How to configure nested VLANS on the AT-8948 switch

Introduction

Nested VLANs, also known as VLAN double tagging, are used to overlay a private Layer 2 network over a public Layer 2 network. This provides simple access to an infrastructure of network service providers in Metropolitan Area Networks (MANs).

Network service providers often have customers whose VLAN range requirements overlap, and the traffic from different customers is mixed in with the service providers' infrastructure. With a nested VLAN configuration, each customer is given a customer-ID (CID), which is a unique identifier within the service provider infrastructure. Traffic from individual customers is tagged with the CID and segregated from other customer's traffic. The VLANs identification of the customer's network can be preserved while the traffic is tunnelled through the network service provider's infrastructure.

The nested VLAN feature is enabled on Allied Telesyn devices via a special feature licence. To obtain a special feature licence, contact an Allied Telesyn authorised distributor or reseller.

Hardware and software used

The configuration example in this document uses:

- an Allied Telesyn AT-8948 switch.
- software release 89262.rez.

How nested VLANs work

A nested VLAN implementation consists of:

- Core Ports connected to a service provider network (public Layer 2 network).
- Customer Ports connected to a customer network (private Layer 2 network).
- Customer IDs (CIDs), which are a second VLAN Identifier (VID) assigned to each customer.

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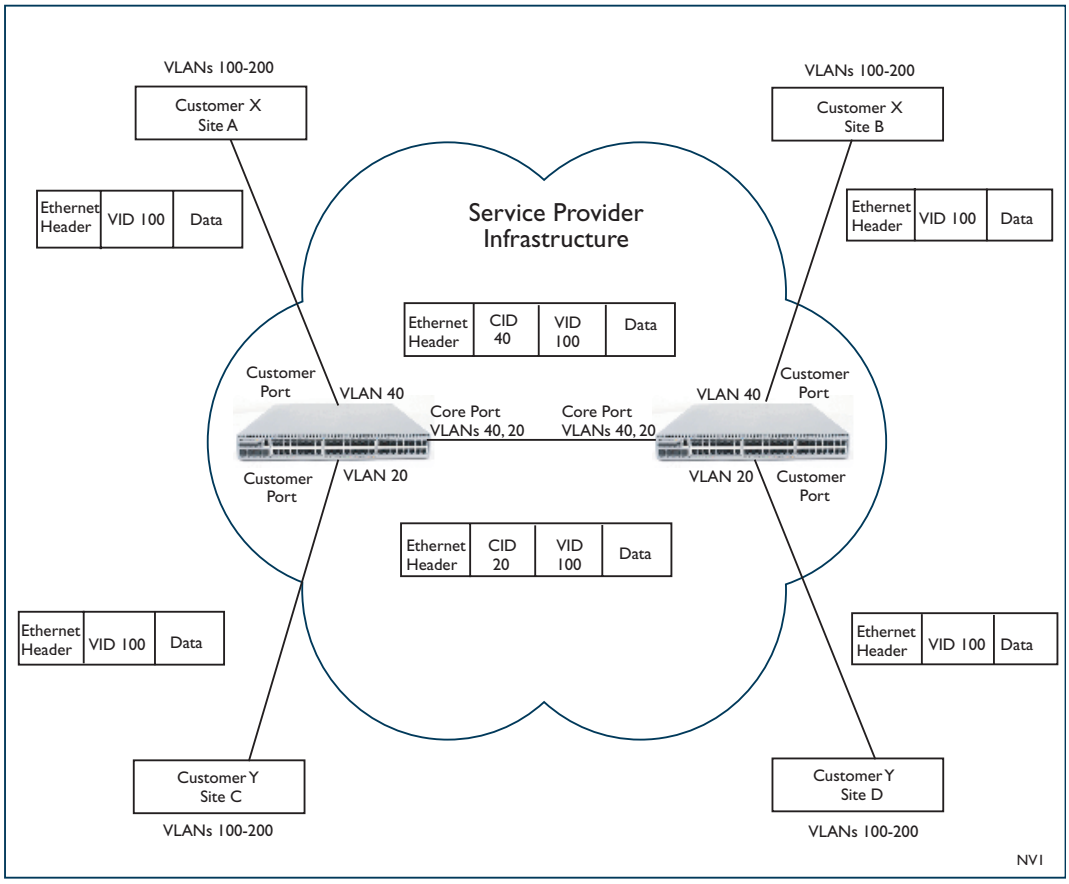
In a nested VLAN implementation, each customer is given a Customer ID (CID), which is a 12-bit identifier within the service provider network. Packets entering the Customer Port of the service provider switch are VLAN tagged packets with original VLAN identifiers (VIDs) from the customer network. When the VLAN tagged packets exit the Core Port into the service provider network, an additional CID tag (outer tag) is added on top of the VLAN tag (inner tag). Within the service provider infrastructure, the VID is ignored and bridging is based on the value of the CID. When the nested tagged packets enter another Core Port of the service provider switch, the CID tag (outer tag) is removed and the packets are transmitted to the appropriate Customer Ports associated with the CID. Therefore, when the packets exit the Customer Port, the original VLAN tags are preserved. Nested VLAN operation is shown in Figure 1.

