

Lenovo Networking OpenStack Neutron Plugin

User's Guide for Kilo

LenovoTM

Note: Before using this information and the product it supports, read the general information in the *Safety information and Environmental Notices and User Guide* documents on the *Lenovo Documentation CD* and the *Warranty Information* document that comes with the product.

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Preface

The *Lenovo Networking Openstack Neutron Plugin User's Guide* describes how to install, configure, and use the Lenovo Networking OpenStack Neutron Plugin.

Who Should Use This Guide

This guide is intended for network installers and system administrators engaged in configuring and maintaining a network. The administrator should be familiar with Ethernet concepts, IP addressing, Spanning Tree Protocol, and SNMP configuration parameters.

Typographic Conventions

The following table describes the typographic styles used in this book.

Table 1. *Typographic Conventions*

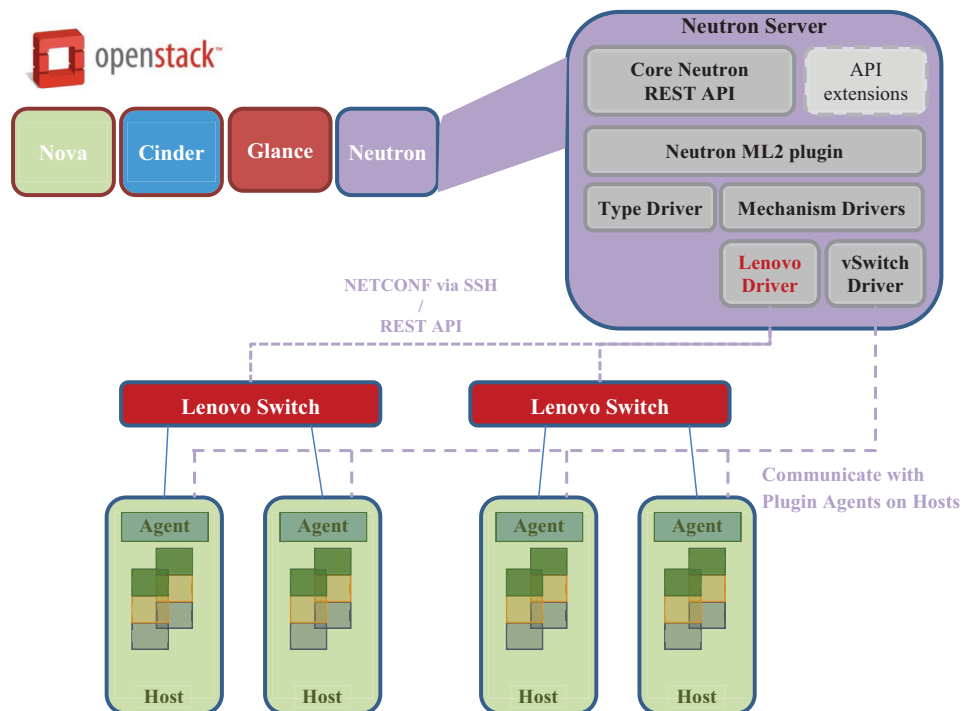
Typeface or Symbol	Meaning	Example
ABC123	<p>This type is used for names of commands, files, and directories used within the text.</p> <p>It also depicts on-screen computer output and prompts.</p>	<p>View the <code>readme.txt</code> file.</p> <p>Main#</p>
ABC123	<p>This bold type appears in command examples. It shows text that must be typed in exactly as shown.</p>	Main# sys
<ABC123>	<p>This italicized type appears in command examples as a parameter placeholder. Replace the indicated text with the appropriate real name or value when using the command. Do not type the brackets.</p> <p>This also shows book titles, special terms, or words to be emphasized.</p>	<p>To establish a Telnet session, enter:</p> <p>host# telnet <i><IP address></i></p> <p>Read your <i>User's Guide</i> thoroughly.</p>
[]	<p>Command items shown inside brackets are optional and can be used or excluded as the situation demands. Do not type the brackets.</p>	host# ls [-a]
	<p>The vertical bar () is used in command examples to separate choices where multiple options exist. Select only one of the listed options. Do not type the vertical bar.</p>	host# set left right
AaBbCc123	<p>This block type depicts menus, buttons, and other controls that appear in Web browsers and other graphical interfaces.</p>	Click the Save button.

