VLAN under Debian

Christian Külker

2024-07-20

Contents

1   Introduction

Virtual Local Area Networks (VLANs) represent a fundamental technology in network segmentation, allowing distinct broadcast domains to be cohesively managed within a single physical infrastructure. This guide outlines the configuration of VLANs under the Debian operating system, detailing procedural steps from installation to setup options. By leveraging Debian's robust networking capabilities, administrators can effectively delineate network traffic, enhance security. The following sections provide a brief walk-through for installing the necessary packages, loading relevant kernel modules (if needed), and configuring network interfaces in two different modes.

1.1 VLAN identifier (VID)

A 12-bit field specifies the VLAN the frame belongs to. Values 0 and 4095 (0x000 and 0xFFF in hexadecimal) are reserved. All other values can be used as VLAN identifiers, allowing up to 4,094 VLANs. The reserved value 0x000 indicates the frame does not carry a VLAN ID. On bridges, VID 0x001 (the default VLAN ID) is often reserved for network management VLANs. The VID value 0xFFF is reserved for implementation use and must not be configured or transmitted. It can indicate a wildcard match in management operations or filtering database entries. Wikipedia

2 Installation

Debian and its derivatives use the vlan package to provide the necessary kernel modules and utilities. Install it if it's not already present:

```
aptitude install vlan
```

3 Setup

Eventually, the driver needs to be loaded into the kernel.

```
modprobe 8021q
echo 8021q >> /etc/modules
lsmod | grep 8021q
```

IEEE 802.1Q, commonly known as Dot1q, is a standard for implementing VLANs on Ethernet networks. It outlines how Ethernet frames are tagged for VLANs, including handling procedures for network devices like bridges and switches. The standard includes a quality-of-service (QoS) prioritization called IEEE 802.1p and the Generic Attribute Registration Protocol. On VLAN-aware sections of a network, frames receive a VLAN tag to indicate their membership. Untagged frames in these areas default to the native VLAN. Developed by the IEEE 802.1 working group, the standard is regularly updated, incorporating advancements such as IEEE 802.1ad and IEEE 802.1s. The 2014 update integrated the IEEE 802.1D-2004 standard.

Wikipedia

4 Configuration

For configuring a VLAN on Debian systems with or without using the vconfig command, you'll typically rely on the native support within the Linux kernel and the

network interface configuration files. The method involves directly editing the `/etc/network/interfaces` file to define VLANs using the physical network interface. Below, I'll demonstrate how to configure a VLAN (e.g., VLAN ID 500) on a network interface (e.g., eth1) using this approach in four different ways.

4.1 Command Line

```
ip link add link eth1 name eth1.500 type vlan id 500
ip link set dev eth1.500 up
ip addr add 192.168.50.254/24 dev eth1.500
```

4.2 Method A: [tested]

4.2.1 Static

```
vim /etc/network/interfaces
```

```
1       auto eth1.500
2       iface eth1.500 inet static
3       address 192.168.50.254
4       netmask 255.255.255.0
```

4.2.2 Manual

```
vconfig add eth1 500
Added VLAN with VID == 500 to IF -:eth1:-
ifconfig eth1.500 192.168.50.254/24
ifup eth1.500
```

4.3 Method B: [untested]

4.3.1 Static

```
vim /etc/network/interfaces
```

```
1       auto vlan500
2       iface vlan500 inet static
```

```
3        address 192.168.50.254
4        netmask 255.255.255.0
5        vlan_raw_device eth1
```

4.3.2   Manual

```
vconfig add eth1 500
```

4.4   Method C: (Combining A and B) [untested]

```
vim /etc/network/interfaces
```

```
1   auto eth1.500
2   iface eth1.500 inet static
3       address 192.168.50.254
4       netmask 255.255.255.0
5       vlan-raw-device eth1
```

- `auto eth1.500` : This ensures the interface is brought up at boot.
- `iface eth1.500 inet static` : Specifies a static IP configuration for the VLAN interface.
- `address 192.168.50.254` : Sets the IP address for the VLAN interface.
- `netmask 255.255.255.0` : Sets the netmask for the VLAN interface.
- `vlan-raw-device eth1` : Specifies the underlying physical interface to which the VLAN is attached.

After editing the file, restart the networking service to apply the changes:

```
systemctl restart networking
# OR
ifup eth1.500
```

By following one of these steps, you will have configured VLAN ID 500 on eth1 with the specified IP address and netmask in Debian.

Debian recognizes the VLAN ID from the interface name. The convention `eth1.500` indicates that this is a VLAN interface with ID 500 on the physical interface eth1.

Interface Naming Convention:

- `eth1` is the physical interface.

- `.500` is the VLAN ID appended to the physical interface name, creating `eth1.500`.

5   History

Version	Date	Notes
0.1.1	2024-07-20	Github release, minor fixes
0.1.0	2019-11-21	Initial release

6   Disclaimer of Warranty

THERE IS NO WARRANTY FOR THIS INFORMATION, DOCUMENTS AND PROGRAMS, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE INFORMATION, DOCUMENT OR THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE INFORMATION, DOCUMENTS AND PROGRAMS IS WITH YOU. SHOULD THE INFORMATION, DOCUMENTS OR PROGRAMS PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

7   Limitation of Liability

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MODIFIES AND/OR CONVEYS THE INFORMATION, DOCUMENTS OR PROGRAMS AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE INFORMATION, DOCUMENTS OR PROGRAMS (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE INFORMATION, DOCUMENTS OR PROGRAMS TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.