Figure 1: Nested VLAN operation



The Ethertype of the outer tag is configurable and can be set by changing the Tag Protocol Identifier (TPID). By default, the Ethertype is set to 0x8100.

In summary, the Nested VLAN functionality makes use of the tag-in-tag technique.

The frame formats at different stages of Nested VLAN operation are shown in Figure 2, Figure 3, and Figure 4.

Figure 2: Original standard Ethernet frame

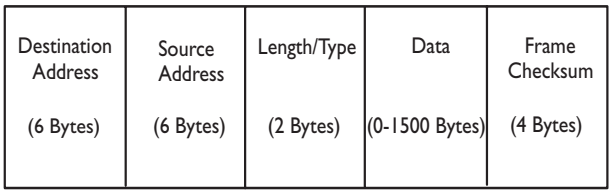


Figure 3: 802.1q VLAN tagged frame (frame entering the Customer Port)

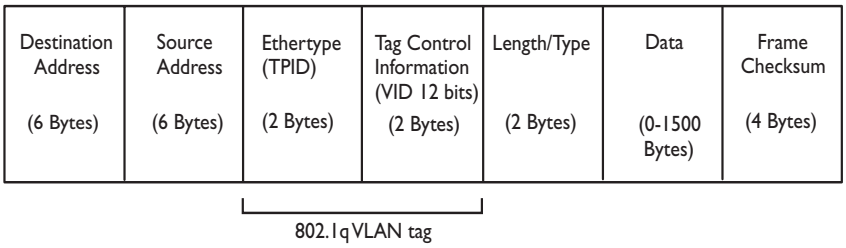
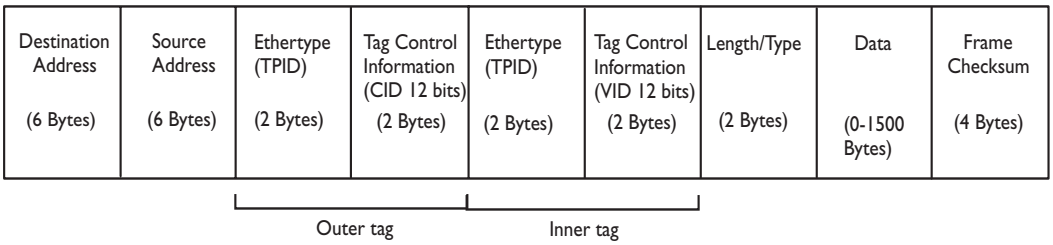


Figure 4: Nested VLAN frame with double tags (frame exiting the Core Port)

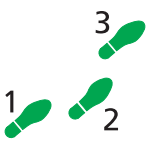


How to configure nested VLANs on the AT-8948 switch

The following steps are required in order to configure a nested VLAN:

1. Create nested VLANs.
2. Add ports to the nested VLANs.
3. Set the Tag Protocol Identifier (TPID). This is an optional step.

A sample configuration of commands for each of these steps follows. Refer to Figure 1 for an illustration of the configuration.



1. Create nested VLANs

```
create vlan=nested1 vid=40 nested
create vlan=nested2 vid=20 nested
```

2. Add ports to the nested VLANs

```
add vlan=20 port=20 nestedtype=customer
add vlan=20 port=1 nestedtype=core
add vlan=40 port=40 nestedtype=customer
add vlan=40 port=1 nestedtype=core
```

3. Set the Tag Protocol Identifier (TPID) – optional step

The `nestedtpid` parameter specifies the Ethernet type of the tagged packet. This is set to 0x8100 by default when a nested VLAN is created.

> ***This command specifies the TPID value that applies to all VLANs used for nested VLANs. The TPID value cannot be set for only one particular VLAN if more than one nested VLAN is created.***

To set the `nestedtpid` value to 0x88a8, use the command:

```
set switch nestedtpid=88a8
```