Overview

Openstack is an open source infrastructure initiative for creating and managing large groups of virtual private servers in a cloud computing environment. Lenovo's Networking Openstack Neutron Plugin provides a means to orchestrate VLANs on Lenovo's physical switches.

In cloud environments where VMs are hosted by physical servers, the VMs see a new virtual access layer provided by the host machine. This new access layer can be typically created via many mechanisms e.g. Linux Bridges or a Virtual Switches. The policies of the virtual access layer (virtual network), when set must now be coordinated with the policies set in the hardware switches. Lenovo's Neutron Plugin helps coordinate this behavior automatically without any intervention from the administrator. [Figure 1](#) provides an architectural overview of how Lenovo's ML2 Plugin and switches fits into an Openstack deployment.

Figure 1. Lenovo Neutron Plugin Architecture



Support Matrix

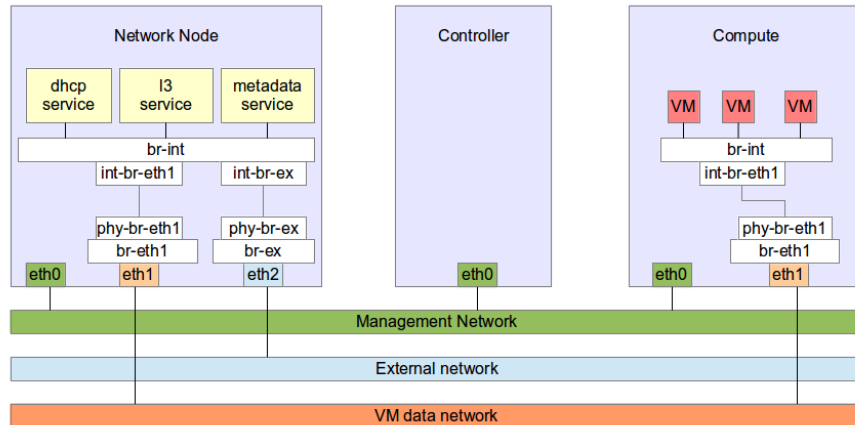
The following provides details on supported Switches, Operating Systems and Environments

Component	Requirements
Supported Lenovo Switches	G8264, G8052, G8272 and G8332
Supported Lenovo NOS	Release 7.9, 8.x
Supported OS Platform	Redhat, Ubuntu
Openstack Version	Kilo
VLAN Range	1-4094
Redhat Linux	RHEL Openstack 7

Recommended Network Topologies

Openstack has specific requirements for providing network connectivity to all nodes while allowing flexibility for using Vendor specific technologies.

Figure 2. Openstack Network Connections



As shown in [Figure 2](#), there are three physical networks in the typical Openstack deployment:

- Management
- Internal Data Networks
- External Networks.

Lenovo supports both single NIC attached servers as well as dual NIC using our VLAG technology. The following is an example deployment with single NIC attached Servers.

