lenovo for further information and assistance. You do not need new licenses for these upgrades.

Upgrading SUSE Linux Enterprise Server for SAP Applications 11 to 12

It is neither by Lenovo nor SAP required to upgrade the SLES operating system from version 11 to 12.

There is no direct upgrade path. An upgrade requires the reinstallation of the appliance using the newest installation media.

Upgrading IBM GPFS

Upgrades from IBM GPFS 3.4 to 3.5 are highly recommended. Support for IBM GPFS 3.4 was discontinued in December 2013.

All migrations from IBM GPFS V3 (3.5) are entitled to IBM GPFS V4 (4.1) and IBM General Parallel File System (GPFS) V4 (4.1.1 and later) Standard Editions. All entitlements are handled out of IBM Passport Advantage. Existing licenses have to be moved to there. V4 pricing is on a per socket basis, as opposed to the per processor or PVU (Processor Value Units) pricing in GPFS V3. Please work with your IBM Representative or an IBM Subscription and Support Renewal Representative to provide the following information:

Table 8.

License Type	Number of GPFS V3 Licenses (per processor core)	Number of sockets to be licensed for GPFS V4**	Anniversary Date
GPFS Server			<Date 1>
			<Date 2>, etc...
GPFS Client			<Date 1>
			<Date 2>, etc...
GPFS FPO			<Date 1>
			<Date 2>, etc...

IBM Renewal Representatives can be located through the following web page: http://www-.ibm.com/shop/americas/content/home/store_IBMPublicUSA/en_US/ssreplocator.html?lnk=rp_right.

Note: For each physical server where GPFS is deployed, determine the number of cores that are licensed, divide by the number of cores/physical sockets, rounding up if a fraction. Example: if you have GPFS V3 Server licenses for 8 4-socket systems with 15 cores per socket, you will be entitled to 32 GPFS V4 server licenses.

Please refer to the *Lenovo Systems Solution for SAP HANA appliance Operations Guide* (SAP Note 1650046) for actually implementing such upgrade on your system.

Chapter 7. Hardware and software add-ons

You can find the basic models of the Workload Optimized Solutions for SAP HANA in HANA_QSG_workload_optimized_model_offers.dita#HANA_QSG_workload_optimized_model_offers/Base_Model. This section focuses on additional features to the basic configurations.

Upgrade from SAP HANA System on Lenovo System x3850 X6 and x3950 X6

Please contact your sales representative or business partner for more information. We will provide details as we proceed with further certification of the solution.

Supported hardware options

You can add additional hardware add-ons to the Workload Optimized Solution for SAP HANA server in the following categories.

A standalone single server Workload Optimized Solution for SAP HANA can be used in a clustered solution. You might need to add hardware or upgrade an existing solution to a model which is validated by SAP and supported by Lenovo for the use in a clustered configuration. It may require additional components (for example, switches, NICs) that are certified with this model and are dedicated to this model only. Consult your sales representative or business partner for more information.

Lenovo does provide scale-out solutions with up to 56 nodes certified by SAP for scale-out configurations. The smallest possible clustered configuration consists of two nodes. At least one additional node is required to prevent a data-inconsistency scenario (i.e. quorum node). The two-node-plus-quorum configuration can provide a single node high availability solution: one is the worker node, and the other is the standby node. Though it is considered a scale-out configuration from the system perspective, it is deemed a standalone configuration from the SAP HANA appliance perspective as all data is loaded on one node only.

Notes:

1. An Lenovo System x3550 M3 or x3550 M4 server can be added as additional nodes herewith. Consult your sales representative or business partner for such configuration.
2. If more than 56 nodes are required in a scale-out configuration, Lenovo will work with SAP to have such installation certified upon request.

All upgrade options have to be performed by certified technicians. Only certified service technicians can perform hardware upgrades and the installation of the Workload Optimized Solution for SAP HANA.

- Expanding the internal storage by adding a storage expansion box.
- Connecting external storage for backup or restore purposes.
- Adding more 10GbE network adapters.
- Using copper-based cabled with the 10GbE switch.

These Lenovo provided hardware components are common components that are used and supported with the System x3850 X6, or System x3950 X6 model, respectively.

Additional software add-ons

You can find additional software add-ons on the Workload Optimized Solution for SAP HANA in the following three categories:

- Supported - Lenovo provides a solution covering the respective area, no validation by SAP is required.
- Tolerated - Solutions provided by a third party that are allowed to be used on the Workload Optimized Solution for SAP HANA. It is customers' responsibility to obtain support for such solutions. Such solutions are not validated by Lenovo and SAP. If issues with such solutions should occur and cannot be resolved, the use of such solutions might be prohibited in the future.
- Prohibited - Solutions that must not be used on the Workload Optimized Solution for SAP HANA, using these solutions might compromise the performance, stability or data integrity of the SAP HANA appliance.

Notes:

1. You must not install any additional software add-ons into the root (/) directory on the Workload Optimized Solution for SAP HANA. Additional software add-ons should be installed into the `/hana/shared` directory. Sufficient disk space is provided to host applications in this directory.
2. All additional software add-ons should be configured not to interfere with the functionality or performance of the SAP HANA appliance. If any issue of the SAP HANA appliance occur, you might be asked by SAP to remove all additional software add-ons and to reproduce the issue.