Figure 3. Single Port Connections

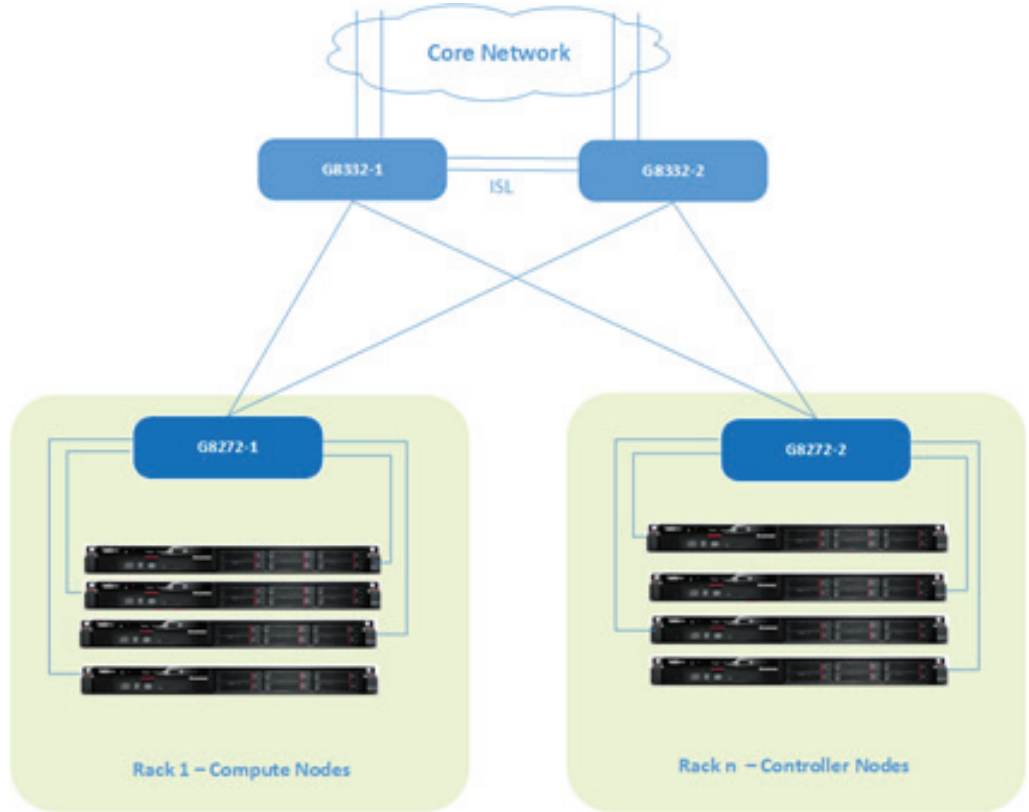


Figure 4 illustrates Lenovo Servers connecting to the Rack switches using the VLAG protocol which includes NIC Bonding on the server side.

Figure 4. Servers with VLAG Connectivity

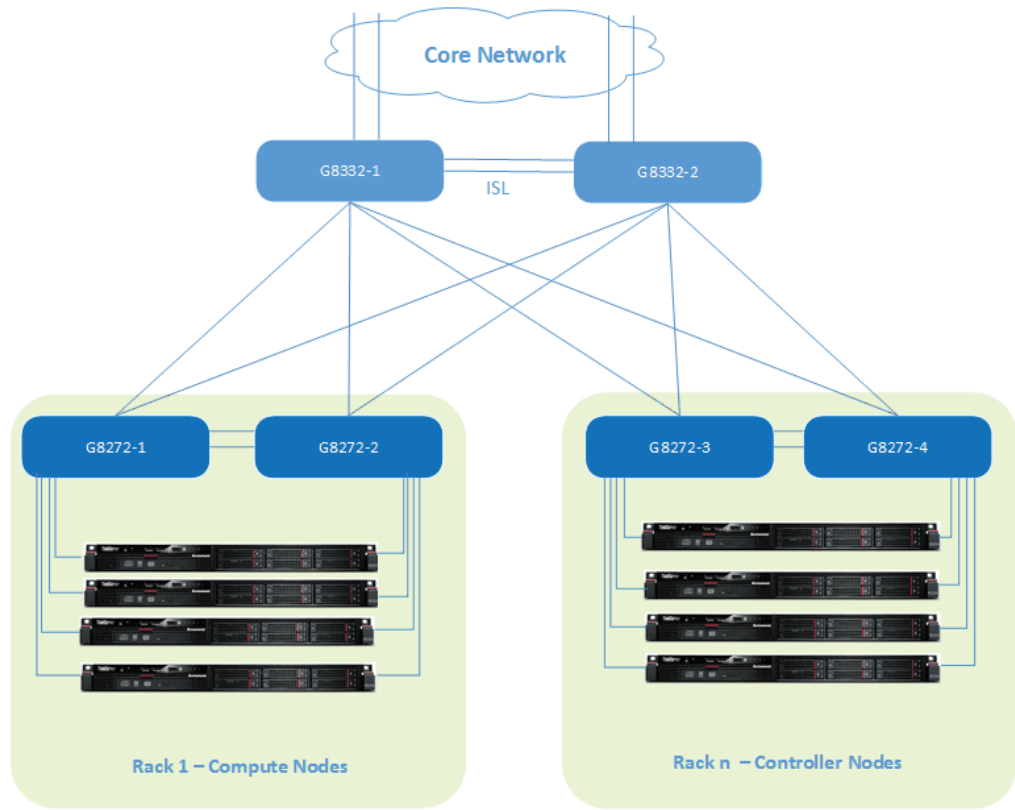
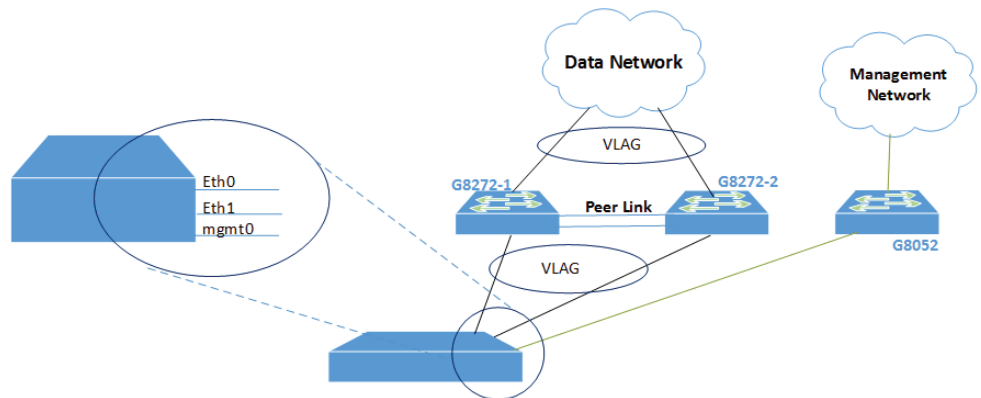


Figure 4 only shows the data path, but each device does have a management connection for communication with the Openstack controller Node. Figure 5 provides more details on how this is done.

Figure 5. Data and Management Network



API Services Description

The ML2 Plugin exposes several APIs that allows Openstack Neutron to make configuration changes on Lenovo Switches

Create_Network: Using this API, the Lenovo Openstack Neutron plugin will create a VLAN on a Lenovo device whenever a Virtual Machine is associated on the connected Compute Node.

Create_Port: Using this API, the Lenovo Openstack Neutron plugin will create a VLAN on the Lenovo Switch on the physical port connected to the compute node on which a Virtual Machine is created and added to a specified network.

Delete_Network: Using this API, the Lenovo Openstack Neutron plugin will delete the VLAN on the Lenovo Switch corresponding to that Network. This occurs if the associated virtual Machine is migrated off the Compute node or the administrator manually deletes the network.

Delete_Port: Using this API, the Lenovo Openstack Neutron plugin will delete a VLAN on the port connected to a compute node where the virtual machine was deleted or migrated to another port or Node.

Installing the Lenovo Networking OpenStack Neutron Plugin

Following are the detailed steps to set up your Openstack deployment with the Networking Openstack Neutron Plugin managing Lenovo switches.

Prerequisites

The Lenovo Plugin will provide dynamic VLAN configuration on access layer switches server facing ports that maps Openstack networks into the physical infrastructure.

The following are pre-requisites for using the plugin:

- Install python pip and git to allow the downloading of files from Github.
For Redhat use the following command:

```
% sudo yum install python-pip git
```

For Ubuntu, use the following command:

```
% sudo apt-get install python-pip git
```

- Install the ncclient v0.4.2 Python library for NETCONF clients. For more information on ncclient, see <http://ncclient.grnet.gr/>.
- Install with the ncclient library by using the *pip* package manager at your shell prompt:

```
% sudo pip install ncclient == 0.4.2
```

- Determine the VLAN pool for your Openstack Deployment, for example 1001-2001. This will be required for configuring the uplink ports and the plugin.
- Configure physical network topology; add the assigned VLAN pool to uplink ports and aggregation switches as required. Other protocols such as ACLs, switch access credential should be configured as needed.
- Enable SSH on all Lenovo Switches that are to be managed by Openstack. This is required for the NETCONF protocol.
- In VLAG mode, the ISL and Portchannel/LACP trunk should be created on the relevant switches as the plugin does not configure these attributes.
- Server NICs connected to VLAG Switches needs to have NIC bonding configured (see Network topology section for examples).
- Install Openstack Controller and Network nodes. Openstack needs to be running before installing the Lenovo Neutron driver.

ML2 Installation Procedure

This section covers installing the Lenovo Networking Openstack ML2 Driver plugin in a Multi Node environment with Redhat Enterprise Linux 7 Openstack or Ubuntu 14.04 LTS.

Download the Lenovo ML2 Driver

The ML2 installation files can be downloaded from Lenovo Stackforge Github site with “git clone” as shown here:

```
% sudo git clone git.openstack.org/cgit/openstack/networking-lenovo
```

Setup the Lenovo ML2 Plugin

Next, install the plugin:

```
% cd networking-lenovo  
% sudo python setup.py install
```

Redhat Openstack Setup

The following steps are required for Kilo based installations such as Redhat Openstack Release 7 Environments.