Antivirus

Installation of an antivirus solution on Workload Optimized Solution for SAP HANA is prohibited because such solution would highly interfere with the SAP HANA appliance.

Other

Additional software that does not impact the function and performance of SAP HANA might be tolerated. Consult your sale representative or business partner for more information.

Chapter 8. Recovering from a hardware failure

This chapter contains general information about how to recover from a hardware failure. If the operating system becomes corrupted for any reason, you can restore the system from an earlier backup. If a restore from an earlier backup is not applicable or there is no recent system backup available, the server can be restored to the factory default installation.

Attention: The recovery process for the server is only available with the support of the certified Lenovo SAP HANA installation service representative at this time. If a factory restore of the server operating system or its components is required, contact your sales or service representative for more information.

To abide by the various legal requirements from all software parties involved, the Lenovo certified installation service representative needs the following CD/DVDs provided by you in order to restore the server:

X6 systems:

- SUSE Linux Enterprise Server for SAP Applications 12, which is available for download from the SUSE website (see Chapter 6 “Software updates” on page 17 for more information)
- Or Red Hat Enterprise Linux 6.6
- Non-OS content for Lenovo Systems Solution for SAP HANA appliance which is included in the original package. Alternatively, you may order a replacement through Lenovo support using the latest field replaceable unit (FRU) part number below:

Table 9. X6 systems only: Non-OS parts listing

FRU part number	Description	Remark
00MV724	SAP HANA FRU Pkg v. 1.10.102-14 for X6	The latest version (use with SLES 12 / RHEL 6.6)
00MV674	SAP HANA FRU Pkg v. 1.9.96-13 for X6	Replaced by FRU part number 00MV724 (use with SLES 11 SP3 / RHEL 6.6)
00KG299	SAP HANA FRU Pkg v. 1.8.80-12 for X6	Replaced by FRU part number 00MV674 (use with SLES 11 SP3 / RHEL 6.5)
00KC236	SAP HANA FRU Pkg v. 1.8.80-10 for X6	Replaced by FRU part number 00KG299 (use with SLES 11 SP3)

Appendix A. Getting help and technical assistance

This section contains information about where to go for additional information about IBM and SAP products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Online service system (OSS)

If you encounter problems on your SAP HANA appliance, access the SAP Online Service System (OSS) website to create a service request ticket using **BC-HAN** as the problem component. Provide the SUSE Linux license key, server model and serial number, and respective SAP application information. IBM support representative works closely with SAP and is dedicated to supporting SAP HANA software and hardware issues.

All questions and requests for support should be sent to SAP via their OSS messaging system. A dedicated IBM representative is available at SAP to work on the issue resolution. Even if it is a clear hardware problem, a SAP OSS message should be opened to provide the best direct support for this product.

After opening a SAP OSS message, the first level support directs the message to the responsible supporters.

- SAP application problem SAP support
- Operating system (Linux) problem Linux lab or SUSE support
- Hardware or GPFS problem IBM supportIf an issue with respect to IBM components is determined, you might want or be asked to open an IBM Problem Management Record (PMR) ticket for problem resolution. In most cases, issues are related to the solution configuration, setup, or operation. In such case the OSS ticket is sufficient, no IBM PMR ticket is required.
- Problems in a Virtual Machine on VMware VMware supportYou might be asked to recreate your issue on a bare-metal installation outside of VMware.

When opening a SAP support message, we recommend using the following text template when it is obvious that you have a hardware problem. This will expedite all hardware related problems within the SAP support organization. Otherwise, the SAP support teams will gladly help you with the questions regarding the SAP HANA appliance in general.

Text template:

```
A problem was found on our Lenovo Systems Solution for SAP HANA appliance.
We believe that this may be a hardware issue, but to be certain, and also to
follow the procedures set out by SAP's development support, we have opened this
OSS message and ask that this message be transferred to the appropriate SAP
queue regarding this product and that the appropriate SAP development support
team has been informed of this issue.
We have collected information from SAP OSS 1661146 and SAP OSS 618104 and
attached them to this note.
(Further information related to this message, like IBM PMR number, can be
added here for SAP.)

Regards,
```

Service offerings

To help speed up deployment and simplify maintenance of your Lenovo System x3850/x3950 X6: Workload Optimized Solution for SAP HANA, Lenovo Lab Services and Global Technology Services offer quick-start services to help set up and configure the appliance and health-check services to ensure the server continues to run optimally. In addition, Lenovo also offers skills and enablement services for administration and management of Lenovo System x enterprise servers.