1. Uninstall the current neutron on the system:

```
% sudo pip uninstall neutron;
```

2. Once the current neutron has been uninstalled, download the kilo neutron code for Lenovo from Github:

```
% sudo git clone https://github.com/lenovo/neutron.git
```

3. Install the Lenovo Neutron driver:

```
% cd neutron  
% sudo git checkout staging/kiloplus  
% sudo python setup.py install
```

The Lenovo ML2 driver is now installed, and Neutron for Kilo has been replaced.

Update the ML2 Configuration

Edit the ml2 configuration files with some basic information on the use of VLANs for networking and add local switch information.

```
% cd /etc/neutron/plugins/ml2
```

Change the file `m12_conf.ini` as follows:

```
% sudo vi m12_conf.ini,  
- change tenant_network_types = vlan  
- change mechanism_drivers = openvswitch,lenovo  
- copy everything in m12_conf_lenovo.ino, and concatenate to  
m12_conf.ini,  
  
*** change this section according to network setup requirements, add the  
IP address of switch(es), Connection details and change the hostname for  
servers
```

If you encounter any problems, see [“Troubleshooting the Installation”](#) on page 15.

Neutron Database Migration

Migrate the neutron database:

```
% sudo neutron-db-manage -config-file /etc/neutron/neutron.conf  
-config-file /etc/neutron/plugins/m12/m12_conf.ini upgrade head
```

Restart the neutron server:

```
% sudo systemctl restart neutron-server.service
```

Note: Exiting mysql is required for this step.

If you encounter any problems, see `tblshint`.

Ubuntu Openstack Setup

The following steps are required for Kilo based installations in Ubuntu 14.x Environments.

1. Uninstall the current neutron on the system:

```
% sudo pip uninstall neutron;
```

2. Once the current neutron has been uninstalled, download the kilo neutron code for Lenovo from Github:

```
% sudo git clone https://github.com/lenovo/neutron
```

3. Install the Lenovo Neutron driver:

```
% cd neutron  
% sudo git checkout staging/kiloplus  
% sudo python setup.py install
```

The Lenovo ML2 driver is now installed, and Neutron for Kilo has been replaced.

Update the ML2 Configuration

Edit the ml2 configuration files with some basic information on the use of VLANs for networking and add local switch information.

```
% cd /etc/neutron/plugins/ml2
```

Change the file ml2_conf.ini as follows:

```
% sudo vi ml2_conf.ini,  
- change tenant_network_types = vlan  
- change mechanism_drivers = openvswitch, lenovo  
- copy everything in ml2_conf_lenovo.ini, and concatenate to  
ml2_conf.ini,  
  
*** change this section according to network setup requirements, add the  
IP address of switch(es), Connection details and change the hostname for  
servers
```

Neutron Database Migration

Migrate the neutron database:

```
% sudo neutron-db-manage -config-file /etc/neutron/neutron.conf  
-config-file /etc/neutron/plugins/ml2/ml2_conf.ini upgrade head
```

Start the neutron server:

```
% sudo service neutron-server restart
```

Note: Exiting mysql is required for this step.

If you encounter any problems, see [“Troubleshooting the Installation.”](#)

Troubleshooting the Installation

If the server Neutron server does not start:

- Check the Neutron log file, located at /var/log/neutron/server.log.
- Verify that the Lenovo Networking OpenStack Neutron Plugin details are in the mysql database:

```
% sudo mysql -u root -p -h [your IP address]  
  
mysql> use neutron;  
mysql> show tables;
```

Verify that the table lenovo_ml2_nosport_bindings is present.

Configuring the Networking Openstack Neutron Plugin

You will need to modify two sections of the file:

/etc/neutron/plugins/ml2/ml2_conf.ini

1. In the sections listed in [Figure 6](#), include lenovo in mechanism_drivers, and define network_vlan_ranges in the ml2_type_vlan section

Figure 6. mechanism_drivers and network_vlan_ranges sections.

```
[ml2]
tenant_network_types = vlan
type_drivers = local,flat,vlan,gre,vxlan
mechanism_drivers = openvswitch,lenovo
# (ListOpt) List of network type driver entrypoints to be loaded from
# the neutron.ml2.type_drivers namespace.
#
# type_drivers = local,flat,vlan,gre,vxlan
# Example: type_drivers = flat,vlan,gre,vxlan

# (ListOpt) Ordered list of network_types to allocate as tenant
# networks. The default value 'local' is useful for single-box testing
# But provides no connectivity between hosts.
#
# tenant_network_types = local
# Example: tenant_network_types = vlan,gre,vxlan

# (ListOpt) Ordered list of networking mechanism driver entrypoints
# to be loaded from the neutron.ml2.mechanism_drivers namespace.
# mechanism_drivers =
# Example: mechanism_drivers = openvswitch,mlnx
# Example: mechanism_drivers = arista
# Example: mechanism_drivers = cisco,logger
# Example: mechanism_drivers = openvswitch,brocade
# Example: mechanism_drivers = linuxbridge,brocade

# (ListOpt) Ordered list of extension driver entrypoints
# to be loaded from the neutron.ml2.extension_drivers namespace.
# extension_drivers =
# Example: extension_drivers = anewextensiondriver

[ml2_type_vlan]
# (ListOpt) List of <physical_network>[:<vlan_min>:<vlan_max>] tuples
# specifying physical_network names usable for VLAN provider and
# tenant networks, as well as ranges of VLAN tags on each
# physical_network available for allocation as tenant networks.
#
# network_vlan_ranges =
# Example: network_vlan_ranges = physnet1:1000:2999,physnet2
network_vlan_ranges = default:1000:1999
```


2. Add the Lenovo switch information to the section `m12_mech_lenovo` of this configuration file (see [Figure 7](#)). Include the following information:

- the hostname/IP address of the Switch
- the hostname and port of any servers connected to the switch
- the Lenovo switch credential username and password
- the Portchannel or LACP number for Host connected with VLAG
- the SSH Port number for NETCONF (typically 830)

There may be several servers to switch port mapping per switch; this is only limited by the number of available ports.

Figure 7. `m12_mech_lenovo` section

```
[m12_mech_lenovo:10.240.179.65]
# Hostname and port used on the switch for this compute host.
nova-node-1 = portchannel:64
# Port number where the SSH will be running at the switch. Default is 22
so this variable
# only needs to be configured if different.
ssh_port = 830
# Provide the switch log in information
username = admin
password = admin

[m12_mech_lenovo:10.240.179.54]
# Hostname and port used on the switch for this compute host.
nova-node-1 = portchannel:64
# Port number where the SSH will be running at the switch. Default is 22
so this variable
# only needs to be configured if different.
ssh_port = 830
# Provide the switch log in information
username = admin
password = admin

[m12_mech_lenovo:10.240.179.54]
# Hostname and port used on the switch for this compute host.
nova-node-2 = 17
# Port number where the SSH will be running at the switch. Default is 22
so this variable
# only needs to be configured if different.
ssh_port=830
# Provide the switch log in information
username = admin
password = admin
```

As more switches and servers are added to the network, you will need to update this file with those details.

Once this configuration is done, you can create networks from the Horizon dashboard or the Openstack command line.

Removing the Lenovo Networking OpenStack Neutron Plugin

Follow these steps to restore the network for Openstack installation to the default state:

1. Uninstall Neutron.

```
% sudo pip uninstall neutron
```

2. Re-install the default ML2 driver.

- On Redhat:

```
% sudo yum install openstack-neutron openstack-neutron-ml2
```

- On Ubuntu or Debian:

```
% sudo apt-get install neutron-server neutron-plugin-ml2
```

Your system is now running with the default Neutron configuration.

Product Support

This is a free and open source product from Lenovo. There are no support entitlements available for this plugin. Alternatively, customers can file an issue or request in the Openstack community with Launchpad.

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Contaminant	Limits
Particulate	<ul style="list-style-type: none">• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2¹.• 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.

Contaminant	Limits
Gaseous	<ul style="list-style-type: none"> Copper: Class G1 as per ANSI/ISA 71.04-1985³ Silver: Corrosion rate of less than 300 Å in 30 days
<p>¹ ASHRAE 52.2-2008 - <i>Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size</i>. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.</p> <p>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.</p> <p>³ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p>	

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Informationen in Hinsicht EMVG Paragraph 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: „Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.“

Nach dem EMVG: „Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.“ (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

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

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

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適合品

Japan Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guidelines (products less than or equal to 20 A per phase)

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，可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A compliance statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這種
情況下，使用者會被要求
採取某些適當的對策。