- **Quickstart Services:** Implementation services for SAP HANA, including installation, update/upgrade and configuration, hardware and software stack (OS, GPFS, SAP) validation, basic skills transfer, and post-installation documentation, on Lenovo System x enterprise servers
- **Healthcheck Services:** Validate existing SAP HANA installation: verify firmware and software levels against recommended best practices, recommend and perform upgrades in consultation with customers, investigate logs and customer concerns and recommend resolution
- **Skills Enablement Services:** Customized training sessions for SAP HANA in selected areas (such as Linux OS, GPFS, and Lenovo hardware)
- **Managed Services:** Ongoing support for SAP HANA, including 24x7 monitoring, ongoing remote healthchecks, firmware and software upgrades and patch application, and problem tracking and resolution

Many customers require more than software and hardware products. They need a partner to help them assess their current capabilities, identify areas for improvement and develop a strategy for moving forward. This is where IBM Global Business Services provides immeasurable value with thousands of SAP consultants in 80 countries. The SAP Consulting Practice offers a broad range of services for SAP HANA such as:

- Discovery and assessment services to maximize business impact
- Architecture assessment and benchmark services
- Proof of concept services
- Express deployment offerings, including industry best practices

By drawing on these resources, Lenovo can help you take full advantage of SAP HANA running on Lenovo System x enterprise servers.

Before you call

Before you call support, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the document on the *Documentation* CD that comes with your system.
- Go to the support website at http://www.ibm.com/supportportal to check for technical information, hints, tips, and new device drivers or to submit a request for information.
- For SAP HANA software-related issues you can search the SAP OSS (Online Service System) website for problem resolutions. The OSS website has a knowledge database of known issues and can be accessed at https://service.sap.com/notes. The main SAP HANA information source is available at https://service.sap.com/sap/support/notes/1514967. See “Online service system (OSS)” on page 25 for more information.

Support disclaimer

The Lenovo Systems Solution for SAP HANA is delivered to you as a preconfigured system. This implies certain restrictions with hardware modifications and software updates. All hardware components have been configured and tuned for optimal performance with SAP HANA. The solution must be operated only with hardware components and software levels that have been certified by IBM and SAP. Adding unsupported hardware or software components may void support.

Getting help and information from the World Wide Web

On the World Wide Web, the website has up-to-date information about systems, optional devices, services, and support. You can find service information for systems and optional devices at http://www.ibm.com/supportportal.

General information about SAP HANA can be found on the SAP Developer Network (SDN) website at http://www.sdn.sap.com/irj/sdn/in-memory.

SAP Service Marketplace (https://service.sap.com) is the main entry point for SAP support, software downloads, and documentation. SAP HANA 1.0 documentation about Installation, Update, Migration is available at https://service.sap.com/hana.

Note: An SAP Service Marketplace ID is required to access the portal.

The SAP Help Portal provides information on SAP HANA 1.0 administration and configuration at https://service.sap.com/hana. General information about SAP HANA can be found on the solutions website at http://www.ibm.com/solutions/sap/us/en/landing/hana.html and on the SAP Developer Network (SDN) website at http://www.sdn.sap.com/irj/sdn/in-memory. Access to SDN requires a free-of-charge registration.

Software service and support

The Lenovo SAP Solutions Center of Competence (CoC) serves as single point of entry for all SAP-related questions for customers who are using IBM Systems and Solutions with SAP applications. It is a key support function of the SAP Alliance. As a managed question and answer service, the Lenovo SAP Solutions Center of Competence (CoC) has access to a worldwide network of experts on technology topics around products in SAP environments.

Contact information: mailto://infoservice@de.ibm.com

IBM GPFS support information can be found at http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/topic/com.ibm.cluster.gpfs.doc/gpfs_faqs/gpfsclustersfaq.pdf.

For support information about SUSE Linux Enterprise Server for SAP Applications 11 SP1, SP2, and SP3, go to the website at http://www.suse.com/products/sles-for-sap/frequently-asked-questions/.

- The SUSE Linux Enterprise for SAP Applications 11 SP1 media is available for download at http://download.novell.com/Download?buildid=ut_49uTDXYc~.
- The SUSE Linux Enterprise for SAP Applications 11 SP2 media is available for download at http://download.novell.com/Download?buildid=7VOt4b-efjo~.
- The SUSE Linux Enterprise for SAP Applications 11 SP3 media is available for download at https://download.suse.com/Download?buildid=XL0RqEykZpc~

Note: A free-of-charge registration is required before you can download software packages from the SUSE website.

For support information about Red Hat Enterprise Linux for SAP HANA 6.5 and 6.6, go to website at http://www.redhat.com/products/enterprise-linux/server/faq/.

Hardware service and support

For IBM in Canada or the United States, call 1-800-IBM-SERV (or 1-800-426-7378). For IBM in the European Union (EU), Asia Pacific, and Latin America countries, contact IBM in that country or visit the following websites: http://www.ibm.com/supportportal/ or http://www.ibm.com/planetwide/.

Upon a successful repair of the server, perform a system recovery and restore from the backup.
If a reinstallation of the system is required, call lab services at 1-720-396-8555 or contact mailto://csmit@us.ibm.com.

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total`

`bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information on recycling Lenovo products, go to: http://www.lenovo.com/recycling.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 10. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days

[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Telecommunication regulatory statement

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia

Germany Class A statement

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

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Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

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Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japan VCCI Class A statement

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This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン準用品

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines with Modifications (products greater than 20 A per phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声 明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，
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Taiwan Class A compliance statement

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居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
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